

AN ANALYSIS OF THE BARRIERS
TO UK SMALL BUSINESS WEB
INFRASTRUCTURE
DEVELOPMENT

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Doctor of Philosophy

By
James Alfred Boyes

Department of Information Systems
and Computing

Brunel University

Abstract

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This thesis analyses the Web infrastructure development process experienced by UK Small Businesses and considers the nature and impact of the barriers and problems that affect it. In doing so the thesis combines three previously disparate streams of research; research that considers the infrastructure development process, research that considers the benefits that become available via the use of an infrastructure and research that considers the barriers to benefit realisation. Analysis reveals that while the organisational advantages and benefits are well documented, Small Businesses routinely encounter problems to their realisation. Likewise, current developmental methodologies appear ill suited for use by Small Business. This thesis addresses those gaps within current knowledge and understanding.

The study utilises a multiple case study research strategy. The research design utilises multiple data collection methods to triangulate the study data thereby corroborating the accuracy, veracity and parsimony of the study findings. The study findings reveal that the development process encompasses three stages: initial development, corrective development and long-term development. The findings also reveal that as the sophistication of an infrastructure is enhanced, increasingly sophisticated benefits become available. At the same time however, barriers to development will be encountered. Each can curtail benefit realisation or can block ongoing development entirely. Within the development process, the business's owner/manager is the driving force behind development and is motivated to undertake development because of the benefits that will bring to their organisation.

The thesis makes a demonstrable contribution to knowledge because its combined analysis of three previously disparate streams of research is novel as is its depiction of a three stage Web infrastructure development process. Future work can build upon this study's findings by testing the theories developed within this thesis so that they can be generalised more widely.

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Chapter 1.0 : Introduction to the Study

1.1 An Analysis of UK Business and Consumer Internet Usage

The World Wide Web, since the mid 1990's, has been widely regarded as a technology whose exploitation and effective use will become increasingly important to businesses due to the benefits that its use can bring to an organisation (Gates 1995, Hoffman *et al.* 1995, Hoffman & Novak 1996, Hoffman & Novak 1996b). For example, by November 2005 4,562,693 commercial domain names had been registered within the UK while more than 2.7 million UK Small Businesses had established a functional Web infrastructure (Nominet 2005, Office of Communication 2004, Small Business Service 2004a). The monetary value of Internet usage to those businesses is also significant. Within the UK, there are now over 24 million internet shoppers (IMRG 2005). The monetary value of e-commerce within the UK is now predicted to reach £80bn by 2009 (IMRG 2004).

Just as UK businesses have begun to use and exploit the Internet and Web, so has the general UK population. By 2004 56% of all UK adults regularly accessed the Internet with 49% of all UK households having Internet access (Office of National Statistics 2004a). Those figures suggest that the UK government is on-track to achieve its stated goal of:

“... ensure[ing] that everyone in the UK who wants it will have access to the Internet...” (Office of the E-Envoy 2001 Section3, para.1).

In order to achieve that 6000 public Internet access points have been established such that 99% of all households are now within 1 mile of a public access point (Cabinet Office 2004).

Since the turn of the century, corporate investment in Information & Communications Technology (ICT) has outstripped investment in either machinery or manufacturing equipment with the largest levels of on-going investment being made in Internet and Web based technologies (Kellock 2000). Furthermore, many authors conclude that the use of the Web can have the largest effect upon Small Businesses (those organisations with 49 or fewer employees) because of the positive impact that its effective use can

have upon that type of organisation's business operations (DTI 1998, UKOnline for Business 2000, Anckar & Walden 2001, Sparkes & Thomas 2001, Tetteh & Burn 2001, Carter *et al.* 2002, Jutla *et al.* 2002, Jones *et al.* 2003).

The ability of Small Businesses to successfully exploit Web based technologies is of the utmost importance since within the UK, Small Businesses account for over 99% of all businesses, employ 46.8% of the UK private sector workforce and account for 37% of the UK's private sector business turnover (Small Business Service 2005). In recognition of the importance of the Small Business sector to the UK economy (and of the potential benefits offered to this sector by the effective exploitation of Web technologies), the UK Government's stated goal is that the UK will be the world's leading environment for e-trade and that UK Small Businesses must lead the G8 nations' Small Business sectors in the commercial use of the Web (Office of the E-Envoy 2001). Those decisions were taken largely in recognition of the organisational benefits and advantages that become available through the development of an effective Web infrastructure. As *UKOnline for Business* noted in 2000:

“E-Business represents a huge opportunity for Small Businesses in the UK. Choosing and implementing the right strategy and technology solution can make the difference between success and failure...” (UKOnline for Business 2000).

1.2 The Business Benefits of an Effective Web Infrastructure

The effective commercial use of the Web has the potential to radically change the way that organisations communicate with their customers about the products and services they offer. A Web infrastructure can be used to support that communications strategy through its ability to function as a low cost yet highly effective communications tool (Chen & Sockel 2004, Fillis *et al.* 2004). Consequently, the effective use of the Web makes 'one-to-one' relationship marketing possible via an interactive medium that users find both stimulating and pleasurable (Shih 1998, Van Nierkirk *et al.* 1999, Chen & Sockel 2004).

The interactivity between business and customer afforded by an effective Web infrastructure can subsequently be utilised by an organisation to more closely align its

product/service offerings to its customers' requirements, which in turn adds significant value for both parties. Through collecting detailed and precise information about customer needs, organisations can create virtuous circles in which providing good customer service creates knowledge about customer behaviour thus improving customer service still further, fostering stronger relationships and through that, repeat sales (Limehouse 1999, Sparkes & Thomas 2001, Chen & Sockel 2004, Martin 2004, Coa *et al.* 2005).

The Web can enable an organisation to differentiate its products and services on non priced-based value adding dimensions thereby maximising the prices that it ultimately charges its customers (Sparkes & Thomas 2001). Similarly, the effective use of a Web infrastructure has the potential to radically change the way that companies do business since it can make a significant contribution to the components of a company's value-chain by improving their relationships with vendors and suppliers, increasing the efficiency of their internal and external operations and by enabling new sources of value to be created via the exploitation of the organisation's digital assets (Rayport & Sviokla 1994 & 1995, Lu & Yeung 1998, Yakhlef 1998, Roberts 2000, Venkatraman 2000, Jones *et al.* 2003). Likewise, the creation of a Web site offers an instant presence within global markets and can be an excellent vehicle through which to increase organisational sales and profits.

1.3 Small Business Web Infrastructure Barriers and Problems

Despite the applicability of the use of a Web infrastructure by Small Business being well documented, many authors comment that Small Businesses are often ill equipped to exploit the Web effectively (Chesher & Skok 2000, Vescovi 2000, Anckar & Walden 2001, Sparkes & Thomas 2001, Carter *et al.* 2002, Jutla *et al.* 2002, Mendo & Fitzgerald 2005). For example, while over 95% of large organisations (those with over 250 employees) possess a Web infrastructure, the corresponding figure for Small Businesses still remained significantly lower at 68% in 2004 (Office of Communication 2004, DTI 2004a). Furthermore, despite its own initiatives the Department of Trade and Industry note a growing 'digital divide' between large and small UK businesses and conclude that:

“The dotcom promise of value through simple presence in the new global marketplace is now so a distant a memory that businesses ... are now questioning the value even of their web presence ... small businesses, in particular, are taking a hard look at the costs of web site maintenance, and some are “clicking off””. (DTI 2004a Section 1).

While it may appear that Small Businesses potentially have the most to gain from the commercial use of a Web infrastructure, they also appear reluctant or unable to exploit the Web because of the barriers and problems (whether real or perceived) inherent with doing so. Literature suggests that is because many Small Businesses initially encounter ‘barriers’ that actively prevent them from developing an appropriate Web infrastructure while others subsequently experience a variety of ‘problems’ that later curtail their ability to exploit their Web infrastructure in pursuit of commercial gain. As a result, UK Small Businesses are now less than half as likely as large UK organisations to possess a functional Web infrastructure since those barriers’ existence dissuades a significant proportion from attempting to develop an infrastructure with which to exploit Web based technologies (Chapman *et al.* 2000, Chesher & Skok 2000). As Jutla *et al.* (2002) note, many Small Businesses are simply unable to realise the potential benefits offered by the development of a Web infrastructure. Consequently, the organisational benefits that can come from the development of a Web infrastructure are far from guaranteed for the Small Business sector.

While a Small Business may desire a straight transition from traditional to electronic trade, there are many reasons why that might not happen. Furthermore, the negative effects of the barriers and problems to development are now being seen. For example, while the Office of National Statistics (2004b) report consistent growth in the monetary value of e-commerce within the UK, they also note that its value to the UK Small Business sector is only £1bn – that represents less than 0.1% of UK Small Businesses’ annual turnover. Similarly, a recent study of UK SMEs revealed that only 32% have an e-commerce enabled Web infrastructure (Silicon 2004). The assertion that Small Businesses are not fully exploiting the medium is similarly expressed by Carter *et al.* (2002 p.110) who comment:

"Clearly small firms are making use of Internet technologies for business purposes, but they are far from deriving the full benefit of this new technology".

1.4 Understanding the Problem Domain

For many Small Businesses the commercial use of the Web represents a 'wasted opportunity' since the barriers and problems they face when they attempt to exploit it for commercial gain prevent many of them from realising any significant, sustainable long-term benefit from its use. That sentiment is expressed by Mullins *et al.* (2001) who conclude that, based upon a survey of 950 European Small Businesses, the majority were unable to fully exploit Internet technologies due to their inability to overcome the problems and barriers associated with the development of anything other than a static, functionally limited, non interactive Web infrastructure. Similarly, DTI (2004a) assert that many Small Businesses are simply unable to leverage their ICT and Web infrastructure investments such that they add real value to their business operations. For those Small Businesses, their continued presence on the Web and their continuing investment in their Web infrastructure's development remains an 'act of faith' rather than a testament to the benefits delivered by it; those businesses now regard their recent expensive investments in ICT as little more than rapidly depreciating assets that hold little long term value (DTI 2004a).

While it would appear that the problems and barriers to the effective use of the Web for commercial gain by Small Businesses increase in size, number and complexity as a Small Business's on-line objectives likewise increase in sophistication, current Web infrastructure development models offer little insight into how those barriers and problems impact upon the development process thereby curtailing benefit realisation. While earlier studies have examined Small Business Web infrastructure development (see Blackburn & Athayde 2000, Anckar & Walden 2001 and Sparkes & Thomas 2001, Coa *et al.* 2005, Mendo & Fitzgerald 2005) they have not attempted to analyse the factors critical to both success and failure based upon the case study organisations' experiences and their findings are of limited use as a result. For example, Chapman *et al.* (2000) studied Web infrastructure development within 21 UK SMEs and argue that for each organisation the process was largely successful since each was still using its

Web infrastructure one year later. However, each business was provided with free hardware, software and on-going support throughout the research project. Consequently, that study's findings are of limited use since they fail to highlight how a Web infrastructure could be successfully developed by other SMEs unless they too were given similar levels of on-going support and assistance. Both Anckar & Walden (2001) and Vescovi (2000) have conducted similar studies. In each case those researchers found that the businesses studied lacked a basic understanding of the impact that the Web could have upon their business, the technical skills to actually develop a Web infrastructure and the financial and technological resources needed to develop and deploy their chosen on-line strategy successfully. However those studies' findings are of limited use since those projects did not attempt to analyse the impact of those issues upon the development process. Rather, those studies aimed to analyse the Web infrastructure development process within the context of projects that were being supported by external agencies. Both the Chapman *et al.* (2000) and Anckar & Walden (2001) studies were undertaken in conjunction with European Regional Development Funding projects that provided each case study organisation with a turnkey package of monetary assistance, software, hardware, ICT installation and on-going training and support for a period of 18 months. While those studies highlight the problems experienced by Small Businesses when they attempt to develop and deploy a Web infrastructure for commercial gain, they offer little insight into how the problems and barriers experienced by the case study organisations impacted upon the development process by curtailing benefit realisation.

Haynes *et al.* (1998) and Hsieh & Lin (1998) discuss the benefits and advantages that become available to a Small Business when it develops and deploys a Web infrastructure but fail to consider the barriers and problems that can impact upon Small Business Web infrastructure development. While Haynes *et al.* (1998) and Hsieh & Lin (1998) highlight what can potentially be achieved through the creation of a Web infrastructure, neither author offers insight as to whether those benefits can be realised in practice by real world Small Businesses. Similarly, Sparkes & Thomas (2001) discuss at length the potential beneficial impact, and general applicability of the commercial use of the Web by Small Businesses, but fail to discuss how a Small Business can realise those benefits and advantages in practice. That issue has not gone unrecognised with authors such as Martin & Matley (2001) and Brock (2005) arguing

that unless new initiatives are undertaken that specifically recognise and respond to the resource and asset limitations of the Small Business sector, many of those organisations' attempts to develop Web infrastructures will end in failure since they will be unable to overcome the many problems and barriers associated with the development of a Web infrastructure for commercial gain.

While it is possible to identify previous studies that have investigated the barriers and problems faced by Small Businesses when developing a Web infrastructure (see Chapman *et al.* 2000, Vescovi 2000, Anckar & Walden 2001, Taylor *et al.* 2001 and Benyon-Davies *et al.* 2002) those studies have not attempted to document the coping strategies available for use by other Small Businesses based upon the case study organisations' experiences. Their findings are of limited use as a result. Similarly, little research exists that has combined an analysis of the barriers and problems encountered, the infrastructure development process and the organisational benefits ultimately realised. That issue has not gone unrecognised with Martin & Matley (2001), Mehrtens *et al.* (2001), Jones *et al.* (2003), Shiels *et al.* (2003) and Fillis *et al.* (2004) arguing that unless further research is undertaken to analyse those barriers and problems, infrastructure development and the resulting benefits, and present that in a format easily accessible to both the academic community (thereby stimulating further research in this area) and Small Business sector (thereby disseminating the research findings to a wider audience), many Small Businesses' future efforts to develop effective Web infrastructures will be unsuccessful.

1.5 Research Aim and Objectives

This Ph.D addresses the apparent gap within current knowledge and understanding discussed within Section 1.4 by combining an analysis of the Small Business Web infrastructure development process with an analysis of the barriers and problems to development encountered by UK Small Businesses. In that way the research questions addressed by this Ph.D are:

- Why do UK Small Businesses encounter barriers and problems when they attempt to develop a Web infrastructure?
- How do the barriers and problems to Web infrastructure development impact upon both infrastructure development and benefit realisation?

The aim of this Ph.D is to build a novel model that considers the barriers and problems to Web infrastructure development, the Web infrastructure development process and organisational benefit realisation. That aim will be satisfied via the rigorous and systematic analysis of the developmental experiences of a group of UK Small Businesses that have already engaged within Web infrastructure development for commercial gain. In that way, the satisfaction of this Ph.D's aim will address the research questions documented above.

To meet this study's aim the author will satisfy the following specific objectives:

- Critically review the normative literature that considers the benefits, limitations and barriers to the use of the Web relevant to Small Businesses.
- Identify and analyse the potential effect and likely impact of the barriers and problems that affect Web infrastructure development within UK Small Businesses.
- Develop a conceptual model in order to build theory about the Web infrastructure development process, the benefits of infrastructure development and the barriers and problems that can curtail benefit realisation.
- Undertake empirical research via a robust research strategy that will provide the data necessary to enhance the theory contained within the conceptual model.
- Offer conclusions and recommendations for further work that will build upon the theory developed by the author in pursuit of the satisfaction of this study's research aim.

The proposed approach centres upon insight and exploration (rather than upon experimentation and the statistical analysis of data) to identify and explore the cross-organisational variables of interest thereby facilitating the further analysis of the relationships they share. Thus, the author will gain a deep understanding of the Small Businesses Web infrastructure development process and its inherent barriers and problems. The author will analyse and document (within their natural setting and context) the experiences of a group of UK Small Businesses that have already established Web infrastructures in order to gain an in-depth understanding of the

phenomena under analysis. By doing that, new theories will be developed that explain that which was observed by the author.

The research findings will provide a rich and in-depth understanding of UK Small Business Web infrastructure development and its inherent barriers and problems. The future dissemination of the study findings will offer practical guidance to the UK Small Businesses sector and will help to bridge the gap that, based upon the author's experiences of working within this sector, appears to currently exist between academic research into the use of the Web for commercial purposes and the application and utilisation of that research by UK Small Businesses.

1.6 Structure of the Dissertation

Figure 1.1 presents the structure of this dissertation diagrammatically;

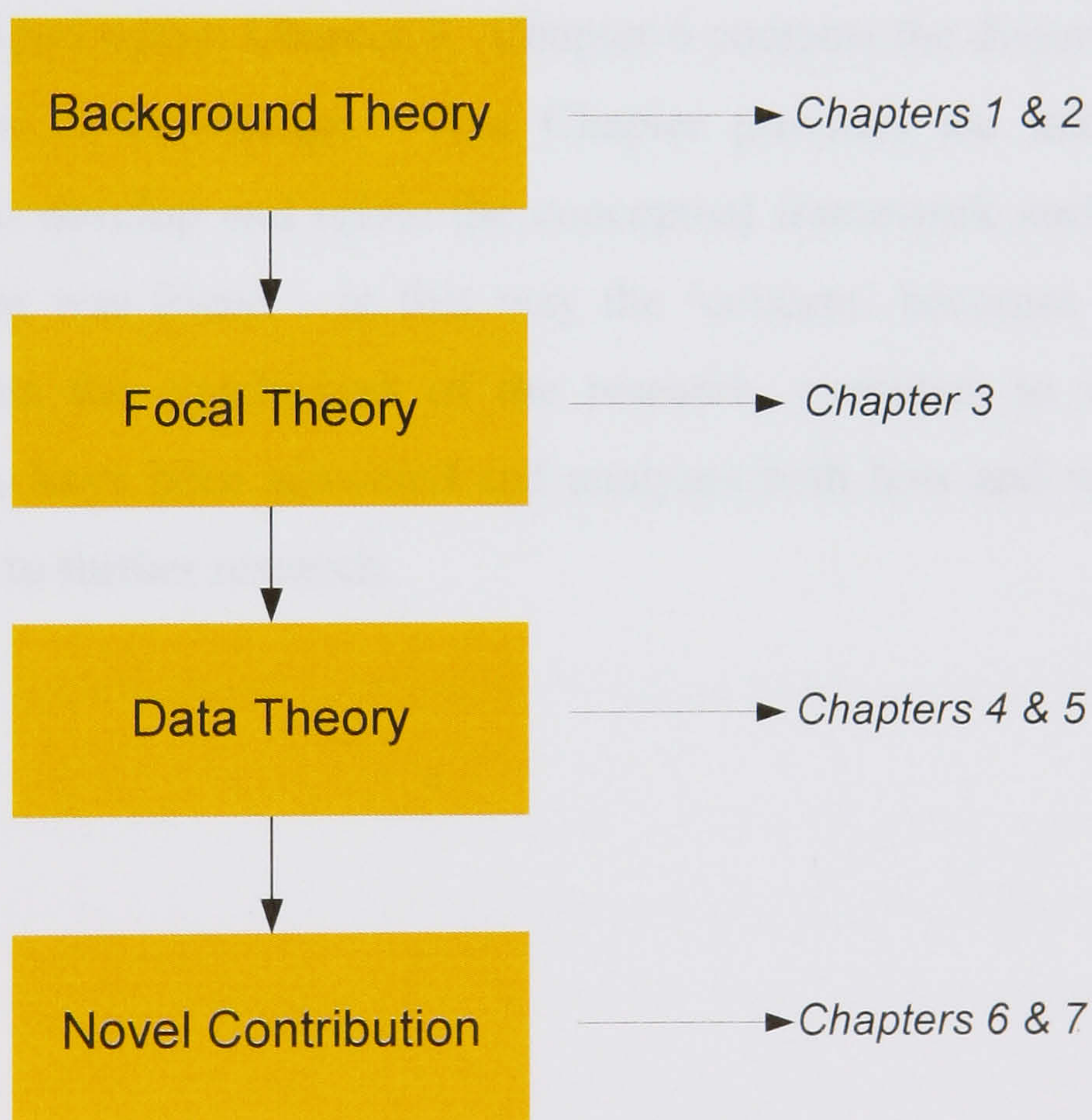


Figure 1.1 – The Structure of the Dissertation

As highlighted within Figure 1.1, Chapters 1 and 2 represent the background theory analysis of this Ph.D. Those chapters critique the normative literature, and in doing so explore the research problem that this study will address. That background theory analysis is subsequently refined within Chapter 3 via the development of the study's

focal theory. The focal theory takes the form of a conceptual framework (Chapter 3) which guides the research. That has been developed to provide focus to the study at an early stage while still allowing new knowledge to be generated within the integrated inductive approach adopted by the author. Chapter 4 justifies the research methodology adopted within the study through its consideration of the methodological choices available to the author, and the research strategy and methods that were utilised to answer the study's research question. In developing the research strategy Chapter 4 considers the ways in which the research was undertaken and findings analysed. Inherent to the development of an appropriate research methodology are the issues of research validity, credibility and reliability. Each issue is considered within Chapter 4.

Chapter 5 presents the study's data theory and the findings of the primary research while Chapter 6 analyses those findings within the context of the novel conceptual framework developed within Chapter 3. Chapter 6 contains the dissertation's primary novel contribution to knowledge. That Chapter provides the understanding and analysis needed to develop and refine the conceptual framework such that it reflects the reality of what was found – in that way the 'concept' becomes 'real'. Finally, Chapter 7 presents the conclusions of the research, considers to what extent the research questions have been answered and analyses both how and why the research findings will lead to further research.

Chapter 2.0: Background Theory

2.1 Introduction

Chapter 2 consists of a critical review of literature relevant to the phenomenon under investigation. The chapter therefore discusses and analyses the barriers and problems encountered by Small Businesses when they attempt to develop Web infrastructures. To achieve that, the Web infrastructure development process, as documented within current literature, is examined. That analysis suggests that several factors are common to the many development process models that exist and that the accuracy with which they can be successfully used to model the Web infrastructure development process of Small Businesses is questionable.

Following an analysis of the Web infrastructure development process an overview of the organisational benefits and advantages that can become available via the development and deployment of an effective Web infrastructure is presented. Finally, an analysis of the barriers and problems likely to be encountered by a Small Business when it attempts to deploy and refine a Web infrastructure is developed. That analysis considers the many factors and issues that exist which negatively impact upon the development process and which can act to prevent a Small Business from realising the organisational benefits and advantages considered earlier within the chapter.

2.2 Web Infrastructure Adoption Methodologies and Models

By developing an effective Web infrastructure a Small Business equips itself with a formidable commercial tool since the appropriate and effective use of the World Wide Web can deliver a diverse range of inter and intra organisational benefits and advantages to its owners. The effective use of the Web can enable a Small Business to pursue export and expansion strategies at low cost via a medium that users find both exciting and pleasurable. The pursuance of such a strategy can make a significant contribution to the overall performance of the Small Business and can enable it to extract and create new sources of value, both for itself and for its customers. The improved communications abilities facilitated by the use of the Web can enable the Small Business to find new value chain trading partners, develop close relationships with them and improve the efficiency and effectiveness of the commercial

relationships that those channel partners now enjoy. That in turn can provide the Small Business with a significant and sustainable competitive advantage over its business rivals thereby helping it to secure its own long-term survival and growth. Likewise, the use of the Web affords a Small Business an instant presence within global markets and can make its products and services available to the Internet's vast user base. That market presence can subsequently be exploited to deliver a significant contribution to the organisation's profits, while the customer feedback and market intelligence garnered through its Web infrastructure can be harnessed by the Small Business to further improve its product and service offerings to the long-term benefit of both itself and its customers.

In order to better understand how on-line benefits and advantages are realised by real world organisations several previous studies have described methodologies for effective Web infrastructure development while others have attempted to analyse and document the Web infrastructure development process itself.

2.2.1 Web Infrastructure Adoption Methodologies

Many of the design methodologies for Web infrastructure development concentrate primarily upon the technical aspects of the design process (see for example Bell & Tang 1998, Dholakia & Rego 1998 and Hsieh & Lin 1998). Within that broad approach the effective commercial use of the Web is largely regarded as a technical problem, and so the appropriate solution is likewise perceived to be technical in nature and origin. However, several authors maintain that methodology is arguably flawed (Abels *et al.* 1997 & 1999, Day 1997 and Remenyi & Sherwood-Smith 1999). As Remenyi & Sherwood-Smith (1999 p.17) note, when that approach is adopted:

"... the [Web infrastructure development] project progressively becomes distanced from top managements' business objectives. In effect the accountants and project manager, who is actually only responsible for the technological solution and not the business solution, take over".

Remenyi & Sherwood-Smith (1999) argue that that is unlikely to culminate with the deployment of an 'effective' Web infrastructure since, because the Web is primarily a communications medium, the development methodology adopted must maximise the

resulting Web infrastructure's ability to easily communicate information deemed desirable by its intended users rather than focusing purely on technical design considerations.

The Web infrastructure development methodologies advocated by authors such as Abels *et al.* (1997, 1999), Remenyi & Sherwood-Smith (1999), Cunliffe (2000), Chen & Sockel (2004), Martin (2004) and Coa *et al.* (2005) focus upon developing a Web infrastructure that exploits the Web's potential as a communications tool by maximising its ability to easily impart product, service and organisational information to users. Within that methodology end-user involvement at every stage of an infrastructure's development is maximised in order that those users' informational requirements are adequately captured and an infrastructure developed that fully satisfies them. Within that methodology technical Web infrastructure design considerations (e.g. the development and use of multimedia technologies such as Flash and Java) are regarded as being of secondary importance to *communications* considerations – the technical aspects of how product/service information is communicated is deemed to be much less important than the information itself and its presentation via a user-friendly interface. Consequently, that approach appears to closely mirror that advocated within the Technology Acceptance Model (Davis 1989) given the importance placed upon maximising users' perceptions of the ease of use of the infrastructure's interface and its perceived usefulness to them via the careful selection of the information that it contains. However, as Mistic & Johnson (1999) note, that methodology is itself arguably flawed since while it may result in an infrastructure that is able to satisfy its users' informational requirements, it might not deliver an infrastructure fully aligned to its other stakeholders' business requirements. For example, that approach does not fully consider how a Web infrastructure should be developed if it is to function effectively as a sales channel or how the organisational problems likely to be encountered in pursuit of such an on-line strategy can be successfully negated. Likewise, that methodology offers little advice as to how an organisation can identify its infrastructure's intended users (since if the Small Business does not already have an active Web infrastructure it cannot, by definition, have an existing Web infrastructure user base!) or how to actively solicit and secure their input within the development process. That approach largely assumes that the proposed infrastructure's users will be both willing and able to provide the design

advice, feedback and input deemed so vital by those authors. Yet as Cunliffe (2000) notes, whose informational requirements should the Small Business canvass? New customers, existing customers, real world users of the Web infrastructure, independent reviewers, proxy users or a combination of these groups? Many customers are reluctant to provide feedback to organisations and those that do may hold views that are unrepresentative of the organisation's entire customer base (Day 1997).

Misic & Johnson (1999) argue that the effectiveness of an organisation's Web infrastructure must always be measured in comparison to its competitor organisations' on-line performance. That 'benchmarking' methodology assumes that the organisation has both the capacity and ability to initially undertake the benchmarking study, and the ability to accurately interpret and act upon the findings. Furthermore, since the Small Business sector's poor understanding of ICT is well documented, that development methodology is unlikely to be suitable for use by many Small Businesses.

While it is possible to identify several broad Web infrastructure development methodologies, each has specific limitations that might limit a Small Businesses' ability to successfully deploy it. As a result of those shortcomings, several authors have attempted to model the Web infrastructure development process experienced by organisations in order to better understand the potential diversity of on-line objectives and barriers to the effective commercial use of the Web. Rather than documenting broad prescriptive methodologies to be followed by an organisation when it attempts to exploit the Web for commercial gain, those models focus instead upon the specific stages of Web infrastructure development that an organisation will pass through when it attempts to develop and deploy a Web infrastructure.

2.2.2 Web Infrastructure Development Models

The Web infrastructure development model proposed by Chaston *et al.* (2001) is typical of the many development models that can be identified (see Figure 2.1). That model has been developed from the experiences of 51 UK SMEs and within it infrastructure development is depicted as a stage gate process. Within Figure 2.1, Chaston *et al.* (2001) argue that a Small Business will initially develop an

‘unsophisticated’ Web infrastructure but will subsequently develop and enhance that incrementally until it is finally operating a ‘sophisticated’ Web presence, back office and ICT infrastructure. Progression through the various stages identified within the model is both logical and ordered, while the overall development process is regimented and structured.



Figure 2.1 – The Web Infrastructure Development Process (Chaston *et al.* 2001)

Several other authors also propose models that document the development process and developmental stages of an effective commercial Web infrastructure. Table 2.1 provides an overview of those models by highlighting the various developmental stages identified and the overall goal for the organisation concerned.

Author(s)	Development Stages Identified	Proposed underlying rationale for infrastructure development
DTI (1998, 2002)	<ol style="list-style-type: none"> 1.E-mail communications 2.Promotional Web site 3.E-commerce infrastructure 4.E-business infrastructure 5.Transformed organisation 	<i>Integration of the supply chain (via the infrastructure) such that the business is able to work in collaboration with its suppliers and partners in order to instantly respond to changes in market demand</i>
Hart et al. (2000)	<ol style="list-style-type: none"> 1. Static Web site 2. 'Added Value' Web site 3. Interactive Web infrastructure 	<i>Instant gratification of product/service enquiries and purchase decisions by customers via the use of the infrastructure</i>
Chaston et al. (2001)	<ol style="list-style-type: none"> 1.Internal e-mail 2.External e-mail 3.Internal Group Ware 4.Promotional Web site 5.Integrated on-line strategy 6.On-line purchasing 7.On-line order tracking 8.Customer focused extranet 	<i>The development of an infrastructure that integrates the business operations of all supply chain partners thereby enabling all channel partners to work together (under the coordination of the infrastructure's owners) to satisfy the demands of the end customer of the product/service</i>
Raymond (2001)	<ol style="list-style-type: none"> 1.Informational Web presence 2.Transaction Web infrastructure 3.Strategic Web infrastructure 	
Daniel et al. (2002a, 2002b)	<ol style="list-style-type: none"> 1.Inactive Web users 2.E-mail communications 3.Promotional Web site 4.On-line payment/purchasing 	
Jones et al. (2003)	<ol style="list-style-type: none"> 1. Firm Behaviour 2. Market Orientation 3. Business Model Development 4. Value Chain Reconfiguration 5. Web-based Value 	<i>The development of an infrastructure that offers its owners a competitive advantage over its rivals via new sources of value afforded by the use of the Web as a commercial medium</i>
Shiels et al. (2003)	<ol style="list-style-type: none"> 1. Technological integration 2. Operational integration 3. Inter-organisational integration 4. Strategic integration 	<i>The development of an infrastructure that integrates the business operations of all supply chain partners thereby enabling all channel partners to work together (under the coordination of the infrastructure owners) to satisfy the demands of the end customer of the product/service</i>
Rao et al. (2003)	<ol style="list-style-type: none"> 1. Web presence 2. Web portal 3. Transaction enabled portal 4. Enterprise integration 	
Brock (2005)	<ol style="list-style-type: none"> 1. Email communications 2. Information searching 3. Advertising products/services 4. Order products/services 5. Sell products/services 6. Extranet 	<i>The development of an infrastructure that enables it owners to trade electronically with its supply chain partners thereby increasing the speed and accuracy with which customer demand can be satisfied</i>
Rowley (2005)	<ol style="list-style-type: none"> 1. Experimentation 2. Product/service promotion 3. Customer service enhancement 4. E-business 	<i>The integration of all functional areas of the business via the use a Web infrastructure. In that way the infrastructure increases the extent to which the end customer can be satisfied more quickly and at a lower cost than could be achieved without the use of the infrastructure</i>

Table 2.1 – Commercial Web Infrastructure Development Models

Table 2.1 demonstrates that while many models exist that attempt to document the Web infrastructure development process, several factors are common to each. Within each model, the Web infrastructure development process is documented as a journey

that takes an organisation from the ‘unsophisticated’ to the ‘sophisticated’ commercial use of the Web. Likewise, each model asserts that progression through the Web infrastructure developmental stages can only be made incrementally, as both experience and expertise with the commercial use of the Web and the exploitation of a Web infrastructure are gained. That gradual refinement and improvement occurs because the organisation’s on-going experiences of the on-line arena act to prompt it to further refine and develop its Web infrastructure in response to its own desires to maximise the potential benefits and advantages now available to it. Within those models progression is staged, logical and ordered.

The development models contained within Table 2.1 assert that successful progression is dependent upon the deployment and exploitation of the experience and expertise acquired by the organisation during its journey through the previous stages – without that ‘hands on’ experience and expertise the organisation will be unable to further refine its Web infrastructure, on-line objectives and e-goals. Again, that assertion appears to mirror the Technology Acceptance Model. In accordance with the Technology Acceptance Model (TAM) (Davis 1989, Igarria *et al.* 1997, Venkatesh *et al.* 2003), each model begins with the use of relatively simple ‘unsophisticated’ technologies (e-mail for example) that are likely to be perceived by their users as being both easy to use and as having the potential to improve their job performance. One would fully expect to see technology being adopted in that way within Small Businesses because, as Igarria *et al.* (1997 p.294) note, that approach is consistent with the:

“...utilitarian and rational underpinnings of the decision to use systems in small firms ... individuals are likely to use the system if they believe that it is easy to use and that using it will increase their performance and productivity”.

As TAM predicts, user adoption of the technology is high which in turn promotes the adoption and use of increasingly complex technologies. Within the context of small firms IT adoption, as the firm becomes more experienced with the use of IT its users’ perceptions of the potential positive impact that the technology will have upon their organisation’s performance becomes a more significant driver of their intention to

adopt such technologies than their perceptions of the ease of use of the technology. Increasing levels of IT experience appears to simultaneously stimulate the desire to adopt more complex technologies (based upon their likely positive impact upon the organisation) while simultaneously reducing user concerns regarding the complexity and ease of use of the technology (Igbaria *et al.* 1997). Consequently, each model culminates with the development and deployment of a highly sophisticated e-business infrastructure within which the organisation's ICT and business systems are integrated thereby delivering a sustainable competitive advantage. The sophistication of such an infrastructure is expressed by Raymond (2001). Raymond (2001) notes that while a variety of factors influence the speed at which an organisation will pass through each stage, the ultimate goal is always to develop an infrastructure that will:

“... reduce costs and re-engineer business processes, to increase product/service differentiation and ... develop new strategic alliances”
(Raymond 2001 p.413).

2.2.3 Analysing Web Infrastructure Development

Section 2.2.2 has shown that current Web infrastructure development models depict a 'stage-gate' process for Web infrastructure development. However, several authors maintain that that approach and the models that advocate it are ill suited to many Small Businesses.

The organisational competences required to develop a sophisticated Web infrastructure become more complex as the organisation's on-line objectives become more intricate. As a result, many Small Businesses fail to progress through the developmental stages identified within the models detailed within Table 2.1 because they lack the appropriate skills and competences needed to do so (Martin & Matley 2001, Sparkes & Thomas 2001, Taylor *et al.* 2001, Jones *et al.* 2003, Mendo & Fitzgerald 2005). For example, the majority of Small Businesses surveyed by Jones *et al.* (2003) and Rao *et al.* (2003) confirmed that they had been unable to develop their Web infrastructure (thereby passing through the stages of infrastructure sophistication identified within Table 2.1) because they had been unable to acquire the more complex knowledge and competences needed to do so (e.g. addressing their unfamiliarity with the legislative formalities of on-line trade, the legal issues

surrounding the collection and protection of customer data, and export requirements). Blackburn & Athayde (2000). Anckar & Walden (2001). Jutla *et al.* (2002) and the Small Business Service (2002) support that argument and maintain that in order to refine the sophistication of their Web infrastructures, Small Businesses need practical help and guidance since they lack the organisational competences to do so unaided. That suggests that while a Small Business may already possess or easily acquire the competences to initially develop a Web infrastructure, as its on-line objectives increase in sophistication the Small Business is unlikely to possess or acquire the skills needed to achieve them.

Anckar & Walden (2001) and Jones *et al.* (2003) maintain that a Small Business's progression through the development stages is not automatic since resource limitations greatly limit the complexity, features and therefore 'sophistication' of many Small Business Web infrastructures. Many Small Businesses fail to gain the experience and expertise needed to further refine and develop their Web infrastructures, and ultimately develop infrastructures that fail to add significant value for their users. As a result, customers choose not to use the Web infrastructure as their preferred means of interaction with the organisation because they remain inherently '*unsophisticated*' in nature and offer little (if any) reason to interact with it (Anckar & Walden 2001).

The issue of successful Small Business Web infrastructure development has not gone unrecognised. The DTI (2004a) report that many Small Businesses fail to progress to become sophisticated Web users since the problems and barriers they face often prove insurmountable for those businesses. Consequently, Web infrastructure development projects are routinely abandoned once a Small Business realises that the benefits originally envisioned will be difficult to realise in practice.

Daniel *et al.* (2002b) argue that since many Small Businesses are unable to overcome the barriers and problems associated with the sophisticated use of the Web for commercial purposes, they fail to persevere with the on-going incremental development of their infrastructures and thus fail to realise any tangible, significant long-term benefit from its deployment. That view is supported by several studies of Small Businesses Web infrastructure development. For example, Carter *et al.* (2002), Oldfield (2002), DTI (2004a) and Mendo & Fitzgerald (2005) report that while there

is a high incidence of Small Businesses using their Web infrastructures for e-mail, electronic file/document transfer and the presentation of promotional literature, the incidence of sophisticated Web usage (e.g. on-line ordering, the provision of real-time product stock level information or the automatic processing of customer payments) remains low. Those findings are mirrored by Webb & Sayer (1998), Clayton (1999), Doherty *et al.* (1999), Howitt (1999) and Mullins *et al.* (2001). Those researchers also report a high incidence of ‘unsophisticated’ Small Business Web infrastructures and a correspondingly low incidence of Small Businesses using their Web infrastructures in more sophisticated ways.

The findings of Dutta & Evrard (1999) add further weight to the conclusion that Small Businesses appear unable to progress through the Web infrastructure development stages identified by the models within Table 2.1. Dutta & Evrard (1999) report that the majority of European Small Businesses with Web infrastructures have developed static non-interactive infrastructures greatly limited in functionality. Dutta & Evrard (1999) attribute that to Small Businesses being unable to overcome the problems inherent with the further refinement of their infrastructures. That in turn suggests that many of the barriers and problems to the sophisticated use of the Web become more complex in nature, and consequently much harder for a Small Business to overcome, as its on-line goals (and the supporting Web infrastructure required to realise them) become more advanced. Thus many UK Small Businesses remain unable to progress through the Web infrastructure development stages identified by authors such as Hart *et al.* (2000), Chaston *et al.* (2001) and Rao *et al.* (2003) and therefore remain unable to develop anything other than an ‘unsophisticated’ functionally limited Web infrastructure. As Daniel *et al.* (2002b p.9) note:

“As firms pass through the stages of [Web infrastructure] adoption, they will gain experience but also face new challenges”.

Each of the development models detailed within Table 2.1 culminates in the deployment of a highly sophisticated ‘e-business’ Web infrastructure within which every aspect of the organisation’s ICT is integrated to provide a ‘seamless’ business system. E-business becomes the goal for every organisation, whether large or small, regardless of their underlying business systems or how appropriate and beneficial such

a system might be. However, since there are fundamental differences in the attitudes towards ICT, available resources and abilities to overcome the barriers and problems to the commercial use of the Web amongst Small Businesses, the adoption strategies and rationales that are appropriate for one organisation cannot necessarily be used by another (Small Business Service 2002, Shiels *et al.* 2003, Mendo & Fitzgerald 2005). Within the Web infrastructure development methodologies and models discussed above however, the goal of 'e-business' remains with little if any regard being paid to the individual circumstances of the Small Businesses concerned. Similarly, financial costing tools (e.g. Return on Investment) are largely incapable of accurately describing the full costs and benefits of organisational IT/IS investments (Irani *et al.* 1998, Lubbe & Remenyi 1999, Patel & Irani 1999, Remenyi & Sherwood-Smith 1999, DTI 2004a). An organisation cannot *automatically* assume that the financial return (and thus desirability) of an IT/IS investment will be high simply because the system itself is highly technical, advanced and complex. Rather, an organisation must take a balanced and rational approach to its IT/IS investments and use a variety of metrics to reach its investment decision since the applicability and desirability of any proposed system is unique, and the potential benefit to its owners cannot automatically be 'assumed'. An analysis of Table 2.1 reveals however that each model largely assumes the desirability and applicability of those complex ICT systems to be present. That issue has not gone unrecognised with Kellock (2000) arguing that the UK business community's on-going desire for complex 'e-business' Web infrastructures is being fuelled by Senior Management uncertainty and insecurity. Senior Management incorrectly believe (Kellock 2000 asserts) that any failure to invest heavily in such technologies will irreparably harm an organisation's long-term competitiveness. In that situation investment decisions are made in ignorance of the long-term benefits that such systems will deliver. This situation appears little changed since:

"The challenge for business has moved on to the smarter deployment of ICT to unlock real value" DTI (2004a Section 1).

Within the Web infrastructure adoption models discussed above, the desirability and applicability of 'e-business' (and the technically sophisticated Web and supporting back office infrastructures required to support it) are assumed to be present regardless of the particular circumstances of the organisation in question (i.e. the 'perceived

usefulness' of the technology (a key driver of the intention to adopt and use IT) is assumed to be present (Davis 1989)). Consequently, the Web infrastructure development models detailed above are arguably inappropriate for use by Small Businesses since they fail to fully consider the likely barriers to such an infrastructure's development or the infrastructure's inherent desirability, usefulness and applicability to the organisation concerned. Martin & Matley (2001) and the Small Business Service (2002) support that argument in their conclusion that the Small Business Web infrastructure development process advocated by the UK Government (DTI 1998, 2002) is flawed because it fails to recognise any difference between the organisations that will use it, takes little account of specific organisational resource limitations and fails to reflect the diversity of objectives and realisable benefits peculiar to each Small Business.

Within the Small Business sector, effective Web infrastructure development must entail recognising the specific business objectives of the organisation concerned. However, within the models contained within Table 2.1 the ultimate objective of the infrastructure development process remains fixed regardless of the particular circumstances of the organisations that will follow it or the desirability of the ultimate 'goal' that each model advocates. Similarly, the models contained within Table 2.1 do not fully consider the likely barriers and problems to infrastructure development that an organisation is likely to encounter if it attempts to develop a Web infrastructure. In essence the models contained within Table 2.1 and development methodologies discussed within Section 2.2.1 highlight what organisational benefits can potentially be realised via infrastructure development but do not adequately consider what barriers and problems to their realisation exist and must be overcome if the organisation's development activities are to be successful. Therefore while a Small Business may well attempt to follow the development models and methodologies discussed above, analysis suggests that its developmental attempts are unlikely to be successful. That is because those models and methodologies take little account of how the barriers and problems to development will impact upon the development process and act to curtail benefit realisation. Therefore, those development models contained within Table 2.1 appear to be flawed because the success with which they could be successfully followed by a Small Business is questionable. That in turn suggests that

current knowledge and understanding of the Small Business Web infrastructure development process is incomplete.

2.3 Small Business Web Infrastructure Organisational Benefits

Section 2.2 has analysed current Web infrastructure development models. Those models depict Web infrastructure development as a stage gate process involving incremental infrastructure enhancement as an organisation becomes more proficient and experienced within the on-line arena. While Section 2.2.3 suggests that for many Small Businesses staged progression is problematic, Table 2.1 highlights that as an infrastructure increases in sophistication, the organisational benefits and advantages it affords likewise increase. Consequently, in order to analyse the Web infrastructure development process experienced by Small Businesses and its inherent barriers and problems, those potential benefits must also be considered.

Current literature (discussed within Section 2.3) suggests that a number of organisational benefits and advantages become available via the development of an effective Web infrastructure. Figure 2.2 has been created by the author from that literature. Figure 2.2 presents the advantages and suggests at what stage of the development process they might be realised by a Small Business. Figure 2.2 shows that as an organisation's Web infrastructure is refined and its sophistication increases, the benefits and advantages that it affords likewise increase. Figure 2.2 also highlights that many of the benefits and advantages discussed within current literature cannot be realised unless the barriers and problems to the effective use of the Web are

overcome and a highly sophisticated Web infrastructure deployed.

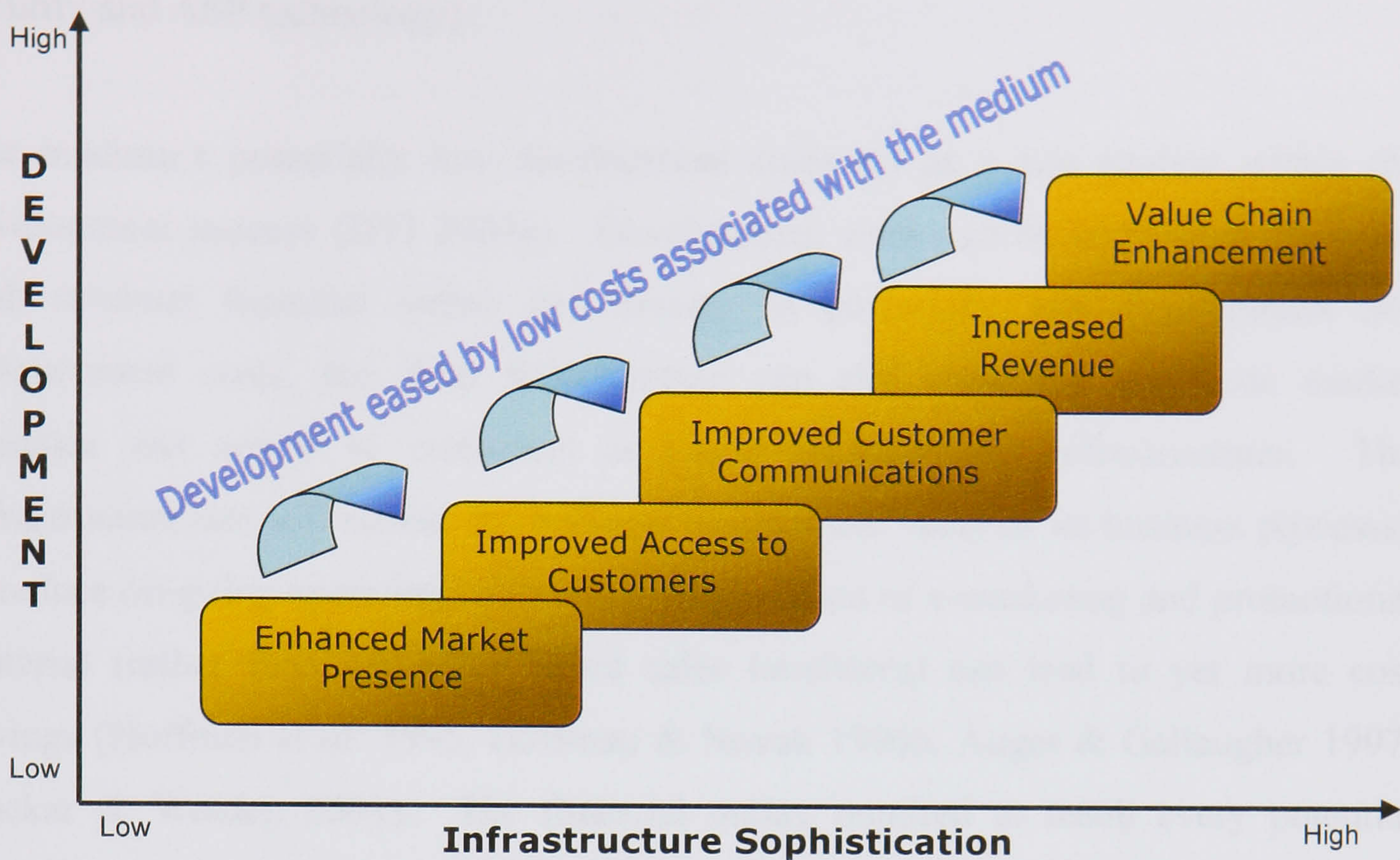


Figure 2.2 – Organisational Web Infrastructure Benefits

2.3.1 Cost Considerations – An Infrastructure Development Enabler

Within Figure 2.2 the potentially low costs associated with the creation and refinement of a Web infrastructure facilitate the infrastructure's on-going development. Vescovi (2000), Sparkes & Thomas (2001), Tetteh & Burn (2001) and DTI (2004a) all argue that that makes the on-line arena highly attractive to Small Businesses. With the advent of Internet based technologies, the 'performance gap' between large and small organisations has greatly reduced as the purchase and maintenance costs of sophisticated business technologies has fallen. Technologies that were traditionally beyond Small Businesses' financial reach can now be exploited for little cost (Boyes *et al.* 2002). For example, Lynn *et al.* (1999) note that during the 1980's an electronic communication system coupled to a bespoke customer information database required a mainframe computer yet those same technologies can now be harnessed via the Internet using a Personal Computer. Similarly, inexpensive software packages are now available that can quickly create a functional Web infrastructure despite its user's ignorance of HTML or Web infrastructure design (Poon & Swatman 1997, Cunliffe 2000, Clapham 2002). More importantly, those packages allow users to subsequently incorporate sophisticated elements within the infrastructure as their expertise increases

(for example the two leading packages, Microsoft FrontPage and Adobe DreamWeaver, both support server-side scripting, SQL interactive databases, SSL security and ASP technology).

The medium's potentially low development costs act as a key enabler within the development process (DTI 2004a). Development work can be undertaken in-house with minimal financial outlay and despite its potentially low development and enhancement costs, the Web infrastructure can still command the same market presence and access to customers as larger organisations' infrastructures. The infrastructure can still enable the business to automate many of its business processes to reduce on-going operating costs while its provision of e-marketing and promotional material (rather than via paper based sales brochures) can lead to yet more cost savings (Hoffman *et al.* 1995, Hoffman & Novak 1996b, Auger & Gallagher 1997, Anckar & Walden 2001). The financial outlay required to reach every potential customer now available via the infrastructure remains a fraction of 1% of the cost of the equivalent newspaper advertising (Dholakia & Rego 1998, Lynn *et al.* 1999). The infrastructure will still function as an efficient, cost effective distribution channel while for certain digital goods the cost of production and distribution can shrink to zero (Hoffman *et al.* 1995). Hsieh & Lin (1998) and Chen & Sockel (2004) regard an infrastructure as the most cost effective vehicle for the on-going provision of after sales support while Bennett (1997 p.331) argues that:

“The Internet allows small firms to grow without expanding physically or incurring relocation expenses, and allows them to advertise and promote themselves globally at minimal cost...such considerations raise the possibility that the Web removes “at a stroke” a number of organisational and resource constraints...”.

2.3.2 Enhanced Market Presence

Vescovi (2000), Sparkes & Thomas (2001), Shiels *et al.* (2003), Fillis *et al.* (2004) maintain that the commercial use of the Web is well suited to Small Businesses since it provides the same market presence to both large and small organisations and is consequently the most cost effective method by which a small organisation can market itself globally. As Bennett (1997 p.330) notes:

“Arguably, the use of the Internet for global marketing enables firms to leapfrog the conventional stages of internationalisation, as it removes all geographical constraints, permits the instant establishment of virtual branches throughout the world and allows direct and immediate foreign market entry to the smallest of businesses”.

Bennett (1997) further notes that since every market is entered instantly there is no delay to product and service information reaching the market. That expansion strategy exploits virtual (rather than physical) assets. The Small Business can therefore promote its own products and services rather than relying upon secondary domestic and overseas intermediaries or distributors in order to do so (Anckar & Walden 2001). Global reach becomes independent of economies of scale (Bennett 1997, Auger & Gallagher 1997) and despite possessing potentially limited physical assets, a Small Business Web infrastructure will still provide instant access to product and service information regardless of customers' physical location thereby removing time and geographical constraints to their purchase decisions (Hoffman *et al.* 1995, Jones & Vijayarathy 1998, Sadowski *et al.* 2002, Chen & Sockel 2004, Fillis *et al.* 2004). The Small Business can consequently penetrate global markets at a lower cost and asset intensity than is required in the physical world and deploy a globalisation strategy that was previously unachievable (Kianni 1998, Fillis *et al.* 2004).

Unlike in the physical world, on-line market presence depends not upon brand recognition or organisational size, but rather upon infrastructure quality and the level of customer service offered (Day 1997, Haynes *et al.* 1998, Hsieh & Lin 1998, Macpherson 2000, Sparkes & Thomas 2001). That is because an infrastructure offers few physical cues regarding organisational status – factors identified by Edvardsson *et al.* (1994) and Parasuraman *et al.* (1985) as primary customer purchase decision motivators. Since speed of response in reacting to changing customer requirements is a key on-line success factor, Small Businesses can be more successful than larger organisations since their reduced bureaucracies and leaner management structures can enable them to implement changes to corporate strategy to exploit new market opportunities quickly (Hsieh & Lin 1998, Rao *et al.* 2003, Fillis *et al.* 2004). When those factors are coupled to the continuing decreasing cost of worldwide distribution

the development of a *global* customer base via the Web becomes increasingly viable even for the smallest of businesses.

An enhanced market presence offers considerable benefits to a Small Business while Table 2.1 and Figure 2.2 suggest that that organisational benefit becomes quickly available via the development of a Web infrastructure. Indeed, Skinner (2000) reports that of the 800 SMEs surveyed, 93% had developed an infrastructure to increase market awareness of their products and services whilst for 63% their primary objective was to extend their geographical reach. Of those, 57% and 58% respectively believed their infrastructure's to have successfully met those objectives.

2.3.3 Improved Access to Customers

As a result of the enhanced market presence initially afforded by the development of a Web infrastructure a Small Business quickly becomes able to communicate with vast numbers of potential customers that might otherwise have remained beyond its reach. Kianni (1998), Vescovi (2000), Anckar & Walden (2001), Tetteh & Burn (2001), Shiels *et al.* (2003) and Martin (2004) all assert that a Web infrastructure equips a Small Business with the tools to constantly 'keep its doors open' to its customers regardless of their location within the physical world. Furthermore, the newly created Web infrastructure equips the business with continuing access not just to its existing customers, but also to the Internet's vast user (and therefore potential customer) base. Commenting on the access to potential customers that a Web infrastructure affords a Small Business Quelch & Klein (1996 p.60) note:

"The Internet removes barriers to communication with customers by eliminating the obstacles created by geography, time zones and location creating a frictionless business environment".

Not only does an infrastructure greatly reduce the role that economies of scale play within market expansion, it can also enable businesses to make direct contact with vast numbers of potential new customers (Haynes *et al.* 1998, Macpherson 2000, Sparkes & Thomas 2001, Tetteh & Burn 2001, Fillis *et al.* 2004, Martin 2004). That access to such a large user base is widely regarded as one of the greatest benefits afforded to a Small Business by a Web infrastructure, and as Figure 2.2 shows, is one that quickly

becomes available (Quelch & Klein 1996, Haynes *et al.* 1998, Jones & Vijayasarithy 1998).

2.3.4 Improved Communications with Customers

For many Small Businesses developing close customer relationships underpins their marketing philosophy and a Web infrastructure can greatly aid such a strategy. By using the infrastructure to capitalise upon a newly found market presence and access to customers the Small Business:

“...is able to develop a deep understanding of [customers’] information needs and their interests ... the services they use ... how they have reacted to advertising and marketing programmes in the past ... to offer precisely targeted advertising with a high degree of interactivity” (Kianni 1998 p.3).

Collecting detailed and precise information about customer needs enables a Small Business to create a virtuous circle in which providing good customer service generates fresh knowledge about customer behaviour thus improving customer service still further, fostering stronger relationships with customers and through that repeat sales (Quelch & Klein 1996, Limehouse 1999, Lynn *et al.* 1999, Sparkes & Thomas 2001, Chen & Sockel 2004, Martin 2004, Coa *et al.* 2005). The Small Business can more closely align its product and service offerings to its customers’ requirements, which in turn adds significant value for both parties. The infrastructure is used to market products and services to customers on a one-to-one basis thereby facilitating the development of a unique relationship with each customer (Peppers & Rogers 1995, Chen & Sockel 2004). ‘Relationship marketing’ is more efficient and effective than traditional marketing strategies because rather than involving blanket communications whose success is measured in terms of market share it relies upon increasing the share of individual customers’ business with the organisation, thereby increasing revenues while decreasing marketing, advertising, administrative and sales costs (Peppers & Rogers 1995). That creates the perception of a unique personal relationship between business and customer that promotes even stronger feelings of loyalty towards the business (Pepper & Rodgers 1995, Jones & Vijayasarithy 1998, Weiber & Kollman 1998, Limehouse 1999, Walters & Lancaster 1999, Chen & Sockel 2004). Peppers & Rogers (1995) argue that when a business is built upon satisfying the needs of

individual customers in a *unique* manner the underlying strength of the business will be greatly enhanced, its profit levels will improve. the business will be much less susceptible to the competitive sales pushes of its competitors and will be less vulnerable to the vagaries of economic cycles.

Hoffman *et al.* (1995) and Chen & Sockel (2004) argue that a Web infrastructure is an ideal tool with which to deploy a one-to-one marketing strategy because while it can fulfil the three key marketing functions (to inform, remind and persuade), unlike traditional media it is interactive rather than passive. Its ability to ‘persuade’ is not limited by the uni-directionality of traditional mass media because its interactivity enables users to undertake deeper non-linear informational searches. While that affords users more control over which marketing messages they choose to interact with, since more dynamic information is being made available to them their interaction with an *online* communication supports the purchase decision more strongly than with traditional marketing media (Hoffman & Novak 1996). In recognition of the value of a Web infrastructure within that approach Clapham (2002 p.8) describes the Web as:

“...*the best value, most ubiquitous marketing tool of our time*”.

In addition to establishing and building a relationship with customers, the Web infrastructure can also be a powerful tool with which to sustain that on-going relationship. As both Gronroos (1988) and Hart (1988) note, providing customers with full after-sales services and acting quickly to resolve their queries or complaints adds significant value to their relationship with an organisation. The one-to-one communications available via the Web and the ease with which a Web infrastructure can be accessed (regardless of a user’s physical location or the time of day), makes it an excellent vehicle with which a Small Business can provide such services (Hsieh & Lin 1998, Limehouse 1999, Chen & Sockel 2004). The infrastructure can enable the Small Business to provide enhanced customer service at a lower cost than would otherwise be incurred (Auger & Gallagher 1997). For example, the provision of *online* customer and product/service support adds significant value for the customer (due to the ease with which such services can be accessed) and can be provided at a lower cost than a traditional telephone support desk. The provision of cost-efficient yet

highly effective Web based after-sales services further strengthens the customer/organisation relationship. Extra value is added to the customer's interactions with the Small Business while the organisation avails itself of a further channel for customer feedback, extends its market reach and reduces the costs incurred in undertaking both market and customer research (Auger & Gallagher 1997, Chen & Sockel 2004). As Peppers & Rogers (1995) and Venkatesh (1998) note, such interactive organisation/customer communications can only be achieved via a Web infrastructure and remain impossible to replicate via any other media without incurring vastly increased costs (e.g. personalised mail shots). Similarly, internal company intranets based upon the one-to-many and one-to-one Web communications paradigm can extend this benefit to *internal* customers thereby increasing the efficiency and effectiveness of the organisation still further (Quelch & Klein 1996).

An effective infrastructure can be used by a Small Business to better understand the needs of its customers and adapt its offerings to better satisfy them. Many authors contend that the access to 'information' afforded by the development of a Web infrastructure does not just positively impact upon an organisation's value chain (see Section 2.3.6) but subsequently becomes a source of competitive advantage *in its own right* (Rayport & Sviokla 1994, Hoffman *et al.* 1995, Rayport & Sviokla 1995, Hoffman & Novak 1996b, Venkatraman & Dholakia 1997, Weiber & Kollman 1998, Vescovi 2000, Tetteh & Burn 2001, Jones *et al.* 2003, Fillis *et al.* 2003, Chen & Sockel 2004, Martin 2004). The ability to manage and extract value from the 'Virtual Value Chain' (by gathering, organising, selecting, synthesising and distributing information) is now recognised as a key factor differentiating organisations regardless of organisational size (Rayport & Sviokla 1995). As a result, the refinement of its Web infrastructure can provide the Small Business with both a competitive advantage over its rivals and new sources of value.

2.3.5 Increasing Organisational Revenues via the Web Infrastructure

Figure 2.2 demonstrates that as an infrastructure increases in sophistication, it can be used to increase organisational revenues. Indeed, the most commonly reported Small Business objective for developing a Web infrastructure is to increase sales revenues (Auger & Gallagher 1997, Skinner 2000).

Jones & Vijayarathy (1998) argue that any income raised via an infrastructure will almost always be generated at the expense of traditional channels' revenues since it simply offers customers a more convenient means of interaction. That argument maintains that an infrastructure redistributes a Small Business's income rather than creating a new income stream with the majority of on-line customers using it in favour of, not in addition to, any other sales channels that the organisation makes available. However, that argument does not fully consider the market penetration, market presence and the direct access to the Internet's vast user (and therefore potential customer) base afforded by the infrastructure. Many more authors conclude that the infrastructure will raise income via *new* revenue streams and incremental increases to *existing* ones (Hoffman *et al.* 1995, Kianni 1998, O'Keefe *et al.* 1998, Doherty *et al.* 1999, Strader & Shaw 1999, Vescovi 2000, Sparkes & Thomas 2001, Tetteh & Burn 2001). While the infrastructure will offer existing customers a potentially more convenient means of interaction, it will also make products and services available to many more potential customers. Internet users view the Web as a separate sales channel that is available for use in addition to, rather than in replacement of, traditional ones (O'Keefe *et al.* 1998, Doherty *et al.* 1999, Porter 2001). While some e-sales may come at the expense of those generated through traditional channels, the net effect will be an increase in organisational income (Porter 2001). Since successful e-trade seeks to increase the share of customers' business with an organisation (rather than increasing overall market share) the cost of e-sales is low while customer loyalty is significantly higher than within the real-world (Peppers & Rogers 1995). As a result, e-revenues are more likely to be permanent while unit margins (even on incremental sales) will improve (Peppers & Rogers 1995).

Hoffman *et al.* (1995) and Sparkes & Thomas (2001) argue that a Web infrastructure will enable the Small Business to differentiate itself on non-price based value-adding factors (e.g. speed of ordering, payment and delivery). That can enable it to charge premium prices based upon its product/service's ability to add value rather than upon its cost of production thereby capitalising upon Internet users' affluence (for example, within the UK there is a three-fold difference in Internet usage between the lowest and highest income deciles (Strategy Unit 2005)). As depicted within Figure 2.2 as infrastructure sophistication increases, the Small Business gains access to new affluent customers while simultaneously facilitating product/service differentiation upon non-

price dimensions. An infrastructure can therefore enable the Small Business to increase its sales revenues and unit margins from new and existing customers, and through that, increase overall profitability.

2.3.6 An Infrastructure's Impact upon the Value Chain

The development models detailed within Figure 2.2 culminate with the deployment of an integrated e-business infrastructure. At that level of sophistication the infrastructure enhances and re-engineers the Small Business value-chain such that new sources of value are created and competitive advantage conferred. In order to analyse how that is realised the value-chain model proposed by both Rayport & Sviokla (1994) and Yakhlef (1998) will be employed. That model maintains that any company's value-chain is comprised of three core components:

- The Infrastructure – *what enables the transaction to take place*
- The Context – *where it is offered*
- The Content – *what is offered*

While those components are irreversibly inter-dependent within the physical world, an infrastructure allows them to be separated and each component better managed (Venkatraman 2000) since it allows:

“content, context and infrastructure to be disaggregated ... information technology adds or alters content, changes the context of interaction and enables the delivery of varied content and a variety of contexts over different infrastructures” (Rayport & Sviokla 1994 p.145).

2.3.6.1 Impact upon the Value Chain Infrastructure

Commenting upon the strategic objectives of Small Businesses, Tetteh & Burn (2001 p.172) argue that they invariably:

“... relate to seeking increased access to wider markets and resources through the extension of its environment ... thus it becomes critical to ... exploit those features of the infrastructure that facilitate and optimise virtual values in the business chain”.

The global market penetration and enhanced communications abilities provided by the Web infrastructure widen the market access discussed by Tetteh & Burn (2001) with Hoffman & Novak (2000) proposing the 'Revenue-Sharing' Internet Business Model as one example of how Small Businesses can exploit their Web infrastructure in that way. The Web infrastructure provides enhanced access to vendors and suppliers and facilitates the on-going establishment of inter-business partnerships and collaborations (Walters & Lancaster 1999, Hoffman & Novak 2000, Tetteh & Burn 2001, Sadowski *et al.* 2002, Martin 2004). The increased speed and ease of communication between value chain members, and the relative ease with which links with new trading partners can be established can greatly shorten lead times while simultaneously reducing inter and intra organisational communication costs (Haynes *et al.* 1998, Lu & Yeung 1998, O'Keefe *et al.* 1998, Blackburn & Athayde 2000). For example, low cost e-mail or on-line conferencing facilities can be used to replace more expensive national or international telephone based communications (Blackburn & Athayde 2000). The Web infrastructure can increase operational efficiency, reduce costs and offers the opportunity to form strategic inter-business collaborations that have traditionally only been available to large organisations that by nature of their size were better able to exploit economies of scale (Haynes *et al.* 1998, Tetteh & Burn 2001, Fillis *et al.* 2004). In that way, the value-chain infrastructure is enhanced to the benefit of every value chain partner. Indeed, the ability to re-engineer the value chain infrastructure via the use of a Web infrastructure is now recognised by UK SMEs as a key component of the value chain management process (Saindis *et al.* 2001).

2.3.6.2 Impact upon the Value Chain Context

Hoffman *et al.* (1995), Jones & Vijayasarthi (1998), and Yakhlef (1998) all note that because a web infrastructure can enable an organisation to interact directly with its customers it can allow it to remove some members of its value chain completely thereby re-engineering 'context' to realise further cost and efficiency gains. Sales costs are lowered while fewer value chain members reduce the constraints to trade that exist between those that remain. That increases the channel's overall efficiency.

Doherty *et al.* (1999) assert that an infrastructure can be used to bring customers closer to suppliers via its use as a combined marketing/distribution channel based upon their common bi-directional relationship such that the value chain is shortened to producer

and end consumer, lowering transaction costs for both parties. Within that approach the infrastructure can alter 'context' through the more effective management of distribution systems via the use of single site distribution centres due to the direct access and improved communications with the customer base now afforded. Once the Small Business is able to retail products and services directly to its customers it may no longer require distributors in non-local markets, export initiatives or physical expansion programmes.

An infrastructure can reduce the need for capital funding by reducing the need for physical premises (be they domestic or overseas) or supply-to-stock distribution systems (Doherty *et al.* 1999). That can negate the need for a Small Business to establish a large physical distribution network by replacing that with a single site distribution centre which responds only to confirmed sales rather than to a host of secondary distributors who are attempting to balance their customers' demand against their own stock levels (Quelch & Klein 1996, Jones & Vijayasarathy 1998). Likewise, the infrastructure can help the Small Business better respond to the needs of its large industrial customers. Roberts (2000) notes for example that Small Businesses often have Just-in-Time (JIT) systems imposed upon them. However, their lack of bargaining power within the value chain reduces their design input to such systems so that many of the costs that the system sought to remove are simply reassigned (e.g. the cost of holding stock is transferred from large customer to small supplier). With the use of an infrastructure that situation can change. Since the infrastructure improves communication between value chain members, and since that can lead to the development of new trading partnerships, all members of the value chain (regardless of their size or bargaining power) become better able to benefit from the cost savings and efficiency gains promised by initiatives such as JIT (Roberts 2000).

2.3.6.3 Impact upon the Value Chain Content

In addition to positively impacting upon both where an organisation makes its products and services available and how it delivers them, an effective infrastructure can also influence *what* is offered to the customer. Hoffman *et al.* (1995), Jones & Vijayasarathy (1998) and Yakhlef (1998) argue that becomes possible because the infrastructure can allow the Small Business to satisfy the demand for certain products

and services instantly via a medium that users find both exciting and pleasurable (Shih 1998, Van Nierkirk *et al.* 1999, Chen & Sockel 2004). That occurs at the convenience of both consumer and supplier alike since the physical distribution of the product or service is no longer required. The ability to instantly satisfy customer demand at low cost can add significant value to the customer/supplier relationship with Yakhlef (1998) offering suitable example products/services such as virtual learning services, music and computer software, news services and customer service/support functions.

Once products have been adapted for electronic sale and distribution it becomes possible to base their commercial value upon their perceived value to the customer rather than upon their cost of production. That can enable the Small Business to charge premium prices thereby maximising both its revenue streams and profits (Rayport & Sviokla 1994, Hoffman *et al.* 1995). Moreover, digital assets are not used up during production, the on-going variable cost of production falls to zero (or near to it) hence sales revenues contribute directly to profits whilst the cost of distribution likewise falls to zero (Rayport & Sviokla 1994 & 1995, Hoffman *et al.* 1995).

The Web infrastructure allows context, content and infrastructure to be better managed since the interaction between customer and business has radically changed (Rayport & Sviokla 1994, Jones *et al.* 2003). While within the physical world those three elements are fundamentally interdependent, within the virtual world it becomes possible to separate them such that new sources of value are created. For example once *content* is adapted (e.g. a news paper adapted into an on-line news service) the business may no longer need either a physical *infrastructure* (e.g. suppliers) or a physical *context* for its consumption (e.g. news stands). Therefore, the extent to which the business is able to exploit information to better satisfy its customers and develop mutually beneficial relationships with them are key on-line success factors (Dutta & Evrard 1999, Poon & Joseph 2000 & 2001, Jones *et al.* 2003). Poon & Joseph (2000, 2001) and Jones *et al.* (2003) argue that a Small Business must now consider how fresh sources of customer value can be created via its *virtual* value chain with Rayport & Sviokla (1994) offering AUCNET as a practical example of how that can be achieved. AUCNET is a virtual car auction system developed in Japan during the 1980's. AUCNET's owners collect information about cars, digitise it and make it available to potential buyers. Thus *content* is re-engineered since information about

cars replaces the cars themselves. *context* is dramatically altered since a *virtual* auction has replaced a physical one while the *infrastructure* enabling transactions is clearly different since computers have replaced car lots (Rayport & Sviokla 1994). The way in which AUCNET's owners extract and add value is radically different to how that was traditionally achieved and graphically demonstrates the power of the virtual value chain – AUCNET own neither *content* (they own information about cars rather than the cars themselves), *context* (the virtual auctions are hosted by another organisation) or *infrastructure* (AUCNET do not supply the computers used by buyers and sellers to access AUCNET's information).

2.4 Barriers and Problems to Web infrastructure Development

2.4.1 Barriers and Problems Definition and Origin

While a Web infrastructure's potentially beneficial impact upon the commercial operations of Small Businesses is well documented, many authors argue that those businesses are often ill equipped to realise those benefits in practice (Chesher & Skok 2000, Vescovi 2000, Anckar & Walden 2001, Sparkes & Thomas 2001, Carter *et al.* 2002, Jutla *et al.* 2002, DTI 2004a). For example, UK Small Businesses are approximately one third less likely than large UK organisations to use the Web (DTI 2004a) while many are unable to realise the potential benefits offered by the development of a Web infrastructure since they have limited financial, physical and human resources and limited management, marketing and ICT knowledge and expertise (Jutla *et al.* 2002, Rao *et al.* 2003). While a Small Business may expect a straight transition from traditional to electronic trade there are many reasons why that might not happen: the organisational benefits discussed in Section 2.3 are far from guaranteed for Small Businesses. As Carter *et al.* (2002 p.110) note:

"Clearly small firms are making use of Internet technologies for business purposes, but they are far from deriving the full benefit of this new technology".

In order to analyse why Small Business routinely fail to capitalise upon the potential commercial advantages offered by a Web infrastructure the framework developed by the author (and reported within Boyes & Irani (2002, 2003)) will be used. Within that framework seven key barriers and problems to the development, deployment and

exploitation of a Web infrastructure are identified. Within that framework the term ‘*barrier*’ refers to those issues and factors that can act to prevent a Small Business from initially developing an appropriate Web infrastructure while the term ‘*problem*’ refers to those issues which might subsequently curtail their ability to exploit it in pursuit of commercial gain. Figure 2.3, developed by the author and reported within Boyes & Irani (2002), highlights that a Small Business is highly likely to initially encounter barriers that prevent it from first developing a Web infrastructure and will also encounter problems with its subsequent development. Likewise, Figure 2.3 highlights that the barriers’ and problems’ origins can be either internal or external to the organisation but regardless of their origin, have the potential to negatively impact upon the Small Business’s ability to develop and exploit a Web infrastructure.

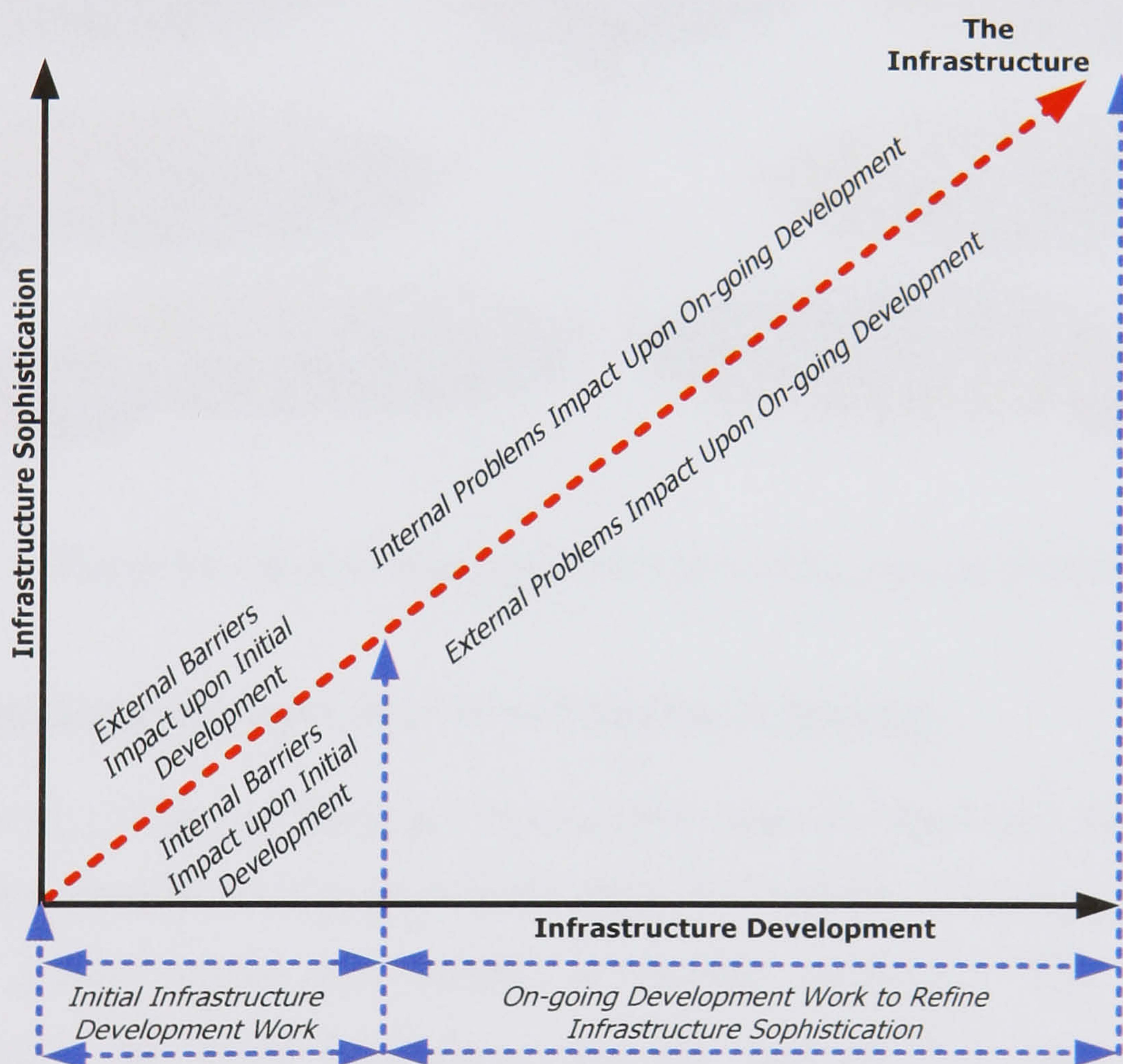


Figure 2.3 – Barrier and Problem Impact and Origin

2.4.2 Identifying Web Infrastructure Barriers and Problems

As discussed above, in order to critically analyse and discuss the origin, nature and impact of those barriers and problems that can impact upon the Web infrastructure development process the framework developed by the author and reported within Boyes & Irani (2002, 2003) will be used. Within that framework (see Figure 2.4), seven key Web infrastructure barriers and problems are identified, each of which has

the potential to negatively affect the successful development of a commercial Web infrastructure by a Small Business and can act to restrict an infrastructure's on-going development. That framework has been chosen for use since it will facilitate the structured analysis of current literature that considers a highly diverse range of issues and factors that impact upon the development and exploitation of a commercial Web infrastructure by a Small Business.

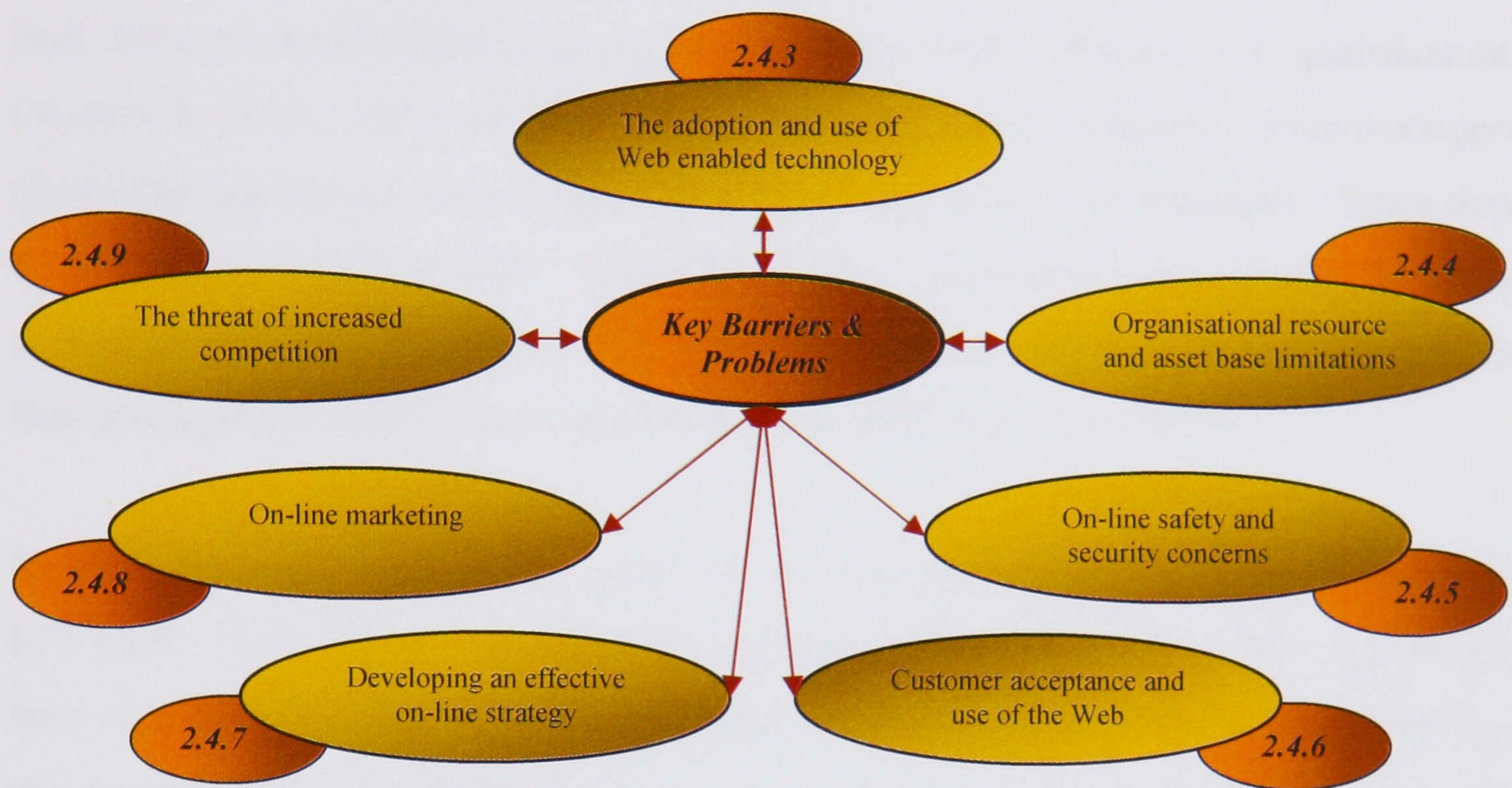


Figure 2.4 – Web infrastructure Development Barriers and Problems

2.4.3 The Adoption and Use of Web Enabled Technology

Sillence *et al.* (1998) and Dutta & Evrard (1999) maintain that many Small Businesses are largely unfamiliar with the use of the Web, ICT and PC technology in general, and that this greatly limits their ability to initially develop a Web infrastructure. Consequently, the Small Business's own ignorance of Web enabled technology represents a major *internal barrier* to their development of a Web infrastructure (Chesher & Skok 2000, Skinner 2000, Carter *et al.* 2002, Levy & Powell 2002, Jones *et al.* 2003, DTI 2004a) and they remain significantly less likely than large organisations to possess a functional infrastructure because of it. For example, 17% of UK Small Businesses cite their own lack of understanding of the technologies involved in creating a Web infrastructure to be a significant barrier to an infrastructure's development and maintenance (DTI 2004a). Commenting upon that, Webb & Sayer (1998 p.250) note that for the Small Business owner/manager:

“... by far the most pressing concern ... was the fear of not understanding fully what technology can do to help business success. The majority of Managers expressed a feeling that they were incapable of keeping abreast of technological progress”.

Likewise, the DTI (2004a) conclude that internet use and connectivity for Small Businesses might have now reached a plateau whilst the DTI (2004b) report that less than 50% of Small Businesses employ someone with a formal ICT qualification. Chesher & Skok (2000) similarly report that many Small Business owner/managers place little importance upon keeping abreast of current ICT developments. Since they do not perceive ICT to offer ‘Value for Money’, they also perceive that the costs associated with the development of a Web infrastructure will far outweigh any benefit that development could bring (Chesher & Skok 2000, Rao *et al.* 2003).

Small Businesses’ unfamiliarity with ICT is compounded since many lack dedicated ICT staff. Their absence precludes the development of the organisational knowledge base vital to addressing the owner/manager’s ignorance of ICT and to understanding the complexities of modern hardware and software involved in the creation and subsequent refinement of a Web infrastructure (Skinner 2000, Boyes *et al.* 2002). That issue is further compounded by the rate at which those technologies evolve and change. As Pollard & Hayne (1998) and Boyes *et al.* (2002) note, PC based technologies continue to increase in sophistication while their price (relative to their performance) continues to fall. Consequently, software and hardware quickly becomes obsolete, maintaining ones’ understanding of new ICT becomes increasingly time consuming while the complexity of the technology available for use within the business increases at an almost exponential rate (Pollard & Hayne 1998, Boyes *et al.* 2002). Within the context of the Internet and Web, that rapid rate of change has resulted in many Internet technologies having short life-cycles and has made the creation of an industry standard, user-friendly Internet access platform almost impossible to achieve (BBC 2005). Thus, a lack of dedicated ICT staff and an organisational inability to understand and deploy Web enabling technology effectively act as both *internal barriers* to an infrastructure’s initial development and cause *problems* for its subsequent refinement while the rapid rate of technological change

represents a major *external barrier and problem* to many Small Businesses' Web infrastructure's development.

Despite ICT's falling price-performance ratio, many Small Businesses remain highly sensitive to capital investment costs and that can preclude the initial purchase and subsequent renewal of the ICT needed to develop and refine the infrastructure (Sparkes & Thomas 2001, Carter *et al.* 2002, Rao *et al.* 2003, DTI 2004a). Investment sensitivity acts as a further *internal barrier* to the development of the infrastructure. Furthermore, should the Small Business successfully negate that barrier, it is probable that their unfamiliarity with Web technologies, cost sensitivity and lack of dedicated ICT staff will cause on-going *internal problems* with the infrastructure's subsequent refinement.

There are also *external barriers and problems* concerning the adoption and use of Web enabled technology. Several sources contend that the world's telephone networks cannot support the demands being placed upon them by the large numbers of organisations now connecting to the Internet (Office of the E-Envoy 2001, Carter *et al.* 2002). Since the world's telephone networks have been designed to carry voice calls, adapting them to carry data at speed results in very narrow bandwidth, poor connection speeds and high access costs. Bandwidth restrictions continue to be recognised as an *external barrier* to the development of Web infrastructures by UK Small Businesses despite the growing availability of broadband access solutions. For example, the (still) limited availability and high (relative) cost of broadband Internet access is recognised as a major barrier to the adoption of web technologies. 50% of UK Small Businesses cite the lack of affordable broadband as a major barrier to the adoption of Internet technologies by UK Small Businesses (DTI 2004a). The lack of affordable broadband greatly limits the range of bandwidth intensive features that can be deployed via the infrastructure and thus cause *external problems* for the Small Business's Web infrastructure's on-going refinement.

Only half of the UK's home internet users and 37% of SMEs currently make use of broadband Internet connections (Office of Communication 2004, 2005). The issue of bandwidth is relevant since it is recognised as a factor that significantly reduces both Web users' and Web infrastructure owners' desire to use the medium. For example,

Martin & Matley (2001) and Rao *et al.* (2003) argue that the Small Business Web infrastructure development process begins with the development of a static non-interactive infrastructure (see Table 2.1). However, since such infrastructures are often incapable of delivering anything other than limited business benefits to their owners and routinely fail to add significant value to their users' interactions with the organisation, the Small Business will quickly 'outgrow' its initial infrastructure and will attempt to supplement both the content and interactivity it provides (thereby refining its sophistication). The ability of such interactivity enhancements and multi-media rich content to supplement and improve users' on-line experiences (and through that increase their willingness to fulfil the business objectives of the infrastructure (an on-line sale for example)) are well documented. Day (1997), Dholakia & Rego (1998), Hsieh & Lin (1998) O'Keefe *et al.* (1998), Shih (1998), Van Nierkirk *et al.* (1999) and Chen & Sockel (2004) all postulate that multi-media rich content greatly improves users' enjoyment of the medium and actively increases the extent to which they interact with the sites they visit, fulfil the underlying purpose of the site and return to these sites in the long-term. However, as Lu & Yeung (1998), Williams (2000) and the Office of the E-Envoy (2001) note, narrow bandwidth greatly limits the extent to which such interactivity enhancements and rich content can be deployed. Raman & Lackenby (1998) note that as Web users become more experienced in the use of the Web, they become increasingly intolerant of download delays and more demanding of the content and features provided on-line. Consequently, bandwidth restrictions greatly limit the ability of a Small Business to enhance the sophistication of its infrastructure to provide value adding on-line features and rich content, and negatively affect their infrastructure's users' enjoyment of the medium and their desire to interact with the organisation.

2.4.4 Organisational Resource, Cost and Asset Base Limitations

Contrary to Section 2.3.1 several authors argue that the development of an effective Web infrastructure requires a significant financial investment (Chesher & Skok 2000, Skinner 2000, Vescovi 2000, Anckar & Walden 2001, Rao *et al.* 2003, Fillis *et al.* 2004). Commenting on the belief that it is possible to develop a commercially successful Web infrastructure with minimal investment Vescovi (2000 p.111) states that:

“... *the illusion that it is possible to gain relevant results without investing in people, time and technology is not part of the virtual world, it is part of dreamland*”.

Patel & Irani (1999 p.37) regard the adoption of ICT to be one of the most expensive, complex and time consuming tasks that an organisation can undertake. As a result, many Small Businesses regard ICT adoption as a ‘high risk’ strategy since project ‘failure’ might result in bankruptcy for the firm (Pollard & Hayne 1998, Lynn *et al.* 1999). Consequently, a Small Business’s *actual* or *perceived* lack of financial resource represents a major *internal barrier* to the development of a Web infrastructure (Chesher & Skok 2000, Vescovi 2000 and Anckar & Walden 2001). That conclusion is supported by the DTI (2004a) who maintain that the high initial purchase cost and on-going upgrade cost of hardware and software are also major *internal barriers* to the use of the Web by UK Small Businesses. Those barriers act to dissuade many Small Businesses from attempting to develop an infrastructure ‘in-house’ thereby exploiting the medium’s potentially low cost base (Bennett 1997, Anckar & Walden 2001). As noted above however, employing a professional Web developer to overcome those barriers may simultaneously prove to be prohibitively expensive for the Small Business (Clapham 2002).

Should the Small Business possess the financial resources required to outsource its infrastructure’s development it may still encounter problems. As Remenyi & Sherwood-Smith (1999) and Boyes (2001) note, many outsourced ICT projects fail (in that they do not deliver the benefits originally anticipated) since external developers often concentrate upon delivering a technology focused solution rather than delivering a business focused solution. That is because they lack the holistic understanding of the business needed to do so. In that situation, the project still incurs (potentially high) costs yet fails to deliver the business benefits originally envisioned by the project’s stakeholders who have progressively become disenfranchised from the project as it has developed. That situation is compounded for Small Businesses because they are often unable to clearly express or communicate their business objectives to the developer hired to develop their Web infrastructure and routinely delegate all responsibility for its design as a result (Geissler 2001, Jones *et al.* 2003). The Small Business still incurs the costs associated with outsourcing the project yet

fails to capitalise on the expertise that the developer was hired to provide. Since that technological solution is likely to be based upon the Internet's open architecture software and hardware platforms it is unlikely to deliver a *sustainable* competitive advantage to its owners because its design can be easily copied by rivals and its functionality quickly replicated (Porter 2001, Levy & Powell 2002, Martin 2004). Those issues act as significant *external barriers* to an infrastructure's development. The initial and on-going development of the infrastructure can highlight shortfalls in the Small Business's skill mix and the human resources available to it. Attempts at in-house development work may serve to graphically highlight the lack of skills, knowledge and time available to develop the infrastructure. Consequently, the Small Business's own shortcomings act as both *internal barriers* and *problems* to the infrastructure's initial and on-going development and can affect its ability to achieve the objectives set for it. That issue has not gone unnoticed and many Small Businesses now recognise that they lack the skills needed to develop and refine an infrastructure. For example, Auger & Gallagher (1997) maintain that the most significant barriers to the adoption of Web technology by Small Businesses are their own lack of ICT knowledge and skills, and their inability to promote their Web infrastructures (thus highlighting their lack of marketing expertise). Similarly, Blackburn & Athayde (2000) report that the majority of Small Businesses recognise that they need further ICT training in order to develop and maintain a Web infrastructure while both Taylor *et al.* (2001) and Mullins *et al.* (2001) report that the majority of SMEs believe that they require outside help and/or further training to develop and maintain an effective Web infrastructure. Jones *et al.* (2003) and Martin (2004) regard the lack of appropriate skills among the workforce as a major barrier to the use of the Web by many Small Businesses while Chesher & Skok (2000) argue that many Small Businesses lack the fundamental skills required to exploit Internet based technologies effectively. In light of that conclusion, they further comment that:

"... the objectives behind an ICT strategy for SMEs must focus not only upon hardware and software issues, but recognise the key issue of people skills to make things happen – termed peopleware" (Chesher & Skok 2000, p.19).

Many Small Businesses lack the *'peopleware'* deemed so vital by Chesher & Skok (2000). For example, several authors argue against an ICT Manager being made

responsible for the development and on-going maintenance of an infrastructure since they are unlikely to possess the holistic understanding of the business's strategic/operational objectives needed to do so effectively (Taylor *et al.* 2001, Clapham 2002). Rather, a cross-functional team, led by the Marketing Manager, should drive the project since that team will possess the necessary holistic understanding of the business. Yet as Chesher & Skok (2000) and DTI (2004b) point out, many Small Businesses employ neither an ICT nor Marketing Manager and thus do not enjoy the luxury of debating which one should lead the development process!

A Small Business's lack of organisational skills, knowledge and competences act as *internal barriers* to the infrastructure's initial development and will cause *internal problems* for its future refinement. While the procurement of organisational training might help overcome those barriers and problems, the Small Business's potential lack of financial resources could exacerbate the issue by placing a further burden upon a potentially already stretched asset base and as both Lange *et al.* (2000) and Taylor *et al.* (2001) note, the Small Business may be unable to afford such training. Likewise, the lower economies of scale available to Small Businesses investing in staff training via formal schemes (e.g. Investors In People) compound those issues further while the Small Business may be unwilling to spare the time to train its staff due to the 'lost' production that involves (Lange *et al.* 2000, Taylor *et al.* 2001).

Resistance to change within the Small Business can also act as an *internal barrier* and *problem* to the initial development and further refinement of the Web infrastructure. As Irani *et al.* (1998) note, all ICT projects can encounter resistance to change from those affected by the project, which acts as a significant barrier to the successful adoption and integration of the proposed ICT within the organisation. For example, the Small Business owner/manager and his employees may harbour concerns regarding the changes that ICT will bring to their work patterns and work loads, and may be concerned that their organisation's adoption of ICT will greatly diminish both their own standing within the organisation and the value of their existing knowledge and skills (Anckar & Walden 2001, Rao *et al.* 2003, Fillis *et al.* 2004). Since infrastructure development might lead the Small Business to re-examine and possibly modify its underlying business model and operations (Roberts 2000, Sparkes & Thomas 2001, Shiels *et al.* 2003), it appears likely that the development project will

encounter the resistance to change identified by Irani *et al.* (1998). Several previous studies support that proposition. The researchers Vescovi (2000), Anckar & Walden (2001) and Fillis *et al.* (2004) have found that Small Business owner/managers are often reluctant to address the ICT skills gap within their organisation because they understand neither the technology nor its potential role. They therefore fail to recognise the value of equipping their organisation with either ICT or ICT skills. Likewise, Small Business owner/managers often refuse to train staff because they resent employees who possess a deeper understanding of a subject than themselves and thus refuse to fund such training (Lange *et al.* 2000). Similarly, because Small Businesses prefer to 'buy in' skilled staff rather than train their existing workforce, many owner/managers are reluctant to train their staff fearing that they will subsequently be 'poached' by business rivals (Lange *et al.* 2000).

It is also possible to identify *external barriers* to the development of the Web infrastructure. Several previous studies have highlighted Small Businesses' general dissatisfaction with third-party training solutions. For example, DTI (2004a) report that only 20% of Small Businesses use Central Government business support agencies and that only 52% of those that do, find it beneficial to their business. Those findings mirror those of Lange *et al.* (2000) whose survey of Scottish SMEs revealed that Small Business owner/managers are routinely unable to identify the relationship between training costs and organisational benefit. Consequently, Small Businesses are highly reluctant to fund 'off-the-job' training particularly when that training is being provided by Government Agencies. Perhaps because of such concerns there appears to be a general dissatisfaction with the ability of third party training solutions to add value to a business on the part of UK Small Businesses. Blackburn & Athayde (2000) report that while many UK Small Businesses are aware of their ICT skills shortages the majority perceive formal training to be of no use because it adds no value to their business. Those issues suggest that the perceived inadequacy of external training solutions to address a Small Business's ICT skills shortages likewise acts as an *external barrier* to the adoption of a Web infrastructure which is itself compounded by many Small Business owner/managers' perceptions that external training solutions can add little value to their organisations despite their recognition of their business's skills and competences shortfalls (Martin 2004). Not only may the Small Business lack the hardware, software, skills and competences needed to develop its Web infrastructure.

it may simultaneously be unable to address that due to limited finances or be unwilling to address that due to internal resistance to change or pre-conceived views of the benefit of external training.

Should a Small Business possess (or acquire) the resources and skills to develop a Web infrastructure, it may still encounter problems with its on-going maintenance and development. As Hsieh & Lin (1998), Porter (2001) and Martin (2004) note, the continuing success of a Web infrastructure is largely dependent upon an organisation having both the resources and skills to maintain it (even if the original build was outsourced to a third-party developer) and the capacity and ability to adequately satisfy the new customers, orders and enquiries that it generates. Further refining the infrastructure may require that additional technical training be provided to staff thus further increasing the infrastructure's on-going costs (O'Keefe *et al.* 1998, Taylor *et al.* 2001). Staff will likewise have to spend time dealing with customer queries and responding to (potentially unsolicited and frequently time-wasting) e-mails. All of those activities might be new to the Small Business but each requires limited and often already stretched resources be allocated to those tasks.

Many organisations remain reluctant to provide employees with Internet access fearing it will be abused and time wasted through 'cyber-slacking' (DTI 2004b). Furthermore, the direct interaction with customers afforded by the infrastructure can lead to a Small Business having to manage tasks such as order taking and credit control for the first time (O'Keefe *et al.* 1998, Howitt 1999, Skinner 2000). Direct overseas sales will require the business to ensure its compliance with local customs requirements, international tax law and the local trade laws applicable within its newly created foreign markets but developing the infrastructure may force the Small Business to consider those issues for the first time (Rao *et al.* 2003). Guaranteeing compliance may involve further training, fresh financial investment or both (Rowley 1998, Taylor *et al.* 2001). As the DTI (2004a) note, many Small Businesses lack the vital *back-office* infrastructure to service and support customers outside of the business's traditional geographical markets. Should they lack such a back office infrastructure and outsource those tasks to compensate, that strategy often proves to be

unprofitable due to the costs and commission payments it entails¹ - typically 10% of the final sales price charged by Small Businesses for goods exported into foreign markets is routinely lost through the extra formalities and paperwork associated with trade within non-domestic markets (Fariselli *et al.* 1997). That analysis suggests that the potential inadequacy of the Small Business's supporting back-office infrastructure might only become apparent as the business begins to refine its infrastructure's sophistication yet clearly has the potential to cause significant *problems* for the achievement of the business's on-line objectives and goals. That argument strongly suggests that the use of a Web infrastructure might actually *increase* an organisation's operating costs rather than reducing them.

2.4.5 The Issues of Online Security and Safety

The issues of on-line security and safety also represent significant barriers to many Small Businesses' adoption of Web infrastructures. For example, The Times (2004) report that 64% of SMEs regard data security as their principle IT concern while the DTI (2004b) comment upon the high number of security threats routinely encountered by UK businesses (the average UK business deals with over 20 virus infections each year and faces repeated probes to its Web site and network). Small Businesses' perceptions that Web based trade is insecure act as a significant *internal barrier* to their development of anything other than a functionally limited, static Web infrastructure and as an *internal problem* to such an infrastructure's further development (Rao *et al.* 2003, Fillis *et al.* 2004).

Udo (2001) and Get Safe Online (2005) argue that Internet users' perceptions of the in-security of divulging credit card and other personal information to Web sites are major factors impeding the further commercialisation of the Web. Those users' perceptions act as both an *external barrier* to the initial development of a transaction enabled Web infrastructure and as a *problem* to the on-going refinement of an existing Web infrastructure by a Small Business so that it incorporates the sophisticated transactional functionality highlighted within the development models contained

¹ For example, following a discussion with the Owner Manager of the business concerned, the author has discovered that the Small Business referred to by Lake (1999) as a practical example of the ease with which a Small Business can develop a global customer base at low cost via the development of a Web infrastructure has now ceased to trade with all non-domestic on-line customers as a result of the unprofitably high costs incurred when doing so.

within Table 2.1. While within the physical world the four basic tenants of a 'secure' communication (Authenticity, Integrity, Non-Repudiation and Confidentiality) are easily achieved, they can only be replicated on-line through the use of complex encryption technologies (Wilson 1997, Singh 2000).

While UK Government initiatives such as the Regulation of Investigatory Powers Act and the Consumer Protection (Distance Selling) Regulations have sought to address both individual and organisational concerns regarding the safety and security of on-line commerce, those concerns still remain (Thomas 2002, Get Safe Online 2005). For example, rather than reducing fears over on-line security the Regulation of Investigatory Powers Act has arguably increased them since it has highlighted to many UK organisations and consumers that the Internet is far from secure and that any attempt to make it more so may be illegal (Thomas 2002). Get Safe Online (2005) report that 17% of UK Internet users now fear on-line crime more than physical crime but that only 13% of users perceive that they have the knowledge needed to adequately protect their on-line safety and security. Similarly, Hoffman *et al.* (1999) report that 94% of Internet users regularly decline to provide personal information to Web sites since they doubt the security of doing so despite that refusal preventing any further interaction with the site in question and that 40% of Internet users deliberately provide false or misleading information to Web sites in order to protect their on-line security.

Despite the existence of encryption security and the legal protection of ones' personal information, many UK organisations and Internet users now harbour concerns (both real and perceived) regarding the security of on-line trade. That issue of security acts as both an *internal* and *external barrier* and *problem* to the Small Business Web infrastructure development process since as Rowley (1998 p.90) notes:

"... it is not only actual security but also people's perceptions of on-line security that are important".

As authors such as Singh (2000) and Coa *et al.* (2005) point out, as long as breaches of on-line security occur (for whatever reason) Internet users and Small Businesses will continue to question the security of transacting business on-line. For a Small

Business, overcoming the barriers and problems caused by on-line security may prove to be impossible. As Fariselli *et al.* (1997) and the DTI (2004a) note, the lack of a globally accepted on-line payment mechanism (e-cash) and the widespread lack of consumer confidence in existing on-line payment systems has led to much research being undertaken to develop a secure on-line payment mechanism for use by organisations and consumers. However, since that research is primarily funded by large organisations (Visa and Mastercard for example) and national agencies, Fariselli *et al.* (1997) argue that the on-line payment system ultimately developed is unlikely to be suitable for use by Small Businesses since it will be designed to satisfy the requirements of larger organisations who will accept a high initial cost for the system's implementation in return for longer-term economies of scale. As discussed within Section 2.4.4 many Small Businesses may be unable to implement the payment mechanism because of their limited financial resources and high investment cost sensitivity but may be simultaneously unable to afford to exploit existing payment and security systems to quell their customers' security concerns. As a result, their ability to successfully trade on-line will be hampered both now and in the future since they will be unable to offer their customers (whether organisational or consumer) access to a high-confidence, global, 'secure' payment mechanism.

Just as the issue of on-line security can act as both barrier and problem to an infrastructure's development, so can infrastructure user concerns regarding safety and privacy. Access to pornography is now widely available via the Internet and just as legitimate businesses have flourished on-line so have the Internet conmen, frauds, fakes and blatant scams (Bennett 1997, Palumbo & Herbig 1998, Attaran 1999). As discussed within Section 2.3.2 a Web infrastructure offers few cues to the size, status and legitimacy of the organisation that owns it. Their absence makes it extremely difficult for users to gauge its legitimacy without first transacting business with it. Furthermore, the low costs associated with creating a Web infrastructure and the ease of market entry it affords makes establishing a Web presence a relatively straightforward proposition. While that might be considered one of the medium's greatest strengths (see Section 2.3) it has also resulted in fraudulent businesses and fraudulent business practices flourishing on-line (Baker 1999). The relative naivety and innocence of many Web users and the Internet's lack of regulation have further compounded that problem (Attaran 1999, Baker 1999, Get Safe Online 2005) while

its lack of regulation and dispensed global nature has made policing it and protecting its users from malicious, offensive or illegal material and misleading, fraudulent or illegal business practices hard to achieve. As Baker (1999 p.357) notes:

“The Internet is a global information system but there is no global security regulator. Hence fraudulent and misleading schemes operate relatively unchecked in cyber-space”.

Hoffman *et al.* (1999) argue that Internet user concerns regarding the safety of on-line transactions and on-line privacy fall into one of two types: environmental or secondary control issues. Environmental control issues encompass one's perceptions of the on-going security of the immediate on-line environment while secondary control issues encompass one's concerns regarding how any information provided will subsequently be stored and used. Within the real world consumers have little control over those issues and so choose to disregard them but on the Web users are able to exercise strong environmental and secondary control over their on-line actions (Hoffman *et al.* 1999). The presence of either type of control issue results in the user refusing to interact with the Web infrastructure in question (Hoffman *et al.* 1999). Not only must on-line trade be secure but it must also *appear* secure thereby reassuring users by quelling both their environmental and secondary control concerns.

There is some evidence to suggest that many organisations largely fail to address users' environmental and secondary control concerns. For example, the US Senate report that whilst 93% of Web infrastructures routinely collect information from their users only 9% comply with the US Federal Trade Commission's 'Fair Information Practices Guidelines' for its subsequent use and sale to other organisations (Hatch 2000). Perhaps as a result of that practice (commonly termed 'data mining'), 87% of US Internet users simply do not trust the Web sites they visit enough to actively interact with them (Hoffman *et al.* 1999, Hatch 2000). As Hoffman *et al.* (1999 p.82) note:

“The reason on-line consumers have yet to shop on-line in great numbers...is because of the fundamental lack of faith that currently exists...on the Web today”.

Hoffman *et al.* (1999) and Coa *et al.* (2005) argue that Internet users' concerns regarding their on-line privacy and safety will greatly hamper organisations' abilities to exploit the Web as a potential source of customer information since its collection is entirely dependent upon those users' willingness to divulge it. However, the majority of organisations do little to address users' secondary control concerns since the majority operate an 'opt-out' rather than an 'opt-in' policy with regard to the collection, use and subsequent sale of the user information they collect despite users' disdain for that practice (Hoffman *et al.* 1999). Some researchers advocate and recommend the on-going collection of customer information via data mining because of the perceived commercial value of such information (see Chen & Sockel (2004)). However, those researchers simultaneously fail to address Internet users' disdain for such practices. Hoffman *et al.* (1999) argue that that explains why the majority of Internet users refuse to use transaction enabled Web infrastructures or interact with the sites they visit; within the UK only 45% of Internet users currently shop on-line (IMRG 2005). That issue clearly represents a major *external barrier* to the development of the functionally sophisticated Web infrastructures detailed within Table 2.1. Furthermore, since both environmental and secondary control concerns increase as a user becomes more proficient and experienced in the use of the Web that issue represents a significant *external problem* to those Small Businesses attempting to further refine their Web infrastructures (Hoffman *et al.* 1999).

Safety and security concerns clearly represent major barriers and problems to the sophisticated use of a Web infrastructure by a Small Business. Not only must the business invest sufficient resources to quell its customers' secondary control concerns it must also forego the arguably tempting option of engaging in data mining activities (unless such activities are undertaken in a manner that will not alienate the site's user base). Yet even if it follows that course of action its infrastructure's users may still refuse to interact with it or use it as a transactional channel because they doubt its legitimacy due to the Small Business's lack of market presence within the physical world.

2.3.6 Customer Acceptance and Use of the Web

Both Doherty *et al.* (1999) and Porter (2001) conclude that the use of the Web acts to largely redefine the organisational/customer relationship by bringing the customer closer to the retailer via a combined marketing/distribution channel within a bi-directional relationship within which more power ultimately accrues to the customer. That in turn suggests that while customers might expect an organisation to establish a Web infrastructure, they will use it only when it is convenient to do so (Cunliffe 2000, Macpherson 2000, Anckar & Walden 2001, Tetteh & Burn 2001). Therefore, if an organisation's customers are to use its infrastructure as their preferred means of interaction the organisation must give them a clear reason for doing so. Customers will transact business electronically only when the benefits on offer outweigh the medium's inherent and perceived limitations, and when the infrastructure adds value to the way in which they engage and interact with the business (Webb & Sayer 1998, Anckar & Walden 2001, Porter 2001, Tetteh & Burn 2001, Rao *et al.* 2003, Zhu & Kraemer 2003, Chen & Sockel 2004). Consequently, the issue of customer acceptance/adoption of the Web infrastructure can act as an *external problem* to its on-going refinement and can limit its beneficial impact upon a Small Business. As Zhu & Kraemer (2003 p.256) note:

“the benefits of e-business initiatives ... depends not only on [the business's] efforts to digitise its value chain, but also on the readiness of its business partners, suppliers and customers to engage in electronic interactions and transactions.”

Abels *et al.* (1997, 1999), Kianni (1998), Hoffman *et al.* (1999), Jones *et al.* (2003) and Chen & Sockel (2004) all note that many organisations' Web infrastructure design activities focus primarily upon the technical aspects of infrastructure development and largely ignore the issue of customer focused 'added value'. Those authors maintain that an infrastructure designed in that way is unlikely to offer any clear benefit over traditional channels for its users and that the organisation's customers might choose not to use it to interact with the business as a result. Instead they will continue to use it as an informational (rather than commercial or transactional) channel. However, the development models contained within Table 2.1 appear to advocate that approach

since they promote the initial development of an unsophisticated infrastructure that is gradually and incrementally developed over time.

Many Small Businesses initially develop Web infrastructures without paying sufficient attention to how they will add value for users thereby giving them a clear reason to continue to use it in the long-term (Anckar & Walden 2001, Chen & Sockel 2004, DTI 2004a). For example, Geissler (2001) reports that many organisations' primary reason for initially developing an infrastructure is to collect marketing/demographic data from customers but that those organisations remain unwilling to offer anything in return for divulging such data (and as Hoffman *et al.* 1999 note, also routinely fail to address users' secondary control concerns). Those infrastructures prove to be ineffective in meeting their owners' initial business objectives because they fail to add any value to users' interaction with the organisation. Since such infrastructures are designed with only their owners' needs in mind, users routinely find them misaligned to their requirements, difficult to navigate, overly complex and lacking in the key features and functionality they expect (Clapham 2002). As a result, the infrastructure's users choose not to interact with it despite the wishes of its owners. The resulting low levels of user interaction jeopardise the infrastructure's future on-going development. The resource limitations discussed in Section 2.4.4 act to limit Small Businesses' desire to invest in Web technologies unless there is likely to be an immediate benefit but as discussed above, for many Small Businesses that is unlikely to be the case.

Since Small Businesses often have little need of internal Internet based communications systems (since they employ fewer staff who are predominantly based in the same geographical location), they are highly reluctant to invest in an externally focused Web infrastructure unless their customer base and trading partners have already embraced the Web as a communication/trading channel because otherwise the direct financial return from such a venture is likely to be low (Sillence *et al.* 1998, Howard 2001, Sadowski *et al.* 2002, Zhu & Kraemer 2003, DTI 2004a). Hence, their existing customer/trading partners' current non-exploitation of Web technologies can act as a further significant *external barrier* to the initial development of a Web infrastructure while their own failure to initially develop an infrastructure that adds

sufficient value for its users can cause *external problems* for its on-going refinement and development.

Katz & Aspen (1998) and Wyatt (1999) both argue that even if an organisation develops a truly 'value-adding' Web infrastructure there will always be customers that will actively choose not to use it. The findings of the UK Government's Strategy Unit (2005) support that proposition. They report that 53% of the UK's non-internet users have no intention of ever using the Internet. That can cause *external problems* for the long-term refinement of an infrastructure because while customer adoption of a technically sophisticated infrastructure is largely assumed to be automatic within the models contained within Table 2.1 the Office of National Statistics' (2004a) findings refute that assumption. While the Web may offer unrivalled access to a vast range of organisations, products and services, the huge choice on offer overwhelms many users and dissuades them from using it for anything other than 'recreation' (Jones & Vijayarathy 1998, Rowley 1998, Doherty *et al.* 1999). Furthermore, the Web's relative lack of regulation and structure can make it difficult for users to find what they are looking for since the complexities associated with searching for specific products and services, and the huge numbers of sites of potential interest routinely identified by search engines can make the Web unusable unless a user already knows the name or URL of the organisation that they are searching for (Rowley 1998, Porter 2001, Chen & Sockel 2004). That quite clearly negates many of the Small Business market penetration and new customer access advantages discussed within Section 2.3.2 and 2.3.3 – if a customer cannot find a Small Business's Web infrastructure they will be unable to use it! Similarly, user perceptions regarding the security and safety of divulging credit card and personal information on-line and their concerns regarding the legitimacy of many Web sites further acts to dissuade potential customers (Hoffman *et al.* 1999, Hatch 2000, Udo 2001). Those issues cause *external problems* for the infrastructure's on-going development since they negate many of the customer perceived benefits associated with being able to source products and services via the Web and could explain why within the UK only 10 e-commerce retailers capture over 46% of on-line shopping revenues (IMRG 2004).

It is far from certain how many of a Small Business's customers will adopt its Web infrastructure as a commercial channel and whether those that do will do so in

sufficient numbers to allow the business to realise the potential benefits and financial return originally envisaged. Customer adoption and use issues consequently act as *external barriers* and *problems* for the Small Business's development and refinement of its Web infrastructure since they have the potential to significantly limit what the business can achieve via the use of the Web.

2.4.7 Barriers and Problems to the Development of an On-line Strategy

Within the UK Small Business sector ICT is still largely associated with improving the day-to-day efficiency of a business rather than being recognised as a strategic tool that can be harnessed to grow a business in the long-term (Igarria *et al.* 1998, Chesher & Skok 2000, DTI 2004a). The failure to recognise the strategic role that ICT and a Web infrastructure can play within an organisation represents a significant *internal barrier* to the development of an effective infrastructure. As Duhan *et al.* (2001) and the DTI (2004a) note, simply owning and using ICT does not automatically deliver competitive advantage. Rather, it is the way in which ICT is deployed and integrated within an organisation's on-going business operations, and how the information that it provides is managed and exploited in pursuit of its strategic goals that delivers competitive advantage. Consequently, developing an infrastructure without first developing an appropriate on-line strategy is highly unlikely to deliver an infrastructure that brings any *significant* benefit to its stakeholders.

To provide a Small Business with a competitive advantage an infrastructure must be fully integrated within its owners' business plans at a strategic level (Poon & Joseph 2000, Roberts 2000, Duhan *et al.* 2001, Shiels *et al.* 2003). Yet as Martin & Matley (2001) and Shiels *et al.* (2003) note, UK Small Businesses' generic ignorance of the strategic role that ICT can play within their businesses, and their subsequent failure to integrate their Web infrastructures within their wider strategic plans, results in many failing to realise the organisational benefits considered within Section 2.3. Poon & Swatman (1997) and Webb & Sayer (1998) conclude that over 50% of Small Businesses with Web infrastructures are unable to detect any tangible quantifiable benefit *whatsoever* and that the majority of Small Business Web infrastructures fail to generate sufficient revenue or cost savings to cover their on-going costs (DTI 2004a). Likewise, Benyon-Davies *et al.* (2002) report that 41% of Small Businesses are unable

to calculate the financial return delivered by their infrastructure while 23% cannot detect any tangible benefit from its ownership and operation. Those authors conclude that many Small Business's long-term use of a Web infrastructure is more an 'act of faith' than a testament to the organisational benefits that it has delivered. Similarly, Williams (2000) has found that over 50% of UK businesses regard the absence of tangible benefit delivered by their infrastructure to be an 'important' or 'very important' barrier to their continued presence on the Web. The work of Geissler (2001), Jones *et al.* (2003) and Shiels *et al.* (2003) highlights that many Small Business owner/managers have little or no understanding of their proposed infrastructure's strategic role. Those researchers also point out that those same managers are typically the driving force behind Web infrastructure adoption within their organisations. Clearly, any failure by the Small Business owner/manager to fully consider his infrastructure's strategic role and contribution represents an *internal barrier* to the realisation of the organisational benefits and advantages discussed above and a serious *internal problem* to its on-going refinement. That analysis adds further weight to the proposition that UK Small Businesses routinely fail to progress through the levels of infrastructure sophistication proposed within the development models and rationales contained within Section 2.1 due to their failure to develop an appropriate on-line strategy.

Commenting on the increases in ICT expenditure by UK organisations Kellock (2000 p.3) argues that:

"The payback hurdle of the hardware age has given way in the boardroom to a must have it mentality, with everyone playing catch-up even if they don't know why".

That statement highlights that peer pressure can act as an *external problem* for the coherent on-going refinement of a Web infrastructure. As Shiels *et al.* (2003) note, Small Businesses routinely establish infrastructures in response to peer pressure and out of a fear of being 'left behind' (rather than as part of a rational strategic plan). Their failure to integrate the Web infrastructure within their organisation's strategic plans results in the subsequent failure to capitalise on the benefits that its development and refinement could bring (O'Keefe *et al.* 1998, Webb & Sayer 1998, Doherty *et al.*

1999). Both Shiels *et al.* (2003) and Martin (2004) argue that the Small Business owner/manager's decision to develop a Web infrastructure is often not based upon the strategic benefits that such a move will bring. Rather, the decision is the product of the manager's opinions, experiences and beliefs that this is what a 'successful' business would do in the same situation. Levy & Powell (2002) argue that while the strategic planning and implantation of ICT is fundamental to long-term business success, within Small Businesses that process either simply does not happen or happens in a piece-meal (and therefore sub-optimal) fashion. Consequently, as Irani *et al.* (1998) note, Small Businesses routinely fail to fully consider how their ICT strategy fits within their wider long-term strategic plans thus greatly increasing the likelihood that their ICT investment will be ineffective in meeting the business objectives set for it.

It is not the use of Internet technologies per se that delivers competitive advantage. Rather, it is the way in which those technologies are harnessed to develop and deploy corporate strategy that confers it (Porter 2001). However, since many Small Businesses fail to develop the strategic plans into which their ICT strategies can be integrated the on-going refinement of the infrastructure fails to deliver the competitive advantages originally sought. For example, Webb & Sayer (1998) report that 83% of Northern Ireland SMEs have no identifiable Internet strategy or integrated ICT/Marketing plan whilst Mullins *et al.* (2001) conclude that the majority of European SMEs fail to undertake any strategic business planning. Likewise, the DTI (2004a) note that the majority of Small Businesses are unable to fully evaluate the beneficial impact that ICT might have had upon their businesses; as a result ICT is routinely regarded as 'cost' with many Small Businesses having no clear understanding of the strategic benefit it has delivered to the business.

The need to integrate an infrastructure within an organisation's wider strategic plans is largely ignored by Small Business owner/managers when they attempt to refine their Web infrastructures (Blackburn & Athayde 2000, Chapman *et al.* 2000, Kellock 2000, Roberts 2000, DTI 2001, Geissler 2001, Tetteh & Burn 2001). The widespread ignorance of the strategic role and importance of a Web infrastructure therefore represents a major *internal problem* for the on-going improvement of a Small

Business's infrastructure since that ignorance can greatly restrict its beneficial impact upon the business.

2.4.8 Developing and Deploying an Effective On-line Marketing Strategy

The issue of effective on-line marketing can act as both an *internal barrier* to the initial development of an infrastructure and can cause *problems* for its subsequent improvement for Small Businesses since they often lack the marketing expertise needed to develop and deploy an effective marketing strategy via an infrastructure (Auger & Gallagher 1997, Chesher & Skok 2000, Vescovi 2000, Jones *et al.* 2003). As Hoffman & Novak (1996b), Vescovi (2000), Chen & Sockel (2004) and Brock (2005) note, a different approach to that traditionally taken is needed to successfully market products/services via the Web. While traditional media command a largely captive audience, on the Web a different approach is needed because Web users are far from captive;

“...consumers not only actively choose whether or not to approach firms but also exercise unprecedented control over the management of the content they interact with.” (Hoffman & Novak 1996b p.44).

While the Internet may be the *“best value, most ubiquitous marketing tool of our time”* (Clapham 2002 p.8) many Small Businesses cannot exploit the medium because they lack marketing expertise. They often develop infrastructures whose content is dated, whose structure is overly complex and whose basic purpose has been lost amongst the multi-media enhancements deployed in a misguided attempt to replicate traditional audio/visual media (Clapham 2002). That is because, Day (1997) argues, businesses fail to recognise that the Internet is fundamentally a communications medium and so task the ICT Manager (rather than the Marketing Manager) with an infrastructure's development. Thereafter technical rather than communications considerations dominate development. That leads to the creation of an infrastructure that while technically sophisticated, fails to acceptably fulfil the required marketing function (Clapham 2002). That situation is compounded for Small Businesses since (as already noted) many lack the in-house marketing competences to market themselves effectively off-line, let alone on-line (Vescovi 2000, Taylor *et al.* 2001, Jones *et al.* 2003).

Should the Small Business possess or manage to acquire the marketing expertise vital to the development of an infrastructure that can fulfil its marketing function it might still encounter *external problems* in its deployment. The Internet is crude in its accommodation of social and cultural norms (Rowley 1998, Rao *et al.* 2003) but since an infrastructure can be accessed globally it must take account of the potentially diverse cultural, linguistic, social, legal and price requirements of every country that the Small Business intends to trade within. Adapting the marketing mix to meet that challenge is extraordinarily difficult (Quelch & Klein 1996, Palumbo & Herbig 1998, Doherty *et al.* 1999). For example, many organisations market their products and services at different prices within different geographical regions. While the Small Business may not wish to draw attention to that its infrastructure (if it contains pricing information) will do so regardless of its owner's wishes. The Web is an inherently visual medium yet different colours and symbols have markedly different meanings across different cultures. That can be difficult to accommodate within an infrastructure intended for global consumption. Similarly Privacy, Decency and Censorship laws differ from country to country yet each country's laws must be complied with for the Small Business to trade successfully within that country. While the refinement of a sophisticated infrastructure will force the business to adapt its marketing and electronic offering to take account of those factors that remains difficult to achieve in practice. In attempting to appease everybody through their consideration, the Small Business risks creating an offering so bland that it actually satisfies nobody (Palumbo & Herbig 1998).

The integration of an infrastructure's marketing function within the business's wider communications strategies can also cause *internal problems*. If neither the infrastructure nor the new communication channels that it creates are managed and integrated within the business's other marketing communication operations, its inability to communicate effectively will be graphically highlighted. As Vescovi (2000) notes, since many Small Businesses lack marketing and ICT expertise their Web infrastructures are often managed in isolation from their other communication channels. Consequently, far from being a formidable tool for the development and delivery of a unified marketing and communication strategy many Small Businesses' infrastructures primarily serve to reinforce the disjointed nature of their overall marketing effort (for example, the infrastructure provides incorrect or obsolete pricing

information, it offers products that are unavailable. it promises unrealistic enquiry reply lead-times and may even contradict other off-line marketing material). While the successful use of an infrastructure as a marketing tool requires a reasoned, unified and combined marketing effort, those issues can cause serious *internal problems* for the Small Business. The deployment and maintenance of a sophisticated infrastructure that operates effectively as a marketing tool can be highly complex and time-consuming to manage profitably (Hoffman & Novak 2000, Martin 2004).

In addition to on-line marketing being potentially problematic, user concerns regarding their on-line shopping experiences can cause further problems. Shopping “on-line” largely fails to replicate the social interaction and satisfaction derived from “a trip to the shops” and requires a conscious effort on the part of the user (Rowley 1998, Doherty *et al.* 1999). In that way, the infrastructure (from its owners’ perspective) is not a pro-active medium and on-line success relies to a great extent upon customers finding suppliers (Bennett 1997, Hart *et al.* 2000, Chen & Sockel 2004). The Web is therefore unlikely to replace traditional trading channels and infrastructures will potentially generate only small pre-planned purchases by consumers (Quelch & Klein 1996, Jones & Vijayasarthi 1998, Rowley 1998, Strader & Shaw 1999).

Porter (2001) argues that a Small Business’s lack of brand recognition (vital to reassure the customer, support their purchase decisions and facilitate product/service differentiation on non-price based dimensions) will result in it being unable to differentiate its products and services by anything other than price despite its desire to charge for the value it has added to its offering. That clearly has implications for the revenues likely to be generated via on-line sales and may prompt the Small Business to fundamentally question the logic underpinning its decision to establish an infrastructure at all if the direct financial return from doing so is likely to be low.

2.4.9 The Threat of Increased Competition

Jones & Vijayasarthi (1998 p.322) state:

“The Internet has spawned chaotic marketing environments that resemble flea markets with numerous vendors jockeying for consumers’ attention and loyalty”.

As a result, the high level of competition experienced on-line act as an *external barrier* to the initial development of a transaction enabled Web infrastructure and can cause *problems* for the refinement of an existing infrastructure so that it incorporates transactional functionality. The low market entry costs associated with trading electronically act to greatly increase the number of competitors within a particular market sector without regard to the competitors’ size or geographical location (Quelch & Klein 1996, O’Keefe *et al.* 1998, Porter 2001). That increases supply relative to demand reducing prices, market share and the potential profits available via on-line transactions (Haynes *et al.* 1998, Strader & Shaw 1999, Porter 2001). For example, Auger & Gallagher (1997) report that the majority of Small Businesses have found that their use of the Web has acted to *decrease* their profits because of the increased competition they have encountered on-line. Interestingly, Auger & Gallagher (1997) do not comment on the effect of ‘on-line’ competition upon those Small Businesses without Web sites. Despite the findings of Auger & Gallagher (1997) it is logical to assume that the *absence* of an organisational Web infrastructure does not preclude an organisation’s customers buying products or services from on-line competitors thereby depriving the organisation of its sales income. As Fillis *et al.* (2004) note, the failure to develop an infrastructure means that the Small Business would still suffer the effects of on-line competition regardless of its own Internet adoption. Dutta & Evrard (1999), Porter (2001) and the DTI (2004a) support that proposition and argue that the increasing exploitation of Web technologies has acted to greatly increase competition and erode market share for those organisations not exploiting Internet technologies. That analysis suggests that the use of the Web acts to reduce organisational profits, with the largest effects being experienced by those Small Businesses that already have Web infrastructures. Commenting on the impact of Web based trade upon the world’s markets, Porter (2001 p.64) notes that the Web:

“... tends to alter industry structures in ways that dampen overall profitability, and it has a levelling effect on business practices, reducing the ability of any company to establish an operational advantage that can be sustained.”

The increasing adoption of the Web as a transactional channel by its users makes it difficult for an organisation to compete on price alone (due to the high number of market entrants). That situation places enormous demands upon organisations' differentiation strategies (Haynes *et al.* 1998, O'Keefe *et al.* 1998). That in turn causes *internal problems* for the successful exploitation of a sophisticated Web infrastructure. That problem is highly pertinent for Small Businesses since many lack the marketing expertise needed to successfully differentiate themselves by anything other than price (Auger & Gallagher 1997, Chesher & Skok 2000, Vescovi 2000). Likewise, rather than offering Small Businesses a low cost yet effective communications tool Sillence *et al.* (1998) argue that many Small Businesses perceive e-mail to be fundamentally at odds with their basic marketing approach. While the use of e-mail can reduce a Small Business's costs, its impersonal nature often conflicts with the Small Business's desire to develop and maintain close personal relationships with its customers and suppliers (Vescovi 2000, Sparkes & Thomas 2001, Tetteh & Burn 2001).

While both Hoffman *et al.* (1995) and Sparkes & Thomas (2001) contend that the use of a Web infrastructure can enable a Small Business to differentiate itself from its larger competitors on non-price based dimensions (thereby enabling it to successfully increase the prices it charges for its products and services despite the existence of competition from larger rivals) it may be unable to successfully do that because of its own marketing shortcomings, the impersonal nature of the medium and the extent of competition encountered on-line. While the Small Business may invest heavily to establish and refine an infrastructure that equips it to offer exemplary customer service (thereby differentiating itself on non-price dimensions) it might fail to attract customers if it is not also the market's lowest price supplier given that Web users have virtually unrestricted access to every competitor within a particular market (Doherty *et al.* 1999). Commercial success via a sophisticated infrastructure therefore requires the Small Business to simultaneously combine high levels of quality and customer service with market leading prices, a strategy well accepted to be impossible to sustain in the long-term (Johnson & Scholes 1999, Porter 2001).

The low market entry costs and the direct access to customers the Web affords can enable organisations to bypass each other in the value chain: so called 'value chain

piracy' (Walters & Lancaster 1999, Porter 2001). Since the use of the Web greatly increases the ease with which new trading partnerships can be established, the Web greatly lessens the switching costs associated with changing suppliers (Porter 2001). That issue represents a serious *external problem* for many Small Businesses since the use of the Web arguably weakens the relationship enjoyed by value chain partners and can turn former trading partners into adversaries. That can place an enormous strain on the channel partners' relationship since they may still need each other's services to maintain their physical world trading channels (Dholakia & Rego 1998, O'Keefe *et al.* 1998, Porter 2001, Sparkes & Thomas 2001). While its infrastructure might enable the Small Business to shorten its value chain that might only be possible at the expense of commercial relationships that have taken years to establish. Furthermore, the resulting harm caused to its commercial relationships may prove irreparable thus harming its ability to continue its operations within the physical world. As Porter (2001 p.72) notes:

"Instead of emphasizing the Internet's ability to support convenience, service, specialisation, customisation and other forms of value that justify attractive prices, companies have turned competition into a race to the bottom".

2.5 Conclusions to the Background Theory

The development and deployment of an effective Web infrastructure appears to be a strategy well suited to the Small Business sector. Normative literature suggests that an infrastructure can be exploited as a low cost yet effective communication tool that makes one-to-one marketing possible via a medium that users find both stimulating and pleasurable. The interactivity afforded by the infrastructure can subsequently be utilised to more closely align the business's product/service offerings to its customers' requirements, thereby adding significant value for both parties. Moreover, the infrastructure can enable a Small Business to differentiate its products and services on non priced-based value adding dimensions thereby maximising the prices that it ultimately charges its customers. Similarly, the infrastructure can be used to deliver a significant contribution to the components of the business's value-chain by improving its relationships with its vendors and suppliers, by increasing the efficiency of its

internal and external operations and by enabling new sources of value to be created via the exploitation of its digital assets. A Web infrastructure can also offer the business an instant presence within global markets. That can subsequently be exploited to make a significant and sustainable contribution to revenue streams and profits thereby helping the business secure its own long-term survival and growth.

It is possible to identify several previous studies that have attempted to identify the stages of development that the infrastructure must pass through if it is to deliver competitive advantage to its owners. Their authors have developed theoretical models to document those stages. Therefore, while several such models exist, they appear to have much in common as detailed within table 2.1. Table 2.1 demonstrates that within each model infrastructure development is documented as a stage gate process that takes a Small Business from the unsophisticated to the sophisticated use of the Web.

An analysis of the normative literature suggests that despite the existence of such models and the development paths they advocate, the effective commercial exploitation of a Web infrastructure is a strategy difficult to realise in practice for many Small Businesses. That is because of the diverse range of inter and intra organisational barriers and problems that must first be overcome. That in turn suggests that on-line commercial success is far from guaranteed for UK Small Businesses. An examination of the relevant literature demonstrates that while it is possible to identify many barriers and problems to infrastructure development, one cannot accurately identify the true scale, nature and likely impact that they will have upon the development process. While previous studies have attempted to identify some of the barriers and problems to development, those studies appear limited since they have not considered precisely how their effects will be realised or how they could be avoided.

In its totality Chapter 2 has highlighted that three disparate streams of previous research can be readily identified; research that considers the Web infrastructure development process; research that considers the benefits that the development process can offer; and research that considers the barriers and problems to the benefits' realisation. While all three areas of research are clearly relevant to each other, previous work appears to have failed to consider those three areas in a holistic

manner. In essence, each area has been considered in isolation by earlier researchers. That suggests that current knowledge and understanding of the Web development process, its drivers and its inherent barriers and problems is not fully understood. That is because it is only by looking at the interplay that exists between these three (previously disparate) streams of knowledge that the impact and effect of each upon the other two areas can be understood. Without that holistic approach, any analysis of the Web infrastructure development process, its drivers and rewards, and its inherent barriers and problems is flawed. It is only by recognising and analysing the interconnectedness of those three areas that a robust and thorough understanding of infrastructure development can be gained.

Chapter 3.0: Conceptual Framework

3.1 Introduction

The concepts that underpin this study have been developed by the author from the normative literature analysed within Chapter 2. That analysis identified three disparate streams of prior research: studies that considered why Small Businesses exploit Web infrastructures in pursuit of commercial gain; the Web infrastructure development process; and the barriers and problems that can act to limit an infrastructure's successful development and deployment. Those three key concepts (identified within existing literature) are synthesised within this chapter into a novel conceptual model that contains new constructs. It is the development of new, novel concepts that will ultimately lead to the enhancement of the understanding of the phenomenon under analysis. In that way, the author utilises existing theory and knowledge within an integrated inductive study. Within that approach, existing theory and knowledge is used to ground the study at an early stage while still providing the author with the scope to develop novel theory and knowledge. That approach was adopted in accordance with the researchers Ali & Birley (1999), Amaratunga & Baldry (2001) and O'Donnell & Cummins (1999). It is the novel conceptual model developed within this chapter that will form the broad framework that will guide this study's primary research.

3.2 Analysing the Web Infrastructure Development Process

Figure 3.1 considers the Web infrastructure development process. Figure 3.1 has been developed by the author from the various models and literature discussed within Section 2.2.2. Figure 3.1 has 3 key elements that consider:

- The improvement and refinement of an infrastructure over time (thereby increasing its sophistication).
- The process within which that improvement and refinement occurs.
- The nature and range of organisational benefits that the infrastructure subsequently delivers to the organisation.

Within Figure 3.1 a macro-systems view is adopted to highlight the relationship between these 3 key elements. While each element can be discussed in isolation, by

combining each element their interconnectedness is highlighted leading to the scientific exploration of the phenomenon.

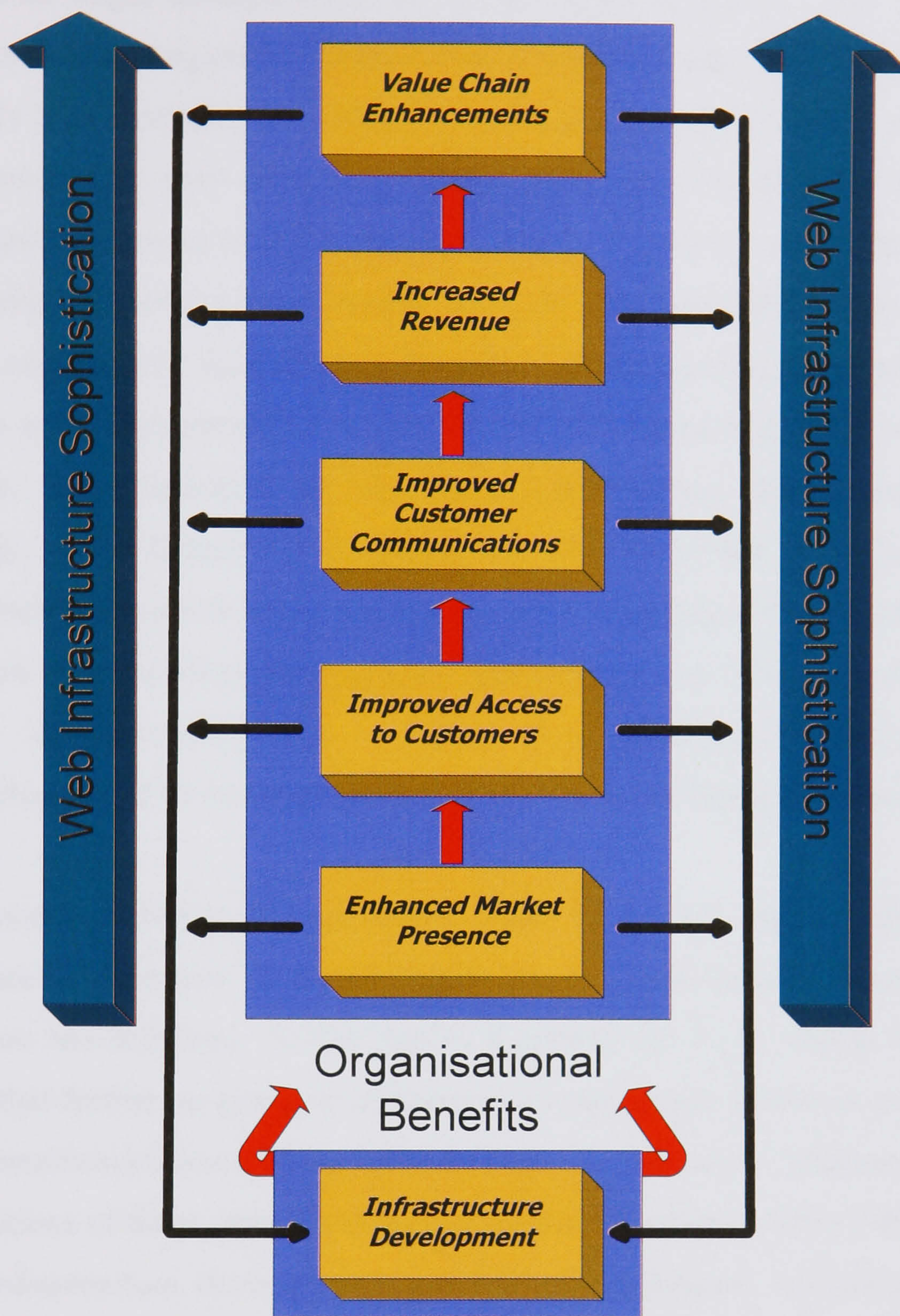


Figure 3.1 – The Web Infrastructure Development Process

In accordance with the development models proposed by DTI (1998, 2002), Hart *et al.* (2000), Chaston *et al.* (2001), Daniel *et al.* (2002a, 2002b), Jones *et al.* (2003), Rao *et al.* (2003), Shiels *et al.* (2003), Brock (2005) and Rowley (2005) Figure 3.1 proposes that infrastructure development is a gradual staged process within which the sophistication of the infrastructure increases as further development occurs. While Section 2.2.2 identified several different models that depict the development process, one factor common to all is that gradual refinement and improvement of the infrastructure. That fundamental feature of the development process has therefore been

included by the author within Figure 3.1. The model differs from those development models discussed within Section 2.2.2 in that it does not detail the precise developmental stages through which an infrastructure will pass. That is due to the lack of consensus among current literature as to precisely *what* stages an infrastructure will actually pass through. As Table 2.1 highlighted, some authors argue that three developmental stages exist (Hart *et al.* 2000) while others maintain that at least eight stages of development exist (Chaston *et al.* 2001). Therefore, rather than attempting to detail arbitrary development ‘stages’ through which an infrastructure will pass, Figure 3.1 concentrates instead upon the nature of the organisational benefits that it will deliver as its sophistication is enhanced. In that regard Figure 3.1 is novel in its presentation and depiction of the Web infrastructure development process. Accordingly, within Figure 3.1 the author has synthesised two disparate streams of previous research (research that considers the Web infrastructure development process and research that considers the organisational benefits that Web infrastructures can potentially deliver) into one. Figure 3.1 graphically demonstrates the interconnectedness of those two areas and details the relationship between the two.

In accordance with Boyes & Irani (2002, 2004) Figure 3.1 maintains that on-going infrastructure development is driven largely by the organisational benefits that the infrastructure has delivered. In that regard, it mirrors the TAM (Davis 1989) since it postulates that further on-going development and refinement occurs as a result of the perceived benefit/usefulness of the infrastructure. In that way it addresses one of the main limitations of those other development models discussed within Table 2.1 – that on-going infrastructure development (and therefore enhanced sophistication) is not automatic. Rather, Figure 3.1 maintains that as further development is successfully undertaken, increasingly sophisticated organisational benefits are delivered and it is their realisation that fuels the organisation’s desire to further refine its infrastructure over the long-term. Within Figure 3.1, in accordance with Igarria *et al.* (1997), the Small Business’s desire to adopt/refine the infrastructure is driven largely by its perceptions that this will enhance organisational performance and productivity: the organisational benefits detailed within Figure 3.1 act as both driver and reward of infrastructure enhancement within an iterative on-going process. Hence, infrastructure development is depicted as being staged and orderly. Figure 3.1 simultaneously recognises that the attainment of those organisational benefits is not guaranteed since

their realisation depends upon the success with which the organisation has already achieved other benefits, gained developmental experience and enhanced its development capability via its infrastructure's earlier development. Without that developmental 'motivation', development will be halted and further refinement to the infrastructure's sophistication is unlikely to occur.

Figure 3.1 proposes that enhancement to the sophistication of the infrastructure (and through that greater degrees of organisational 'benefit') is not automatic (Martin & Matley 2001, Sparkes & Thomas 2001, Talyor *et al.* 2001, Rao *et al.* 2003, Mendo & Fitzgerald 2005). The resource and other limitations discussed within Section 2.4.2 can act to greatly limit the extent of infrastructure development (and therefore sophistication) within the context of the Small Business Web infrastructure development process. That assertion echoes the findings of Dutta & Evrard (1999), Mullins *et al.* (2001), Carter *et al.* (2002) and the DTI (2004a) who report a low incidence of Small Businesses having developed sophisticated Web infrastructures. Anckar & Walden (2001) and Daniel *et al.* (2002b) directly attribute such high levels of 'unsophisticated' infrastructure development to those Small Businesses' inability to overcome the barriers and problems discussed within Section 2.4.2 and later within this chapter.

Figure 3.1 maintains that not every Small Business will realise every potential benefit offered by the development and deployment of a Web infrastructure (as reported within Boyes & Irani 2002, 2003, 2004). The organisational benefits act as drivers that stimulate the organisation's desire to further enhance the sophistication of the infrastructure through its on-going refinement. That is motivated by the rewards that prior development has delivered. Within Figure 3.1 however, the attainment of each benefit is also dependent upon the organisation successfully redeveloping its infrastructure to realise the desired benefit by further increasing the infrastructure's sophistication. Yet, as discussed within Section 2.4.2 such development is often problematic for Small Businesses because of the numerous inter and intra organisational barriers and problems that can limit development. Figure 3.1 consequently, suggests that not only must the organisation desire their infrastructure's sophistication to increase (i.e. the organisation wishes to realise ever more sophisticated organisational benefits via its infrastructure), it must also possess or

acquire the *capability* to overcome those barriers and problems thereby successfully enhancing its infrastructure's sophistication. While a wide range of organisational benefits are depicted by the author within Figure 3.1, their attainment is not automatic since their realisation depends upon the desire and capability of the organisation to realise them in practice.

3.3 Web Infrastructure Enhancement Drivers and Benefits

Figure 3.1 proposes that the Web infrastructure development process experienced by Small Businesses is iterative. The organisational benefits delivered by the infrastructure act as drivers that fuel the organisation's future desire to further enhance the infrastructure thereby realising greater and more sophisticated benefits. As such, Figure 3.1 is developed from the background theory analysis detailed within Section 2.3 yet remains comprehensive and novel in its synthesis through further developing and enhancing the theories presented within Chapter 2. The key Web infrastructure benefits presented within Figure 3.1 are also tabulated by the author within Table 3.1 to provide further understanding of those component sub-systems.

3.3.1 Analysing the Drivers and Benefits

The sub-systems identified by the author, detailed within Table 3.1 and discussed at length within Sections 2.3.2 - 2.3.6.3, provide the construct framework for one of the areas of analysis within this study's primary research. They also provide the basis of the Web infrastructure barriers and problems framework discussed within this Chapter. Table 3.1 demonstrates that the initial development and deployment of a Web infrastructure offers the Small Business an instant presence within on-line markets which in turn enhances its access to both existing and potential customers. Those benefits can subsequently be built upon and exploited by an organisation to improve the way in which it communicates with those customers. The further refinement of the infrastructure makes 'one-to-one' relationship marketing possible via an interactive medium that users find both stimulating and pleasurable (Shih 1998, Van Nierkirk *et al.* 1999). The interactivity between business and customer can subsequently be utilised to more closely align the businesses' offerings to its customers' requirements, which in turn adds significant value for both parties.

Developmental Benefit Sub-System	Sub-System Component Factors	Discussed Within;
Enhanced Market Presence	<ul style="list-style-type: none"> • Equality of market presence regardless of organisational size • Instant market entry • Low entry costs and low asset intensity requirements for new market penetration • Potential for the development and maintenance of a global customer base 	Section 2.3.2
Improved Access to Customers	<ul style="list-style-type: none"> • Immediate access to both existing and potential customers • Negation of communication/access barriers with customers caused by time-zones and geographical location • Creation of a customer contact portal available for use 24/7 	Section 2.3.3
Improved Customer Communications	<ul style="list-style-type: none"> • Improved access to customer information facilitates improvements to customer service • Improved access to customers' product/service requirements facilitates enhancements to products/services • One-to-one marketing of products and services via the infrastructure • Relationship marketing of products/services via the infrastructure • Enhanced perceptions of a unique relationship between organisation and customer • Interactive presentation of product/service information aids customer purchase decisions and informational searches • Low cost provision of easily accessible customer care/support services enhances and supports the customer/organisational relationship 	Section 2.3.4
Increased Revenues	<ul style="list-style-type: none"> • Products/services available to customers 24/7 • Access to new revenue channels via the infrastructure • Incremental increases to existing revenue channels via the infrastructure • Reduced cost of sales via increases in the share of each customer's business • Enhanced customer loyalty via enhanced service provision • Differentiation upon non-price based factors 	Section 2.3.5
Value Chain Enhancements	<ul style="list-style-type: none"> • Greater access to vendors and suppliers • Enhanced ability to form inter-business partnerships and collaborations • Improved communication between value chain partners • Reductions in the number of value chain members results in greater channel efficiencies between those channel members which remain • Reduced transaction costs and increased transparency amongst value chain members • Improved management of distribution systems via improvements to the value chain infrastructure • Potential for the instant satisfaction of customer demand via the delivery of digital products/services • Product/service prices can now be based upon their value to customers rather than upon their cost of production • Lowered on-going variables costs of production for digital assets (which are not used up during production) leads to enhanced profits and reduced distribution costs 	Section 2.3.6

Table 3.1 – Web Infrastructure Developmental Benefits

Both the initial and incremental development are supported by the potentially low-costs associated with the medium's communications mechanisms (Peppers & Rogers 1995). The improvements to the organisation's communications capabilities fuel its

desire to further refine the infrastructure such that it can be utilised to collect more detailed and precise information about its customers' needs. That enables the organisation to create a virtuous circle in which providing good customer service creates knowledge about customer behaviour thereby leading to further improvements in customer service/product quality. Not only do those benefits increase the organisation's desire to further enhance its infrastructure (by quantifiably demonstrating the value of the infrastructure as a commercial tool), but they also provide the foundation upon which such future development can be built. Hence, the on-going refinement of the infrastructure further enhances the relationship now enjoyed between business and customer. That leads to increases in the organisation's revenues via both on-line and off-line sales, since a new transactional channel has been created, while increases in levels of customer service enhance the reputation of the business within the real-world (Hoffman *et al.* 1995, Hoffman & Novak 1996, Quelch & Klein 1996, Limehouse 1999, Sparkes & Thomas 2001).

Due to the enhanced perceptions of 'value' created by the infrastructure for customers, the infrastructure simultaneously enables the business to differentiate its products upon non-priced based dimensions thereby further enhancing its revenues and profits (Sparkes & Thomas 2001) while also stimulating the business's desire to realise even greater levels of organisational benefit. Further successful development enables the organisation to re-engineer its value chain since the infrastructure facilitates improvements to the organisation's relationships with both vendors and suppliers while also improving the efficiency and effectiveness of its internal and external operations (Rayport & Sviokla 1994 & 1995, Lu & Yeung 1998, Yakhlef 1998).

Within Table 3.1 each component sub-system is expanded upon to reveal its component factors thereby highlighting that Sections 2.3.2 to 2.3.6 have provided the understanding and discussion that underpins the constructs contained within Figure 3.1. Consequently, Figure 3.1 simultaneously builds upon existing knowledge and understanding (since that has been drawn upon by the author to develop its component parts) and also *enhances* knowledge and understanding of the phenomenon under analysis. That is achieved through the novel way in which the model combines two previously separate streams of research in its depiction and examination of the model's component sub-systems. While Chapter 2 identified previous Web

infrastructure development models, Chapter 2 highlighted that they do not fully consider the likely organisational benefits that an infrastructure can deliver (since they concentrate upon the developmental *stages* that the infrastructure will pass through rather than upon the benefits that development might deliver) and likewise do not fully consider how those organisational benefits might act to stimulate the on-going refinement of the infrastructure over the long-term. Within Figure 3.1 however, those issues are considered because the diagram graphically demonstrates not only the nature of the organisational benefits under consideration but also their role within an iterative on-going process. As such, Figure 3.1 is both a synthesis of current knowledge and understanding, and an enhancement to it via its fuller consideration of the development process, the drivers of that process and the outputs from that process (i.e. the organisational benefits detailed within Table 3.1).

3.4 The Conceptual Model

Figure 3.1 considers the potential benefits and advantages offered by a commercial Web infrastructure. It also proposes a process within which they can be realised. However, Figure 3.1 does not consider the barriers and problems that can limit their realisation. That is because it has been developed to enhance understanding of the Web infrastructure development process alone. The term '*barrier*' refers to those issues and factors that can act to prevent a Small Business from initially developing an appropriate Web infrastructure while the term '*problem*' refers to those issues that might subsequently curtail the business's ability to exploit it in pursuit of commercial gain (Boyes & Irani 2002, 2004). While Section 2.4 provided an analysis of those barriers and problems (using the novel framework reported within Boyes & Irani (2003)), Figure 3.1 does not consider their likely impact upon the development process. Consequently, the conceptual model developed by the author (Figure 3.2) fully considers that issue within the context of the Small Business Web infrastructure development process.

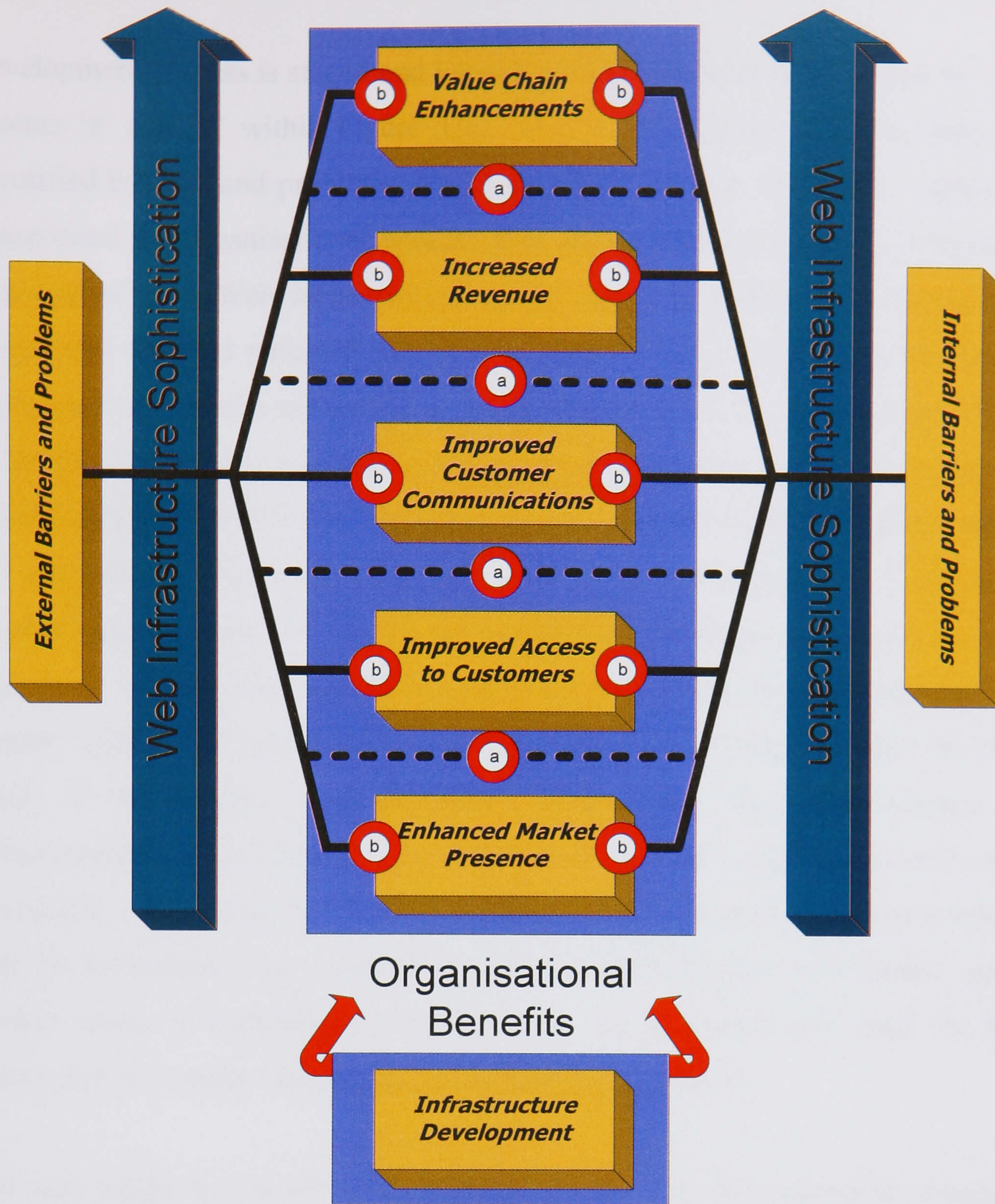


Figure 3.2 – The Conceptual Model of Web Infrastructure Development

Within the conceptual model (Figure 3.2) the proposed impact of the barriers and problems to Web infrastructure development identified by the author and reported within Boyes & Irani (2002, 2003, 2004) is highlighted. Figure 3.2 demonstrates that within the Web infrastructure development process the impact and effect of certain barriers and problems must also be considered. Figure 3.2 enhances understanding of that phenomenon through its novel analysis and synthesis. Figure 3.2 maintains that the barriers and problems to successful Web infrastructure development are both internal and external in origin (as discussed within Section 2.4.1).

A macro-systems view is adopted within Figure 3.2 in order to clearly demonstrate the role of the identified barriers and problems. Figure 3.2 proposes that while the

development process is staged and logical, certain 'points of tension' can be identified (points 'a' and 'b' within Figure 3.2). It is at those points that the impact of the identified barriers and problems is realised. For example, Section 3.3 identified and categorised the organisational benefits that can be attained via the development and deployment of a Web infrastructure based upon the framework developed by the author and reported within Boyes & Irani (2002, 2004). Within that framework the organisational benefits act as both a reward and driver of the infrastructure's on-going enhancement thereby leading the organisation to further refine its infrastructure's sophistication (to realise more benefits) within an iterative process. However, Figure 3.2 proposes that the iterative process can be disrupted at point 'a' by the identified barriers and problems. In that way the barriers and problems can 'block' the on-going refinement and enhancement of the infrastructure. While the organisational benefits already realised by the business might motivate it to undertake further development work, if the barriers' and problems' impact upon the redevelopment of the infrastructure are not addressed the organisation will not realise the rewards originally envisaged. The on-going iterative process of 'development-benefit-redevelopment' will be interrupted, the sophistication of the infrastructure will remain static and further levels of organisational benefit will remain unattainable until the business overcomes or negates the barrier(s) or problem(s) in question.

Not only might the barriers and problems impact upon the successful completion of on-going point 'a' development work, they might also limit the extent to which the benefits detailed within Table 3.1 are realised by the organisation (i.e. their effects are realised at point 'b' within Figure 3.2). Since the on-going long-term development and refinement of the infrastructure is driven to a large extent by the successes and rewards being delivered by it, any issue or factor that impacts upon the infrastructure's success in delivering those rewards will also act to reduce the motivation of the business to undertake further development work. For example, if the business developed its infrastructure to increase organisational revenues (an aim expressed by 50% of Small Businesses for their infrastructure's development (Skinner (2000)) but its infrastructure fails to deliver an increase (as reported by 23% of Small Businesses with this specific on-line objective (Benyon-Davies *et al.* (2002))) then the motivation to devote *further* resources to enhance the infrastructure will be low due to its failure to meet its original objective. Therefore, Figure 3.2 proposes that at point 'b' the

identified barriers and problems can also limit the success with which the Small Business realises the organisational benefits discussed within Section 3.3. While within that example the impact of the barrier/problem is realised at a different point within the conceptual model (e.g. at the point at which the benefit is realised rather than at the point at which successful benefit attainment promotes further infrastructure development), the effect remains the same – the development of the infrastructure is compromised and the iterative process detailed within the conceptual model is interrupted. Therefore, the effects of the barriers and problems outlined within Figure 3.2 are realised at two key points;

- At the intersection between organisational benefits (point ‘a’).
- At the point at which the organisational benefit is realised (point ‘b’).

3.4.1 Analysing the Barriers and Problems

Within Figure 3.2 two key points of impact for both internal and external barriers and problems to Web infrastructure development are identified. Since a macro-systems view is adopted within the model, the precise nature of those barriers and problems is not detailed. Rather, the model details only the categories of barrier and problem identified by the author and reported within Boyes & Irani (2002, 2003, 2004). To address that limitation Tables 3.2 – 3.8 to provide the micro-systems view of those barrier and problem categories necessary for their full analysis (Tables 3.2 – 3.8 have been developed from Boyes & Irani (2004)).

Chapter 2 has provided the knowledge and understanding that underpins the conceptual model (Figure 3.2). Therefore, the Web infrastructure barriers and problems framework utilised within Chapter 2 has influenced the development of the new constructs contained within the conceptual model. Within Chapter 2 the framework developed by the author, and reported within from Boyes & Irani (2002, 2003, 2004), was utilised to identify, analyse and discuss the barriers and problems to Web infrastructure development as experienced by Small Businesses. Figure 2.4 (which was developed by the author and reported within Boyes & Irani 2002, 2003, 2004) proposed that there are seven key barrier and problem categories. It is at points ‘a’ and ‘b’ within Figure 3.2 that the effect of the seven key barriers and problems reported within Boyes & Irani (2002, 2003, 2004) will be realised. Each barrier and

problem has the potential to negatively impact upon the development process as discussed above. The seven key barrier and problem categories developed by the author, and reported within Boyes & Irani (2002, 2004), are shown within Figure 3.3.

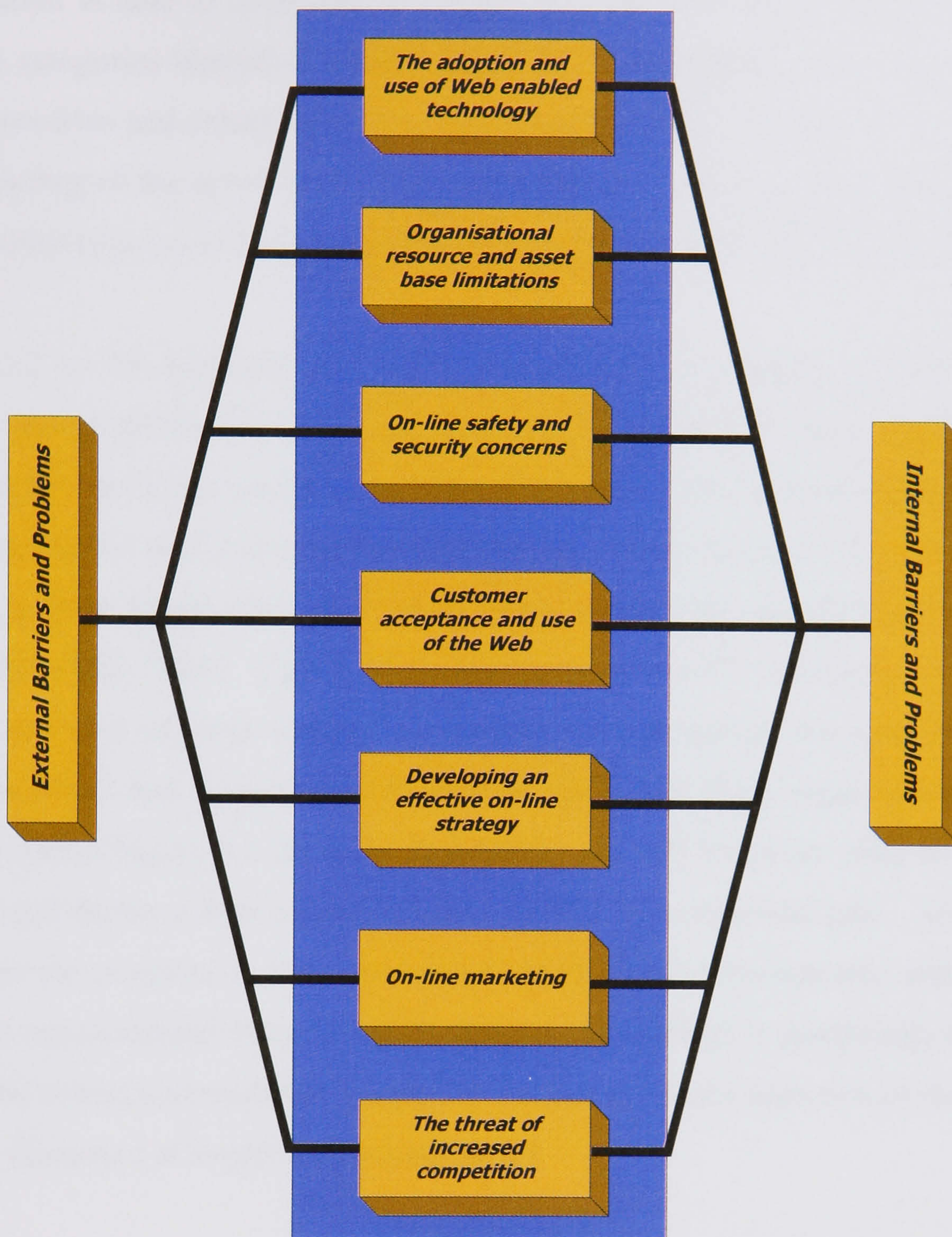


Figure 3.3 – Web Infrastructure Development Barrier and Problem Categories

Figure 3.3 identifies seven key barrier and problem categories that can negatively impact upon the Web infrastructure development process as experienced by Small Businesses. Figure 3.3 is based upon the framework used within Chapter 2 (Sections 2.4.3 to 2.4.9) to analyse and discuss their impact. While Chapter 2 highlighted that a Small Business developing a Web infrastructure is likely to face numerous barriers and problems, both within and outside of its direct control, Figure 3.3 classifies them based upon their broad characteristics.

As discussed within Section 3.4, the conceptual model (Figure 3.2) proposes that while the Web infrastructure development process experienced by Small Businesses is iterative, successful development is also dependent upon the extent to which the organisation is able to overcome or negate the effects of the seven key barrier and problem categories identified within Figure 3.3. Consequently, the conceptual model also synthesises and enhances the theories presented within Chapter 2. To further aid understanding of the seven key barriers and problems, and their likely impact upon the development process an analysis of their effects is presented within Tables 3.2 to 3.8.

Tables 3.2 to 3.8 highlight that while it is possible to identify a diverse range of barriers and problems that have the potential to negatively impact upon the Web infrastructure development process, and to limit the extent to which a Small Business might realise the organisational benefits detailed within Section 3.3, it is possible to categorise them based upon their broad characteristics (as reported within Boyes & Irani 2002, 2003, 2004). Tables 3.2 to 3.8 therefore provide a micro-systems view of each barrier and problem category to identify the sub-system components of Figure 3.3. The effect and impact of each must be addressed if the organisational benefits detailed within Figure 3.1 are to be realised by a Small Business when it attempts to develop and deploy a Web infrastructure in pursuit of commercial gain. Any failure to do so has the potential to limit the success of that Web infrastructure and curtail the extent of organisational benefit delivered by it. That effect is graphically highlighted within the conceptual model developed by the author via its depiction of the 'points of tension' discussed at length within Section 3.4

Figure 3.3 Sub-System **Nature** **Description** **Effect/Consequence** **Discussed within;**

Figure 3.3 Sub-System	Nature	Description	Effect/Consequence	Discussed within;
Internal 'Technological' Barriers and Problems	Barrier & Problem	Unfamiliarity with ICT.	Unfamiliarity with, and lack of expertise in, the use of the Web, ICT and PC technology in general is common amongst Small Businesses (SBs). This greatly limits their ability to develop and subsequently exploit a Web infrastructure.	
	Barrier	Ignorance of ICT's role.	SBs are often ignorant of the potential beneficial role of ICT within their organisations. Thus, ICT usage is currently low amongst UK SBs.	
	Barrier & Problem	Lack of ICT staff.	SBs often lack dedicated ICT staff. Their absence precludes the development of an organisational knowledge base vital to understanding the complexities of hardware, software and Web enabled ICT.	
External 'Technological' Barriers and Problems	Barrier & Problem	Cost Sensitivity.	High sensitivity to capital investment costs can preclude the initial purchase and subsequent renewal of ICT on the part of SBs.	Section 2.4.3 "The Adoption and Use of Web Enabled Technology"
	Barrier	Telephone Network Infrastructure.	The current limited availability and high cost of broadband Internet access within the UK acts to dissuade many SBs from utilising Internet technologies.	
	Problem	Bandwidth Restrictions.	The inadequacies of the current UK telephone network infrastructure result in narrow bandwidth, low connection speeds and high Internet access costs for those SBs with a presence on the Web. This in turn negatively affects the SB's ability to exploit the Web for commercial gain.	
Barrier & Problem	Rate of Change.	The rapid rate of change of Web enabled (and Web enabling) technologies make maintaining ones' knowledge of new hardware and software developments time-consuming and onerous for the SB owner/manager.		

Table 3.2 – The Adoption and Use of Web Enabled Technology Barriers and Problems

Figure 3.3 Sub-System

Discussed within;

Effect/Consequence

Nature

Description

Many SB's lack the appropriate programming skills, knowledge and time needed to develop an infrastructure 'in-house' (thereby minimising the project's overall costs) and are unable to afford the services of an external third-party developer to compensate for their own resource deficits. They are therefore unable to develop an appropriate Web infrastructure.

Many SBs lack the dedicated staff (e.g. ICT Manager, Marketing Manager, Sales Manager) needed to provide the holistic understanding of their business and its objectives crucial to the development of an effective infrastructure.

The on-going maintenance of an infrastructure can highlight further shortfalls in an SB's resource base and inadequacies in its business infrastructure (e.g. it may lack the capacity to meet on-line orders, handle e-mail enquiries or undertake credit control activities) thus negatively affecting its on-line performance and greatly reducing the likely success of its Web infrastructure.

Resistance to changes in workloads, work patterns and fears that the development of an infrastructure will diminish their own standing and contribution within the organisation on the part of the SB owner/manager actively dissuades many SB owner/managers from establishing an on-line presence.

SB owner/managers routinely comment upon their dissatisfaction with third party training and report that external training does not represent 'Value for Money'. Thus many SBs remain reluctant to address their Web skills shortcomings.

Many SBs are unable to undertake external training due to the high cost of such training and the limited availability of appropriate training organisations.

Internal 'Resource Base' Barriers and Problems

Section 2.4.4 "Organisational Resource and Asset base limitations"

External 'Resource Base' Barriers and Problems

Table 3.3 – Resource and Asset base Barriers and Problems

Figure 3.3 Sub-System

Nature	Description	Effect/Consequence	Discussed within;
Barrier & Problem	Organisational Security Concerns.	Many SBs harbour concerns regarding the apparent insecurity of on-line trade. These concerns can dissuade the SB from using the Web for commercial purposes.	
Internal 'Security' Barriers and Problems			
Barrier	Data Security.	Developing an infrastructure that adequately addresses its users' concerns regarding the collection, safe storage and subsequent use of personal information is overly costly and too complex a task for many SBs.	
Barrier	Site Security.	Equipping its infrastructure with the on-line 'live' security features needed to address both its own and its site's users' security concerns is too costly for many SBs.	
External 'Security' Barriers and Problems			
Problem	User Safety Concerns	Users' concerns regarding the relative safety of the on-line world results in user reluctance to interact with the Web sites they visit.	Section 2.4.5 "The Issues of On-line Security and Safety"
Problem	User Security Concerns.	Users' concerns regarding the perceived insecurity of on-line trade dissuades many users from engaging in transaction relationships with the sites they visit. This situation is compounded for SBs since they are likely to lack the brand recognition needed to calm their users' safety and security concerns. These user concerns can greatly reduce the on-line revenues available to SBs.	
Problem	On-line Regulation.	The Web's lack of a global regulator to police fraudulent business practices, the collection and sale of user information and the lawfulness of Web sites actively dissuades many Internet users from using the Web as a commercial channel. Thus user interaction with the SB infrastructure may be low.	

Table 3.4 – On-line Safety and Security Barriers and Problems

Figure 3.3 Sub-System

Discussed within;

Effect/Consequence

Nature

Description

An SB's ignorance of the need to involve its infrastructure's users within the design process can result in the development of an infrastructure that fails to add significant value to their interactions with the organisation – as a result subsequent levels of user interaction will be low.

**Internal
'Customer
Acceptance'
Barriers and
Problems**

Problem
Users' Design
Input.

The failure to involve the infrastructure's intended users within the design process can result in the SB developing an infrastructure that is fundamentally misaligned to its users' needs (e.g. users' will find its structure confusing, its features limited and its apparent overall purpose unclear). As a result the users will remain reluctant to interact with it and the SB's on-line objectives will remain unfulfilled.

Problem
Design Process.

**Section 2.4.6
'Customer
Acceptance and
Use of the Web'**

Users may resist the adoption of the SB's infrastructure over existing traditional channels of interaction thus negatively affecting the attainment of the objectives set for it (for example, users may refuse to place orders on-line preferring instead to speak in person to the Sales Manager).

Problem
User Resistance.

**External
'Customer
Acceptance'
Barriers and
Problems**

The Web's relative lack of structure acts to dissuade many potential users from using the medium for anything other than 'recreational' purposes. This negatively affects the SB's infrastructure's ability to reach new and potential customers and trade with them.

Problem
The Web's lack of
Structure.

Whilst an SB's customers fully expect it to maintain an infrastructure they might only use it infrequently (when doing so clearly benefits them rather than the SB) thus denying the SB the opportunity to fully exploit it.

Problem
User Expectations.

Table 3.5 – Customer Acceptance Barriers and Problems

Figure 3.3 Sub-System **Nature** **Description** **Effect/Consequence** **Discussed within;**

Figure 3.3 Sub-System	Nature	Description	Effect/Consequence	Discussed within;
	Barrier & Problem	Performance Measurement.	The difficulties associated with monitoring its infrastructure's on-going performance and impact upon its business can result in the SB being unable to detect any tangible, quantifiable business benefit delivered by it. This causes many SBs to question whether to establish or maintain an infrastructure.	
	Barrier	Ignorance of ICT's Role.	The SB sector routinely fails to recognise ICT as a strategic (rather than an operational) tool that can be harnessed to grow a business in the long term. As a result many SBs remain ignorant of the potential strategic benefits of developing an infrastructure and thus choose not to develop one.	
Internal 'Strategic' Barriers and Problems	Problem	On-line Strategy Development.	Since many SBs fail to carefully integrate their infrastructures within their wider strategic plans they subsequently fail to develop meaningful strategic performance measures. Thus they are unable to analyse its on-going contribution to the attainment of their strategic goals and fail to recognise its true contribution (both on-going and potential) to their organisation's performance.	Section 2.4.7 "Barriers and Problems to the Development of an On-line Strategy"
	Barrier & Problem	Development Costs.	The high costs associated with the development of an e-commerce enabled infrastructure actively dissuade many SBs from trading on-line thereby exploiting the Web as a revenue generating medium.	
	Barrier & Problem	Web Enabled Technology Costs.	Many SBs lack the requisite financial resources with which to develop and maintain an infrastructure and/or purchase the required hardware and software. They are consequently unable to exploit the Web for commercial purposes.	
	Barrier	Strategy Mismanagement.	A SB's lack of understanding of its proposed infrastructure's strategic role and objectives can result in the mismanagement of the development process and result in project 'failure' – an infrastructure is developed that is misaligned to satisfying the business and strategic objectives originally envisioned by the SB.	
External 'Strategic' Barriers and Problems	Problem	Peer Pressure.	'Peer pressure' often forces a SB to develop an infrastructure without first setting clear objectives for it thus leading to the creation of an infrastructure whose potential strategic impact is not fully exploited and that is poorly integrated within the organisation's wider strategic plans and goals.	

Table 3.6 – On-line Strategy Barriers and Problems

Figure 3.3 Sub-Syetsm

Discussed within;

Effect/Consequence

Nature Description

A fundamentally different approach to that taken with traditional media is required to market oneself successfully via the Web yet SBs' general lack of marketing expertise is well documented. Thus many SB's lack the skills needed to successfully market themselves via the Web and are unable to exploit their infrastructure's potential as a marketing tool effectively.

**Internal
'Marketing
Consideration'
Barriers and
Problems**

Any failure on the part of the SB to carefully integrate its infrastructure within its wider communications strategy will graphically highlight the disjointed nature of its communications and will be highly unlikely to satisfy its users' informational/communications requirements (for example customer e-mails are ignored, the SB infrastructure provides incorrect or out of date pricing information, it offers products that have been withdrawn from sale or promises unachievable product delivery and/or enquiry reply lead-times).

**Section 2.4.8
"Developing and
Deploying an
Effective On-line
Marketing Strategy"**

Barrier & Problem
Marketing Strategy.
Communications Strategy Integration.

**External
'Marketing
Consideration'
Barriers and
Problems**

The Web (from the infrastructure's owner's perspective) is not a pro-active communications medium (i.e. within this non-passive medium it is the user who chooses and controls which marketing communications to interact with). Consequently the SB's on-line success is arguably outside of its own control and its on-line ambitions may prove to be unachievable despite its own efforts.

Problem
User Resistance.

Table 3.7 – On-line Marketing Barriers and Problems

Figure 3.3 Sub-System	Nature	Description	Effect/Consequence	Discussed within;
<p>Internal 'On-Line Competition' Barriers and Problems</p>	Problem	Product Differentiation.	<p>The increased levels of competition on the Web can place enormous demands upon an organisation's product differentiation strategies yet many SBs lack the marketing expertise needed to successfully differentiate their products on anything other than price. Consequently, the use of the Web may decrease unit margins for the SB.</p>	
	Problem	Ease of Market Entry.	<p>The low market entry costs associated with the creation of an infrastructure acts to greatly increase the number of competitors within a particular market sector without regard to the competitors' size or geographical position. This acts to greatly increase competition with that market and depress the profits available to its members. Thus a SB may remain unable to generate the on-line sales and profits originally envisioned when developing its infrastructure.</p>	
<p>External 'On-line Competition' Barriers and Problems</p>	Problem	Value Chain Re-engineering.	<p>The creation of an infrastructure can allow a SB to profitably bypass other members of its value chain completely (e.g. establishing a relationship with the end user of its products via the infrastructure can negate the need to trade through existing distributors). This, however, can strain the value chain partners' relationship to breaking point and harm the SB's ability to continue its off-line business activities.</p>	<p>Section 2.4.9 "The Threat of Increased Competition"</p>
	Barrier & Problem	Online Price/Quality Demands.	<p>Since the Web offers its users almost unrestricted access to every competitor within a particular market sector the SB may invest heavily equipping itself with an infrastructure that enables it to offer exemplary customer service (thus differentiating itself on non-price based dimensions) yet simultaneously fail to attract any customers if it is not also that markets lowest priced competitor. Thus the Web can force an SB to attempt to combine market-leading product quality with market leading prices – a strategy unsustainable in the long-term.</p>	

Table 3.8 – The Threat of Increased Competition Barriers and Problems

3.5 Conclusions to the Conceptual Framework

The conceptual framework presented within this Chapter has been developed to synthesise the theories presented within Chapter 2. and to develop new constructs upon which this study's primary research will be based. Those new concepts are embodied within the conceptual model developed by the author. Therefore, the conceptual model is itself a component of the broader conceptual framework that underpins this study's primary research. The conceptual framework builds upon and enhances current understanding and knowledge of the development process, its drivers and the barriers and problems to Web infrastructure development. The conceptual framework will therefore be used to provide guidance and focus to the study – the primary research will not attempt to test the validity of either the framework or its embodiment (the conceptual model). Rather, the conceptual model (Figure 3.2) will form the springboard from which new theory can be built based upon the novel constructs that it contains. In accordance with Ali & Birley (1999), Amaratunga & Baldry (2001), Eisenhardt (1989) and O'Donnell & Cummins (1999) the conceptual model (which itself builds and enhances understanding of the phenomena under analysis) will guide the study's primary research. It will do that by providing the broad framework within which data collection and analysis, and ultimately theory development, can take place. Existing theory and knowledge has therefore been used within this Chapter to ground this study's primary research. That approach has been adopted to focus the study at an early stage while still facilitating theory building and novel findings. That approach (the development of a conceptual model) is entirely appropriate within an inductive, exploratory study since it has been adopted to build and enhance (rather than to test) the theories and constructs being developed.

In order to further aid understanding of the broad rationale and logic employed to develop the conceptual framework and its constituent parts, the process adopted during its development is shown within Figure 3.4. Figure 3.4 demonstrates the logical nature of the conceptual framework's development and highlights how each issue of analysis and discussion presented within this Chapter by the author combine to form the framework that will itself guide the study's primary research.

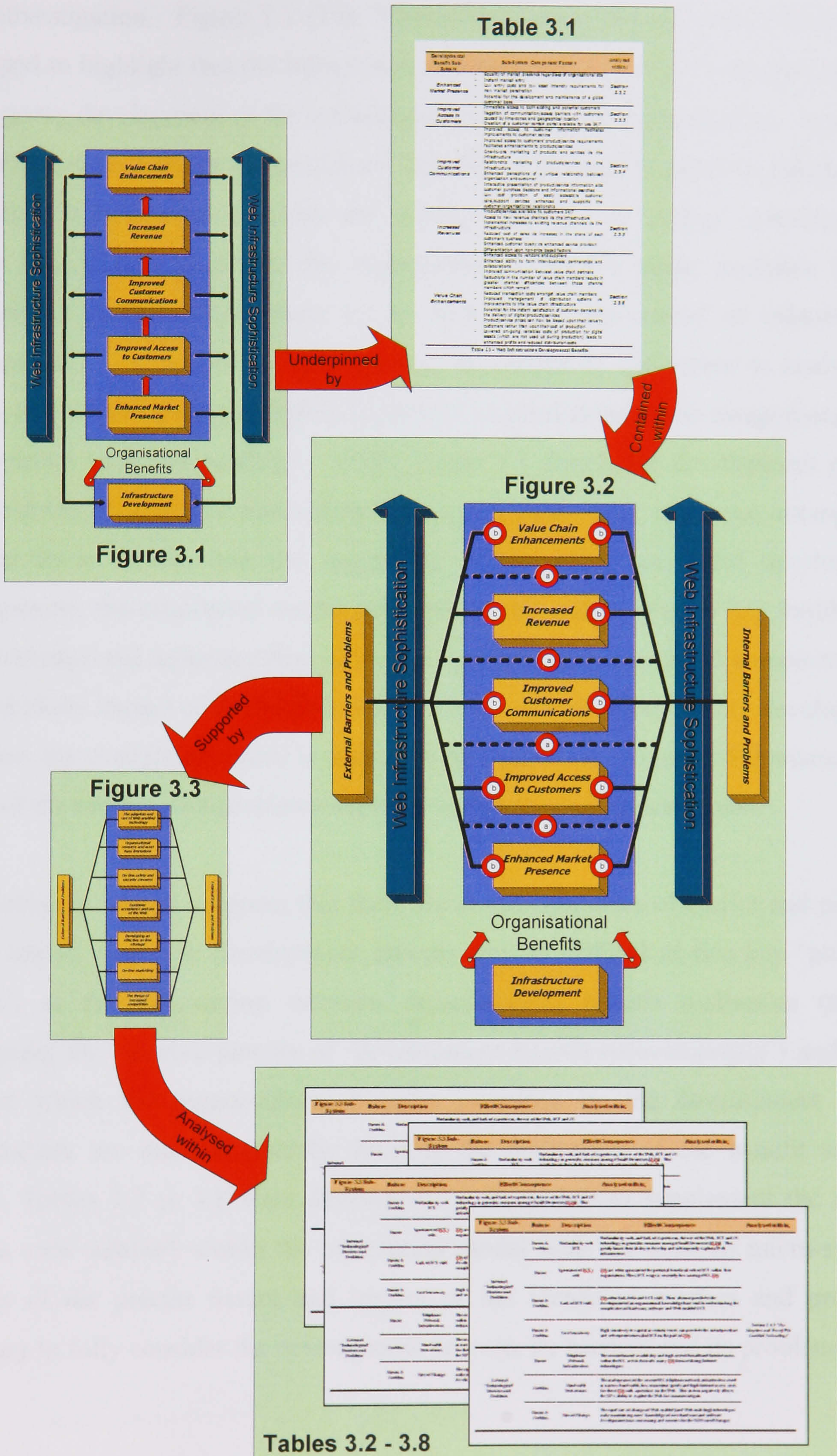


Figure 3.4 – Conceptual Framework Development

Within the conceptual framework several diagrams have been used to enhance and develop understanding of the constructs being proposed and their role within the area under investigation. Figure 3.1 (The Web Infrastructure Development Process) was developed to highlight that the infrastructure development process is iterative and that the on-going development of the infrastructure increases its sophistication. Increasing its sophistication delivers organisational benefits to the infrastructure's stakeholders, while benefit realisation provides the driving force for its further redevelopment. Within that iterative process, the organisational benefits made available by the development of the infrastructure act as both driver and reward of infrastructure development. Consequently, Table 3.1 was developed by the author to analyse the drivers and rewards proposed within Figure 3.1 in great detail while categorising them under certain umbrella headings. While Figure 3.1 details the development process itself, and the rewards and motivating factors that underpin it, it has not attempted to consider those factors that can negatively impact upon successful development. Consequently, the conceptual model developed by the author (Figure 3.2) builds upon the knowledge and understanding underpinning Figure 3.1 in order to demonstrate the role and likely impact of the barriers and problems to Web infrastructure development. Likewise, the conceptual model is supported by Figure 3.3. Figure 3.3 documents the nature of the barriers and problems depicted within the conceptual model.

The conceptual model proposes that there are seven categories of barrier and problem whose impact upon the development process can be realised at two key 'points of tension': at the intersection between organisational benefit realisation (thereby interrupting the iterative process of 'development-benefit-redevelopment') and at the point at which the organisational benefits promised by the development of the infrastructure are realised (thereby limiting the realisation of the benefit sought). Finally, Tables 3.2 to 3.8 were developed by the author to supplement the macro-systems view adopted within the conceptual model with the detailed micro-systems analysis of the precise nature and impact of the identified barriers and problems necessary to fully consider the development process, its barriers and its problems.

Chapter 4.0: Research Methodology

4.1 Introduction to the Research Methodology

Gardner & Lehmann (2002) argue that within every research project there is a need to develop a logical approach to undertaking the research, and a set of activities or methods that will facilitate the collection and analysis of data relevant to the issue under investigation. Within this study the ‘logical approach’ adopted by the author for this study is encapsulated within the research design (Figure 4.1).

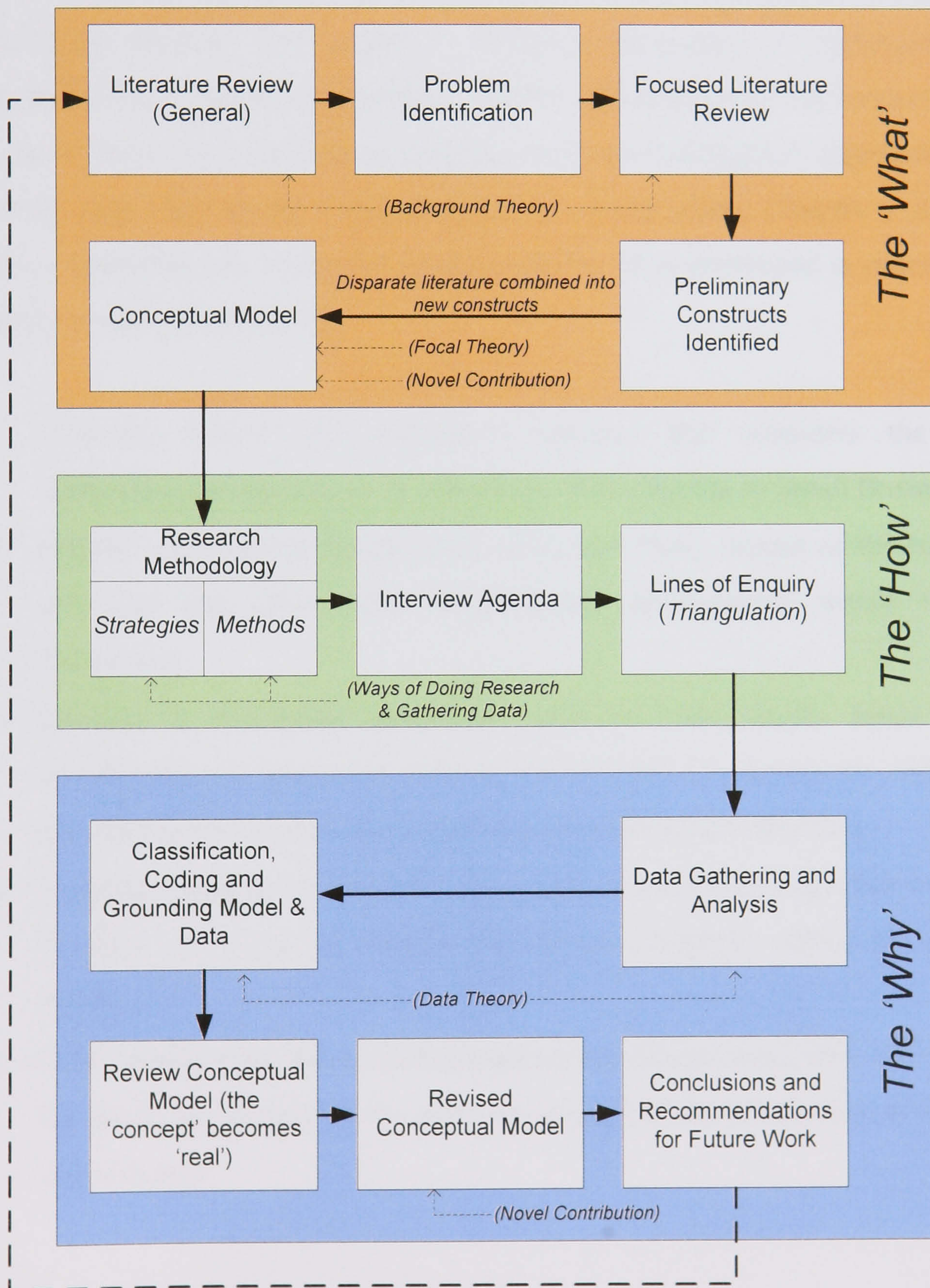


Figure 4.1 – Research Design

The research design has been developed in accordance with O'Donnell & Cummins (1999) and Sekaran (2000) and represents the logic that links the primary data collected and the conclusions drawn back to the research questions initially posed. It is that logic that ensures the study's coherence (Rowley 2002). To analyse and discuss the research methodology adopted within this study (which itself forms an integral part of the research design) the framework proposed by Saunders *et al.* (2000) will be used. That framework has been chosen since it will facilitate a structured analysis of the methodological choices made by the author within the overall research design. Within the Saunders *et al.* (2000) framework 'methodology' is comprised of the interplay between five criteria – different approaches to systematic enquiry developed within a particular paradigm. Within this study, each has required a choice between distinct (and often non-complimentary) methodological approaches to link the study data back to the research questions posed within Chapter 1 in a robust manner. Therefore, the research methodology has been developed in order to satisfy the study's research objectives:

- Critically review the normative literature that considers the benefits, limitations and barriers to the use of the Web relevant to Small Businesses.
- Identify and analyse the potential effect and likely impact of the barriers and problems that affect Web infrastructure development within UK Small Businesses.
- Develop a conceptual model in order to build theory about the Web infrastructure development process, the benefits of infrastructure development and the barriers and problems that can curtail benefit realisation.
- Undertake empirical research via a robust research strategy that will provide the data necessary to enhance the theory contained within the conceptual model.
- Offer conclusions and recommendations for further work that will build upon the theory developed by the author in pursuit of the satisfaction of this study's research aim.

4.2 Exploring Research Paradigms

An analysis of Figure 4.1 highlights that when conducting research the researcher must adopt an epistemological stance within which all claims for knowledge discovery can be grounded because as Guba & Lincoln (1998 p.195) note:

“Questions of [research] method are secondary to questions of paradigm, which we define as the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways”.

4.2.1 A Critique of the Positivist Paradigm

Within this study a phenomenological/interpretive epistemological stance is adopted by the author. The author’s phenomenological/interpretive stance highlights his acceptance of the subjectivism of social reality – how the members of a society or group understand, make sense of social events and their settings, and how that sense making influences and impacts upon the very settings themselves (Gephart 1999). That stance is appropriate to this study because inherent within it was the need to understand and make sense of social members’ definition of the context within which they find themselves (*“Undertake empirical research via a robust research strategy that will provide the data necessary to enhance the theory contained within the conceptual model”*). The author’s viewpoint is based upon the proposition that it is not possible to separate the outside world from an individual’s ideas and perceptions of that world (DePoy & Gitlin 1994). Consequently, this study’s grounding within the interpretive paradigm accepts reality as being socially constructed, rather than objectively determined. In accordance with Hyde (2000), the study attempts to identify underlying concepts and analyse the relationships between them - the phenomenon under investigation and analysis, and the context within which it occurs are interlinked and cannot easily be separated.

The author’s epistemological stance is taken to avoid the criticisms levelled at much of the research grounded within positivism that has considered IS development and deployment within small firms. For example, Swartz & Boaden (1997) argue that positivistic studies do not adequately consider the contextual factors or management processes at play within the organisations under analysis due to their epistemological

stance. In accordance with Saunders *et al.* (2000), the author recognises that by investigating a phenomenon within its real world setting of a functioning small firm, its full complexity can be revealed and analysed. The author's belief is supported by Robson (2002 p.21) who argues that:

"...when people are the focus of the study, particularly when it is taking place in a social real world context, 'constant conjunction' in a strict sense is so rare as to be virtually non-existent".

Not only are business situations complex, they are also unique since they are the function of both *context* and *individual*. Rather than imposing a pre-determined view of the world upon subjects the methodology adopted enabled the author to capture, understand and analyse subjects' own worldviews. That stance appeared highly appropriate for knowledge discovery and generation for this study since it was being adopted within the context of a *social* research project (Gephart 1999).

The author's stance has allowed him to study the phenomenon within its natural setting and context, and in great detail, while data collection is not limited to predetermined categories (Hyde 2000). Within that paradigm the basis for generalisation is not statistical (as with quantitative/positivist paradigms within which a researcher attempts to study a large and representative sample drawn from the population of interest, measure their behaviours and then extrapolate generalisations regarding that behaviour back to the population as a whole). Within this study generalisation is analytical – the author's objective is to expand and generalise theory rather than to establish the frequency with which the phenomenon has occurred within the population (Hyde 2000). The author's aim is to explain, rather than predict, phenomena. Consequently, this study's depth of understanding and knowledge discovery is based upon the detailed analysis and understanding of the *particular* since that understanding provides the basis for the theoretical explanation of a *general* phenomenon (Stake 1994).

4.3 Developing the Research Approach

Within this study the research approach is broadly inductive. The characteristics of inductive and deductive approaches to research are shown in Table 4.1.

Inductive Approach	Deductive Approach
<ul style="list-style-type: none"> • No priori acceptance of truth • Alternative conclusions can be drawn from data • Theory building • Examines relationships among pieces of data • Development of concepts • Holistic perspective • Multiple realities 	<ul style="list-style-type: none"> • A priori acceptance of truth • One set of conclusions is accepted as true • Theory testing • Tests relationships among discrete phenomena • Testing concepts based on application to discrete phenomena • Atomistic perspective • Single, objective reality

Table 4.1 – Major Characteristics of Inductive and Deductive Research (DePoy & Gitlin 1994)

An inductive approach is adopted to *build* theory since if the opposite had been adopted the study would have begun with the firm acceptance of a general principle or belief, deduced hypotheses from that and then tested them in order to explain a specific case or phenomenon;

“... hence the researcher working deductively assumes a truth before engaging in the research process and applies that truth to the investigation” (DePoy & Gitlin 1994 p.7).

While the development of a conceptual model (Chapter 3) implies that a deductive approach was adopted, that was not the case. In accordance with Ali & Birley (1999), Amaratunga & Baldry (2001) and O’Donnell & Cummins (1999) an *integrated* research approach was utilised. That approach recognises that there is a role for existing theory and knowledge within inductive studies. Therefore, existing theory and knowledge (a priori constructs) are used by the author to provide the broad initial framework that guides the study’s primary research;

“...conceptual models may be constructed, whereby the key issues from the literature are linked together, and their interactions and relationships illustrated” (O’Donnell & Cummins 1999 p.85).

Existing theory is used by the author to identify constructs from existing knowledge and understanding thereby grounding the study’s primary research and ultimately its findings. The careful design of data collection tools subsequently allowed respondents to determine for themselves how to interpret the constructs under investigation, facilitating theory building by the author (Ali & Birley 1999). That approach was highly practical because it guarded against data overload during the data collection phase (by focusing the study at an early stage) while still providing scope for

generating novel findings and theory. The logical outcome from that approach was that existing knowledge was enhanced and that an alternative conceptual framework was developed. That approach was highly suitable for this research project since, as discussed within Chapter 3, existing theory was not sufficiently robust to capture the complexities of the phenomenon under analysis. Similarly, as Eisenhardt (1989 p.536) notes;

“A priori specification of constructs can also help to shape the initial design of theory building research ... valuable because it permits researchers to measure constructs more accurately”.

An integrated approach is adopted by the author in order to avoid the limitations associated with theory *testing* grounded within the positivist paradigm (DePoy & Gitlin 1994, Saunders *et al.* 2000, Robson 2002). While that approach has its origins within natural sciences research, the emergence of the social sciences during the 20th century caused researchers to be wary of it (Saunders *et al.* 2000). Specifically, they were critical of an approach that enabled a cause-effect relationship to be established between variables without supplementing that with an understanding of the way in which humans interpret their social world. Commenting upon that, Robson (2002) argues however that there is still a place for both theory testing and building. The choice of approach, Robson (2002) argues, should be determined by the circumstances and context of the research study because what is important is that upon completion of the study a theory exists. Consequently, a broadly inductive approach is adopted since this study is particularly concerned with the context within which events take place and the author accepts that there might be alternative explanations for the phenomenon under investigation.

An integrated inductive approach is used to build theory within a process in which general rules develop from observations of phenomena which ultimately lead to the development of theory. Within that approach the conceptual framework (Chapter 3) is used to provide initial guidance and focus to the study – it is used as the springboard from which theory can be built. Existing knowledge and theory was analysed within Chapter 2. That analysis highlighted the three disparate streams of prior research that were ultimately refined and developed into original constructs within Chapter 3

(constructs that consider the web infrastructure development process, the drivers and rewards of that process and barriers inherent to the process's successful completion). In that way existing theory and knowledge grounds this study while enabling the author to propose new constructs as shown within Figure 4.2

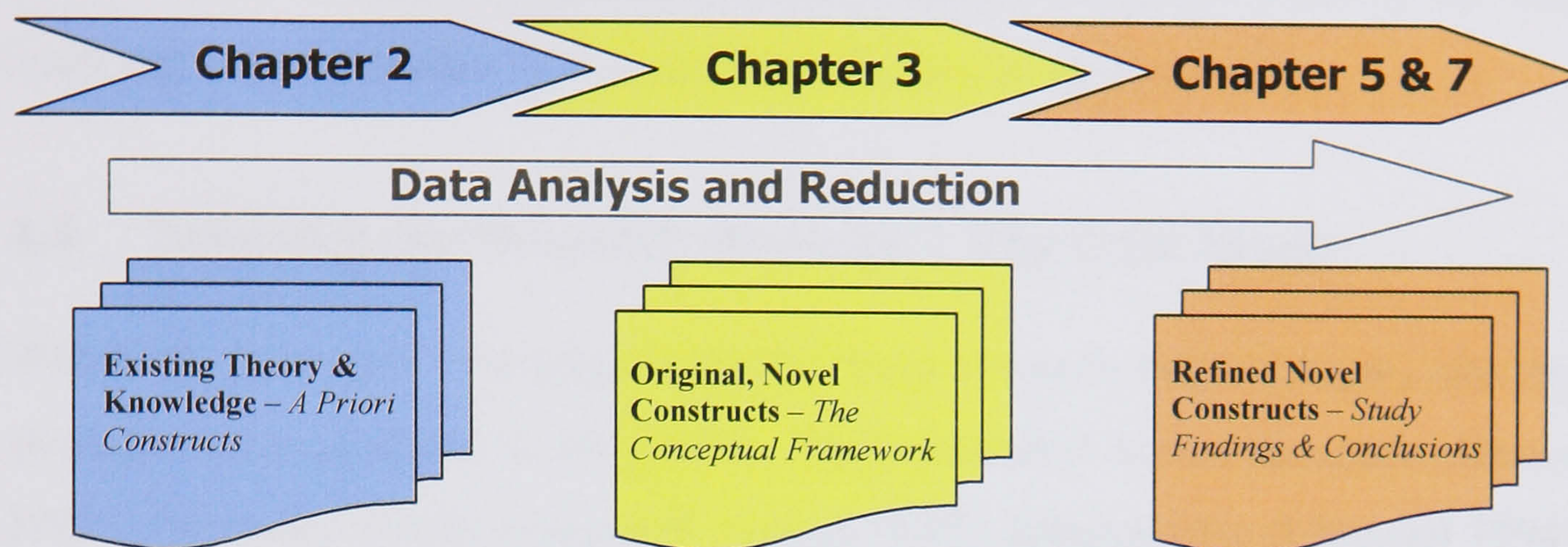


Figure 4.2 – Construct Development within an Integrated Research Approach

In accordance with this integrated approach, the careful design of the data collection tools used ensures that researcher bias is minimised and that respondents are able to attach their own meanings and understandings to the constructs under analysis. In that way, the use of existing knowledge and understanding enhances the study while still enabling the author to build theory pertinent to the issues under analysis. That research approach is highly suitable because this study's primary aim is to build understanding of the Small Business Web infrastructure development process and its barriers and problems, and from that develop further knowledge about this phenomenon. Hence, that approach was adopted since the research emphasis is to gain an understanding of both a contextual phenomenon and the understandings and meanings of those people affected by it (Saunders *et al.* 2000). That analysis also highlights that this study's purpose is essentially *exploratory* in nature (rather than being *descriptive* or *explanatory*). The exploratory approach to research encompasses studies conducted in natural settings that have;

“... the explicit purpose of discovering phenomena, variables, theory or [a] combination thereof” (DePoy & Gitlin 1994 p.78).

An exploratory research purpose is methodologically sound because the objective of the study is to develop and clarify understanding of a problem or situation. Consequently, in accordance with Ali & Birley (1999), Amaratunga & Baldry (2001), Eisenhardt (1989) and O'Donnell & Cummins (1999) the conceptual model presented

within Chapter 3 guides the study's primary research by providing the broad framework within which data collection and analysis, and theory development take place. Therefore, the development of a conceptual model (which builds and enhances understanding of the phenomena under analysis) is entirely appropriate within the context of this inductive, exploratory study because it was developed by the author to build and enhance (rather than to test) the theories being proposed.

4.4 Selecting the Research Strategy – The Case Study

Within the interpretive paradigm adopted many research methodologies and research strategies were available to the author. These included Action Research (Gummesson 1991), Grounded Theory (Glaser & Strauss 1967), Ethnography (Creswell 1994), and Case Studies (Yin 1994, Stake 1994). The choice of strategy is crucial since, as Yin (1994) notes, each has both advantages and disadvantages based upon the type of research questions being posed, the level of control the researcher has over behavioural events and whether the research focuses upon contemporary or historical events. Table 4.2 summarises the research strategies available to the author and is based upon Yin (1994) and Saunders *et al.* (2000).

Research Strategy	Research Questions	Requires Control over Behavioural Events?	Focuses on Contemporary Events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/no
History	How, why?	No	No
Case Study	How, why?	No	Yes
Grounded Theory	What, how?	No	Yes
Ethnography	How, why?	No	Yes
Action Research	How, why, what?	No	Yes

Table 4.2 – Research Strategies (Yin 1994 & Saunders *et al.* 2000)

This study adopts a case study strategy since Connell *et al.* (2001) maintain that strategy would offer the author the ability to obtain rich data with high validity while situating and interpreting data within its wider context. Yin (1994) likewise asserts that a case study strategy should have been adopted since this project attempts to explain phenomena that are too complex for survey or experimental strategies, to analyse and document the real life context within which the phenomena occurs and to

explore situations that have no clear single outcome. In essence that strategy was chosen within this study because;

“A how or why question [is] being asked about a contemporary set of events over which the investigator [has] little or no control.” Yin (1994 p.9).

4.5 The Strengths of the Case Study Strategy

Yin (1994) argues that case study research is a comprehensive research strategy that relies upon a multiplicity of data sources to triangulate the study findings and goes on to define this strategy as:

“... an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.” (Yin 1994 p.13).

The ‘case study’ strategy chosen by the author represents not so much a single qualitative method, but rather an overall approach to research; it is a methodological strategy within which a combination of sources and types of data are drawn upon to describe, analyse and evaluate interactions within a particular context. The case study represents an in-depth study of a particular instance, or number of instances, of a phenomenon (Hyde 2000) and includes many different types of data collection. Stake (1994) however, offers a contradictory view and argues instead that adopting a case study approach is not a choice of strategy by the author but rather the selection of an object of study – since the author chose to adopt a case study approach he chose to study the case. According to Stake (1994) researchers that use the case study approach do so in an attempt to uncover the commonality of the case as well as its unique character. Therefore, since one of the greatest strengths of the case study approach (whether defined as a research strategy, research methodology or research method) is its ability to enable a researcher to undertake an in-depth investigation into a phenomenon in its natural setting and context (Stake 1994, Yin 1994, Rowley 2002) that research strategy is adopted within this study. That strategy is strongly advocated by Swartz & Boaden (1997) since the overall aim of this study is to uncover and analyse the contextual factors and the relationships they shared pertinent to the commercial exploitation of Web infrastructures by Small Businesses within functioning real-world Small Businesses.

4.6 The Study's Time Horizon

The study's time horizon is also an important consideration within the development of the author's research methodology. The author had to choose between a longitudinal or cross-sectional design (Easterby-Smith *et al.* 2002). Within the latter, a sample is drawn across a large number of organisations or situations and the researcher investigates how factors vary across them at one point in time. While such designs have the ability to describe the features of large numbers of people or organisations they often fail to analyse *why* correlations exist between the phenomena observed (Easterby-Smith *et al.* 2002, Yin 1994). To address that apparent limitation of cross sectional studies, this study's design is *longitudinal* since by analysing the long-term experiences of a smaller number of organisations (but over a greater period of time) the interplay between the phenomena of interest can be better considered and conclusions regarding why this interplay exists are more likely to be able to be drawn.

4.7 Generalisation and Case Study Organisation Selection

The approach adopted and discussed does not attempt to infer global findings from the organisations studied back to the population from which they were selected. Rather, it enables the author to understand and articulate patterns and linkages of theoretical importance (Amaratunga & Baldy 2001). In accordance with Perry (1998), multiple cases were selected since that approach facilitates cross-case analysis to enhance theory building. Within that strategy those 'multiple cases' were regarded as 'multiple experiments'; hence replication logic (rather than sampling logic) was employed within the research design (Robson 2002, Yin 1994). In accordance with Stake (1994), representativeness was not the overriding criteria for case selection. Rather, as Yin (1994) notes, each case was selected such that it provided either literal replication (i.e. the case displayed predictable results for predictable reasons) or theoretical replication (i.e. the case displayed contradictory results for predictable reasons).

On the basis of replication logic, the study's multiple cases can be likened to multiple experiments, and the more cases that can be shown to have established or refuted the theories developed, the more robust will be the research findings (Robson 2002, Rowley 2002). Thus, the comparative case study strategy enabled the author to

analyse those factors that transcended the specificity of only one Small Business (Swartz & Boaden 1997). Within that comparative case study strategy, and in accordance with Robson (2002) and Rowley (2002), the author compared the Small Businesses studied with each other in a systematic way in order to explore and analyse the phenomena under investigation.

4.8 Study Data Collection

Since qualitative research seeks to reveal understandings and experiences that are internal to the group or domain being studied, the data collection methods adopted within this study were designed to allow the research subjects to construct and communicate their own understanding of the issues under analysis (crucial within an integrated inductive study). Within the case study strategy adopted, data collection was an amalgam of several sources of data based upon those suggested by Yin (1994) and Saunders *et al.* (2000):

- Documentation (e.g. letters, agendas, memoranda and written reports)
- Archival records (e.g. company records, administrative records and survey data)
- Interviews
- Direct observation
- Physical artefacts (e.g. technological devices)

Primary data collection involves the use of semi-structured face-to-face key informant interviews. That technique was chosen since it was recognised as a powerful data collection tool that would allow the author to dictate both the topic and issues to be investigated while generating rich qualitative data regarding the phenomenon under investigation (Hussey & Hussey 1997, Cryer 2000, Jankowicz 2000, Sekaran 2000). Likewise, that data collection method offers the advantage of being more capable than structured interview techniques of capturing the interviewees' world-views (Cavana *et al.* 2001). That choice of data collection method reflects the author's epistemological stance in that knowledge creation is contextual, situational and interactional. Consequently, all data-collection tools were designed to be both flexible and sensitive to the specific dynamics of each interaction (Mason 1996). In accordance with Easterby-Smith *et al.* (2002) the primary purpose of the interviews was to elicit

understanding of the meanings interviewees attached to the issues and situations under analysis within contexts that were not highly structured in advance by the author. Similarly, the interviews were conducted so that every opportunity was available for the insights of the interviewees to be gained (Easterby-Smith *et al.* 2002).

A completely unstructured non-directive interview approach was avoided (as advocated by Easterby-Smith *et al.* (2002 p.88)). That technique would most likely have resulted in the interviewee having no clear picture in mind of what questions or issues the author was interested in, and the author having no clear understanding of what questions the interviewee was answering! While some structure for the interviews was needed it was vital that the interview schedule was designed to not limit responses to those variables already identified within the conceptual model. That supported the integrated inductive research approach adopted within the study (Eisenhardt 1989, Ali & Birley 1999, O'Donnell & Cummins 1999). Therefore, as advocated by O'Donnell & Cummins (1999) the conceptual model guided the structure and content of each interview – in that way it provided an agenda of areas to be covered within the interview. However, as Eisenhardt (1989), Ali & Birley (1999) and O'Donnell & Cummins (1999) note, within an integrated inductive approach the interview tool must also be designed so as not to limit responses to those variables already identified within the conceptual model and to facilitate data collection in the *interviewee's* own terms. In order to balance those two fundamental requirements the broad constructs contained within the conceptual model were used to provide structure to the interview schedule while the specific variables contained within it (Tables 3.2 – 3.8) were not disclosed to interviewees. That allowed interviewees to articulate their own experiences without undue bias from the author/conceptual model.

4.8.1 Construct Identification

Cavana *et al.* (2001 p.78) define a construct as an *idea* that can be expressed as a symbol or in words while a variable can be observed and measured. That definition closely mirrors that proposed by Silverman (2000 p.78) who defines constructs as:

“... clearly specified ideas deriving from a particular model”.

Those definitions were used by the author to identify the constructs contained within the conceptual model that subsequently formed the basis of the interview schedule. The conceptual model therefore represents the foundation upon which the primary research is based. It was developed logically and detailed the network of associations amongst the constructs deemed relevant to the situation under analysis as identified by both secondary research (background theory analysis) and the author's experiences (Cavana *et al.* 2001). In that way, the conceptual model provides the framework to understand the phenomena under analysis and provides the basis of how the unknown can be organised and explored (Silverman 2000). Figure 4.3 details the constructs contained within the conceptual model. Figure 4.3 demonstrates that the conceptual model contains four primary constructs. Those four constructs form the agenda upon which the questions contained within the interview schedule are based and were also used as the framework within which data analysis subsequently took place. That approach enabled the relationship between the conceptual model and the interview schedule ultimately developed to be graphically highlighted as shown within Tables 4.3 and 4.4.

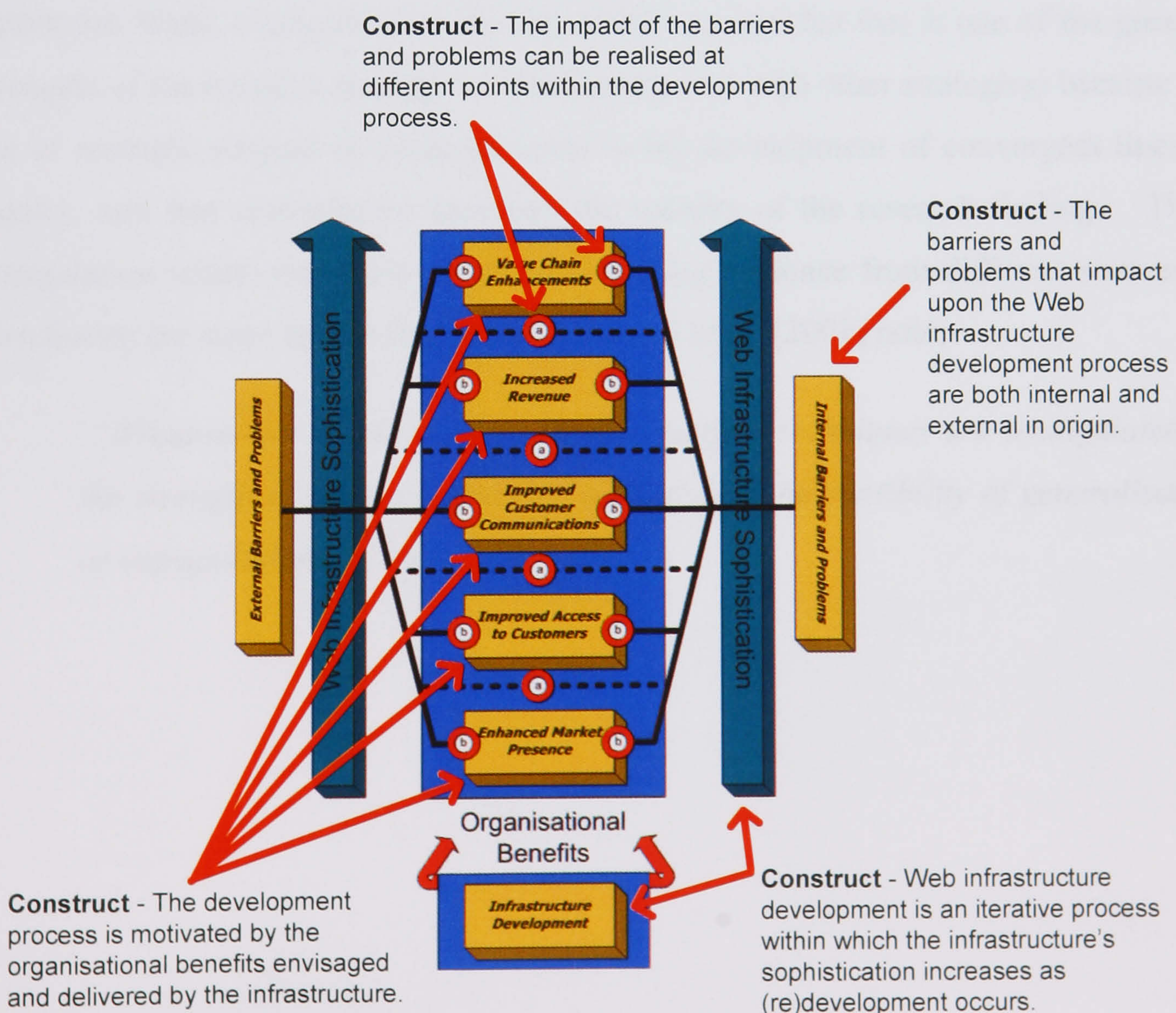


Figure 4.3 – Construct Identification

Table 4.3 demonstrates how each question relates specifically to the four key constructs under analysis. The output from that process (i.e. the interview agenda and list of questions raised by the constructs contained within the conceptual model) was then re-ordered and re-phrased into a series of interview questions and related probes. Likewise, duplicated questions were discarded and certain questions combined. That resulted in an interview schedule that followed a logical sequence, was not overly long and which was capable of generating data specifically relevant to the constructs under consideration. The interview schedule ultimately used within this study is shown within Table 4.4.

The data gathered via the interview agenda were also supplemented by both direct observation and document analysis in order to triangulate the data ultimately collected, thereby corroborating both the accuracy and veracity of the study findings. Similarly, transcripts of the interviews held were made available to the case study organisations in order to confirm their accuracy, thereby minimising data and interpretation bias. That use of multiple sources of evidence leads to an important element of data analysis within this study, *triangulation*. Rowley (2002) argues that that is one of the greatest strengths of the research strategy adopted (compared with other strategies) because the use of multiple sources of evidence leads to the development of convergent lines of inquiry, and that convergence increases the validity of the research findings. Thus, triangulation within this study involved collecting evidence from different sources to corroborate the same fact or finding. As Connell *et al.* (2001) note:

“Whatever the method utilised when multiple techniques are triangulated ... the strength of research findings, validity and the possibility of generalisation or extrapolation are increased”.

Construct	Questions Raised by Construct	Related Interview Schedule Question
General Questions	Organisation Name & Address	SQ1
	Organisation URL	SQ2
	Nature of Business	SQ3
	Annual Turnover	SQ4
	Number of Employees	SQ5
	Interviewee & Organisational Position	SQ6
The development process is motivated by the benefits envisaged and delivered by the infrastructure	When did you first develop a Web infrastructure?	SQ7
	Why did you develop it?	SQ7 probe
	What objectives were originally set for the infrastructure?	SQ7 probe
	How were these original objectives established?	SQ7 probe
	Did the infrastructure meet its original objectives?	SQ8
	How was its initial performance assessed?	SQ8 probe
	Have the infrastructure's objectives changed over time?	SQ9
	How have the objectives changed?	SQ9 probe
	Why have the infrastructure's objectives changed?	SQ9 probe
	What benefit(s) has the infrastructure delivered?	SQ10
	When were these benefits realised?	SQ10 probe
	How are these benefits assessed?	SQ10 probe
Development is an iterative process within which sophistication increases with (re)development	Who was responsible for developing the infrastructure?	SQ7 probe
	How was the process of development undertaken?	SQ7 probe
	How has the infrastructure changed since it was developed?	SQ9 probe
	Why has it changed?	SQ9 probe
	What impact has the infrastructure had upon the business?	SQ11
	Has its impact upon the business changed over time?	SQ11 probe
	How is its impact assessed?	SQ11 probe
	How is the infrastructure's impact upon the business managed?	SQ12
The impact of the barriers and problems can be realised at different points within the development process	Has the infrastructure failed to achieve any of the objectives set for it?	SQ13
	Why has it failed?	SQ13 probe
	What impact has this had?	SQ13 probe
	What actions were taken as a result of this 'failure'?	SQ14
	Have you encountered problems with the infrastructure?	SQ15
	When did you encounter these problems?	SQ15 probe
	What impact have these problems had upon the infrastructure?	SQ15 probe
	What impact have these problems had upon the business?	SQ15 probe
	How did these problems affect the infrastructure's development?	SQ16
	How did you solve these problems?	SQ16 probe
The barriers and problems are both internal and external in origin	Have you encountered problems with the infrastructure?	SQ15
	What types of problems have you encountered?	SQ15 probe
	How did you overcome them?	SQ16 probe
	What strategies did you use to overcome them?	SQ16 probe
	Were any of these problems outside of your control?	SQ17
	Why was this the case?	SQ17 probe
	Have you been unable to overcome any of these problems?	SQ18
	Why were you unable to overcome them?	SQ18 probe
	What effect has this had upon the infrastructure?	SQ18 probe
	What impact has this had upon the business?	SQ18 probe

Table 4.3 – Construct & Interview Schedule Question Development

Question Reference	Interview Schedule Agenda, Question and Related Probes
SQ1	Organisation Name & Address
SQ2	Organisation URL
SQ3	Nature of Business
SQ4	Annual Turnover
SQ5	Number of Employees
SQ6	Interviewee & Organisational Position
SQ7	When did you develop a Web infrastructure?
<i>probes</i>	<ul style="list-style-type: none"> • Why did you develop it? • What objectives were originally set for it? • How were these objectives established? • Who was responsible for developing the infrastructure? • How was the process of development undertaken?
SQ8	Did the infrastructure meet its original objectives?
<i>probe</i>	<ul style="list-style-type: none"> • How was its initial performance assessed?
SQ9	Have the infrastructure's objectives changed over time?
<i>probes</i>	<ul style="list-style-type: none"> • How have they changed? • Why have they changed? • How has the infrastructure changed since it was developed? • Why has it changed?
SQ10	What benefit(s) has the infrastructure delivered?
<i>probes</i>	<ul style="list-style-type: none"> • When were these benefits realised? • How are they assessed?
SQ11	What impact has the infrastructure had upon the business?
<i>probes</i>	<ul style="list-style-type: none"> • Has this changed over time? • How is this measured?
SQ12	How is the infrastructure's impact upon the business managed?
SQ13	Has the infrastructure failed to achieve any of the objectives set for it?
<i>probes</i>	<ul style="list-style-type: none"> • Why has it failed? • What impact has this had?
SQ14	What actions were taken as a result of this 'failure'?
SQ15	Have you encountered problems with the infrastructure?
<i>probes</i>	<ul style="list-style-type: none"> • What types of problems have you encountered? • When did you encounter these problems? • What impact have these problems had upon the infrastructure? • What impact have these problems had upon the business?
SQ16	How did these problems affect the infrastructure's development?
<i>probes</i>	<ul style="list-style-type: none"> • How did you solve these problems? • What strategies did you use?
SQ17	Were any of these problems outside of your control?
<i>probe</i>	<ul style="list-style-type: none"> • Why was this the case?
SQ18	Have you been unable to overcome any of these problems?
<i>probes</i>	<ul style="list-style-type: none"> • Why were you unable to overcome them? • What effect has this had upon the infrastructure? • What impact has this had upon the business?

Table 4.4 – The Interview Schedule

4.8.2 Deploying the Interview Agenda

The interview agenda was designed so that each of its eighteen questions could be posed in the same way during each interview (thereby providing stimulus equivalence and construct validity) while still providing the author with the flexibility to alter their

sequence and probe for more information if required (Fielding 1993). That was important because the interview agenda, when followed, would mirror a 'natural' conversation: the agenda had to be capable of mimicking a natural conversation's ebb and flow. That design rationale enabled the author to adapt the research instrument to suit the level of comprehension and articulacy of each respondent and handle the fact that in responding to one question interviewees routinely provided data pertinent to questions that had not yet been asked (Fielding 1993). Each agenda item was supplemented with probes appropriate to the topic under discussion. The probes were used to elicit further information from interviewees when their initial response to a question failed to generate the breadth and depth of data being sought by the author. The use of such probes:

"...is entirely acceptable within...[semi-structured interviews]... because we probe all the time in normal conversation and our objective is to have a guided conversation" (Fielding 1993).

4.8.3 Case Study Organisation Selection and Overview

Within the methodology deployed multiple cases were studied in order to facilitate cross-case analysis leading to enhanced theory development. Where appropriate, multiple interviews were held within each case. Within that approach each case can be regarded as a unique 'experiment'; each one is distinct and separate. In support of that approach, and in accordance with Jankowicz (2000) & Sekaran (2000), the objectives underpinning the interview process focus upon insight and exploration rather than upon the quantitative statistical analysis of data and the wide generalisation of the study's findings. Since case study organisations were selected on the basis of replication (rather than sampling) logic purposeful sampling was used. That approach was taken because the study involved the in-depth analysis of a relatively small number of organisations that had been chosen because they possessed certain attributes and displayed certain behaviours. Table 4.5 details the criteria used by the author to select organisations for study and the rationale that underpins this.

The strength of the research method utilised within this study relies upon the author having selected information-rich cases from which information relevant to the

research questions posed can be gleaned. As Yin (1994) notes, there is no 'ideal' sample size since this research method does not attempt statistical generalisation from its findings. As advocated by Yin (1994) and Stake (1994) the number of organisations selected for study was determined by the information that they subsequently imparted to the author; once data saturation occurred data collection ceased. The author did not begin data collection with a predetermined number of case study organisations already selected. Instead, the number of organisations studied (cases) was determined entirely by the data that they imparted. The data generated from each interview was then subjected to a thematic analysis in order that novel theory about the issues of interest could be generated. In that way data analysis and collection occurred concurrently. Within that approach the same question set was used within each interview to ensure stimulus equivalence. However, once data collection failed to generate data that contributed to the enhancement of the novel 'themes' and theory being sought data collection ceased. At that point no further case study organisations were selected for study. That was because at that stage the ongoing further collection of study data would have added increasingly less value to the study. Consequently once enough data had been collected to answer the research questions, data collection ceased. That approach highlights that the in-depth study of the case organisations was undertaken specifically to enable the author to gather sufficient data to gain a rich insight into the issues of interest visible within them (the four key constructs contained within the conceptual model). As discussed above, each case must therefore be regarded as a unique experiment. This collection of experiments does not represent a 'sample' that is representative of any given population. As a result, the study findings cannot be generalised back to a population since any claims for knowledge discovery based upon that approach would be fundamentally flawed. Rather, the study findings are generalised to theoretical propositions and not to entire populations. That approach has been adopted by the author because within this methodology it is the study of the particular that leads to the theoretical understanding of a wider phenomenon. Within this study the author's intention is to expand and generalise theory (analytical generalisation) rather than to establish the frequency with which phenomena may occur in the future within a wider population (statistical generalisation).

Criterion	Rationale
<i>The organisation is owner managed</i>	All case study organisations met at least two of these three criterion. The ability to satisfy at least two of these criterion establishes that the organisation is a Small Business as defined by the Small Business Service (2004b) and Section 248 of the Companies Act (1985).
<i>The organisation has an annual turnover of less than £2,800,000</i>	
<i>The organisation employs fewer than 49 people</i>	
<i>The organisation has traded for at least 1 year</i>	This criterion establishes that the organisation is one of 40% of UK Small Business that successfully trade for more than 1 year (Barclays 2005). This criterion helps to establish that any perceived failure on the part of the web infrastructure is not a failure of the organisation's underlying business model.
<i>The organisation has a functional web infrastructure that supports electronic commerce between a business and a customer</i>	This criterion establishes that the organisation has a functional business to customer web infrastructure as defined by IBM (2005).
<i>The organisation has a functional web infrastructure that enables the exchange of information between business and customer entities</i>	This criterion establishes that the organisation has a functional business to customer web infrastructure as defined by Microsoft (2005).
<i>The organisation's web infrastructure displays the characteristics of a;</i> <ul style="list-style-type: none"> • 'level 2' web infrastructure (as defined by DTI (1998)) • 'level 3' web infrastructure (as defined by Chaston et al. (2001)) • 'level 3' web infrastructure (as defined by Daniel et al. 2002a, 2002b)) 	This criterion establishes that the functionality of the web infrastructure, and use of the web by the organisation, extends beyond email alone. As a minimum the organisation must; <ul style="list-style-type: none"> • use email (and) • make a web site available for access via the world wide web.
<i>The organisation has managed the initial development of the web infrastructure</i> <hr/> <i>The organisation has managed the on-going development of the web infrastructure</i>	This criterion establishes that those organisations selected for study have experienced the web infrastructure development process <i>to some degree</i> . That is, the process has not been sub-contracted <i>in its entirety</i> to another organisation.

Table 4.5 Case Study Organisation Selection Criteria

In addition to establishing the criterion by which case study organisations would be selected for study and defining the criterion that would govern the scope of experimentation, the author also had to define the study's unit of analysis. Adequately defining the unit of analysis is vital since as Yin (1994) notes, studies that contain specific propositions are significantly more likely to stay within feasible limits. Ultimately, it is the unit of analysis that provides those 'feasible limits' and that can take many forms. Whatever form the unit of analysis takes it is important that it is clearly defined because it ultimately determines how those included within the 'group' under analysis differ from those outside of it; the unit of analysis determines the boundaries within which data collection and analysis occurs. To satisfy those

requirements and in accordance with Yin (1994), this study's unit of analysis has been developed from the research questions posed within Chapter 1. Within this study the unit of analysis is the experiences of managers of UK Small Businesses of the Web infrastructure development process that have developed and deployed a commercial business to customer web infrastructure. Clearly defining this study's unit of analysis also impacted upon the questions ultimately asked of each respondent. For example, questions concerning user perceptions of the navigability and ease of use of each case study organisation's web site were not asked because the study respondents would not have been able to provide the valid data necessary to accurately answer that question. Had that question been asked the author would not have collected valid data about each web site's users' experiences of using that Web site. Rather, data would have been collected about each case study organisation's owner/manager's perceptions as to their Web site's users' perceptions of the usability and navigability of the organisation's web site. In essence the data collected of the owner/manager regarding the perceptions and experiences of others would not be valid because the owner/manager's views cannot be considered either valid or representative of anyone other than that owner/manager! Without the fundamental recognition the internal validity of the study would have been greatly compromised thereby compromising the overall credibility of the study.

Table 4.6 presents an overview of the organisations chosen for study. Table 4.6 has been anonymised at the request of the case study organisations. That has been done since commercially sensitive information was discussed with the author and is published within this study's findings. By giving each case study organisation and interviewee confidence that all discussions would be reported anonymously, the need for a confidentiality agreement was negated. Likewise, the use of respondent validation addressed the case study organisations' and interviewees' concerns regarding the subsequent ethical use of the data collected by the author (in accordance with Bryman 2001). This study's findings also consider areas of both strength and weakness of the case study organisation which the Small Business owner/managers did not wish to be made publicly available.

Organisation Name and Address	Nature of Business	Employees	Interviewee(s) & position	First contact
The Holiday Cottages, Nr. Alnwick, Northumberland.	Holiday cottage letting	16	Crissy S. (Owner & Managing Director) and Anthony S. (Owner & Director)	6/10/2004
The Gallery, Skipton, North Yorkshire.	Art gallery	6	Ben M. (General Manager), Jonathon S. (Owner)	4/11/2004
The Web Designer, Bolton, Lancashire.	Web design and ICT support	6	Steve L. (Sales, Marketing & Design Manager), Glyn L. (Sales & Managing Director), Neil C. (Programmer)	8/11/2004
The Guest House, Swale Dale, North Yorkshire.	Guest house	7	Joe L. (owner/manager)	15/11/2004
The HPO, Kettering, Northants.	Executive training, consultancy and business systems development	19	Rob P. (Owner & Director) and Ian R. (Owner & Director)	3/12/2004
UK Installer, Rochdale, Lancashire.	The manufacture, sale, fitting and servicing of bespoke carpeting	15	Paul B. (Sales and Marketing Manager), Paul P. (Production Manager), Angus C. (Financial Manager)	24/01/2005
The Trainer, Manchester, Greater Manchester.	Provider of management coaching and mentoring	25	Marilyn C. (Owner and Managing Director)	26/01/2005

Table 4.6 – Case Study Organisation Overview

Organisation Name and Address	Nature of Business	Employees	Interviewee(s) & position	First contact
The Trade Association, Oldham, Lancashire.	Small Business trade association	14	Bob B. and John S. (Chamberlink business advisors to The Trade Association), Frank R. (The Trade Association Chairman)	1/02/2005
The Manufacturer, Bolton, Greater Manchester.	Cable assembly & sales, &wiring harness manufacture	45	Graham B. (Managing Director)	4/03/2005
3SE, Manchester, Greater Manchester.	Promotion of social enterprise within Gtr. Manchester	10	Sharon C. (Service Development Manager)	31/03/2005
The Food Company, Lytham St. Annes, Lancashire.	Supplier of pre-packed Eastern & Western foods	25	Zera R. (Sales & Technical Director)	28/04/2005

Table 4.6 (cont'd) – Case Study Organisation Overview

Each organisation was initially contacted by the author in order to secure their agreement to take part within the study. The author first explained the broad purpose and nature of the study and outlined what their role within it would be. The author then explained his research and professional background. As part of that initial contact the author established who had contributed to the development and deployment of the organisation's Web infrastructure and business plans, and arranged to meet those people at a mutually convenient time. Initial interviews with each manager were then held and follow up interviews scheduled. The author also offered each organisation future access to the study findings. That approach greatly helped overcome the access problems often encountered by researchers caused by the reluctance of Small Business owner/managers to involve themselves and their organisations within academic research projects. Small Business owner/managers often fail to recognise the potential organisational benefits of engaging within academic research projects (Boyes 2005). However, the pragmatic approach adopted by the author (and reported within Boyes (2005)) helped to overcome those concerns.

4.8.3 Pilot Testing

In accordance with Fielding (1993), Ghauri *et al.* (1995), Hussey & Hussey (1997) & Jankowicz (2000) the interview agenda was pilot tested with one case study organisation prior to its full use. The organisation used to pilot test the agenda was the Cottages (see Table 4.6). Pilot testing was undertaken to confirm that the output from the interviews would be sufficient to satisfy the research objectives they sought to fulfil and to detect any errors or problems in the interview agenda layout, design and wording prior to its wide scale use. Pilot testing revealed no problems with design and wording of the agenda. That was because the author subjected the generated data to the thematic analysis subsequently applied to all study data. The data generated by the pilot test revealed that the question set had generated data sufficient to identify the emergent themes being sought. Those themes emerged from the data and were relevant to the four key constructs contained within the conceptual model which had themselves been developed from existing literature and knowledge. Ultimately, those themes subsequently enabled the author to generate the novel theory and findings necessary to answer the study's research questions. However, the pilot test highlighted one major flaw with the data collection process. As discussed within

Section 4.8.4 each interview was recorded such that the author could refer back to the discussion and so that each interview could be transcribed and validated by the interviewee. Pilot testing revealed that the recording device had failed to record the interview. Therefore, the author replaced the recording device before the next interview was undertaken.

4.8.4 The Interview Protocol

As discussed within Section 4.8.2 each case study organisation was contacted by the author to secure their agreement to take part within the study. Initial interviews were then scheduled within the following 2 weeks. At the start of each interview the author secured each interviewee's agreement that any subsequent discussions could be recorded and reiterated the broad purpose of the study. The author then used the interview agenda to guide the subsequent discussions. During each interview, documentation that could support the interviewee's answers was reviewed by the author and the content of each interview was supplemented by the author's observations.

Following each interview a transcript of the discussions was prepared based upon the recording made by the author during the interview. That was done to enable interviewees to validate their answers (respondent validation) and to give them an appropriate opportunity to review their contributions to the topics discussed. To assist with that process, the transcripts were structured around the interview agenda that had guided the discussions rather than following the conversation precisely and reporting the content of each interview 'word-for-word'. That was done because since the interview agenda produced a conversation that moved easily and naturally from topic to topic during the course of the discussion, the interviews did not discuss each agenda item in sequence or in isolation. That was to be fully expected since the agenda was specifically designed to allow the author to alter the sequence of the questions and probes asked in response to on-going developments within the general discussion being held. However, if each discussion had been transcribed exactly 'as is' they would have been very difficult for interviewees to follow and review. That would have greatly lessened the value of respondent validation because respondents would not have been fully able to understand the responses that they were being asked to

validate! Therefore, restructuring the transcripts around the issues discussed (rather than around the order in which the words were spoken) offered interviewees a fuller opportunity to review, amend, supplement or retract their answers than would have been available to them if the transcripts had of been word-for-word accounts. That does not mean that the transcripts are abridged or amended accounts of the interviews: each transcript accurately documents the full range and content of the interview upon which it is based. That approach also ensured that the author's interpretation of an interview mirrored that of the interviewee's thereby increasing confidence in the validity of the data. The transcripts were then returned to the case study organisation under cover of a letter asking the interviewee to read the transcript and either indicate where changes were required or to sign-off the transcript to validate its contents. An example of a validated interview transcript is contained within Appendix 1 and an example of the covering letter is contained within Appendix 2.

4.9 Study Data Analysis

Miles & Huberman (1984) argue that it is vital that a researcher documents and discusses how a study's data were analysed. That must be done to support the validity and reliability of the claims being made of the data. Likewise, as Easterby-Smith *et al.* (2002) note, rigorous research requires both a clear explanation of how data analysis is conducted and conclusions reached, and a clear demonstration of how the raw data was transformed into those conclusions. To address those issues data analysis was based upon the rationale proposed by Huberman & Miles (1998) and discussed by Robson (2002). Data analysis was therefore composed of four key elements; data collection and management, data reduction, data display and conclusion drawing as shown within Figure 4.4.

Within this study Section 4.8 analysed how the study data were collected while Section 4.9.2 discusses data reduction and data display. Finally, appropriate conclusions are drawn within Chapters 6 and 7. Within that data analysis process all claims for knowledge discovery reflect the epistemological stance of the author. That is, reality is socially constructed, rather than objectively determined. Consequently, data analysis has been undertaken to enable the author to identify and study the underlying concepts of interest and analyse the relationships that exist between them

within the context within which they occurred. The objective of that data analysis is to identify the underlying structure of those experiences studied through the intensive examination of the cases being analysed.

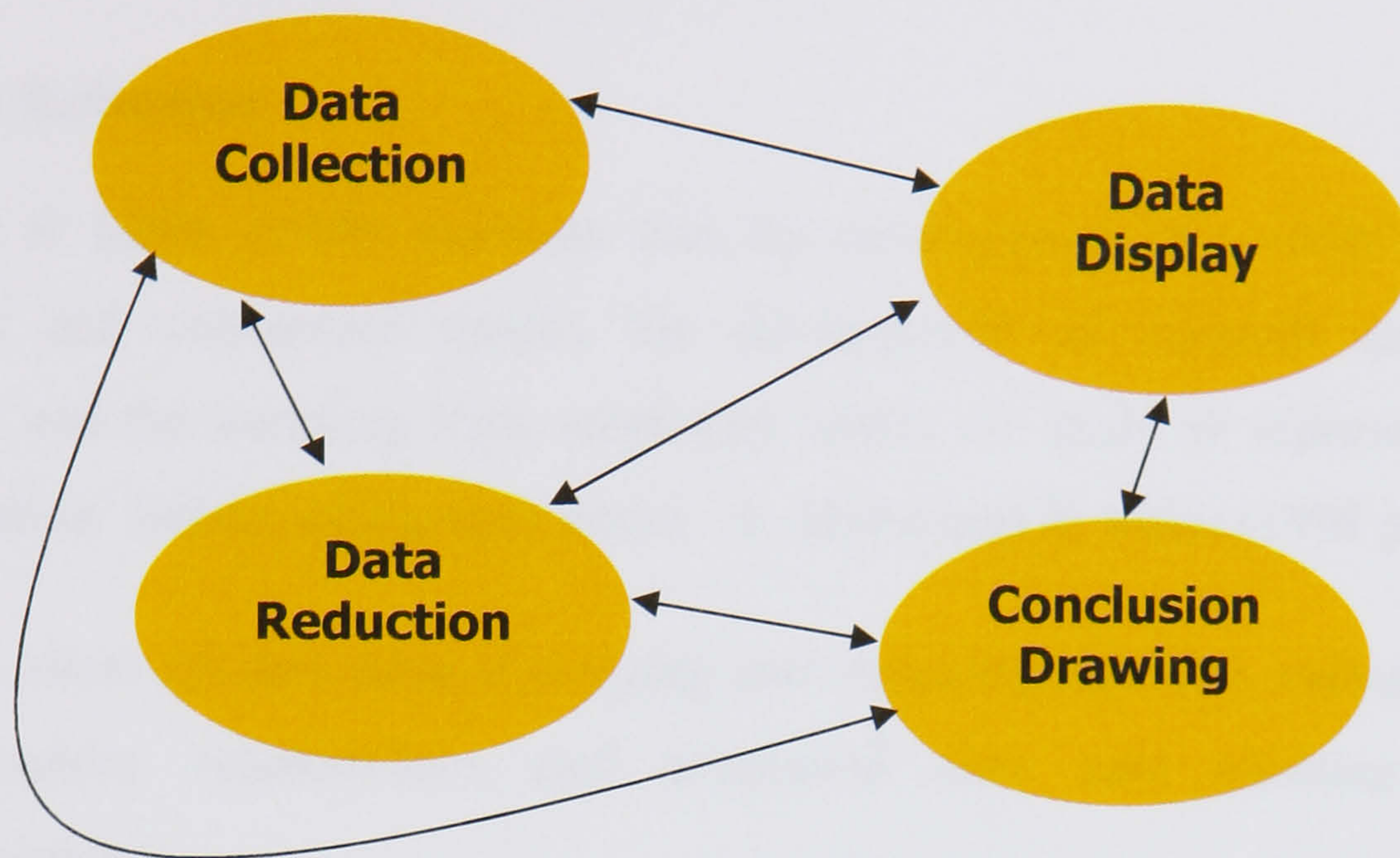


Figure 4.4 – Data Analysis (Huberman & Miles 1998)

4.9.1 Data Collection and Management

Section 4.8 detailed the multiple data collection methods employed within this study. That revealed that the data collected via the interview agenda was supplemented with researcher observation and document analysis. As a result, strong data management was vital since each case study interaction produced large amounts of ‘raw data’. The problem facing the author was how to manage that data so that it would be readily available and accessible at a later date. That ‘problem’ is well recognised – both Easterby-Smith *et al.* (2002) and Robson (2002) remark that condensing and managing highly complex, context-bound and voluminous information into a usable format is routinely a major problem within qualitative studies. Therefore, immediately following each interaction the author’s field notes were extended and supplemented with further information so that he could refer back to them (and make sense of them) at a later date. Likewise, each interaction produced several hours of recorded digital audio which was later transferred to, and organised within, a PC-based database. Physical documents were filed by reference to the case study that had produced them and were cross referenced within the author’s database. The use of an ‘electronic’ filing system enabled the author to store data securely, access it easily and

protect it from accidental loss/deletion. That type of system is advocated by Robson (2002). Each interaction was then transcribed. The resulting interview transcript was made available to each interview subject so that they could verify the accuracy of the data.

4.9.2 Data Reduction

Huberman & Miles (1998) maintain that the development of a study's theoretical framework and conceptual model, the development of research questions and objectives, and the sampling logic employed within the study all represent modes of 'data reduction' (albeit anticipatory ones). As Huberman & Miles (1998 p.184) note;

"... these choices have a focusing and bounding function, ruling out certain variables, relationships, and associated data, and selecting others for attention".

That approach has been adopted within this study since it strongly supports the broad research aim (to analyse and explain the pattern of relationships that exist within the Small Business web infrastructure development process). The data reduction process employed by the author is shown within Table 4.7.

Stage	Activity	Achieved Via	Discussed within
1	Noting patterns and themes	• Background theory analysis	Chapter 2
2	Seeing plausibility	• Conceptual model	Chapter 3
3	Seeing connections	• Conceptual model	
4	Establishing metaphors	• Conceptual model	
5	Establishing frequencies	• Data collection methods	Chapter 4
6	Making contrasts and comparisons	• Data analysis • Data reduction	Chapter 5
7	Establishing relationships	• Data analysis • Data reduction	
8	Building a logical chain of evidence	• Data analysis	Chapter 5
9	Establishing conceptual coherence	• Data analysis	Chapter 6
10	Reaching conclusions	• Data analysis	Chapter 6 Chapter 7

Table 4.7 Data Analysis and Reduction (based upon Huberman & Miles 1998 & Robson 2002)

Table 4.7 highlights that data analysis and explanation can only be achieved by reference to a set of carefully constructed conceptually specific analytic categories. Within this study, the four key concepts contained within the conceptual model

provided the author with the required 'carefully constructed specific analytic categories' needed for data analysis. In that regard, and in accordance with Robson (2002 p.459), this study's qualitative analysis remains much closer to codified 'common sense' than to a hypothetico-deductive statistical analysis. Since this study employs an integrated research approach, both the development of the conceptual framework and the data collected during subsequent fieldwork have both been drawn upon to develop those categories. In that way, the use of a conceptual model (that guided the structure and content of each interview) and the subsequent preparation of structured interview transcripts (themselves validated by interviewees) provided the primary means of data reduction. That approach enabled the author to identify and concentrate specifically upon those concepts and issues of interest (as identified by the broadly inductive methodological approach adopted within the study to identify and develop the four key constructs embodied within the conceptual model). That resulted in data (and ultimately conclusions) firmly grounded within the reality of that being observed by the author within its natural context and setting (Robson 2002).

4.9.3 Data Display and Analysis Activities

Table 4.7 highlights that, as noted by Huberman & Miles (1998) and Robson (2002), it is not possible to clearly delineate between initial, preliminary and final data analysis stages. Table 4.7 demonstrates that data analysis occurred throughout the study since that process considered both primary and secondary research and data. On-going data analysis was integral to the integrated inductive research approach adopted by the author. Within this study primary data analysis consisted of two main stages – within-case analysis and cross-case analysis. Both stages were based upon the output from the data reduction process already applied to the raw data. Similarly, data reduction was integral to both background theory analysis and the development of the conceptual model. In that way, data reduction and data display have influenced the preliminary, initial and final data analysis phases of the study.

Both within and cross-case analysis activities sought to address the four essential elements of qualitative study identified by Morse (1994):

- *Comprehending* what has been observed.

- *Synthesising* an understanding of the observed phenomenon to account for the relationships and linkages within it.
- *Theorising* about why these relationships exist.
- *Re-contextualising* that abstract knowledge about the observed phenomenon back into a real world setting and context.

Each stage was supported by the way in which data were displayed. Therefore, data were displayed such that it facilitated the viewing of the data set in a single location and were arranged systematically in order to answer the research questions at hand (Huberman & Miles 1998). In that way data display supported data analysis. That does not mean that all data needs to be displayed (Easterby-Smith *et al.* 2002). Rather, data were reduced (to facilitate its analysis) and are presented in a condensed fashion using tables and text-based matrices within Chapter 5 (as recommended by Huberman & Miles 1998). In that way, the display of the data and its analysis is an iterative process. Each step influences and informs the other with the author recompiling and redisplaying the data in order to further its analysis. That process was adopted because it resulted in a rich analysis that addressed the four fundamental elements of qualitative research detailed above while also providing a supporting ‘chain of evidence’ for the conclusions ultimately drawn. The overall purpose of that holistic process was to produce common or contradictory themes and patterns from the data which could then be used to form the basis of further interpretation (Easterby-Smith *et al.* 2002). In order to achieve that a 7 step approach (based upon that proposed by Easterby-Smith *et al.* (2002)) was adopted as shown within Table 4.8.

The first stage of data analysis concentrated upon within-case analysis. That was undertaken to establish and analyse those first-order concepts present within the data (subsequent cross-case analysis developed second-order concepts that explained the ordering of those first-order concepts already observed and analysed). During that first stage the author constructed theory in order to explain that which had been observed by reference to the four key constructs contained within the conceptual model already proposed (an approach advocated by Yin 1994). That analysis supported the author’s attempt to understand issues of causality between the concepts and variables being observed. Consequently, within-case analysis involved the author analysing these ‘local’ cases in order to explain how and why they led to the specific

outcomes actually observed. Therefore, within-case analysis involved the detailed write-up of case descriptions for each individual case. The purpose was to become highly familiar with each case. That enabled the author to identify unique patterns within each case. For each case a rich descriptive summary was then prepared (thick description) based upon the condensed data set (presented in tabular form) already developed by the author. From that, within-case analysis enabled the author to identify multiple causes that combined and affected each other to produce the context dependent situation observed 'in the field'. Chapter 5 embodies that process in the depiction and presentation of this study's findings.

Stage	Activity	Achieved Via
1	Familiarisation	Careful preparation of interview transcripts and enhanced field notes.
2	Reflection	Re-evaluating interview transcripts based upon respondent feedback/comments.
3	Conceptualisation	Identifying preliminary concepts based upon initial 'raw data' and reduced data.
4	Concept development	In-depth within-case analysis and thick description leading to the identification of firm concepts. This activity was initially guided by the secondary research contained within the conceptual model.
5	Re-coding	Re-analysis of the data set based upon the firm concepts identified from the data.
6	Linking	Detailed cross-case analysis that develops themes, patterns and explanations across all cases.
7	Re-evaluation	Modifications to the original conceptual model based upon study analysis and findings – the 'concept' becomes 'real'.

Table 4.8 The Data Analysis Process (developed from Easterby-Smith *et al.* 2002)

Data analysis was undertaken without the use of computer assisted qualitative data analysis software (CAQDAS). The author elected not to use CAQDAS for several reasons;

- The author had already created a database with which to organise (and retrieve) the field and analytical notes generated during and after each interview
- The author's inexperience with the use of commercial CAQDAS packages would have resulted in a high learning 'cost' had such a package been used
- Incompatibilities between the author's database and commercially available CAQDAS packages meant that much work would have duplicated if a commercial package had been adopted part way through data collection and analysis

- The author's previous professional experiences strongly support the 'manual coding and analysis' approach adopted within the study. In that way, the author was biased towards the use of manual, visual data management and analysis systems. That is because the author has previously had much success storing, retrieving and analysing highly complex data sets within the context of professional projects using manual, visual data management techniques (see Boyes (2005) and Boyes & Boyes (2006) for a further analysis of the role and use of visual management systems)
- The manual coding and analysis of data (combined with the use of the author's database) proved sufficient to answer the study's research questions!

During data analysis, the analysis process moved from the descriptive towards the explanatory (see above and Chapter 5). That 'move' is vital because the objective is to explain rather than simply report and describe the phenomenon under analysis. As Huberman & Miles (1998 p.191) note that is done in order to;

"... understand not just that a particular thing happened, but how and why it happened".

Within-case analysis was supplemented with cross-case analysis. The key constructs and variables identified via within-case analysis and the explanations for their presence were tested across multiple cases in order to understand the generic processes at work across all cases. That analysis was undertaken to enhance the external validity of the study. Therefore, the concepts and issues of interest *within each case* were first analysed and explained. They were then subjected to a *comparative analysis* so that underlying similarities and associations could be identified. The logical outcome from that analysis is the development of an explanatory model that captures the full complexity of the observations made across all cases under analysis. As Eisenhardt (1989) notes, it is not enough to simply show that relationships exist between cases: the researcher must also decipher the underlying theoretical reasons as to why those relationships exist. To achieve that, the approach advocated by Huberman & Miles (1998) is adopted. Textual displays and matrices are developed that allow the author to analyse (in a condensed form) the full data set. The author began with a *partially ordered metamatrix* which brought the basic information from all cases together. That

was then supplemented with *conceptually orientated displays* and *sequence matrices*. In that way the author moved from the meta-data back to individual case data to explore emergent themes and issues of interest until ultimately returning back to the metadata once a more detailed understanding of that which had been observed had been gained.

4.10 An Analysis of Research Credibility

Saunders *et al.* (2000) argue that within every research project there is a need to demonstrate the credibility of the study and its findings. Essentially, that issue is concerned with answering the question “*how do I know?*” As Saunders *et al.* (2000 p.100) note;

“Reducing the possibility of getting the answer wrong means that attention has to be paid to two particular emphases on research design: reliability and validity”.

Yin (1994) likewise asserts that the validity and reliability of a study must be maximised in order to increase its credibility. Consequently, Table 4.9 was developed by the author to define these concepts by reference to Yin (1994) and Saunders *et al.* (2000).

	Yin (1994)	Saunders <i>et al.</i> (2000)
Construct Validity	Establishing correct operational measures for the concepts being studied.	<i>“Concerned with whether the findings are really about what they appear to be about”</i> (p.101)
External Validity (Generalisability)	Establishing the domain to which the study’s findings can be generalised.	Establishing the extent to which the results are generalisable and the extent to which the findings are applicable to other settings and organisations.
Reliability	Demonstrating that the operations of the study can be repeated with the same results.	Establishing that similar observations will be made by different researchers on different occasions (for inductive studies).

Table 4.9 – Research Credibility Definitions

DePoy & Gitlin (1994) , Bryman (2001) and Easterby-Smith *et al.* (2002) also stress the need to maximise the credibility of a study. However, they also note that the concepts of reliability, validity and generalisability might be inappropriate for this study (since it is grounded within the interpretive paradigm). For example, while Easterby-Smith *et al.* (2002) recognise the importance of ‘credibility’ within a study,

they also note that the terms defined above were developed largely for use within positivistic quantitative studies. As such, the author is reluctant to apply them to this interpretive study because those definitions imply an acceptance of one absolute (positivist) reality, which is clearly at odds with the basic premise of the author's interpretive philosophy. Consequently, Easterby-Smith *et al.* (2002 p41) offer an alternative criteria for 'credibility' within interpretive studies. Within that framework *validity* is concerned with whether the researcher has gained full access to the knowledge and meanings of informants, *reliability* considers whether similar observations will be made by different researchers on different occasions while *generalisability* considers how likely it is that the ideas and theories generated within one setting will also apply in others. Similarly, Bryman (2001) offers alternative criteria for the assessment of the credibility of qualitative research which is based upon Guba & Lincoln (1994) – *trustworthiness* and *authenticity*. DePoy & Gitlin (1994) likewise offer an alternative of viewpoint of 'credibility' within interpretive studies. They argue that to be credible the study must be;

- *Logical* (thought and action processes are made clear and conform to accepted norms of deductive or inductive reasoning).
- *Understandable* (the process, study outcomes and conclusions need to make sense, be precise, intelligible and credible).
- *Confirmable* (others can follow the path of analysis and thereby arrive at similar outcomes and conclusions).
- *Useful* (knowledge derived from the study should inform and improve professional practice).

While some authors suggest using the traditional concepts of validity, reliability and generalisability in order to assess a study, others (as discussed above) argue instead that because those terms are grounded within positivism they are unsuitable tools with which to judge a qualitative study. However, while it is possible to identify competing criteria against which a study can be assessed, within each approach certain strategies appear repeatedly. For example respondent validation is recommended by Guba & Lincoln (1994), Yin (1994) and Bryman (2001) but is done so to satisfy different criteria for different reasons. Since there is no single approach by which the credibility of this study can be either assessed or maximised the author accepts that a

variety of measures should be taken as detailed within Table 4.10. For example, respondent validation is employed to maximise the study's internal validity and to maximise its trustworthiness as advocated by Yin (1994) and Bryman (2001) respectively. Likewise, thick description is used to enhance the study's trustworthiness and to maximise its reliability as suggested by Guba & Lincoln (1994) and Saunders *et al.* (2000) respectively.

Measure Adopted	In Accordance with;	In Order to;	Measure Considered in;
Triangulation of Data Collection Methods	<ul style="list-style-type: none"> • Yin (1994) • Saunders <i>et al.</i> (2000) 	<ul style="list-style-type: none"> • Maximise Construct Validity 	Section 4.7
	<ul style="list-style-type: none"> • Yin (1994) 	<ul style="list-style-type: none"> • Maximise Construct Validity 	
Respondent Validation	<ul style="list-style-type: none"> • Guba & Lincoln (1994) • Bryman (2001) 	<ul style="list-style-type: none"> • Maximise Trustworthiness (<i>Credibility & Authenticity</i>) of study 	Section 4.7
Replication Logic	<ul style="list-style-type: none"> • Yin (1994) • Saunders <i>et al.</i> (2000) 	<ul style="list-style-type: none"> • Maximise External Validity 	Section 4.6
Multiple Case Study Strategy	<ul style="list-style-type: none"> • Yin (1994) 	<ul style="list-style-type: none"> • Maximise External Validity 	Sections 4.4 & 4.6
	<ul style="list-style-type: none"> • Yin (1994) • Saunders <i>et al.</i> (2000) 	<ul style="list-style-type: none"> • Maximise Reliability of study 	
Fully Documented and Robust Research Design, Methodology and Fieldwork	<ul style="list-style-type: none"> • DePoy & Gitlin (1994) 	<ul style="list-style-type: none"> • Maximise Logic, Understandability and Confirmability of study 	Section 1.6 Chapters 4 & 5
	<ul style="list-style-type: none"> • Guba & Lincoln (1994) • Bryman (2001) 	<ul style="list-style-type: none"> • Increase Trustworthiness (<i>Confirmability & Dependability</i>) of study 	
Clearly Articulated Study Findings	<ul style="list-style-type: none"> • DePoy & Gitlin (1994) 	<ul style="list-style-type: none"> • Maximise Usefulness of study • Display parsimony 	Chapter 5
	<ul style="list-style-type: none"> • Yin (1994) • Saunders <i>et al.</i> (2000) 	<ul style="list-style-type: none"> • Maximise Reliability & External Validity of study 	
Thick Description	<ul style="list-style-type: none"> • Guba & Lincoln (1994) • Bryman (2001) 	<ul style="list-style-type: none"> • Maximise Trustworthiness (<i>Transferability</i>) of study 	Section 4.7 Chapters 5 & 6
	<ul style="list-style-type: none"> • Yin (1994) • Saunders <i>et al.</i> (2000) 	<ul style="list-style-type: none"> • Maximise Reliability & External Validity of study 	

Table 4.10– Measures Adopted to Maximise the Credibility of the Study

4.11 Conclusions to the Research Methodology & Research Design

Chapter 4 has detailed the methodology adopted within this study (and the rationale that underpins its development) in order to link the conclusions ultimately reached to the research questions initially posed. To facilitate the analysis and discussion of that methodology the framework proposed by Saunders *et al.* (2000) was utilised. Figure 4.5 highlights how this study's methodology has been developed and illustrates the methodological choices made by the author.

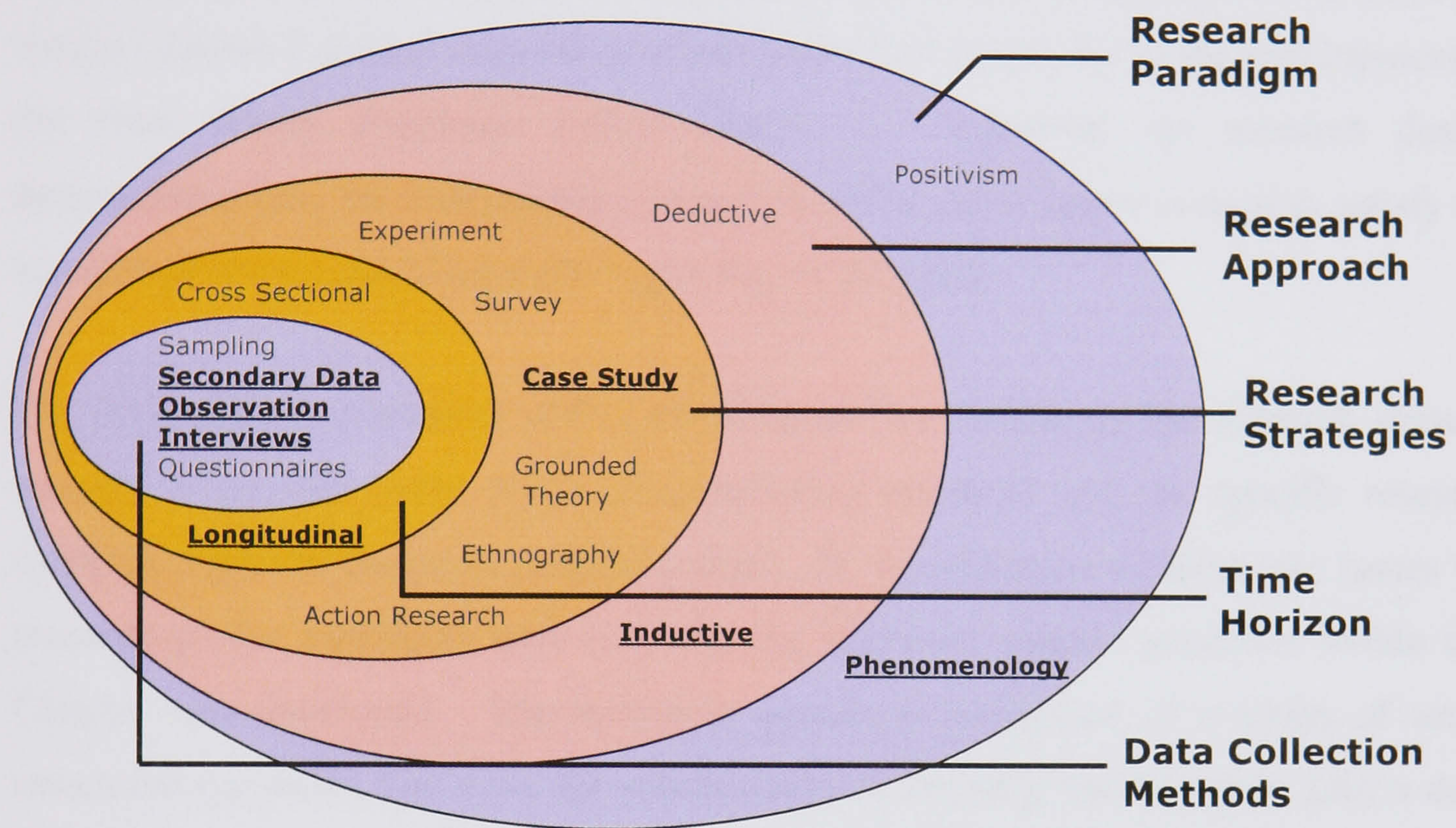


Figure 4.5 - The Research Process (Saunders *et al.* 2000)

In accordance with Figure 4.5, Section 4.2.2 discussed the interpretive standpoint of the author and considered why that philosophical approach to knowledge discovery is suitable for this research project. Sections 4.3 and 4.6 highlight that the study is longitudinal in nature while Section 4.3 considers the overall research approach adopted by the author and demonstrates why this is essentially an exploratory, integrated inductive project. In order to satisfy the overall research aim and objectives a multiple case study strategy is adopted (as discussed within Sections 4.4 and 4.5) within which replication logic determines the cases that are ultimately selected and the theoretical domain to which the study's findings are generalised. In order to collect the data to answer the research questions posed a mixture of data collection techniques are employed (semi-structured key informant interviews, document analysis and researcher observation) in order to triangulate the data ultimately collected thereby maximising the veracity of the conclusions drawn from it. Finally, Section 4.10

considered how the credibility of the study is maximised and details the specific techniques and measures that are employed to counter threats to the study's validity, reliability and generalisability.

Within the wider context of the study as a whole, the methodology ultimately adopted by the author plays a crucial role within the research design. It provides the robust linkage between the research questions initially posed and the answers ultimately developed by the study. Figure 4.1 demonstrates how the background theory analysed within Chapter 2 guided research problem identification and led to the development of the focal theory presented within Chapter 3. Likewise, the research design demonstrates how the methodology presented within this Chapter is used to satisfy the research problem identified at the beginning of the study.

The methodology presented within this Chapter has considered the research strategy adopted within the study (ways of undertaking research) and the specific research methods deployed (ways of collecting data). In consideration of these two issues the research design highlights how and why the interview agenda presented within this Chapter was developed. The interview agenda is comprised of a series of semi-structured questions that have the specific aim of enabling the author to gain a deep understanding of a contextual phenomenon, and the understandings and meanings of those people affected by it. That aim reflects the author's epistemological belief that knowledge is contextual and situational, and his acceptance of the subjectivism of social reality – how the members of a society or group understand, make sense of social events and their settings, and how this sense making influences and impacts upon the very settings themselves. That in turn led to the identification of appropriate lines of enquiry that facilitated the collection and triangulation of data pertinent to the issues under analysis.

The research design also identifies the role of data theory within the study – how through data gathering, analysis, classification, coding and grounding within the conceptual framework the conceptual model is refined such that its 'concepts' become 'real'. Based upon that analysis and refinement, appropriate conclusions can be drawn and recommendations made for future lines of enquiry that can build upon the work undertaken within this study.

Chapter 5.0: Study Findings

5.1 Introduction to the Study Findings

Chapter 4 detailed and documented the research methodology and its supporting rationale that underpin this study. The data collection and analysis methods used within the study were discussed at length within Sections 4.8 and 4.9 while the research strategy employed was documented within Section 4.4. Those discussions highlighted that a case study research strategy was chosen within which multiple data collection methods were used; semi-structured key informant interviews, researcher observation and document analysis. Consequently, Chapter 4 has provided a detailed discussion and analysis of the research methodology employed within the study of which data collection formed one part. Chapter 5 therefore presents the data and findings delivered by that research methodology.

Data were collected over an eight month period using the data collection methods detailed within Chapter 4. Table 5.1 details the dates of the interviews held with each organisation.

Abbreviation	Organisation	Dates of Interactions with Company
VFC	The Cottages	6/10/2004; 7/10/2004; 25/10/2004; 2/11/2004
SG	The Gallery	4/11/2004; 5/11/2004; 18/11/2004; 30/11/2004
ED	The Web Designer	8/11/2004; 9/11/2004; 29/11/2004; 6/12/2004
MH	The Guest House	15/11/2004; 22/11/2004; 14/12/2004
HPO	The HPO	2/12/2004; 3/12/2004; 10/12/2004; 10/1/2005
UKM	The Installer	24/1/2005; 25/1/2005; 31/1/2005
LG	The Trainer	26/1/2005; 27/1/2005; 4/2/2005; 23/3/2005
OG	The Trade Association	1/02/2005; 9/2/2005; 28/2/2005; 1/3/2005
ASL	The Manufacturer	4/3/2005; 9/3/2005; 10/3/2005; 22/3/2005
3SE	3SE	31/3/2005; 4/4/2005; 1/5/2005; 2/5/2005
LFF	The Food Company	28/4/2005; 12/4/2005; 28/4/2005; 12/4/2005

Table 5.1 – Case Study Organisation Interview / Discussion Dates

In order to facilitate the structured presentation of the study findings, the findings are discussed in relation to the four key constructs contained within the conceptual model; infrastructure development is motivated by the rewards offered by such development,

infrastructure development is an iterative process, barriers and problems to development will be encountered during the development process and the barriers and problems to development are both internal and external in origin.

5.2 Findings – The Infrastructure Development Process

Tables 5.2 to 5.12 present the findings relevant to the Web infrastructure development process for each organisation. Their analysis reveals that for each organisation the initial impetus for infrastructure development was the realisation that development could offer benefits to the organisation (for example, SG developed its infrastructure to extend the geographical reach of the business). Specifically, the benefits envisaged by every organisation were focussed upon improving that business's marketing efforts. Both ASL and VFC are prime examples of that. VFC created a web infrastructure to supplement their existing marketing efforts while ASL combined infrastructure development with the redevelopment of its existing paper-based marketing materials. That common development goal supports the proposition that (at least initially) a relatively unsophisticated infrastructure will be developed that has (relatively) simple business objectives (i.e. the web infrastructure, through its very existence, markets the organisation's products and services to the on-line world).

Tables 5.2 to 5.12 highlight that the Small Business's owner/manager is the prime catalyst within the development process. Every organisation's development process was spearheaded by its owner/manager(s). That finding highlights that not only is initial infrastructure development fuelled by the potential benefits on offer to the business, but that it is the business's owner/manager (rather than the business's customers for example) who will have the organisational ability to realise the potential role of an infrastructure within the business via infrastructure development. At the same time however, external stakeholders and other entities appear to function as 'agents' who make the owner/manager aware of those benefits. For example, for the MH, SG and VFC, competitors made the owner/managers aware of the potential role of an infrastructure while for ASL it was the owner/manager's recognition of the likely future demands of his customers to be able to trade electronically that prompted his initial desire to establish an on-line presence.

The Cottages

Infrastructure developed	1999
Reason for development	VFC were advised by a business associate that the use of the web would become increasingly important within the leisure sector. They acted upon that advice and developed a web infrastructure.
Development led by	VFC approached a web designer with which they already had a business relationship. The web designer created the basic structure and functionality of the infrastructure. VFC were heavily guided by his advice with regard to the content and purpose of the infrastructure. The web designer developed prototype sites which were reviewed by VFC prior to the infrastructure 'going live'.
Development work undertaken by	VFC wrote and provided all 'copy' for the web site whilst the web designer developed that paper-based material into a functional web site. The web designer provided all software & hardware and created the wider infrastructure still used by VFC.
Initial objectives	No formal objectives were set for the infrastructure. However, VFC had clear expectations as to what the infrastructure should achieve. Those were; to provide information to new & existing customers, to extend the marketing and geographical reach of the business, to lower marketing and advertising costs and to offer customers another means of interacting with the business.
Extent to which initial objectives are perceived to have been satisfied	VFC believe that the web infrastructure was successful in meeting its objectives. That perception is based largely upon the positive customer feedback VFC has received. VFC perceive that the infrastructure has enabled them to successfully respond to the implicit expectations of their customer base that VFC should have a functional web infrastructure.
On-going infrastructure development / enhancement since undertaken	More information has been included within the web site while VFC have begun to make more use of email as a communications tool. Availability and booking is now possible online.
Enhancement undertaken	2000 onwards
Enhancement work led by	VFC recognised the potential of the infrastructure as a communications tool and information resource for customers very quickly. As a result, the infrastructure has been enhanced to improve its ability to impart information to new & potential customers.
Enhancement undertaken by	The web designer who originally created the infrastructure has undertaken all subsequent development work.
Reason for on-going development / enhancement	The realisation that the use of the infrastructure could allow VFC to reach new customers (and secure more repeat business from existing customers) led the business to further develop the infrastructure. That perception is reflected in the enhancements made to the infrastructure (e.g. more information is now included within the web site while the infrastructure allows visitors to check availability and make bookings).
Revised objectives	Despite undertaking on-going development work no formal objectives have been set for the infrastructure.
Extent to which revised objectives are perceived to have been satisfied	VFC perceive that (despite the lack of formal objectives) the infrastructure has been largely successful. That perception is based upon the positive customer feedback that VFC has received.
Impact of the infrastructure upon the business	The business's lack of formal objectives and objective performance measurement has meant that it is not possible to quantify (in objective terms) the infrastructure's impact upon the business. However, VFC believe that the infrastructure has lowered the business's advertising and marketing costs and has helped to secure new bookings.
Infrastructure management systems	No formal infrastructure management systems currently exist. The web designer is still heavily involved with on-going infrastructure management. The web designer makes improvements to the infrastructure as they are required. The infrastructure is not formally included within the business's other management systems.

Table 5.2 – The Cottages Infrastructure Development

The Gallery

Infrastructure developed	April 2002
Reason for development	The infrastructure was developed to market the business to a wider geographical audience by providing location details and contact information. To support that marketing focus the web site contained details of the artists stocked within the gallery.
Development led by	Initial infrastructure development was led by SG's owner who realised that the use of the web could benefit the business. However, the owner had no understanding of how the web could be best exploited.
Development work undertaken by	SG's owner's son developed the original infrastructure. He registered a domain name, hosted the site and provided all hardware and software needed to create and run the infrastructure.
Initial objectives	To promote the business outside of its real-world location (SG is based within a town that attracts large numbers of tourists throughout the year). The infrastructure sought to allow those potential customers to research the gallery before they visited the area.
Extent to which initial objectives are perceived to have been satisfied	Both the SG owner & manager perceived the infrastructure to have satisfied its objectives. However, they also felt that the infrastructure added little value to either the business or its customers' interactions with it because of its limited functionality.
On-going infrastructure development / enhancement since undertaken	Both the functionality of the web site and the content it contains have been expanded. The infrastructure now supports a wider range of products and offers on-line payment facilities.
Enhancement undertaken	January 2004
Enhancement work led by	SG's main customer is also its largest supplier. SG is obliged to source 70% of its stock from Demontford Fine Art (DFA). At the same time DFA are the largest buyer of SG's owner's original pieces. DFA 'suggested' to SG that its infrastructure did not portray the professional image expected of its stockists and so encouraged SG to extend its content and functionality. SG's manager liaised closely with DFA to redevelop the infrastructure in accordance with their suggestions.
Enhancement undertaken by	A local professional web designer was commissioned to undertake all development work. The web designer provided a new domain name for the business and currently hosts the site. Likewise, the designer provided a template based site that enables SG to modify their site's content without the designer's direct involvement. All on-going infrastructure management is dealt with by the designer.
Reason for on-going development / enhancement	The redevelopment work was undertaken to respond to the demands of SG's largest customer/supplier and to provide a more professional image of the business to the outside world. The redevelopment work was also undertaken to increase the sales of the business (and through that, profits) while lowering marketing and advertising costs.
Revised objectives	The infrastructure is expected to function as an electronic catalogue thereby reducing the business's marketing costs. It must also promote the business to a wide, geographically dispersed audience to support both online sales and real-world purchases.
Extent to which revised objectives are perceived to have been satisfied	SG perceived those objectives to have been satisfied. On-going sales analysis reveals that the infrastructure has delivered several high value on-line sales, large volumes of commissions and is regularly used by customers to research artists and artwork.
Impact of the infrastructure upon the business	The infrastructure is perceived to have had a large positive impact. The owner doubts that sales of his own work would have been so high without the infrastructure.
Infrastructure management systems	The infrastructure is linked to existing pricing/stock management systems and so its prices and content are reviewed regularly. New content is added regularly while the web designer handles on-going technical maintenance issues.

Table 5.3 – The Gallery Infrastructure Development

The Web Designer

Infrastructure developed	June 2004
Reason for development	The infrastructure was developed to showcase ED's ability to develop commercial web sites. Therefore, the infrastructure was developed to support the business's real-world sales activities by promoting its services to a wide audience.
Development led by	The development project was led by ED's owner. That was because he is responsible for the sales function within ED and so he has designed its content and functionality such that it integrates with the business's other sales tools.
Development work undertaken by	All development work was undertaken in-house. The wider infrastructure is owned and maintained by a third party ISP. That ISP hosts the web site on behalf of ED.
Initial objectives	The primary objective for the infrastructure was to support the business's other sales activities. Likewise, the infrastructure is expected to function as an electronic catalogue for the business.
Extent to which initial objectives are perceived to have been satisfied	The infrastructure is perceived to have been very successful. It has not generated direct sales independently (but isn't expected to) but is used extensively to support other sales activities (all potential customers are referred to the web site for example.)
On-going infrastructure development / enhancement since undertaken	A secure area has been included within the infrastructure to allow customers to (re)view all on-going work-in-progress. The infrastructure has also been expanded to include the business's financial and customer contact records.
Enhancement undertaken	Late 2004 onwards
Enhancement work led by	Enhancement work was led by the business's owner. The work was prompted by his realisation that the infrastructure could have a larger impact upon the business. The owner perceives that the infrastructure will be unable to generate sales independently and so enhanced the infrastructure to maximise its impact upon the business in other areas.
Enhancement undertaken by	As with the initial development work, all enhancement work was undertaken in-house.
Reason for on-going development / enhancement	To achieve cost reductions via the use of the infrastructure. The infrastructure was already successfully supporting the business's sale function and so its functionality was enhanced to enable it to lower operating costs – for example, a secure area was created within which customers can review work-in-progress (an activity that was previously very time consuming for the business).
Revised objectives	To combine the infrastructure's indirect contribution to sales & profits with a direct reduction in operating costs (e.g. reducing the time & effort spent by the business reviewing on-going work with customers).
Extent to which revised objectives are perceived to have been satisfied	ED perceives the infrastructure to have been successful. Analysis reveals a large reduction in the amount of time spent reviewing work-in-progress with customers. The business's CRM records and processes have also been integrated within the infrastructure thereby leading to higher operating efficiencies and the on-going support of the business's marketing efforts.
Impact of the infrastructure upon the business	The infrastructure is now used to store all customer and financial information. In that way, the use of the infrastructure has simplified the customer relationship management process and the management of work-in-progress. It is now integral to the sales & marketing function because it is used extensively to showcase ED's expertise within the commercial use of the web.
Infrastructure management systems	The infrastructure is fully integrated within ED's other management systems. Its sales information is managed by ED's owner while all technical issues are managed by ED's lead programmer. A 24/7 availability service level agreement has been secured with the 3 rd party hosting company to ensure that the wider infrastructure is always available. That contract is reviewed every 6 months.

Table 5.4 – The Web Designer Infrastructure Development

The Guest House

Infrastructure developed	1998
Reason for development	It was created following the purchase of the business by its current owner. Its use was integral to the owner's business plans as a means of marketing the business and securing bookings.
Development led by	The Guest House's new owner. The impetus for its development came from his discussions with other hoteliers already using the internet to secure bookings. The owner realised that the use of the web could lower his business's operating costs while simultaneously reaching a widely dispersed customer base.
Development work undertaken by	A local web designer created both a web site and also provided the supporting infrastructure. The MH's owner provided the designer with a clear 'brief' as to what was required which the designer subsequently turned into a functional infrastructure.
Initial objectives	To market the business to geographically dispersed customers, secure 10% of the business's room bookings and provide the MH with the ability to advertise & secure bookings at short notice (typically same day/next day availability) via email communications.
Extent to which initial objectives are perceived to have been satisfied	The infrastructure fully met its objectives. Within 18 months 10% of all room bookings were being secured online. It is used to collect customer information and exploit that by contacting customers electronically. It is also used to research the market and tailor prices accordingly (e.g. when local weddings are taking place the web site is modified to show that MH will only accept 2 night bookings). Likewise, it has reduced costs since the web site can be easily tailored to appeal to different markets (e.g. locals, wedding guests, UK tourists, overseas tourists, specialist tourists (walkers, cyclists etc.)). Traditionally, that has been costly since adverts were placed in a variety of printed media.
On-going infrastructure development / enhancement since undertaken	The infrastructure is currently being enhanced such that it can manage all bookings. Likewise, it will be modified such that rooms can be booked & paid for using a credit card and so that deposits against 'no shows' and late cancellations can be taken. The infrastructure will replace all current manual booking systems.
Enhancement undertaken	Spring 2005
Enhancement work led by	The enhancement work is being led by the MH's owner. He is working with the web designer to develop a bespoke system.
Enhancement undertaken by	The development work is being undertaken by the same web designer that developed the original infrastructure. He is providing all necessary hardware and software and will support the infrastructure in the long-term.
Reason for on-going development / enhancement	To further reduce operating costs, widen the infrastructure's ability to market/promote the business, and unify the business's existing management and booking systems.
Revised objectives	To secure 15-20% of all room bookings and improve the business's internal processes.
Extent to which revised objectives are perceived to have been satisfied	The MH are satisfied with the progress being made towards the introduction of the revised infrastructure.
Impact of the infrastructure upon the business	The infrastructure has had a positive impact upon MH. It has reduced marketing expenditure while increasing income. It now secures 10-15% of all bookings while also maximising the value of those bookings (e.g. by securing 2 night rather than 1 night bookings). The infrastructure is also the primary means by which the business keeps in contact with its existing customer base.
Infrastructure management systems	The MH liaises with the web designer fortnightly so that additions/amendments can be made as they are required. The template based nature of the current web site enables the MH to alter their site's content daily while support for the wider infrastructure is outsourced to the web designer. Its performance is measured and analysed monthly based upon a financial performance analysis of the business and customer feedback.

Table 5.5 – The Guest House Infrastructure Development

The HPO

<i>Infrastructure developed</i>	2000
<i>Reason for development</i>	To offer information about the HPO to (potential) customers and make the HPO's products & services available via the internet. The infrastructure was developed to support the HPO's long-term goal of the online delivery of traditionally face-to-face services.
<i>Development led by</i>	The HPO's owners led the development. The infrastructure's long-term goals were included within the HPO's original business plan and so the first iteration of the infrastructure represented the first step towards achieving those goals.
<i>Development work undertaken by</i>	A web designer was commissioned to translate the HPO's owners' requirements into a functional infrastructure. The designer was also tasked with creating and maintaining the wider web infrastructure used by the HPO.
<i>Initial objectives</i>	The infrastructure was required to make information about the HPO, its products and services available to (potential) customers and to make those products & services accessible via the internet.
<i>Extent to which initial objectives are perceived to have been satisfied</i>	The HPO perceive the infrastructure to have successfully satisfied its objectives even though it was largely static (& therefore did not make products/services available via the internet). The fulfilment of the 2 nd objective was always seen by the HPO as a longer-term goal that required a staged development approach.
<i>On-going infrastructure development / enhancement since undertaken</i>	Further functionality has been included within the infrastructure – it has been enhanced such that it can process e-payments and deliver services (by capturing, analysing, recording and presenting information from/to its users). In that way the infrastructure makes traditionally face-to-face consultancy services (e.g. 3 rd party management systems audits) available via the internet.
<i>Enhancement undertaken</i>	June 2002
<i>Enhancement work led by</i>	The HPO's owners' led the on-going development work as part of their larger business plan for the organisation. In order to satisfy their business plan several iterative infrastructure development stages were required.
<i>Enhancement undertaken by</i>	The same web designer has been used to enhance the infrastructure. That decision was taken since the HPO's owners believed that he fully understood their goals and that educating a new designer would take too long. Therefore, the same designer has been used (& will be used) throughout the project.
<i>Reason for on-going development / enhancement</i>	To enable the infrastructure to satisfy the long-term objectives of the HPO.
<i>Revised objectives</i>	The infrastructures objectives remain unchanged.
<i>Extent to which revised objectives are perceived to have been satisfied</i>	The HPO's owners perceive that the infrastructure's objectives have been fully satisfied. It is used extensively in service delivery thereby allowing the HPO's owners to focus upon the HPO's strategic control/direction and upon developing customer relationships.
<i>Impact of the infrastructure upon the business</i>	The infrastructure allows the business to service a large global client base. Likewise, the use of the infrastructure is integral to the HPO's business model since it supports their goal of providing services electronically that have traditionally only been available via face-to-face contact with clients (e.g. management consultancy and audit services).
<i>Infrastructure management systems</i>	The importance of the infrastructure within the HPO's business model has meant that it has been engineered to include built-in redundancy (e.g. multiple servers are used to host the web site). Based upon market demand and user requests, the infrastructure's data-base driven services are modified by the HPO to provide new 'products' while the HPO's owners meet with the web designer (at least) weekly to resolve any apparent issues with the web site or wider infrastructure.

Table 5.6 – The HPO Infrastructure Development

The Installer

Infrastructure developed	1999
Reason for development	To provide email facilities to the business and to replicate the business's printed marketing materials on-line thereby marketing UKM to a wider audience than would be possible via traditional media.
Development led by	Due to the infrastructure's promotional/marketing objectives its development was led by UKM's Sales Manager. However, he had little input to the process other than providing copies of existing marketing materials for use within the infrastructure.
Development work undertaken by	All development work was undertaken in-house by an employee who had an interest 'in computers'. He developed the UKM web site, registered a domain name and secured hosting for the site. He also established an intranet within UKM to provide the business with internet access.
Initial objectives	No clear objectives were set. The infrastructure was seen as an extension of UKM's other marketing activities. Its only informal objective was to promote the business via the internet.
Extent to which initial objectives are perceived to have been satisfied	UKM perceive the infrastructure to have failed to market the business successfully. UKM believe that the infrastructure is too limited in its functionality and that its content is too outdated. Therefore, due to the infrastructure's perceived shortcomings and inaccuracies there was a perception that it has actually harmed the business's marketing efforts by creating a poor impression with its users.
On-going infrastructure development / enhancement since undertaken	The infrastructure's content was heavily revised during 2004 to reflect the (then) current marketing materials.
Enhancement undertaken	July 2004
Enhancement work led by	Development work was led by the external contractor who had been commissioned to update UKM's intranet.
Enhancement undertaken by	The external contractor subcontracted all infrastructure development work to India.
Reason for on-going development / enhancement	To update the infrastructure's content so that it contained accurate information and provided a 'marketing message' consistent with UKM's other marketing materials.
Revised objectives	No objectives were set for the infrastructure.
Extent to which revised objectives are perceived to have been satisfied	The UKM management team perceive the infrastructure to have failed. It has no clearly defined purpose or goal and its content is now out-of-date. The UKM management team believe that the infrastructure is now harming the company since it portrays inaccurate information in a limited and static format.
Impact of the infrastructure upon the business	This has been minimal. Since the content of the site has not been updated, it quickly became inaccurate. Likewise, its lack of objectives and purpose has meant that performance analysis has not taken place – in the absence of objective evidence to the contrary UKM believe the web infrastructure to have been a failure.
Infrastructure management systems	No formal management systems exist. Its performance is not assessed and no-one is formally responsible for its upkeep. At the same time the wider infrastructure is managed by UKM's IT contractor who has ensured that the availability of the web site and email has been high. The availability of email and the intranet is analysed weekly by the contractor and corrective actions are then taken to address any problems experienced by UKM.

Table 5.7 – The Installer Infrastructure Development

The Trainer

Infrastructure developed	February 2004
Reason for development	Infrastructure development coincided with the creation of the business. It was established to replicate the paper-based marketing materials used by the company & make that information more widely available to potential customers.
Development led by	LG's MD's lack of ICT expertise meant that she approached a graphic designer who guided her as to what functionality the infrastructure should contain and what its broad purpose should be.
Development work undertaken by	The graphic designer made suggestions to LG's MD as to what content was needed and how the wider infrastructure should be created. The MD followed that advice and developed 'copy' for the site. The graphic designer subsequently created both the web site and supporting infrastructure.
Initial objectives	No clear objectives were set. LG's MD perceives that that caused significant problems for her since she had no clear understanding as to what the purpose of the infrastructure actually was.
Extent to which initial objectives are perceived to have been satisfied	LG's MD perceives that the infrastructure largely failed to achieve anything. She was unable to establish what benefit it had offered LG or its users.
On-going infrastructure development / enhancement since undertaken	A new web designer was approached to revise the existing infrastructure and establish a clear strategic purpose for it. That led to more focussed content and a web strategy aligned to the wider goals of the business.
Enhancement undertaken	July 2004
Enhancement work led by	The web designer and LG's MD led the redevelopment. The designer provided guidance to the MD as to how the infrastructure could be used to achieve the business's long-term goals.
Enhancement undertaken by	All development work (and infrastructure management) was undertaken by the web designer. The designer translated LG's MD's suggestions into a functional web site and supporting infrastructure.
Reason for on-going development / enhancement	The work was undertaken to address the perceived shortcomings of the first iteration.
Revised objectives	To promote and market the business to potential customers. That is achieved by using the infrastructure to support the face-to-face sales activities undertaken by LG's MD and by providing customers with a method of researching LG prior to using its services.
Extent to which revised objectives are perceived to have been satisfied	LG's MD perceives the infrastructure to be fully meeting its objectives.
Impact of the infrastructure upon the business	The infrastructure has helped to establish the credibility of LG within the marketplace. It is regularly modified to support current face-to-face marketing/sales activities and appeal to potential customers. It has lowered LG's marketing costs and has led to orders being won. Likewise, it is now generating high numbers of enquiries.
Infrastructure management systems	No formal management or analysis takes place. Its content and broad purpose is reviewed weekly by LG's MD and any changes required are implemented by the web designer. The infrastructure's day-to-day management is outsourced to compensate for LG's in house lack of expertise and to allow LG's MD to concentrate upon the strategic direction and control of the business.

Table 5.8 – The Trainer Infrastructure Development

The Trade Association

Infrastructure developed	Spring 2003
Reason for development	To support an on-going publicly funded urban regeneration program by stimulating local Small Business use of the internet by providing an electronic market place within which those businesses can trade.
Development led by	An outside advisor to the OG project led infrastructure development and helped to develop the overall web strategy that has determined the broad purpose of the infrastructure.
Development work undertaken by	The advisor (who owns a local IT company) undertook all development work and provided the wider infrastructure that supports the OG web site. The advisor's company also provides those services to OG member companies at minimal charge.
Initial objectives	To create an e-trade association with which to stimulate trade between local companies. The infrastructure functions as a portal within which local businesses' own web infrastructures can exist. The OG infrastructure was also created to disseminate information about the OG to both potential members and the general public.
Extent to which initial objectives are perceived to have been satisfied	The OG perceives that the initial objectives set for the infrastructure have been satisfied. The number of member organisations using the OG's services has increased in-line with targets since the creation of the infrastructure as has OG's member organisations' use of the OG infrastructure as a web portal.
On-going infrastructure development / enhancement since undertaken	No enhancements to the infrastructure have been made since its creation.
Enhancement undertaken	Not applicable
Enhancement work led by	Not applicable
Enhancement undertaken by	Not applicable
Reason for on-going development / enhancement	Not applicable
Revised objectives	The infrastructure's objectives have not changed since its creation.
Extent to which revised objectives are perceived to have been satisfied	The OG perceives that all of the objectives set for the infrastructure have been satisfied. Since it was created to support an on-going regeneration program that is itself perceived to have been very successful no changes to the infrastructure have been felt necessary.
Impact of the infrastructure upon the business	The infrastructure is perceived to have played a vital role within the OG project. It has enabled the OG to respond to the needs of its members quickly and satisfy their informational requirements in a timely and easily accessible manner. Similarly, it is perceived to have helped to create a sense of 'community' amongst OG members and support the project's real world activities. It has achieved that by disseminating information about the project and OG member events thereby 'advertising' the project at a lower cost than would have been incurred if traditional media had been used.
Infrastructure management systems	All aspects of the infrastructure's management are handled by the advisor and the advisor's company that originally developed the infrastructure. That approach has been adopted to minimise the infrastructure's on-going running costs while simultaneously addressing the project's lack of 'in-house' IT expertise and competence. The advisor provides those supporting services at minimal cost in return for the opportunity to work with OG member companies to develop their web infrastructures.

Table 5.9 – The Trade Association Infrastructure Development

The Manufacturer

Infrastructure developed	February 2003
Reason for development	To supplement the production of (then) new paper-based marketing materials. Development coincided with ASL's MD's decision to begin a marketing campaign that would increase turnover and profits.
Development led by	This was led by ASL's MD. He began the marketing campaign in an effort to secure new customers (rather than gain more repeat business) and developed the infrastructure to support that program.
Development work undertaken by	All development work was outsourced to the graphic design company hired to produce the business's real-world marketing materials. They also created the wider infrastructure that supports the web site.
Initial objectives	To promote the business and allow (potential) customers to research ASL thereby supporting their purchases and intentions to order products.
Extent to which initial objectives are perceived to have been satisfied	ASL's MD perceives the infrastructure to have satisfied its objectives. ASL's turnover and profits have increased since the marketing campaign began and that increase is attributed to the success of the project. Likewise, the web infrastructure is perceived to have played an important supporting role within the wider marketing project.
On-going infrastructure development / enhancement since undertaken	Enhancement work is currently underway that will extend the functionality of the infrastructure by allowing customers to place orders and pay for goods electronically.
Enhancement undertaken	Spring 2005
Enhancement work led by	ASL's MD believes that the use of the infrastructure could enable his business to enter new markets without having to expand within the real world. That belief is driving infrastructure enhancement.
Enhancement undertaken by	All on-going work is being undertaken by the IT support company who currently maintain ASL's intranet.
Reason for on-going development / enhancement	To open up new markets to ASL. That strategy is being pursued in order to safeguard the business against downturns within their traditional markets (ASL is now facing increasing competition from far-eastern suppliers but the enhancements to the web infrastructure are intended to provide a means of diversification for ASL thereby dealing with the threat of increased competition).
Revised objectives	To generate direct sales and a visible contribution to profits. At present the infrastructure is perceived to make only an indirect contribution to profitability via its role in supporting ASL's other marketing & sales activities.
Extent to which revised objectives are perceived to have been satisfied	Not applicable – enhancements are currently being made.
Impact of the infrastructure upon the business	The infrastructure is perceived to have played a key supporting role in increasing turnover and profits over the last 18 months. ASL's owner believes that without the infrastructure the marketing campaign would not have been as successful. He therefore feels that the infrastructure has had a major positive impact upon ASL.
Infrastructure management systems	The day-to-day management of the infrastructure is outsourced to the IT support company tasked with maintaining the ASL intranet. Due to the infrastructure's static content and marketing support role performance analysis is largely informal and few changes to the infrastructure or the web site's content have been made. Those changes that are required, are delegated by ASL's MD to the IT support company to implement.

Table 5.10 – The Manufacturer Infrastructure Development

3SE	
Infrastructure developed	September 2004
Reason for development	To disseminate information about the role of socially responsible enterprises within society.
Development led by	3SE's Service Development Manager (SDM) led all infrastructure development work. All 3SE staff were asked to comment & make suggestions as to the role and purpose of the proposed infrastructure prior to its development. The SDM intended to utilise that feedback when developing the infrastructure.
Development work undertaken by	A web design company (itself a socially responsible enterprise) was commissioned by 3SE to create both a web site and supporting infrastructure.
Initial objectives	No formal objectives were set for the infrastructure at its creation. However, its primary purpose was to disseminate information about socially responsible enterprises to as wide an audience as possible.
Extent to which initial objectives are perceived to have been satisfied	The 3SE SDM believes that the infrastructure has partially met its initial goal. However, since it was never formally agreed what specific objectives the infrastructure existed to satisfy, 3SE are unsure as to how successful the infrastructure has actually been.
On-going infrastructure development / enhancement since undertaken	No enhancement work has as yet been undertaken. Further development work is currently being planned.
Enhancement undertaken	Spring 2005
Enhancement work led by	The 3SE SDM is leading the redevelopment project. That will involve establishing a more coherent purpose and setting specific objectives for the infrastructure.
Enhancement undertaken by	The same web design company that was commissioned to create the original infrastructure will be used to enhance the infrastructure.
Reason for on-going development / enhancement	To establish clear and formal objectives for the infrastructure against which its performance and contribution to the business can be gauged.
Revised objectives	To generate revenue for 3SE by advertising and promoting training courses and seminars. The infrastructure will also be required to provide users with a forum within which a community of socially responsible enterprises can be created and supported by 3SE.
Extent to which revised objectives are perceived to have been satisfied	Development work to enhance the infrastructure so that it is capable of satisfying those objectives is currently being planned – the proposed enhancements have yet to be implemented.
Impact of the infrastructure upon the business	The infrastructure is has had little tangible impact upon the business. Its lack of clear purpose and objectives have made any objective assessment of its performance or contribution to the business very difficult to ascertain. 3SE's failure to act upon any of the staff suggestions regarding its potential role has negatively affected staff morale. The SDM believes that the business made a serious mistake by failing to act upon those suggestions since that appears to have led staff to believe that they are being ignored by the 3SE management team.
Infrastructure management systems	The infrastructure is not formally managed. No-one has been made formally responsible for its upkeep or improvement. At present that role has been adopted by the SDM (in the absence of any other senior manager volunteering to undertake it) in order that once the redevelopment work has been completed, responsibility for its day-to-day and long-term management will be delegated to somebody else.

Table 5.11 – 3SE Infrastructure Development

The Food Company

Infrastructure developed	September 2002
Reason for development	To address LFF's Directors' concerns that their business's lack of a web infrastructure was negatively affecting their ability to market & grow the business due to the business's inability to meet its customers' informational needs (e.g. that the business make a web site available to the public and be able to communicate via email).
Development led by	The LFF Sales/Technical Director (SD) led the development project. A loose 'brief' was prepared and handed over to a web design company who then translated that 'specification' into a functional web site and supporting infrastructure.
Development work undertaken by	The web design company undertook all development work. Due to their high workload the LFF management team had no further involvement with the project once the original project brief had been given over to the web design company.
Initial objectives	To market & promote the business by acting as an 'electronic brochure' for LFF.
Extent to which initial objectives are perceived to have been satisfied	The LFF management team perceive that the infrastructure has failed to meet their expectations. The ability to use email and access the web is recognised to have helped the business expand but the team were dissatisfied with the web site ultimately created. They believed that it did not portray an acceptable image of the business because its 'copy' was outdated and the site's navigation was perceived to be cumbersome.
On-going infrastructure development / enhancement since undertaken	Modifications to the web site are currently being made. A new web design company has been commissioned to make those changes. LFF's SD has decided to use the graphic design company that currently produce the business's real-world marketing materials in order that continuity can be maintained across marketing materials.
Enhancement undertaken	Spring 2005
Enhancement work led by	The LFF Directors have delegated responsibility for the enhancement work to the SD. The SD is overseeing the project and will present the proposed final version of the web site back to the Board for its approval prior to the re-launch of the site.
Enhancement undertaken by	The original web design company are still maintaining the LFF web infrastructure while responsibility for the production of a new web site has been passed to the graphic design company used by LFF to prepare paper-based marketing materials. Those materials are being used as the 'template' for the site in order that a consistent and unified marketing message can be presented across multiple marketing mediums.
Reason for on-going development / enhancement	The development work is being undertaken specifically to address the perceived shortcomings of the first web site.
Revised objectives	The infrastructure's objectives remain unchanged – it exists to market & promote the business by acting as an 'electronic brochure' for LFF.
Extent to which revised objectives are perceived to have been satisfied	Despite the changes not yet being implemented, the management team believe the project to be being successful – that is due to their perceptions that they are now 'back in control' of the project.
Impact of the infrastructure upon the business	The infrastructure has had a minor impact upon the business. Due to the management team's dissatisfaction with the site's content it was quickly 'pulled' from the web (early 2003) and was replaced with an 'under development' web page. That decision was taken in order to minimise any negative impact that the web site could have had upon LFF.
Infrastructure management systems	The wider supporting infrastructure is managed by the original web design company that developed the first web-site iteration. However, since the web site is no longer available on the web current management activities revolve around developing its replacement. That process is being led by the SD (who liaises fortnightly with the graphic design company) who then reports progress back to the LFF Board for their approval.

Table 5.12 –The Food Company Infrastructure Development

Tables 5.2 to 5.12 also suggest that infrastructure development is a staged process (as depicted within the conceptual model). EDs experiences are typical in that further development was undertaken specifically to realise further, more sophisticated organisational benefits. The experiences of LFF, 3SE and UKM are slightly different to EDs but are arguably complementary to the above proposition. For those organisations, further development was undertaken to address the perceived shortcomings of the initial infrastructure and through that, realise greater levels of organisational benefit. The development process was to be driven by the potential benefits that further development would *directly* deliver and by the desire to counter any perceived shortcomings of the infrastructure's first iteration (and through that, deliver more benefits to the organisation *indirectly*). OGs experiences contradict that analysis however. Table 5.9 highlights that the OG undertook no further development once the original infrastructure had been created. Table 5.16, highlights that OG experienced both barriers to their infrastructure's initial development and problems that have affected the extent to which the planned benefits were realised. At the same time, the OG undertook no further development to overcome those problems. Likewise, LFF took the decision to remove their web site from the web in order to address the problems that they were experiencing (see Table 5.26). For both organisations, encountering problems to the deployment and use of their infrastructures did not result in corrective development work being undertaken. That apparently contradictory situation can be explained. The OG perceived that all of their on-line objectives had been satisfied by their infrastructure's first iteration while the 'development' undertaken by LFF actually involved the withdrawal of the web site. Therefore, the OGs experiences demonstrate that within the 'staged' development process further infrastructure development is entirely dependent upon further potential benefits being perceived as 'desirable' by the organisation's owner/manager. While an external observer (e.g. this author) might argue that further development would be beneficial to the organisation, unless the organisation shares that realisation further development will not be undertaken. Similarly, LFFs experiences highlight that on-going development within the staged development process can take many forms!

Tables 5.2 to 5.12 offer more support for the proposition that infrastructure development is a staged process when one analyses the drivers of infrastructure redevelopment. As noted above, those drivers encompass the desire to realise even

greater, more sophisticated organisational benefits (e.g. the HPO) and/or the desire to address the limitations of the current infrastructure (e.g. LFF and 3SE). Tables 5.2 to 5.12 also demonstrate the varied nature of those drivers. For example, both the MH and the HPO undertook further development in order to integrate their infrastructures more closely within their business's other key processes while for SG's and ED the driver of on-going development was the desire that the infrastructure should offer more functionality for its users. That finding highlights that (as proposed within the conceptual model) a wide range of business benefits become available through the development of a Web infrastructure and it is the business's desire to realise those benefits (directly or indirectly) that drives the process.

Tables 5.2 to 5.12 also offer an insight into how the development process functions in practice. Every organisation utilised the expertise of an external Web developer. The only exception to that is ED who are themselves Web developers! Likewise, every organisation utilised the expertise and services of external hosting companies to help create their infrastructures. That finding suggests that those 'external entities' play a vital role within the development process: they act as facilitators within it.

A closer analysis of Tables 5.2 to 5.12 suggests that the role of external entities is more complex than simple facilitators of the process. For example, LGs experiences of relying upon such entities highlight that they arguably function as 'gatekeepers' within the development process. LG relied heavily upon their Web developer for advice and project management support. Unfortunately, the developer was either unable or unwilling to offer such advice and guidance. The impact of that was that LG were unable to overcome the problems to the effective use of the Web that the developer had originally been hired to provide. That problem was compounded since LG had no clear objectives or strategic rationale for their Web infrastructure and so in the absence of the required guidance and advice, benefit realisation was blocked. LGs subsequent development work became focussed upon 'damage limitation' rather than upon benefit realisation. That situation is readily explained if one accepts that external entities act as gatekeepers to the process that have the ability to either block benefit realisation or facilitate on-line success. That finding is supported by the experiences of the HPO, VFC and the MH. All three companies have strong perceptions of on-line success (see Table 5.14) and have used the same developer (external entity)

throughout the development process. At the same time UKM and LFF changed developer part-way through the development process and report that they experienced problems with benefit realisation as a direct result.

While external entities function as gatekeepers within the development process, the key driver of the process remains the business's owner/manager(s). Tables 5.2 to 5.12 demonstrate that a critical factor for the successful attainment of organisational benefit is the success with which the owner/manager(s) provide(s) strategic guidance and support during the development process. Both LFF and UKM relied heavily upon external developers but simultaneously failed to develop a coherent strategy for the development of their Web infrastructures. Therefore, it is possible that the root cause of their development projects' failure to deliver organisational benefits is not the external entity involved within the process, but the owner/manager's lack of guidance and support to the project. The organisation with the highest perceptions of on-line success (the HPO) also had the clearest long-term strategy with which to guide all (re)development activities. In that situation, the external entity still functioned as a gatekeeper. However, his work was greatly eased since the organisation that had commissioned his services could provide him with clear guidance and advice as to what benefits the HPO wished to realise from the development of an infrastructure. At the same time, the organisations with the lowest perceptions of on-line success (UKM, 3SE and LFF) simultaneously failed to develop a strategic understanding of the proposed infrastructure's role within the business, objectives against which infrastructure performance could be assessed and a system of management for the infrastructure and its development. In all three cases, the strategic 'vision' that guided development work was actually created by the Web developer rather than by the business's owner/manager. That does not mean that strategies and objectives have to be formalised. VFC's experiences suggest that the owner/manager's perceptions as to the extent to which their goals have been satisfied are also a key determinant of infrastructure success. For that organisation, formal objectives have never been established. Likewise, the external developer also helped that organisation to develop a coherent strategy as to how the proposed infrastructure could contribute towards 'business success'. The MH also has only limited formal performance objectives and measures yet also reports their infrastructure to have delivered many benefits to the organisation (see Table 5.14). Therefore, while the external entities used to facilitate

development act as gatekeepers to the process it is also the owner/manger(s)' perceptions of success that drive the on-going development of the infrastructure over time.

5.3 Findings – Developmental Drivers

Tables 5.13 to 5.15 detail (respectively) what benefits were realised by each case study organisation, the extent to which those benefit(s) were realised (as reported by the case study organisations) and when those benefits were realised.

An analysis of Tables 5.13 and 5.15 suggests that infrastructure development is a staged process within which more sophisticated organisational benefits are realised as more development is undertaken. Those tables show that while some of the case study organisations (e.g. the HPO) realised a mixture of both sophisticated and unsophisticated benefits, no organisation realised the more sophisticated benefits without having first realised (relatively) less sophisticated ones. Table 5.13 also shows that while every benefit was realised by at least one case study organisation, no single organisation realised every potential benefit. That suggests that progression through the developmental stages is not automatic and that barriers and problems can be encountered that will act to lessen the extent to which a benefit is realised.

Table 5.15 adds further weight to the argument that more sophisticated organisational benefits can only be realised after on-going development work is undertaken. Table 5.15 highlights that those organisations who reported experiencing sophisticated benefits from their infrastructure (e.g. the HPO and ED), did so only after their original infrastructure's sophistication was enhanced via further development work. As noted above however, progression through the development process is not automatic because the extent to which an organisation will realise each benefit is not uniform. Table 5.14 highlights that while (for example) SG, ED and the HPO found that the use of an infrastructure had positively affected their distribution systems, the perceived extent of that benefit was different for each organisation.

<i>X = benefit reported)</i>		Organisation										
		VFC	SG	ED	MH	HPO	UKM	LG	OG	ASL	3SE	LFF
Enhanced market presence	Equality of presence	X	X	X	X	X	--	X	X	X	--	--
	Instant market access	X	X	X	X	X	--	X	X	X	--	X
	Low market entry costs	X	X	X	X	X	--	X	X	X	--	--
	Global customer base	X	X	--	X	X	--	X	--	X	--	X
Improved access to customers	Immediate access to customers	X	X	X	X	X	X	X	X	X	--	--
	No geographical / time barriers to trade	X	X	X	X	X	X	X	X	X	--	--
	24/7 portal now available	X	X	X	X	X	X	X	X	--	--	--
Improved customer communications	Enhanced customer service	X	--	X	X	X	--	X	X	--	--	--
	Product / service enhancement	X	--	X	--	X	--	X	X	--	--	--
	1-1 marketing	X	--	X	X	X	--	X	X	--	--	--
	Relationship marketing	X	--	X	X	X	--	X	X	--	--	--
	Improved relationship with customers	X	X	X	X	X	--	X	X	--	--	--
	Enhanced purchase decisions	X	X	X	X	X	--	X	X	X	X	X
	Customer care/support	--	--	X	--	X	--	--	X	--	--	--
Increased Revenues	24/7 availability	X	X	X	X	X	--	--	X	--	--	--
	New revenue channels opened	X	X	--	X	X	--	X	--	--	--	--
	Increases to revenues	X	X	X	X	X	--	X	--	X	--	--
	Lowered cost of sales	X	X	X	X	X	--	X	--	X	--	--
	Enhanced customer loyalty	--	X	X	--	X	--	X	X	--	--	--
	Non price differentiation	X	--	X	X	X	--	X	--	--	--	--
Value Chain Enhancements	Enhanced access to suppliers	--	--	--	--	--	--	--	X	--	--	--
	Inter business partnerships	--	X	--	X	X	--	X	X	--	--	--
	Improved VC communications	--	--	X	X	X	--	X	X	--	--	--
	Channel efficiencies realised	--	--	--	X	X	--	--	X	--	--	--
	Transaction costs lowered	--	--	--	X	X	--	--	X	--	--	--
	Enhanced distribution systems	--	X	X	--	X	--	--	--	--	--	--
	Instant product / service delivery	--	--	X	--	X	--	--	--	--	--	--
	Revised pricing structure	--	X	X	X	X	--	X	--	--	--	--
	Lowered variable costs	--	--	X	--	X	--	--	--	--	--	--

Table 5.13 – Organisational Benefits Reported by each Case Study Organisation

(5 = strong presence TO
1 = weak presence)

		Organisation										
		VFC	SG	ED	MH	HPO	UKM	LG	OG	ASL	3SE	LFF
Enhanced market presence	Equality of presence	2	1	2	3	4	--	4	3	3	--	--
	Instant market access	3	1	1	2	4	--	2	3	3	--	1
	Low market entry costs	3	3	1	3	3	--	2	3	2	--	--
	Global customer base	1	1	--	3	5	--	3	--	2	--	1
Improved access to customers	Immediate access to customers	3	1	2	2	4	1	3	3	3	--	--
	No geographical / time barriers to trade	3	2	1	2	3	1	2	2	2	--	--
	24/7 portal now available	4	4	2	1	4	1	2	--	--	--	--
Improved customer communications	Enhanced customer service	4	--	4	1	5	--	2	--	--	--	--
	Product / service enhancement	4	--	4	--	5	--	4	--	--	--	--
	1-1 marketing	5	--	5	2	5	--	4	--	--	--	--
	Relationship marketing	5	--	5	1	5	--	5	--	--	--	--
	Improved relationship with customers	5	4	5	1	5	--	5	--	--	--	--
	Enhanced purchase decisions	5	5	4	3	3	--	5	2	4	1	1
	Customer care/support	--	--	5	--	3	--	--	3	--	--	--
Increased Revenues	24/7 availability	4	3	3	2	4	--	--	2	--	--	--
	New revenue channels opened	2	4	--	5	5	--	3	--	--	--	--
	Increases to revenues	3	5	3	4	5	--	3	--	5	--	--
	Lowered cost of sales	4	5	5	5	5	--	2	--	4	--	--
	Enhanced customer loyalty	--	2	2	--	3	--	2	2	--	--	--
	Non price differentiation	3	--	4	5	5	--	4	--	--	--	--
Value Chain Enhancements	Enhanced access to suppliers	--	--	--	--	--	--	--	1	--	--	--
	Inter business partnerships	--	2	--	3	2	--	3	2	--	--	--
	Improved VC communications	--	--	2	2	2	--	3	3	--	--	--
	Channel efficiencies realised	--	--	--	2	2	--	--	2	--	--	--
	Transaction costs lowered	--	--	--	4	3	--	--	2	--	--	--
	Enhanced distribution systems	--	1	5	--	5	--	--	--	--	--	--
	Instant product / service delivery	--	--	5	--	5	--	--	--	--	--	--
	Revised pricing structure	--	2	5	5	5	--	4	--	--	--	--
	Lowered variable costs	--	--	5	--	3	--	--	--	--	--	--

Table 5.14 - Strength of Reported Benefit

		<i>Organisation</i>										
		VFC	SG	ED	MH	HPO	UKM	LG	OG	ASL	3SE	LFF
		(1 = immediate 2 = after development 3 = after redevelopment)										
Enhanced market presence	Equality of presence	1	1	1	1	1	--	2	1	1	--	--
	Instant market access	1	1	1	1	1	--	1	1	1	--	1
	Low market entry costs	1	1	1	1	1	--	2	1	1	--	--
	Global customer base	1	1	--	1	2	--	2	--	1	--	1
Improved access to customers	Immediate access to customers	1	1	1	1	1	1	2	1	1	--	--
	No geographical / time barriers to trade	1	1	1	1	1	1	2	1	1	--	--
	24/7 portal now available	1	2	1	1	1	1	2	1	--	--	--
Improved customer communications	Enhanced customer service	2	--	2	1	1	--	2	1	--	--	--
	Product / service enhancement	2	--	2	--	2	--	2	1	--	--	--
	1-1 marketing	2	--	2	1	2	--	2	1	--	--	--
	Relationship marketing	2	--	2	1	2	--	3	1	--	--	--
	Improved relationship with customers	2	2	2	1	2	--	3	1	--	--	--
	Enhanced purchase decisions	2	2	1	1	2	--	3	1	1	1	1
	Customer care/support	--	--	2	--	3	--	--	1	--	--	--
Increased Revenues	24/7 availability	3	2	2	1	3	--	--	1	--	--	--
	New revenue channels opened	1	2	--	1	3	--	3	--	--	--	--
	Increases to revenues	1	2	1	1	3	--	2	--	1	--	--
	Lowered cost of sales	2	2	2	1	3	--	2	--	1	--	--
	Enhanced customer loyalty	--	2	2	--	3	--	2	1	--	--	--
	Non price differentiation	2	--	2	1	3	--	3	--	--	--	--
Value Chain Enhancements	Enhanced access to suppliers	--	--	--	--	--	--	--	1	--	--	--
	Inter business partnerships	--	2	--	1	2	--	3	1	--	--	--
	Improved VC communications	--	--	2	1	2	--	3	1	--	--	--
	Channel efficiencies realised	--	--	--	1	2	--	--	1	--	--	--
	Transaction costs lowered	--	--	--	1	3	--	--	1	--	--	--
	Enhanced distribution systems	--	2	2	--	3	--	--	--	--	--	--
	Instant product / service delivery	--	--	2	--	3	--	--	--	--	--	--
	Revised pricing structure	--	2	2	1	2	--	3	--	--	--	--
	Lowered variable costs	--	--	2	--	2	--	--	--	--	--	--

Table 5.15 - Benefit Realisation

SG report experiencing only a minor benefit while both ED and HPO report that benefit to have had a major impact upon their businesses. Those organisations' experiences suggest that while it might be possible to identify a 'generic' development model (e.g. the development process depicted within the conceptual model can be considered generic since it is not specific to any one organisation or industry) every organisation's developmental journey will be unique. That in turn suggests that it is not possible to document a development model that can predict, with certainty, the *extent* of the benefits that an organisation will realise. It would appear that it is only possible to analyse and document the infrastructure development process so that it details what benefits could be realised, rather than attempting to predict the full eventual impact and extent of those benefits following development. Table 5.14 shows that such a model would still have merit however. Table 5.14 graphically demonstrates that the extent to which a benefit is realised in practice is far from guaranteed. Therefore, by understanding the development process, its drivers, problems and barriers, and presenting that in a format that is transparent is likely to improve the successful attainment of those potential benefits by other organisations. That will happen because such a model will detail the potential problems and barriers to developmental success and could help future organisations safeguard against their effects from being realised. In that way, the problems and barriers function as threats to the eventual success of the development project. As is the case with any organisational improvement project, being aware of potential barriers and problems to success increases the likelihood that timely corrective/preventative action can be taken in advance to safeguard against them (Boyes 2005, Boyes & Boyes 2006).

Tables 5.14 and 5.15 highlight that there appears to be a correlation between both the number of benefits realised and the strength of those benefits, and the amount of development work undertaken. Table 5.15 demonstrates that as more development occurs, more sophisticated benefits are realised (e.g. the HPO). Table 5.15 also shows that the absence of development work curtails an infrastructure's ability to deliver benefits to an organisation. The experiences of ASL, 3SE and LFF support that finding. Each organisation has undertaken only limited development work and has also failed to realise any sophisticated benefit from that development work. The experiences of the MH appear to contradict that finding since that organisation has realised many organisational benefits from its infrastructure (and reports those benefits

to have had a strong beneficial impact upon the business). However, Table 5.5 reveals that while the MH has realised organisational benefit from its infrastructure the extent to which they were realised only increased after redevelopment work was undertaken. For that organisation, the driver of on-going infrastructure development was not the attainment of ever more sophisticated benefit but the consolidation of those benefits already being realised.

Tables 5.13 to 5.15 demonstrate that within the development process those organisations that have undertaken on-going incremental development have subsequently experienced the highest levels of satisfaction with their infrastructures. That analysis adds further weight to the finding that it is the realisation of organisational benefit (or the recognition that further benefits could become available to the business) that fuels the development process. Consequently, on-going development is driven by the desire to realise new benefits or consolidate the benefits already delivered by the infrastructure. The experiences of 3SE, UKM and LFF demonstrate that. All three organisations have experienced low levels of limited benefits from their infrastructures. All three organisations have also undertaken only limited development work. Within that analysis however, it is not clear which factor is the cause and which is the effect. For example, do low levels of benefit realisation lessen an organisation's desire to further refine its infrastructure or does the lack of development result in low levels of benefit being realised? That question can be answered if one also considers the issue of strategy development. A lack of strategy development and a lack of strategic understanding as to the role of the proposed infrastructure are common to all three organisations. Therefore, the relative failure of those organisation's infrastructure development projects can be explained by reference to this lack of strategic coherence. The lack of 'strategy' meant that each organisation subsequently failed to develop useful and tangible measures of performance for their infrastructure. With an absence of performance measurement metrics, the actual contribution of the infrastructure to each business could not be accurately ascertained by each organisation's owner/manager and as a result their desire to invest further resources within the infrastructure was low. It would therefore appear that a lack of benefit realisation curtails on-going development work and that that curtailment subsequently reduces both the number and extent of any benefits realised.

5.4 Findings – Barriers and Problems to Development

Table 5.16 documents the barriers and problems to development experienced by the case study organisations. Table 5.16 also highlights which of the barriers and problems experienced were internal or external to the case study organisations. Tables 5.17 to 5.27 document the nature, scale and impact of those barriers and problems contained within Table 5.16.

Table 5.16 highlights that every organisation experienced barriers to the development of an infrastructure. Every organisation (with the exception of ED) lacked the knowledge and competences needed to develop and deploy a commercial Web infrastructure unaided. In each case, that was compensated for via the use of an external Web developer. However, when that lack of knowledge and understanding is combined with an inability to develop a coherent strategy for the proposed infrastructure, the resulting infrastructure is highly unlikely to be successful in delivering benefit to its stakeholders. That situation is typified by LFF and LG. For both organisations, their owner/manager's lack of understanding of the use of the web as a commercial medium made the development of a coherent purpose and strategy for the proposed infrastructure impossible to develop. That in turn meant that the creation of a value-adding purpose and strategic role for the infrastructure was delegated to the external Web developer. In both cases, the external 'expert' lacked the holistic understanding of the business, its aims and objectives needed to compensate for the owner/manger's lack of technical expertise. In both cases, the resulting infrastructure failed to deliver significant benefit for the organisation.

Tables 5.16 to 5.27 also show that the case study organisations largely failed to develop coherent performance measures for their proposed infrastructures at the initial development stage. Given the lack of performance measurement metrics, and a failure to integrate the infrastructure either operationally or strategically within the business only modest organisational benefits were subsequently reported (for example, UKM are typical of that finding in that responsibility for the infrastructure was delegated to the developer who largely failed to integrate the infrastructure within the business). The MH's experiences highlight that when development is undertaken without any clear rationale for the role that the infrastructure will subsequently play within the

business, perceptions as to the success of the infrastructure will be low because the business will lack both an understanding of the fundamental purpose of the infrastructure and a method by which to ascertain and measure its contribution to the business. Tables 5.17 to 5.27 reveal that the strategy adopted by each case study organisation to overcome that barrier to development was to compensate for their own lack of developmental expertise by retaining the services of an outside Web 'expert'. As discussed above however, the external expert cannot solve every development problem since their primary role is to function as a facilitator who turns an organisation's on-line ambitions into a functional infrastructure. When the organisation cannot articulate (or does not even understand) what its on-line ambitions actually are, the external expert cannot facilitate successful development. That can help to explain why, despite the self-confessed ignorance of the use of the web and the development process by each owner/manager, each external developer still managed to overcome that barrier to development by creating a functional infrastructure but ultimately created an infrastructure that each organisation recognised to be a 'failure' to a greater or lesser degree. That analysis suggests that such external entities function as gatekeepers to development; when they are provided with clear direction they act as facilitators who can deliver a 'successful' infrastructure (as evidenced by the HPOs experiences). When they are provided with no clear guidance and direction they act to block to resulting infrastructure success despite their best efforts to compensate for the organisation's lack of knowledge and understanding (as evidenced by LFF and UKM's experiences).

<i>(X = Barrier/Problem encountered)</i>		Organisation											
		VFC	SG	ED	MH	HPO	UKM	LG	OG	ASL	3SE	LFF	
Barriers To Web Infrastructure Development Experienced	The Adoption & Use of Web Technology	Internal	X	X	--	X	X	X	X	X	X	X	X
		External	--	--	--	--	--	--	--	--	--	--	--
	Resource & Asset Base Limitations	Internal	X	X	--	X	--	X	X	X	--	X	X
		External	--	--	--	--	--	--	--	--	--	--	--
	On-line Safety & Security Concerns	Internal	--	--	--	--	--	--	--	--	--	--	--
		External	--	--	--	--	--	--	--	--	--	--	--
	Customer Acceptance & Use of the	Internal	--	--	--	--	--	--	--	--	--	--	X
		External	--	--	--	--	--	--	--	--	--	--	--
	On-line Strategy Dev'tment	Internal	X	--	--	X	--	X	X	--	X	X	X
		External	--	--	--	--	--	--	--	--	--	--	--
	Online Marketing	Internal	--	--	--	--	--	X	X	--	X	--	X
		External	--	--	--	--	--	--	--	--	--	--	--
	The Threat of Increased Competition	Internal	--	--	--	--	--	--	--	--	--	--	--
		External	--	--	--	--	--	--	--	--	--	--	--
Problems To Web Infrastructure Enhancement Experienced	The Adoption & Use of Web Technology	Internal	X	X	--	X	X	X	X	X	X	X	X
		External	X	--	X	--	--	--	--	--	X	X	X
	Resource & Asset Base Limitations	Internal	X	X	--	X	--	X	X	X	X	X	X
		External	X	--	--	--	--	--	--	--	--	--	--
	On-line Safety & Security Concerns	Internal	--	--	--	--	--	--	--	--	--	--	--
		External	--	X	X	--	--	--	--	X	--	--	--
	Customer Acceptance & Use of the Web	Internal	--	X	--	--	--	X	X	--	X	X	X
		External	--	X	X	X	--	--	--	--	X	--	--
	On-line Strategy Dev'tment	Internal	X	X	--	X	X	X	X	X	X	X	X
		External	--	--	--	--	--	--	--	--	--	--	--
	Online Marketing	Internal	X	X	--	--	--	X	X	X	X	X	X
		External	--	X	X	--	--	--	--	--	--	--	--
	The Threat of Increased Competition	Internal	X	X	--	--	--	X	--	--	--	--	--
		External	--	--	X	--	X	--	--	--	--	--	--

Table 5.16 – Barriers & Problems to Development Reported by Organisations

The Cottages

Infrastructure developed	1999
Implementation Barriers Encountered	VFC's owner/managers did not fully understand how the Internet and Web could be exploited for commercial gain.
Impact of Barriers	VFC's owner/managers were unable to develop a coherent development plan that was integrated at both a strategic & operational level with the business's wider corporate goals.
Coping Strategies Deployed	The business drew upon the expertise of an external web developer for both the development of the web infrastructure and the development of a web strategy for the business.
Problems Encountered	<ul style="list-style-type: none"> • Updating the infrastructure's content is perceived to be overly time consuming. • The owner/managers do not have the technical expertise to extend the infrastructure's functionality. • The owner/managers' lack of web expertise has limited their ability to develop objectives for the infrastructure. • Incorporating the use of the infrastructure within existing business processes has further complicated those management processes. • High volumes of unsolicited email are regularly received. • The owner/managers' lack the time to train themselves further within the use of the Web, Internet and PC technologies. • Integrating the business's key service differentiator (their personal and friendly approach to dealing with customers) has proven to be impossible to replicate on-line; the owner/managers perceive the medium to be inherently impersonal.
Impact of the Problems upon the Infrastructure	<ul style="list-style-type: none"> • Updates to the infrastructure's information are made infrequently thereby compromising its ability to provide accurate and timely information to its users. • The owner/managers are unable to further enhance or develop the infrastructure without the direct involvement of an external web developer; that has raised the on-going costs of maintaining the infrastructure. • The lack of firm objectives has made objective performance measurement impossible. Therefore, the infrastructure's contribution to the business cannot be fully ascertained. • Due to the complexities of integrating the infrastructure within existing business processes, the owner/managers now operate two separate booking systems (on-line and off-line). That has led to errors being made when making bookings and has greatly increased the amount of time spent dealing with bookings and managing the booking process. • The time spent dealing with unsolicited e-mail has reduced the amount of time devoted to other areas of the business and has decreased the extent to which e-mail is used. Similarly, e-mail is not checked regularly (due to the amount of time that activity takes) and so customer enquiries are not always responded to in a timely manner. • The owner/managers do not fully understand either the existing infrastructure or how the infrastructure could be further developed. Their lack of understanding has limited their desire to further invest within the infrastructure. • To maintain personal contact with customers the infrastructure's functionality has been limited so that bookings cannot be made entirely 'on-line' (customers must also speak to the owner/manager). That limits the infrastructure's impact upon the business and further complicates the booking process.
Coping Strategies Deployed	<ul style="list-style-type: none"> • To limit the impact of the problems a web developer updates the infrastructure and provides management and technical guidance to VFC. Likewise, the owner/managers have tempered their desire to further exploit the web because they recognise that they lack the capability to do so unless further money is invested to secure more services from the web developer.

Table 5.17 – The Cottages Barriers & Problems to Development

The Gallery

<i>Infrastructure developed</i>	April 2002
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> • Neither the owner nor manager of SG understood the technologies involved in creating a commercial web infrastructure. • SG's owner lacked the financial resources to outsource the infrastructure's development.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> • The owner and manager were unable to develop an infrastructure independently. • The business could not afford to employ a professional web developer.
<i>Coping Strategies Deployed</i>	<p>SG's owner approached his son who subsequently developed a basic static web infrastructure.</p>
<i>Problems Encountered</i>	<ul style="list-style-type: none"> • SG's owner and manager's lack of technical expertise meant that they were unable to enhance/modify the infrastructure without assistance. • The infrastructure did not align with SG's real-world marketing activities or materials. • SG's products cannot easily be digitised for sale via the infrastructure. • The rigidity of the template based web site (see 'coping strategies' below) limits both the amount of information (and its format) that can be made available via the infrastructure. • The complexity of the information contained within infrastructure (and the complexity of product information) has made structuring the web site difficult to achieve. • Enhancing the web infrastructure has proven to be expensive for the business. • SG's customers appear reluctant to use the infrastructure to purchase high-value products.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> • The owner and manager's lack of technical expertise restricted the infrastructure's development. • The lack of alignment with existing marketing materials/activities ultimately led to a complete redesign of the SG web site and supporting infrastructure. • Only limited SG products are offered for sale via the infrastructure. That limits the infrastructure's ability to contribute to organisational income and profits. • The rigidity of the web template currently used has made navigation within the site complex and is perceived to have lowered the site's ease of use. • The high cost of infrastructure development has lessened the owner's desire to further enhance it. • The customer base's reluctance to purchase high-value products on-line has restricted the infrastructure's contribution to the business to one of marketing/sales support rather than revenue generation. That has created a perception that the infrastructure makes only a limited beneficial contribution to the business's performance. That in turn has lessened the owner's desire to further invest in enhancing the infrastructure.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • In order to address the owner and manager's lack of technical expertise a professional web developer was contracted to redevelop the then current static web infrastructure by using a template based transaction enabled web site. • In order to address the owner and manager's concerns regarding the infrastructure's goodness-of-fit with existing marketing materials a strategic business partner of SG was approached to offer advice regarding infrastructure use and development.

Table 5.18 – The Gallery Barriers & Problems to Development

The Web Designer	
Infrastructure developed	June 2004
Implementation Barriers Encountered	none
Impact of Barriers	none
Coping Strategies Deployed	none
Problems Encountered	<ul style="list-style-type: none"> • ED's customers are unwilling to place orders for services on-line. • The use web technologies such as flash and java within the web infrastructure caused problems for ED. • ED has experienced problems with the telephone infrastructure used to connect their business to the internet. • ED's customers have expressed concerns over the perceived security of transacting business on-line and in accessing certain ED products/services electronically. • ED's owner has found the internet to be difficult to exploit as a marketing tool; he perceives the internet to be a passive sales medium.
Impact of the Problems upon the Infrastructure	<ul style="list-style-type: none"> • The infrastructure has failed to contribute directly to organisational profits and income. As a result, the infrastructure is used only to support real-world sales activity. Also, the owner's desire to further enhance the infrastructure has been reduced because he does not believe that he will see an acceptable financial return from that investment. • The use of complex web technologies has meant that the ED web infrastructure could not be accessed by certain companies and was not 'search engine friendly' – those two issues caused ED to simplify the infrastructure but ED's owner perceives that the static nature of the site is one of the reasons that it has failed to generate independent sales. • The business has been unable to fully utilise the web infrastructure because of their customers' security concerns. That has limited its positive contribution to the business. • Problems with the telephone infrastructure have limited ED's ability to connect to the internet and make their infrastructure available to their customer base. • The infrastructure does not directly contribute to sales and profits. Its role is restricted to supporting other sales/marketing activities.
Coping Strategies Deployed	<ul style="list-style-type: none"> • Following ED's owner's realisation that the infrastructure cannot directly generate sales its objectives have been modified such that its performance is assessed against its success in supporting real-world marketing activities. • To protect against telephony problems the infrastructure is now independently hosted. • The web infrastructure was stripped of flash and java enhancements in an effort to maximise accessibility and enable search engines to correctly index the site. • Further enhancements to the infrastructure have had to have been made in order to reassure customers of the infrastructure's security (thereby increasing its costs) while certain features have been disabled (e.g. downloadable '.exe' files showcasing ED's product range have been withdrawn following customer concerns about running downloaded executable files).

Table 5.19 – The Web Designer Barriers & Problems to Development

The Guest House

<i>Infrastructure developed</i>	1998
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> • The MH's owner did not have the technical knowledge or competence to develop an infrastructure himself. • The cost of infrastructure development was high. • The MH's owner was unsure of what purpose the web infrastructure would fulfil.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> • The MH's owner could not develop an infrastructure without assistance. • The MH could not afford to buy hardware/software. • The MH's owner was unsure of exactly what to develop or how to deploy the resulting infrastructure within the business.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • An outside web developer undertook all development work. • All infrastructure hardware (with the exception of 1 PC) was (and still is) hired. • All of the MH's marketing materials were redeveloped in order to provide a consistent 'look and feel' with the new infrastructure.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> • The MH's owner was unable to integrate the infrastructure within the business's other processes (e.g. booking and customer contact processes). • Usage of the infrastructure by customers was slow to develop. • The MH's owner lacks the technical expertise to further enhance/modify the infrastructure. • The MH's customers now expect an almost 'instant' response to their on-line enquiries. • The MH's owner has been unable to accurately measure the infrastructure's performance, and through that, its contribution to the business.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> • Integration of the infrastructure within existing business processes has limited its role within and contribution to, the business as a whole. • The MH was unable to exploit the infrastructure's potential as a direct marketing tool until a database of customers had been developed (which took several years). • Infrastructure content and functionality cannot be amended or enhanced without the further involvement of a web developer. • The time demands of the business preclude the MH's owner from regularly checking for on-line enquiries. The MH's owner therefore believes that he is failing to adequately meet the implied expectations of customers since he cannot instantly respond to the enquiries. • The MH's owner is unable to objectively assess the infrastructure's performance. That has led to him questioning the value of further investment within the infrastructure.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • The web developer has been heavily involved within the infrastructure's development to ensure its compatibility with existing working practices and working processes (which has increased development costs). • The infrastructure's objectives have been revised such that performance measurement is less problematic and such that the infrastructure is no longer expected to make a visible and explicit contribution to the business. • Regular contact is maintained with the web developer and a template-based site is now used so that the MH's owner has limited scope for updating the infrastructure on a regular basis. • The MH's owner devotes large amounts of time to responding to on-line enquiries even though he is sceptical of the value of spending his time in that way. • A single metric is now used to assess the infrastructure's overall performance. That approach has been adopted to simplify the performance measurement process but is recognised by the MH's owner to be a potentially flawed measurement system.

Table 5.20 – The Guest House Barriers & Problems to Development

The HPO

<i>Infrastructure developed</i>	2000
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> • The HPO's owners were inexperienced in the commercial use of the Internet and web. • The HPO's owners lacked the technical knowledge needed to develop an infrastructure.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> • The infrastructure was initially limited in its functionality and scope. • The HPO could not develop an infrastructure independently.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • A long-term development plan was prepared with which to guide on-going development work. • A web developer was hired to develop the infrastructure.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> • The costs associated with realising the owners' online ambitions was extremely high. • Updating the infrastructure's content and further developing its functionality is overly time-consuming. • The business's heavy reliance upon its infrastructure means that any 'down time' will have a high impact upon the HPO. • Other members of the HPO's value chain doubt the validity of their on-line business model. • Processing the information collected via the infrastructure and analysing it proved to be more complex than was originally thought. • Project managing the infrastructure's staged development was highly complex.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> • On-going development places a strain on the HPO's financial resources. That has prevented other areas of the business from being expanded. Should the infrastructure fail the HPO would be unlikely to survive. • Much of the owners' time is devoted to maintaining and enhancing the infrastructure. That diverts their attention away from other areas of the business's management. • On-going costs have been raised since redundancy has had to be built into the infrastructure because of its key role within the business. • Since the HPO's online business model involves restructuring the current value chain, acceptance of the model from other value chain members has been low. • Adapting the HPO's services/products for online delivery has proven to be highly time consuming and expensive. That has limited further development work and has delayed the completion of the infrastructure (since resource requirements were underestimated). • The web developer has been retained (thereby raising the infrastructure's costs) in order that he can provide on-going project management advice and guidance to the HPO's owners.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • By preparing a staged development plan and regularly monitoring the infrastructure's performance, the HPO's owners have confidence in the long-term viability of their 'online investment'. • The infrastructure's users are involved within the development process in order to ensure that on-going development fully satisfies their needs and expectations. • Further capital has been raised by the HPO's owners to ensure that the project has the financial resources needed. • Extensive user testing is undertaken to ensure that the adaptation of existing products/services for digital delivery has been successful. • The web developer has been 'followed' across web development companies to minimise the impact upon infrastructure development that changing developers would have had upon on-going development work.

Table 5.21 – The HPO Barriers & Problems to Development

The Installer

<i>Infrastructure developed</i>	1999
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> • The business lacked the technical expertise to develop a web infrastructure. • The business had no clear rationale for developing an infrastructure.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> • The business was unable to develop a web infrastructure without hiring a web developer; that increased development costs. • The infrastructure lacked strategic purpose and had no performance objectives set for it.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • A web developer was hired to both develop the web infrastructure and provide guidance as to its role within the business.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> • The business was unable to develop a system for managing the infrastructure's performance. • The business lacked the technical expertise to update or enhance the infrastructure. • The infrastructure was not integrated with the business's other marketing materials. • The time needed to update the infrastructure was excessive.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> • The lack of a system of management for the infrastructure meant that its information quickly became out of date and its content directly contradicted other marketing materials. The business's senior managers believed that their failure to manage the infrastructure was actively harming the business's marketing efforts. • Due to the lack of in-house expertise updates to the infrastructure's information were not made and its functionality was not enhanced. The management team report that despite their early adoption of the web, their business is now unable to exploit the internet as a sales or marketing medium. • The business's failure to integrate the infrastructure within its other marketing plans and materials meant that it was unable to either secure sales or tangibly support other marketing efforts. That led to the senior management team questioning whether to maintain a presence on the web at all or to continue attempting to use a web infrastructure as a business tool. • The infrastructure's lack of upkeep and maintenance prevented it from being able to contribute to the business in any meaningful way. The management team report that their decision to develop and maintain an infrastructure has actively harmed the business.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • To counter the problems encountered, a new web developer has been hired and is currently redeveloping the infrastructure. • A formal development plan has been created that will integrate the infrastructure within existing management systems and the business's long-term strategic goals. • The business intends to work much more closely with the developer to ensure that the infrastructure is capable of adding value both for its users and for the business. • The infrastructure has now been formally included within the business's overall marketing plans in order that a unified marketing message can be presented to the market. • A clearer brief has been provided to the developer to ensure that he produces what the business <i>actually</i> wants rather than what he <i>thinks</i> they want. • A management system has been developed for the infrastructure so that its on-going development will be a constant process rather than a staged process with updates/enhancements only occurring once approximately every 24 months.

Table 5.22 –The Installer Barriers & Problems to Development

The Trainer

<i>Infrastructure developed</i>	February 2004
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> • LG's owner lacked the technical expertise and the knowledge needed to develop an infrastructure. • LG's owner did not fully understand how to utilise web technologies within the business. • The web developer chosen (see below) was unwilling to offer design advice (he would only work to the precise instructions of LG rather than offering design/development suggestions). • The cost of buying the hardware associated with an infrastructure was perceived by LG's owner to be high.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> • LG were unable to develop an infrastructure in-house. • LG were unable to develop a strategy for the infrastructure. • LG were unable to develop an infrastructure (despite the use of a web developer) that contributed to the attainment of the business's strategic goals. • LG were unable to purchase the necessary hardware to support their infrastructure.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • A web developer was hired to undertake all development work. • Existing marketing materials were used to provide the content for the web site. • The infrastructure's first iteration was quickly redeveloped in order to improve its fit with existing corporate strategy. • The web developer provided all hardware/software needed to develop the infrastructure.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> • LG lack the in-house expertise needed to further enhance the infrastructure. • The infrastructure is limited in its functionality. • The infrastructure has had no formal objectives set for it. • LG's owner has failed to integrate the infrastructure within the business's wider operational and strategic plans. • The infrastructure has had poor availability due to failures on the part of the hosting company currently used. • LG's owner has limited technical knowledge of the internet and web.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> • LG have continued to use a web developer (thereby increasing the infrastructure's on-going costs). Similarly, LG's owner has been unable to develop a coherent strategic plan for the use of the web within the business. • User interaction with the infrastructure is low; the infrastructure's corresponding contribution to the business is low. • Performance measurement is problematic and the infrastructure's contribution to the business cannot be accurately established. That has reduced LG's owner's desire to further enhance it. • The infrastructure is regularly reported to be unavailable to users. That has reduced LG's owner's confidence in the use of the web as a business tool. • LG's owner cannot establish the accuracy of the information being given to her by the hosting company and web developer currently used.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • LG have now employed a 'technical expert' to champion both on-going development/enhancement and the development of a clear business strategy for the use of the web. • The technical expert is currently redeveloping the infrastructure to extend its functionality thereby increasing its value to users and its contribution to the business. • Clear objectives have now been set for the infrastructure in order that its contribution to the business can be ascertained. • A new hosting company is being approached and an SLA is being secured to guarantee infrastructure availability.

Table 5.23 – The Trainer Barriers & Problems to Development

The Trade Association

<i>Infrastructure developed</i>	Spring 2003
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> OG lacked both the expertise and hardware needed to create a functional web infrastructure.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> OG's lack of expertise and hardware prevented them from developing an infrastructure.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> All development work was outsourced to a web developer. The web developer provided the OG with all hardware and software needed.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> The OG lack the expertise needed to update or maintain the infrastructure. The OG was unable to develop coherent and meaningful objectives for the infrastructure. The OG failed to integrate the infrastructure within the organisation's wider strategic plans. The OG does not have enough time to update or enhance the infrastructure on an on-going basis.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> The OG is unable to modify/update its infrastructure independently; that has increased on-going infrastructure costs. No clear method currently exists by which performance can be assessed. That has led the OG to question whether to continue to invest within the infrastructure since its contribution to the business is currently unknown. The OG is uncertain as to the future role of the infrastructure within the business. As such, future development is unlikely to occur since developing the infrastructure is not included within the organisation's strategic plans. Since development is not undertaken as part of a coherent plan, the OG believes that explains why its contribution to the business is perceived to be low. On-going development and maintenance has been outsourced entirely to a web developer. That has both increased on-going maintenance costs and has created a situation within which the developer must seek the OG's approval before enhancements to the infrastructure can be made. The OG is unable to respond to those request in a timely manner and so they now represent a 'bottleneck' for on-going infrastructure upkeep.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> All maintenance of the infrastructure has been outsourced in an attempt to counter the OG's lack of in-house expertise. An SLA has been secured from the developer to provide long-term stability to development work. No other strategies have yet been developed to address the problems experienced with performance measurement, the time demands placed upon the organisation through owning an infrastructure or the future strategic role of the infrastructure within the business.

Table 5.24 – The Trade Association Barriers & Problems to Development

The Manufacturer

<i>Infrastructure developed</i>	February 2003
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> ASL lacked the knowledge and technical expertise needed to establish a web infrastructure. ASL lacked the marketing expertise to develop an infrastructure capable of enhancing their real-world marketing activities.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> ASL recognised the potential positive contribution to their marketing activities that an infrastructure could make but were unable to act upon that. ASL recognised that a web infrastructure could potentially improve the business's ability to market its products and services but were unable to act upon that realisation.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> Local government funding was obtained to retain the services of a web developer; that was done to compensate for ASL's lack of technical expertise. Local government funding was used to retain the services of a marketer in order to develop an effective marketing/promotional infrastructure.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> The ASL management team have been unable to accurately measure the performance of the infrastructure. The ASL management team do not understand how to set meaningful objectives for the infrastructure. ASL's MD plays a central role within the infrastructure's development but at the same time has only a limited understanding of web technologies. The infrastructure has failed to visibly and directly contribute to organisational sales. ASL have begun to receive numerous electronic requests to quote for business that they suspect they will not ultimately win.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> The lack of performance measurement metrics has caused the ASL management team to question the value of continuing to invest within an infrastructure. Given the absence of tangible objectives for the infrastructure, the ASL management team are unable to establish the infrastructure's actual contribution to the business. Infrastructure development is compromised since ASL's MD must agree all on-going development work. At the same time he lacks the time and technological understanding to do that effectively. The failure to generate sales led to the management team not including the infrastructure within their marketing and promotional strategies. That has meant that the infrastructure does not have resources specifically allocated to it (thereby compromising its further development) and has led to the team questioning the value of further investment within the infrastructure. A disproportionate amount of time is now spent responding to enquiries that will not be won – the infrastructure has placed ASL in the position of being used as a 'benchmark' by customers who will use that information to negotiate lower prices with other suppliers.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> The MD is currently developing a coherent web strategy and performance objectives for the infrastructure so that its true contribution to the business can be ascertained. Future development will be based upon that analysis. On-going ICT management within ASL has now been outsourced in order that the MD can retain strategic control while delegating operational decisions to those experts best qualified to make them. ASL's marketing strategy has been revised such that it includes the use of the web infrastructure. The quotation process has been modified to deal with spurious quotation requests (whether electronic or paper based).

Table 5.25 –The Manufacturer Barriers & Problems to Development

3SE	
<i>Infrastructure developed</i>	September 2004
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> • 3SE lacked the technical expertise to develop a web infrastructure. • The 3SE management team lacked the understanding of web technology to clearly establish what purpose a web infrastructure should fulfil within the business.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> • 3SE were unable to create an infrastructure. • 3SE were unable to establish a clear design brief or rationale for the proposed infrastructure.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • A web developer was hired to create the infrastructure. • The developer's expertise was drawn upon to establish the role and purpose of the infrastructure.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> • Despite the involvement of the web developer a clear purpose for the infrastructure was not developed. • User and staff opinion was canvassed for the role of the infrastructure but that information was not acted upon. • A system of management for the on-going upkeep of the infrastructure was not established. • 3SE lack the technical expertise and knowledge needed to modify/enhance the infrastructure. • 3SE are unsure as to who the target audience of the infrastructure is. • The 3SE senior management team have not appointed a project 'champion' for the infrastructure's future development.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> • 3SE now question the value of the infrastructure to the business and the sense of investing further time and money in development. • There have been low levels of user interaction with the site and a perception amongst staff that they have been ignored. Dissatisfaction exists with the infrastructure (by its external users) and with the development process (by its internal users). • Changes/modifications/enhancements to the infrastructure are not made. As a result, the information contained within the infrastructure is now perceived to be out of date by 3SE. • 3SE lack the organisational ability to manage the infrastructure or further enhance it. • The infrastructure is unable to market/promote 3SE within the market place since it has not been developed with any specific customer group in mind. • The on-going development project now lacks strategic direction. The absence of a senior management 'project champion' has starved the project of resources.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • 3SE intend to formally include the infrastructure within the business's strategic, marketing and operational plans. • Responsibility for the upkeep and long-term enhancement of the infrastructure is to be formally allocated to a trained member of staff.

Table 5.26 – 3SE Barriers & Problems to Development

The Food Company	
<i>Infrastructure developed</i>	2002
<i>Implementation Barriers Encountered</i>	<ul style="list-style-type: none"> • LFF did not have the technical expertise or understanding of web technologies to develop an infrastructure. • LFF were unsure as to what purpose the web infrastructure could fulfil; they were unable to develop a business strategy for the infrastructure.
<i>Impact of Barriers</i>	<ul style="list-style-type: none"> • LFF were unable to develop an infrastructure. • LFF were unable to develop a coherent rationale or development strategy for the infrastructure. That meant the resulting infrastructure lacked any clear objectives or a means by which its performance could be assessed.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • All development work was outsourced to a web developer. • LFF drew upon the developer's expertise heavily in order to establish a purpose for the proposed infrastructure. Existing paper-based marketing materials were used extensively to create the web site's content.
<i>Problems Encountered</i>	<ul style="list-style-type: none"> • Since infrastructure development was undertaken without any clear guiding development purpose or rationale, the infrastructure ultimately developed was to be 'poorly designed', to be difficult to navigate, to not be targeted at any specific customer or user group and to have limited functionality (as assessed by the LFF management team). • The absence of an overall purpose for the web infrastructure meant that the management team was unable to establish specific objectives against which the infrastructure's performance could be assessed. • The business's use of the web infrastructure was not included within the business's strategic or marketing plans. As a result, the infrastructure was misaligned with the business's real-world marketing activities. • LFF lacked the technical expertise to correct the infrastructure's shortcomings. • The LFF management team did not have sufficient time to devote to the on-going development of the infrastructure.
<i>Impact of the Problems upon the Infrastructure</i>	<ul style="list-style-type: none"> • There were low levels of user interaction with the infrastructure while customer feedback about it was highly critical. That led the LFF management team to believe that the infrastructure was actively harming their real-world marketing activities and the reputation of their company. • Performance measurement (and through that, improvement activities) could not be undertaken since the LFF management team had no objectives against which to assess the infrastructure's performance. • The web infrastructure's content directly contradicted the business's other marketing materials thereby harming the business's overall marketing activities. • LFF were unable to correct the infrastructure's shortcomings without the further involvement of the web developer (thereby raising the infrastructure's costs). Simultaneously, the LFF management team were highly reluctant to invest further time and money enhancing the infrastructure because of the infrastructure's poor performance to date. • The LFF management team was unable to devote the time needed to develop a strategy to correct the problems associated with the infrastructure.
<i>Coping Strategies Deployed</i>	<ul style="list-style-type: none"> • In order to address the concerns of the LFF management team regarding the infrastructure's performance, the web site was withdrawn from the web and was replaced with an 'under construction' web page. At the same time, the wider infrastructure was maintained in order to provide the business with internet access and e-mail facilities.

Table 5.27 – The Food Company Barriers & Problems to Development

Tables 5.16 to 5.27 highlight that three key barriers to development can be identified: the adoption and use of web technology, the development of an on-line strategy and resource and asset base limitations. That finding supports the proposition that Web infrastructure development can be depicted as orderly and staged. For example, it is entirely logical that given the broad marketing objectives established for each case study Web infrastructure, each organisation would not have encountered barriers to development that concerned increased competition or on-line security. Put simply, those barriers are arguably unrelated to a non e-commerce enabled Web infrastructure. That in turn suggests that while all of the barriers contained within Table 5.16 have the potential to block initial infrastructure development, it is likely that within a staged development process the three barriers evidenced within this study will routinely be experienced because they are relevant to infrastructure development for both those organisations with only modest initial ambitions and for those with more sophisticated goals. For example, SGs only initial objective was to raise awareness of the business outside of its physical geographical location (an unsophisticated objective) while the HPO (even at the initial development stage) always intended to trade electronically and radically reconfigure their industry's value-chain (a sophisticated objective). Both organisations still encountered the same barrier to initial infrastructure development; a lack of understanding as to how Web technology could be exploited in practice.

Table 5.16 also highlights that none of the organisations experienced external barriers to infrastructure development. That finding suggests that initial infrastructure development is more likely to be blocked by internal barriers than by external ones.

Tables 5.17 to 5.27 highlight that a wide range of problems were subsequently experienced by the case study organisations when they attempted to exploit their newly created infrastructures. Just as with the barriers to development however, few organisations encountered problems whose origins were external to the organisation. The most commonly reported external problem related to the case study organisations' customers' acceptance and use of the Web infrastructure (SG, ED, MH and ASL). That situation is understandable given that all four organisations initially developed infrastructures that delivered largely static, functionally limited infrastructures. Those infrastructures offered customers little reason or incentive to use them and so their

reluctance to use them (and each organisation's recognition of customer acceptance and use problems) is explained as a result.

Tables 5.17 to 5.27 also highlight that the case study organisations experienced far more problems to the on-going use of the Web than barriers to the initial creation of an infrastructure. That finding supports the depiction of the development process as being staged and incremental. Indeed, the organisation that has experienced the greatest levels of online success and lowest incidence of problems (the HPO) explicitly engaged in gradual and staged infrastructure development. Likewise, if an infrastructure's sophistication is incrementally increased over time one would logically expect the problems encountered by its owners to also increase over time. That is, as an organisation's on-line objectives become more sophisticated, its infrastructure is further refined. That refinement of both online goals and supporting infrastructure presents ever more complex and sophisticated problems to the realisation of those goals. The experiences of 3SE, LFF, UKM and SG support that finding. Those organisations have all attempted to further refine the sophistication of their Web infrastructures but have simultaneously encountered a variety of problems that have impacted upon the extent to which the planned benefits of further refinement were realised in practice. While for each organisation further refinement was undertaken to address a shortcoming of the original infrastructure, the effect remains the same; each organisation encountered large numbers of problems to their development attempts. Table 5.16 also suggests that those organisations experiencing barriers to successful development are likely to go on to experience problems to the subsequent commercial exploitation of their infrastructures. For example, despite the HPO's infrastructure being largely successful in delivering tangible benefits to the business, the HPO have also encountered three significant problems to its usage.

The HPOs experiences highlight that the development of a coherent on-line strategy is crucial to the successful exploitation of an infrastructure. Those organisations that lack clear strategy and purpose are also the ones who report high numbers of problems with the use of the infrastructure (e.g. 3SE, LFF, UKM and LG). That finding again highlights the crucial role that external entities can play within the successful on-going refinement of a Web infrastructure. For example, for the HPO and ASL (who both developed a coherent on-line strategy), the Web developer actively helped them to

overcome the problems being experienced. Each organisation was able to successfully draw upon their developer's expertise to better exploit the medium by developing an increasingly sophisticated infrastructure that made increasingly sophisticated benefits available to each organisation within a well defined overall strategy. However, if those experiences are contrasted with those of LG, LFF and 3SE a very different picture is seen. Those organisations were unable to harness the expertise of their 'external expert' because they could not communicate what strategic purpose the infrastructure should fulfil effectively. As a result, they have been largely unable to overcome the problems that they have experienced. That analysis highlights that external entities are the gatekeepers of both success and failure within the development process. That analysis also suggests that the ability to develop strong, coherent performance measures and an organisational strategy with which to guide the on-going refinement of an infrastructure are key determinants of online success (because they are key determinants of the organisation's ability to overcome the barriers and problems to development thereby realising tangible benefit from the development process).

5.5 Conclusions to the Study Findings

Chapter 5 has presented the findings of this study. It has done that through the use of text-based tables and matrices. Their analysis highlights that each case study organisation initially developed a Web infrastructure because of the potential organisational benefits that development could offer and subsequently went on to further refine their infrastructure over the long-term. That finding suggests that within the infrastructure development process, benefit realisation fuels infrastructure development. Immediately preceding infrastructure development is the realisation that organisational benefit could be realised through development that fuels the first stage of the development process. Following the creation of a functional infrastructure it is the actual realisation of benefit that fuels the next stages of the development process. In that way, benefit realisation provides both the initial catalyst that prompts initial infrastructure development and provides the impetus to further enhance the infrastructure over the long term.

The findings demonstrate that for each case study organisation the business's owner/manager was the driving force behind each infrastructure's initial development. The findings demonstrate that while the infrastructure development process is fuelled by the organisational benefits that such development can offer, it is the owner/manager who is prompted to act upon that realisation.

The findings also demonstrate that for all but one case study organisation, the owner/manager lacked the technical knowledge and understanding to complete the project unaided. Therefore, the findings show that within each business the owner/manager recognised the potentially beneficial impact that the use of the internet could have upon the business but was unable to realise those benefits in practice. In that way, the findings have also revealed the key role that external entities play within the infrastructure development process. That is because it is routinely the external entity (the Web developer, for example) that is expected to develop an infrastructure capable of delivering the benefits being sought by the owner/manager. That finding also highlights the importance of strategy development within the infrastructure development process; those organisations that experienced the greatest levels of 'online success' are also the ones that have successfully developed a strategy to guide both initial and on-going development work. The role of strategy development appears to be so crucial because it represents the bridge between the owner/manager's aspirations and the means by which those aspirations will be realised. When a clear and coherent strategy exists, the expertise of the Web developer can be fully utilised and harnessed because the aspirations of the owner/manager exist in a tangible form. That strategy will subsequently be used to guide all development work and provide transparency to the development project. When a clear strategy does not exist it would appear that it becomes significantly harder for the owner/manager to harness to expertise of the Web developer. Indeed, in extreme circumstances responsibility for the creation of the organisation's on-line strategy can be delegated in its entirety to the external entity. In that situation it appears highly unlikely that the resulting infrastructure will be capable of delivering the benefits being sought by the organisation's owner/manager. Either because the owner/manager does not in-fact fully understand what impact the infrastructure should actually have upon the business or because the Web developer lacks the requisite understanding of the business to develop such a strategy successfully.

A wide variety of benefits become available to an organisation following the creation of an infrastructure. The wide variety of organisational benefits reported by the case study organisations demonstrate the potentially greatly beneficial impact that an infrastructure can have upon a Small Business. Likewise, the wide incidence of benefit realisation demonstrates the motivational role that benefit realisation appears to play within the development process. The study findings also show that while every case study organisation realised at least one benefit from their infrastructure, the extent of benefit realisation was not uniform among them. Therefore, the findings suggest that while the potential benefits on offer might drive the development process, at the same time the extent to which they will actually be realised is not guaranteed. The findings show that is because it is possible to identify barriers that act to curtail the success of initial infrastructure development and problems whose effect is to lessen or block the extent to which ongoing infrastructure development is successful.

Within the development process, development does not end with the creation of the initial Web infrastructure. Rather, long-term development work will be undertaken. Just as is the case with the initial development of the infrastructure, the potential organisational benefits that can be realised by more development work continue to act to motivate further long-term development work. At the same time, long-term development work can also be motivated by the desire to overcome the shortcomings of the initial infrastructure creation. In both cases, it is the desire to realise further organisational benefits that fuels the long-term process of redevelopment. The owner/manager of the business either wishes to enhance the sophistication of the infrastructure thereby realising an organisational benefit directly or wishes to overcome a recognised shortcoming of the infrastructure thereby making the realisation of a previously desired benefit possible. While in the latter example benefit realisation occurs as a consequence of overcoming one (or more) of the infrastructure's shortfalls, it is still the realisation of benefit that prompts development activity. In that way, the study findings show that on-going infrastructure development takes place as part of a staged process that is itself driven by the potential rewards offered by further infrastructure development.

The findings also show that, despite both initial and on-going infrastructure development work being undertaken, benefit realisation is not automatic. That is

because numerous barriers and problems exist that can affect the attainment of organisational benefit. The findings reveal that each organisation encountered both internal barriers that acted to prevent them from initially developing an infrastructure and numerous problems that subsequently curtailed the extent to which benefits were realised following the deployment of the infrastructure. The findings also show that the problems likely to be encountered increase in both number and magnitude as an infrastructure's sophistication is enhanced via on-going development work. That appears to be because not every barrier and/or problem will be relevant to every infrastructure. Similarly, the findings suggest that initial infrastructure development is likely to deliver a relatively un-sophisticated Web infrastructure that has been set only modest organisational goals. In that situation relatively few of the myriad potential barriers and problems to infrastructure development will be relevant to the infrastructure in question. However, as that infrastructure is enhanced over the long-term (in order that it is able to deliver ever more sophisticated benefits to the business) more of the barriers and problems will have the potential to impact upon the success with which the benefits sought are actually being realised in practice. Consequently, the on-going process of infrastructure development can be interrupted by the impact of certain barriers and problems. Likewise, even if the process is not interrupted entirely, the barriers and problems have the potential to divert redevelopment away from benefit realisation towards 'damage limitation'. In that situation, while on-going development work is still undertaken, it is done so for different reasons.

Chapter 6.0: Discussion

6.1 Introduction to the Discussion

Chapter 5 presented the findings of this study. Those findings revealed that certain aspects of the conceptual model developed within Chapter 3 (and later explored using the methodology discussed within Chapter 4) appear to have strong evidence supporting them. The findings also suggest that certain aspects of the conceptual model remain unsupported by the data collected by the author. In order to uncover the true meaning of the data collected by the author, the study's findings must therefore be analysed and discussed in relation to existing theory and knowledge, and the conceptual model already developed. In order to facilitate that analysis, the discussion of the study's findings focus upon the key concepts originally presented within Chapter 3. The discussion analyses the study data in relation to the Web infrastructure development process and the drivers of that process. The study data is then analysed within the context of the barriers and problems that were experienced by the case study organisations while their impact upon the development process is also analysed. That discussion and analysis enables the study's data theory to be further refined. Finally, this Chapter revisits the study's research questions and considers the extent to which they have been answered.

6.2 Discussion of Findings – The Development Process

6.2.1 Methodological Web Infrastructure Development

Section 2.2.1 reviewed the normative literature that considers the Web infrastructure development process within the context of developmental methodologies. That literature considered the developmental approach advocated by authors such as Bell & Tang (1998), Dholakia & Rego (1998) and Hsieh & Lin (1998). Those authors regard the development of a commercial web infrastructure as a largely technical undertaking within which technical design considerations are of paramount importance. Within that methodology, technical considerations must drive the development process in order that a technologically advanced and competent infrastructure can be developed. Within this study's findings, examples of that approach can be found. For example, Table 5.4 presented the findings relevant to the Web Designers' infrastructure's

development. Those findings highlight that the Web Designers (ED) were primarily concerned with the technical aspects of their infrastructure during its initial development and subsequent refinement. This study's findings also demonstrate however that that approach is unlikely to culminate with the development of a 'successful' infrastructure. Table 5.19 highlights that their approach ultimately led to the development of an infrastructure that, while technologically sophisticated (since it used multi-media enhancements and technologies extensively), was misaligned to both the business's and its users' needs. In that way, the study findings mirror those of Abels *et al.* (1997 & 1999), Day (1997), Remenyi & Sherwood-Smith (1999) and Cao *et al.* (2005) in that an organisation's overall approach to development should not focus purely upon the technical aspects of infrastructure development if the organisation intends to create an infrastructure fully capable of meeting the business and informational needs of its stakeholders.

The Web infrastructure development methodologies advocated by authors such as Abels *et al.* (1997, 1999), Remenyi & Sherwood-Smith (1999), Cunliffe (2000), Chen & Sockel (2004) and Martin (2004) do not focus upon the technicalities of Web infrastructure development. Rather, they advocate a methodological approach to infrastructure development that concentrates upon maximising the resulting infrastructure's ability to exploit the Web's potential as a communications tool. That is achieved by maximising the infrastructure's ability to impart product, service and/or organisational information to its end users. Again, within this study's findings numerous (apparent) examples of that approach to development can be found. The Cottages (VFC), the Gallery (SG), the Guest House (MH), the HPO (HPO), the Installer (UKM), the Manufacturer (ASL) and the Food Company (LFF) all undertook infrastructure development specifically to distribute product, service and organisational information within the wider marketplace: each organisation had clear marketing and promotional objectives for their initial infrastructures and undertook development specifically to enhance their presence within both local and non-local markets. However, (just as was found with the 'technological' methodological developmental approach discussed above) this study's findings demonstrate the problems that can be encountered when that broad development methodology is adopted. For example, while SG ultimately developed an infrastructure whose ability to communicate product and service information had been maximised, it was still

ultimately perceived by the business to be misaligned to the underlying business objectives that had prompted its initial creation. In that way, this study's findings support those of Misic & Johnson (1999) in their criticism of that developmental approach. This study's findings suggest that if both initial and on-going infrastructure development is to be successful (as judged by the business that created it) neither technological nor communications considerations should be allowed to dominate the development process.

The HPO's developmental experiences suggest that while it can *appear* that a development process has been dominated by communications considerations that might not actually be the case. While for the HPO, one of their initial objectives was to create an infrastructure that could successfully communicate product, organisational and service information to the wider market place, that objective was actually only one of several long-term ones. The HPO developed a coherent and long-term strategic plan that guided both initial and on-going development work. That strategy was not dominated either by communications or technological considerations even though an examination of their initial development experiences could incorrectly suggest that. Their developmental experiences graphically highlight that in order to understand and fully explain the experiences of either a specific organisation or a group of disparate organisations a more comprehensive analytical tool must be used. That is because the broad methodologies advocated by authors such as Abels *et al.* (1997 & 1999), Day (1997), Remenyi & Sherwood-Smith (1999), Cunliffe (2000), Chen & Sockel (2004) and Martin (2004) appear incapable of revealing the fundamental business drivers, objectives and subsequent success/failure assessments integral to organisational Web infrastructure development. For example, while the HPO's and ED's experiences can be analysed by reference to those methodologies such an analysis does not help one to understand why on-going development was undertaken or why each infrastructure's on-going development and objectives changed over time. Such changes can be understood and explained however, if (as initially postulated within the conceptual model) infrastructure development actually takes place as part of a staged, orderly process that takes an organisation from the unsophisticated to the sophisticated use of the Internet and Web.

The case study organisations' experiences clearly have parallels with the broad developmental methodologies originally discussed within Section 2.2.1. That is because at least one organisation's development experiences were (initially) dominated by technical considerations (ED) while several other organisations' development processes were (at least) initially concerned primarily with the desire to maximise their infrastructure's ability to communicate organisational information (LFF for example). However, the study findings also graphically demonstrate the limitations of those approaches both to infrastructure development and to the analysis of that development. For example, an analysis of the HPO's experiences suggests that it might be more accurate to regard those broad methodologies as sub-components of a larger developmental process. Within that 'process' the role of the owner/manager as developmental 'champion' is paramount while external developers act as the 'gatekeeper' to both success and developmental failure (as discussed within Section 5.2). Likewise, within that 'process' it is the extent to which a clear developmental strategy is developed that facilitates the owner/manager(s)' subsequent assessment of the success or failure of the infrastructure (as discussed within Section 5.3). That analysis highlights that while the case study organisations' experiences can be discussed in relation to the broad developmental methodologies considered above, any such discussion cannot fully explore or explain the development process within which development occurred. That is because such considerations fall outside of the scope of such developmental methodologies. Those development methodologies are similarly limited if one attempts to understand how any subsequent perceptions of success or failure have been reached by the infrastructure's stakeholders. That is because this study's findings demonstrate that even though an organisation might create a technologically sophisticated infrastructure that is capable of distributing product, service and/or organisational information within the wider market place, the business that created it could remain dissatisfied with its performance. Therefore, it appears that in order to understand both the experiences of specific organisations and Web infrastructure development at the meta-level, a more holistic tool must be developed.

6.2.2 Modelling Web Infrastructure Development

Section 2.2.2 analysed the normative literature that attempts to understand Web infrastructure development as a staged process. Table 2.1 detailed that literature by presenting several models of Web infrastructure development. Within each model, specific developmental stages were identified that commercial Web infrastructures will pass through. As discussed within Section 2.2.2, each model begins with the creation of a relatively unsophisticated infrastructure and culminates with the deployment of a highly sophisticated infrastructure that has been made integral to the business's other management and operational systems.

Within Chapter 3, the conceptual model developed new constructs from the models presented within Table 2.1. A staged approach to development was integral to the conceptual model developed by the author. The conceptual model differs from those models presented within Table 2.1 in that rather than detailing precise developmental stages that an infrastructure will pass through, it presents staged development by reference to the benefits ultimately delivered to the organisation. For the conceptual model to be accurate this study's findings must therefore support the proposition that infrastructure development cannot be defined by reference to the 'precise stages' contained within the models within Table 2.1.

Table 2.1 suggests that while there is consensus that development is staged, there is little consensus as to the precise development stages that an infrastructure will pass through. For example, Chaston *et al.* (2001) identify eight stages of development while Hart *et al.* (2000) and Raymond (2001) identify only three. If the theoretical development construct contained within the author's conceptual model is valid, it should not be possible to explain the experiences of the case study organisations by reference to any of the models contained within Table 2.1. Rather, the conceptual model should be better able to explain them.

The case study organisations' experiences do offer some support for the development models discussed above. For example, the developmental experiences of every case study organisation took each organisation from the non-use of Web technologies, to the unsophisticated use of them, and ultimately to the more sophisticated use of them.

That developmental ‘journey’ clearly has parallels with the above models. For example, the model developed by Hart *et al.* (2000) appears to explain the experiences of SG, ED, MH, and the HPO in that each organisation initially created a largely static web site that was ultimately enhanced such that it contained various interactive features supported by a larger Web infrastructure. Similarly, the development model proposed by Raymond (2001) appears to explain the experiences of the HPO in that they initially created an informational web presence that was ultimately developed into a Web infrastructure that was integrated within the business’s management processes and long-term development plans at a strategic level. However, neither model can fully explain the experiences of the Trainer (LG), UKM, the Manufacturer (ASL), 3SE (3SE) or LFF. None of those organisations successfully created either an interactive Web infrastructure (Hart *et al.* 2000) or a strategic Web infrastructure (Raymond 2001). That apparent discrepancy could be explained if one argued that those organisations had only recently developed their infrastructures and were (as a result) still working through the stages identified within the models. There is little evidence to support that proposition however, since every organisation had actively engaged within on-going infrastructure development for at least 18 months. It is therefore reasonable to have expected them (in accordance with the models of Hart *et al.* (2000) and Raymond (2001)) to have progressed beyond the first stage of development.

The more complex development models contained within Table 2.1 break the development process down further by identifying more stages. For example, DTI (1998, 2002), Chaston *et al.* (2001), Daniel *et al.* (2002a, 2002b) and Brock (2005) all identify the use of email systems as a distinct developmental stage. Chaston *et al.* (2001) goes further and differentiates between the use of internal and external email systems, and the use of organisational ‘groupware’ as distinct stages of infrastructure development. There is no evidence of the case study organisations’ infrastructure development encompassing those stages however: all of the case study organisations bypassed those apparent ‘initial’ stages of development. Every organisation combined the acquisition of email communications systems with the initial creation of a Web infrastructure. That was because each organisation used an external hosting company to provide Web access, email access, a valid Web domain and an organisational URL *at the same time*. That suggests that, at least for the Small Businesses studied, those initial developmental stages are not distinct. Rather, they are encompassed within a

single initial infrastructure development 'stage'. That conclusion is supported by the earlier findings of Igarria *et al.* (1997) in that the decision to adopt new technologies within small firms is largely a utilitarian one within which technologies are adopted only if they are perceived as offering some practical benefit to the organisation. As noted by Sillence *et al.* (1998), Howard (2001), Sadowski *et al.* (2002), Zhu & Kraemer (2003) and DTI (2004a) small firms are typically not geographically dispersed. This study's findings support that and suggest that small firms have little use for the internal email and groupware identified as distinct developmental stages by Chaston *et al.* (2001). That in turn suggests that those models which identify distinct initial stages of development that encompass the acquisition of distinct Web technologies cannot accurately explain the experiences of the organisations studied by this author.

The model proposed by Shiels *et al.* (2003) does not make a distinction between the types of technology that will be adopted by the organisation. In that way, the model arguably addresses the limitations of those models developed by DTI (1998), Chaston *et al.* (2001) and Daniel *et al.* (2002a, 2002b). Within Shiels' *et al.* (2003) model the adoption of Web technologies is encompassed within a single stage of development. As a result it arguably explains the development experiences of the case study organisations. However, that model is itself flawed since there is little evidence of either 'operational integration' (stage 2) or 'inter-organisational integration' (stage 3). Only the HPO and ED successfully integrated their Web infrastructures within their other operational systems and processes while only the HPO integrated its Web infrastructure with those of its customers and suppliers. Consequently, Shiels' *et al.* (2003) model is unable to explain the experiences of the case study organisations.

6.2.3 Modelling the Web Infrastructure Development Process

An analysis of the study findings strongly suggests that it is not possible to document Small Business Web infrastructure development by reference to the precise stages of development that an infrastructure will pass through. Of the models presented within Table 2.1, none accurately explain the development experiences of the case study organisations. In essence the more complex the developmental model (e.g. Chaston *et al.* 2001), the less able it is to explain the experiences of those organisations studied.

However, certain constructs contained within the author's Conceptual Model of Web Infrastructure Development are supported by the study findings. The development experiences of all of the case study organisations were 'staged' in that every organisation was able to differentiate between an initial development 'stage', a refinement 'stage' and a long-term on-going development 'stage' that was either currently being undertaken or was being planned for. That finding mirrors those of Davis (1989), Igarria *et al.* (1997) and Venkatesh *et al.* (2003) in that (as TAM predicts) development was undertaken by the case study organisations in order to deliver benefits that were recognised by their owners as having the potential to improve their organisation's commercial performance. Similarly, the case study organisations' experiences show that as each organisation became more experienced with the use of its infrastructure, the recognition and awareness of its potential positive impact upon the organisation's performance became a significant driver of the further refinement of the infrastructure (as postulated by Igarria *et al.* 1997). In that way, the creation of a developmental strategy is a key element of the development process.

The study findings suggest that it is more important that a strategy exists than how it was developed. For example, the HPO have undertaken six years of development based around a development strategy that was created before infrastructure development began while LG only created a coherent developmental strategy after their infrastructure's first iteration had been completed. For both organisations, their strategy was subsequently used to assess the performance of the infrastructure and guide on-going development work. In contrast, 3SE and UKM lacked a development strategy and subsequently struggled to assess (and through that improve) their Web infrastructure. Within that 'staged' process the benefits already delivered by the infrastructure or recognised as being potentially available (via further refinement) prompted on-going infrastructure development. The conceptual model (developed within Chapter 3) therefore does not accurately explain the development experiences of the case study organisations in its depiction of the infrastructure benefits as developmental 'stages'. The study findings suggest that (in accordance with DTI 2004a) the potential benefits on offer via the development of an infrastructure are actually the drivers of the process rather than being stages of the process themselves.

As discussed above the study findings suggest that (contrary to the models contained within Table 2.1 and the model proposed by the author within Chapter 3) the development process actually contains only three developmental stages: initial infrastructure development, the refinement of the infrastructure's first iteration and the on-going refinement of the infrastructure over the long-term. Within that staged process, progression is not automatic. The experiences of 3SE, LFF, and UKM demonstrate that benefit realisation is not guaranteed and that an organisation might very well fail to progress its infrastructure's on-going refinement. In that way, the study findings reflect those of Jutla *et al.* (2002), the Small Business Service (2002), Jones *et al.* 2003, Rao *et al.* (2003) and Mendo & Fitzgerald (2005) in that on-going infrastructure development for Small Businesses is routinely problematic because of the numerous developmental barriers and problems they face.

Regardless of any subsequent assessments of success on the part of the Small Businesses studied, one common finding was that immediately following the creation of an infrastructure, the infrastructure was redeveloped to consolidate the benefits originally sought. That 'first iteration' was subsequently refined over the longer-term in order to realise even more sophisticated benefits. Consequently, infrastructure development appears to be better explained by reference to those three stages rather than by reference to the features of the infrastructure being developed. As discussed above, the HPO and LG have very different developmental experiences (and markedly different perceptions as to the success of their infrastructures) but both organisations passed through the same three stages. To reflect that finding Figure 6.1 redefines the Web infrastructure development process by reference to the case study organisations experiences.

Figure 6.1 depicts infrastructure development as a staged process that takes an organisation from the unsophisticated to the sophisticated use of the Web. Crucially, Figure 6.1 is able to accommodate the differences in the online successes reported by the case study organisations (see Table 5.13). For example, the HPO reported high levels of satisfaction with their infrastructure (and passed through all three stages of development detailed within Figure 6.1) while LG reported both fewer benefits being delivered by their infrastructure and lower levels of satisfaction with it (while still passing through the same three developmental stages). For both organisations, Figure

6.1 accurately documents both the development process that they experienced (the three stages) and the drivers of that process (the owner/managers' desire to increase the sophistication of their infrastructure in order to realise increasingly sophisticated organisational benefits). Therefore, the potential benefits on offer are depicted driving the process rather than (as within the Conceptual Model of Web Infrastructure Development) being actual stages of development. That is because not every benefit was realised by any case study organisation. Indeed the experiences of ED, LFF, LG, 3SE and UKM highlight that increasing the sophistication of an infrastructure to realise more benefits is not always the driver of continuing development. For those organisations, infrastructure redevelopment was undertaken to address the limitations of the first infrastructure iteration and to protect each organisation from the damage that might be being caused by their infrastructure. For those organisations, further development was driven by the desire to correct a perceived failure rather than the desire to realise more sophisticated benefits.

It is for that reason that Figure 6.1 contains the intermediate stage of benefit consolidation before on-going long-term development work is begun. Within that three stage process, long-term development is begun only after the benefits originally sought have been consolidated. That construct explains the experiences of the Trade Association (OG). For the OG, no long-term development was undertaken. That decision was made because the organisation perceived that it had realised all of the benefits that it desired after its infrastructure's development had been consolidated. Consequently, the drivers of long-term development were absent and further development work was not undertaken. Integral to Figure 6.1 is the recognition that any judgement of infrastructure 'success' is relative to the aspirations of its stakeholders.

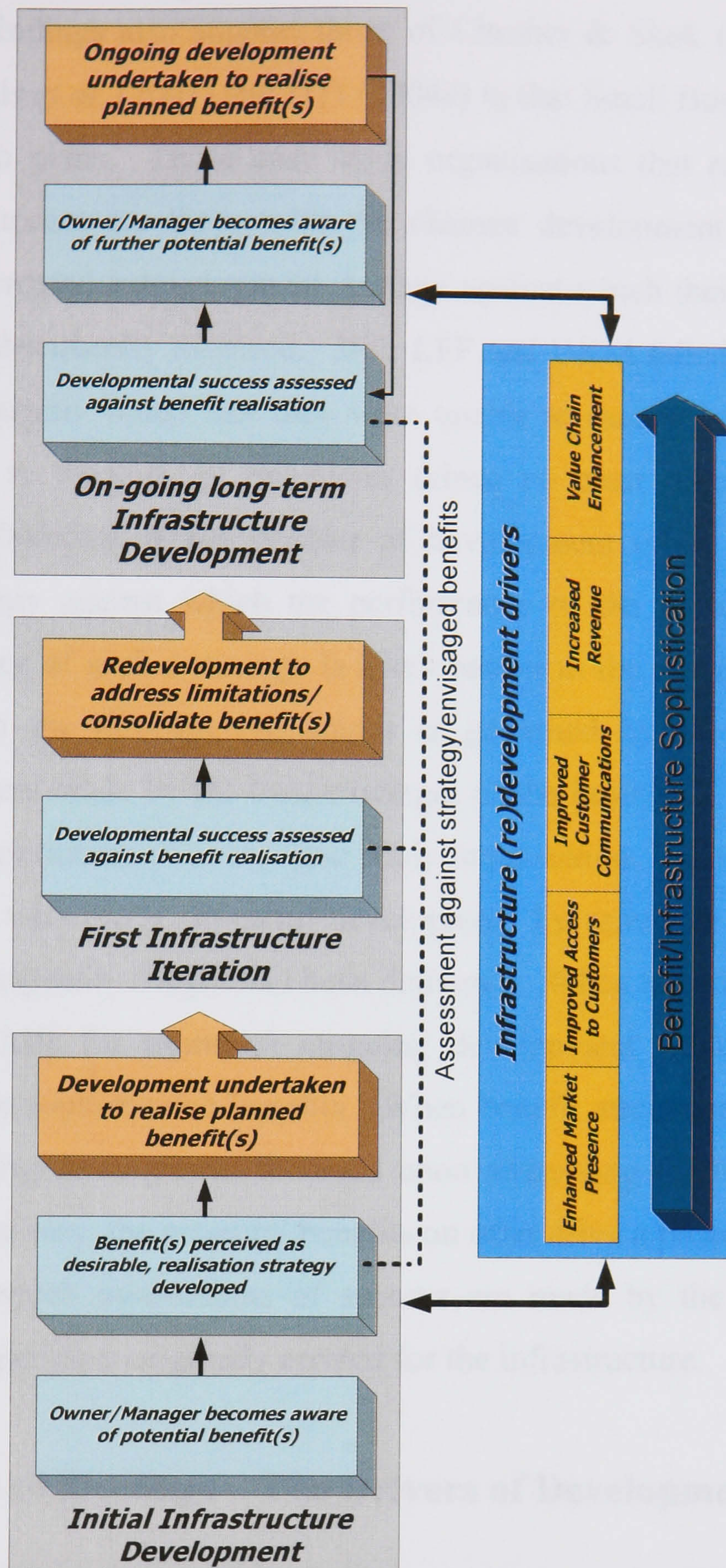


Figure 6.1 – The Web Infrastructure Development Process

Within the development process not only do the potential benefits available via infrastructure development drive the process, the strategy with which they are to be realised is a vital component. In accordance with the earlier findings of Poon & Joseph (2000), Roberts (2000), Duhan *et al.* (2001) and Shiels *et al.* (2003) this study has found that the development of an organisational strategy for the creation of a Web infrastructure is a key factor within future assessments of ‘success’. Unfortunately,

this study study's findings also support those of Chesher & Skok (2000), Martin & Matley (2001), Shiels *et al.* (2003) and DTI (2004a) in that Small Businesses routinely fail to develop such plans. Those case study organisations that report the highest levels of on-line success are those with the clearest development strategies. For example, the HPO created a development strategy against which their infrastructure's performance was subsequently assessed. 3SE, LFF and UKM failed to create such a strategy and subsequently found that they were unable to assess the performance of their infrastructure in meeting its objectives (since no clear objectives had been created for it!). Therefore, a key enabler of development is the existence of an organisational strategy against which the performance of the infrastructure can be assessed. An absence of such a strategy is a key barrier to the process. In that way, progression through the development stages is governed by the assessments of developmental success made by the owner/manger of the business. That assertion is supported by the experiences of every case study organisation. In every case, it was the owner/manager who drove on-going development by reference to the extent to which the benefits originally sought had been delivered. When benefit attainment was high (SG and the MH for example) on-going development work focussed upon delivering ever more sophisticated benefits. When benefit attainment was low (LFF for example) on-going development focussed upon addressing the limitations of the infrastructure. In that way, the potential benefits on offer drive a process that has three key stages within which assessments of success are made by the owner/manager relative to the strategic plans originally created for the infrastructure.

6.3 Discussion of Findings – The Drivers of Development

Section 6.2 has analysed this study's findings relevant to the Web infrastructure development process and has refined understanding of it as a result. That refinement culminated in the presentation of infrastructure development as a three stage process. Within that process the organisational benefits that can be realised via infrastructure development drive on-going development work and form the basis against which subsequent assessments of development 'success' or 'failure' are made. In order to fully understand the development process and its barriers and problems it is therefore necessary to analyse the drivers of that process.

6.3.1 Evidence of Organisational Benefits

Table 5.13 revealed that every benefit discussed within Chapter 2 was realised by at least one case study organisation. Table 5.13 also revealed that no single organisation realised every benefit (thus supporting the proposition that there are barriers and problems to development that act to 'block' benefit realisation). When that finding is combined with those presented within Table 5.13 and 5.14, that suggests that more benefits will be realised as more development work is undertaken. That conclusion mirrors those of Martin & Matley (2001), Sparkes & Thomas (2001), Taylor *et al.* (2001), Jones *et al.* (2003) and Rao *et al.* (2003) in that the enhancement of an infrastructure's sophistication increases both the extent and sophistication of the benefits that it delivers to an organisation. Therefore, in accordance with the conceptual model developed within Chapter 3, *benefit sophistication* appears to increase in tandem with *infrastructure sophistication*: a sophisticated Web infrastructure is required if the organisation is to realise sophisticated benefits. The case study organisations' experiences also support the proposition contained within Table 3.1 (reproduced below) in that, while a diverse range of organisational benefits become available via the creation of a Web infrastructure, it is possible to group and order them based upon their broad characteristics.

Developmental Benefit Sub-System	Sub-System Component Factors	Discussed Within;
Enhanced Market Presence	<ul style="list-style-type: none"> • Equality of market presence regardless of organisational size • Instant market entry • Low entry costs and low asset intensity requirements for new market penetration • Potential for the development and maintenance of a global customer base 	Section 2.3.2
Improved Access to Customers	<ul style="list-style-type: none"> • Immediate access to both existing and potential customers • Negation of communication/access barriers with customers caused by time-zones and geographical location • Creation of a customer contact portal available for use 24/7 	Section 2.3.3
Improved Customer Communications	<ul style="list-style-type: none"> • Improved access to customer information facilitates improvements to customer service • Improved access to customers' product/service requirements facilitates enhancements to products/services • One-to-one marketing of products and services via the infrastructure • Relationship marketing of products/services via the infrastructure • Enhanced perceptions of a unique relationship between organisation and customer • Interactive presentation of product/service information aids customer purchase decisions and informational searches • Low cost provision of easily accessible customer care/support services enhances and supports the customer/organisational relationship 	Section 2.3.4
Increased Revenues	<ul style="list-style-type: none"> • Products/services available to customers 24/7 • Access to new revenue channels via the infrastructure • Incremental increases to existing revenue channels via the infrastructure • Reduced cost of sales via increases in the share of each customer's business • Enhanced customer loyalty via enhanced service provision • Differentiation upon non-price based factors 	Section 2.3.5
Value Chain Enhancements	<ul style="list-style-type: none"> • Greater access to vendors and suppliers • Enhanced ability to form inter-business partnerships and collaborations • Improved communication between value chain partners • Reductions in the number of value chain members results in greater channel efficiencies between those channel members which remain • Reduced transaction costs and increased transparency amongst value chain members • Improved management of distribution systems via improvements to the value chain infrastructure • Potential for the instant satisfaction of customer demand via the delivery of digital products/services • Product/service prices can now be based upon their value to customers rather than upon their cost of production • Lowered on-going variables costs of production for digital assets (which are not used up during production) leads to enhanced profits and reduced distribution costs 	Section 2.3.6

Table 6.1 – Web Infrastructure Developmental Benefits

The ordering of benefit realisation contained within Figure 6.1 is based upon that which was observed by the author (i.e. benefit realisation mirrored the grouping and ordering contained within Table 6.1). The case study organisations (with the

exception of 3SE) all realised the relatively less sophisticated benefits contained within Figure 6.1. For reference the organisational benefits delivered by the case study organisations' infrastructures are shown within Figure 6.2.

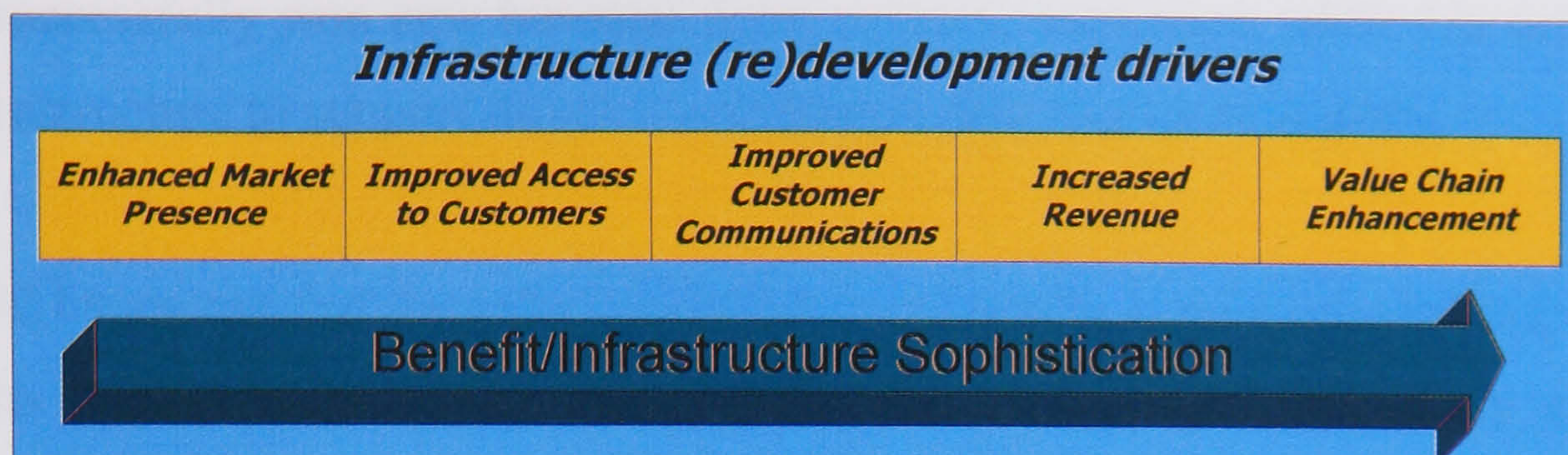


Figure 6.2 –Web Infrastructure Benefits

Figure 6.2 demonstrates that, as discussed above, as the sophistication of an infrastructure is enhanced, more sophisticated benefits will be realised. In that way the benefits delivered by the infrastructure are hierarchical in nature. With the exception of 3SE, each case study organisation benefited from an enhanced market presence and improved access to customers following either the initial creation of an infrastructure or the refinement of the infrastructure's first iteration. That finding supports those of Vescovi (2000), Sparkes & Thomas (2001), Shiels *et al.* (2003) and Fillis *et al.* (2004) in that the development of an infrastructure provides the same market presence to small organisations as to large ones. ASL's experiences are typical of those organisations studied in that by developing a Web infrastructure the organisation was able to expand its customer base and trade with suppliers and customers that would previously not have been possible. Similarly, SG, MH and VFC used their 'enhanced market presence' to attract non-local and non-domestic customers without the use of channel intermediaries. That finding reflects the conclusion reached by Bennet (1997), Auger & Gallagher (1997) and Anckar & Walden (2001) in that by using its virtual assets to expand, Small Businesses can promote their products and services at a lower cost and asset intensity than is required with real-world physical expansion. Both organisations highly value that particular benefit while the HPO successfully developed a global customer base via the use of its Web infrastructure. The HPO do not believe that would have been possible without the use of their infrastructure. Similarly, every case study organisation (with the exception of 3SE and LFF) reported the use of a Web infrastructure to have improved their 'access to customers'. That finding supports those of Kianni (1998), Vescovi (2000), Anckar & Walden (2001), Tetteh & Burn (2001), Shiels *et al.* (2003) and

Martin (2004) in that the use of an infrastructure enabled the case study organisations to ‘keep their doors open’ 24 hours a day to customers that would have previously been unable to trade with the businesses in question. For example, the MH and SG have successfully won new business from overseas customers while LG actively uses its infrastructure to support its sales activities within non-local markets.

It could be argued that the early realisation of relatively unsophisticated organisational benefits merely reflects the strong promotional objectives that every case study organisation set for its infrastructure. That in turn suggests that the development models developed by DTI (1998), Hart *et al.* (2000) Raymond (2001), Jones *et al.* (2003) and Rao *et al.* (2003) more accurately document the case study organisations’ development experiences than does Figure 6.1. That is because each of those models begins with the creation of a ‘promotional’ or ‘informational’ Web infrastructure. It appears however, that Figure 6.1 is accurate in its depiction of the development process since, as discussed above, the case study organisations also realised other immediate benefits. Specifically, an improved ability to communicate with customers via the use of email. Consequently, the ‘promotional’ stages identified within the models contained within Table 2.1 are not actually developmental stages at all. Rather than being a developmental ‘stage’ the improved communications abilities afforded by the Web infrastructure and the enhanced ability to disperse promotional information within the wider market place are actually benefits being delivered by infrastructure development. If the initial benefits observed were actually stages of development one would logically expect to see a relatively uniform progression to the next stages identified within those other models. The findings do not show that. The findings show that following the attainment of those relatively unsophisticated benefits, one of two things happened. Either the organisations undertook more development work to realise ever more sophisticated benefits (e.g. the HPO subsequently enhanced its infrastructure in order to integrate it more closely within its service delivery processes thereby realising a more sophisticated organisational benefit) or the organisations focussed development work upon consolidating the benefits being delivered. LG, LFF and UKM all had clear promotional objectives for their Web infrastructures but remained largely unsatisfied with their infrastructure’s first iteration’s success in delivering them. Consequently, those organisations’ early infrastructure development activities concentrated upon enhancing their infrastructures so that they could better

deliver those 'promotional' benefits. Development work was not undertaken to deliver more sophisticated benefits. Rather, development attempted to consolidate the gains already won. The case study organisations' development experiences therefore suggest that in order to analyse the development process and the benefits that it delivers one cannot concentrate solely upon what the infrastructure 'does' (i.e. promote the business or disperse organisational information). Instead, one must analyse the success with which the infrastructure achieves it! Therefore, in order to understand infrastructure development, one must concentrate upon the benefits being delivered by it rather than upon the nature of what the infrastructure appears to do for the organisation. Within that 'model' of development, the only uniform and identifiably distinct development stages are 'initial development', 'benefit consolidation' and 'long-term development' (the three stages detailed within Figure 6.1). The benefits actually delivered by those three stages are the drivers of the process rather than being actual stages of development.

6.3.2 Analysing the Drivers of Development

The proposition that the organisational benefits delivered by an infrastructure are drivers of the development process rather than being developmental stages is supported by the study findings. Those findings show a lower incidence of sophisticated benefit realisation than unsophisticated benefit realisation (see Table 5.13). For example, ten of the case study organisations successfully improved their ability to communicate with their customers after deploying their infrastructure; eight successfully increased their organisation's revenues via their infrastructures while only six successfully enhanced their value chains via their infrastructures. Despite that finding, however, all of the organisations studied passed through the three stages of development documented within Figure 6.1.

The HPO, VFC, ED, LG and OG all reported a significant improvement in their abilities to communicate with their customers following the development of their infrastructures. While for LG, HPO, ED and VFC that benefit was only realised after the original infrastructure's iteration had been enhanced, that particular benefit was still realised. That finding is in accordance with the earlier work of Quelch & Klein (1996), Limehouse (1999), Lynn *et al.* (1999), Sparkes & Thomas (2001), Chen &

Socket (2004), Martin (2004) and Cao *et al.* (2005) that the use of a Web infrastructure can strengthen the relationship between customer and supplier by enabling the business to more closely align its product and service offerings to its customers' requirements as a result of its improved ability to communicate with them and ascertain their needs. For example, the HPO specifically noted that they now engage in extensive dialog with their customers to ensure that their on-line offerings meet their requirements. Similarly, the MH uses its Web infrastructure to inform its customers of product offerings relevant to them. That mirrors the conclusions of Pepper & Rodgers (1995), Jones & Vijayasarthi (1998), Weiber & Kollman (1998), Limehouse (1999), Walters & Lancaster (1999) and Chen & Socket (2004) that an infrastructure can help an organisation create the perception of a unique and personal relationship with customers by offering precisely targeted product/service information. ED has likewise successfully managed to use its infrastructure to provide customer support services (by providing customers with access to on-going project work and other work-in-progress). That mirrors the earlier findings of Chen & Socket (2004) that a Web infrastructure can be an excellent low cost vehicle with which to provide sales and after-sales support.

As discussed above, few of the case study organisations successfully attained the more sophisticated organisational benefits depicted within Figure 6.2 and Table 6.1. For example, only seven of the case study organisations increased organisational revenues while only five reported that the use of the Web had enabled them to successfully differentiate themselves on non-priced based dimensions. That finding does not appear to support the conclusions of Strader & Shaw (1999), Vescovi (2000), Sparkes & Thomas (2001) and Tetteh & Burn (2001) that the internet represents a further sales channel that can be exploited to increase organisational revenues. Furthermore, there is only limited support for Hoffman *et al.* (1995) and Sparkes & Thomas' (2001) assertion that the use of the Web can enable organisations to increase their revenues by differentiating themselves on non-price based dimensions. The MH are a good example of that. The MH quickly realised that they could exploit the access to information offered by the Internet to predict when demand for their services would be high. That in turn has enabled the business to increase its prices based upon the value of the service to the customer, rather than upon what it costs the business to offer. On balance however, relatively few of the case study organisations successfully managed

to realise that benefit. That finding supports the proposition that the more sophisticated benefits contained within Figure 6.2 are harder for Small Businesses to realise in practice and that, as a result, benefit attainment is hierarchical in nature.

Within Figure 6.2 and Table 2.1, the most sophisticated benefit involves using an infrastructure to reconfigure an organisation's value-chain. As discussed within Section 2.3.6 that benefit is highly sophisticated and involves adapting the value chain's infrastructure (*what enables a transaction to occur*), its context (*where it is offered*) and its content (*what is offered*). The study findings reveal that only three organisations have successfully reengineered their value chain (and through that, realised organisational benefit) via the use of their infrastructures; the Guest House, Web Designers and the HPO. Of those three organisations, none reported that the use of the Web has significantly improved their access to suppliers. That finding contradicts those of Walters & Lancaster (1999), Hoffman & Novak (2000), Tetteh & Burn (2001), Sadowski *et al.* (2002) and Martin (2004) that the use of the Web will provide organisations with improved access to non-local vendors and suppliers. Likewise, there is little evidence to support the arguments of Haynes *et al.* (1998), Tetteh & Burn (2001) and Fillis *et al.* (2004) that, via the use of a Web infrastructure, a Small Business can reconfigure its value chain infrastructure by forming strategic inter-business partnerships and collaborations (see Section 2.3.6.1).

The MH and the HPO report that the use of their infrastructure has lowered their business's transaction costs and has enhanced their distribution systems. That finding is in accordance with Jones & Vijayasarithy (1998), Doherty *et al.* (1999), and Yakhlef (1998) who maintain that the use of the Web can enable a Small Business to shorten its value chain by removing certain members of the chain completely. The MH specifically reports that they have used their infrastructure to interact with certain customers directly. That has meant that they no longer have to deal through commission based sales agents while the HPO no longer deals with distributors of its services. It has increased profits while simultaneously lowering its costs as a direct result.

Several of the case study organisations report their infrastructure to have had a beneficial impact upon their business by allowing them to reconfigure their products

and services for on-line delivery. Both the HPO and the ED are now able to offer digitised services via their infrastructure. In both cases, each organisation's services were traditionally delivered face to face at a higher cost and asset intensity than is now required. That finding mirrors the conclusions of Hoffman *et al.* (1995), Jones & Vijayasarthi (1998), Yakhlef (1998) and Chen & Sockel (2004) that certain products and services can be adopted for on-line consumption. That finding also suggests that this will not apply to every organisation as evidenced by the low number of case study organisations that successfully managed to do so. However, despite the potential problems associated with the adaptation of products and services, five case study organisations successfully revised their pricing structures via the use of their infrastructures. For example, the MH now increases its prices to reflect changes in the market place – that information is made available to customers via the Web infrastructure. In that way the experiences of the MH reflect the earlier work of Dutta & Evrard (1999), Poon & Joseph (2000, 2001) and Jones *et al.* (2003) in that the ability to exploit the information made available via the Web is a key determinant of organisational success.

An analysis of the benefits realised by the case study organisations supports the proposition that benefit realisation progresses from the unsophisticated to the sophisticated as an infrastructure is enhanced. Table 5.15 highlights that, not only was there a lower incidence of the sophisticated use of the Web, but that the sophisticated benefits were only realised after the infrastructure had been enhanced. That in turn supports the depiction of a staged infrastructure development process presented within Figure 6.1. The study findings also suggest therefore, that organisations do not always adopt a long-term view when undertaking development work. The findings reveal that only one organisation (the HPO) undertook all of their infrastructure's development as part of a single coherent plan. That in turn suggests that Small Business owner/managers typically begin infrastructure development with only modest objectives. Those objectives are gradually expanded as the owner/manager becomes aware of the potential benefits that further infrastructure enhancement will bring. That proposition explains both the on-going enhancement work observed by the author and the case study organisations' work in enhancing their infrastructures such that they could consolidate the benefits already being delivered; development work was specifically prompted by the owner/manager(s)' realisation that such work would

bring more benefits to the organisation. The findings also suggest that once an owner/manager recognises their organisation to have realised a particular benefit in sufficient quantity, they will be driven to realise even more sophisticated benefits. That proposition explains why the organisational benefits function in the way that they do. Rather than being stages of development, they act as both the driver and reward of development. For example, LG initially developed a Web infrastructure to better market the organisation by supplementing the organisation's paper based marketing materials with a promotional on-line presence. In that way the 'benefit' desired by the owner/manager drove infrastructure development. Unfortunately, immediately after the first infrastructure iteration had been created the owner/manager did not believe the benefit to have been realised to an acceptable degree. Consequently, early enhancement work focussed upon addressing the shortcomings of the infrastructure. It was only after that benefit had been consolidated that further enhancements were undertaken that ultimately delivered even more sophisticated benefits to them.

6.3.3 Reviewing Benefit Realisation

Within a development process within which the benefits on offer drive on-going infrastructure enhancement, a periodic review of the extent to which the benefits sought have been realised in practice should also be present. That 'feedback loop' is shown within Figure 6.1 and is supported by the study findings. Every organisation undertook some form of review against either the formal objectives originally set for the infrastructure (e.g. the HPO) or the informal broad expectations of the owner/manager (e.g. VFC). That finding is supported by the earlier work of Poon & Joseph (2000), Roberts (2000), Duhan *et al.* (2001) and Shiels *et al.* (2003) who comment that performance assessments are always made against some predetermined strategy and objectives. The study findings also reflect the conclusions of Geissler (2001), Martin & Matley (2001), Jones *et al.* (2003), Shiels *et al.* (2003) and DTI (2004a) that Small Businesses often fail to develop coherent strategic plans for their adoption and use of technology: VFC, LG, 3SE and LFF all failed to develop clear objectives and a strategic role for their infrastructure against which its performance could subsequently be assessed. Those organisations were initially dissatisfied with the performance of their Web infrastructure while simultaneously accepting that their expectations had not been clarified before development work began. Those

organisations' experiences reflect the findings of Shiels *et al.* (2003) and Martin (2004) that the Small Business owner/manager's decision to develop a Web infrastructure is often not based upon the careful examination of the strategic benefits that such a move will bring. Rather, as was evidenced by 3SE, VFC and the MH the decision can be the product of the owner/manager's opinions, experiences and beliefs that this is what a 'successful' business would do in the same situation.

Within the development process the key catalyst for infrastructure development is the owner/manager's desire to realise some form of organisational benefit from the development of a Web infrastructure. Within every case-study organisation it was the owner/manager who initiated infrastructure development. Consequently, benefit realisation occurs within an iterative process within which regular reviews are undertaken to assess the extent to which the desired benefits have been realised. In that way, Figure 3.1 (which depicted benefits as stages of infrastructure development) is flawed since the benefits are actually the driver that motivates the organisation to pass through the three stages of development identified by the author. Even though the development process is orderly (in that it is an iterative process that has three stages) benefit realisation is not. For example, the HPO and LG reported realising similar organisational benefits to each other and in similar levels. However, the HPO realised those benefits much earlier than was the case for LG. That highlights that while the development process experienced by each organisation was identical (development, consolidation, redevelopment) the way in which benefits were realised was not. While the benefits are hierarchical in nature, their realisation is not necessarily an orderly progression from the unsophisticated to the sophisticated.

The key differentiators between the experiences of LG and the HPO were the strategy used to guide the development work and the means by which performance assessments were subsequently conducted. The HPO formulated a development strategy before any development work was begun and then used that strategy to assess the extent to which the infrastructure was delivering the desired benefits. LG did not develop a developmental strategy and subsequently struggled to assess the relative success or failure of the development process. VFC, SG, 3SE, UKM and LFF likewise failed to develop either a coherent developmental strategy or performance metrics with which to assess the performance of their infrastructure. Each

organisation subsequently remained dissatisfied both with the development process and with the benefits delivered by their infrastructures. The feedback loop by which the performance of the Web infrastructure is assessed is therefore a vital component of the development process. Since that was observed as occurring within the case study organisations, that 'feedback loop' is a fundamental element of the three stage development process depicted within Figure 6.1. That finding (that regular reviews of performance against a predetermined plan must be undertaken) has long been recognised within management research. For example, quality guru Juran (1951), in the 1950s, discussed sustaining business through the quality trilogy of planning, control and improvement. Likewise, Deming (1982) implores business managers to improve their businesses through the quality improvement cycle of 'plan, do, check, act' first presented in the 1930s by process improvement statistician Shewhart (1931)

Within the staged development process the organisational benefits do not represent stages of infrastructure development. Rather, they are the drivers of the process. Those drivers motivate the owner/manager to initially commence infrastructure development. They subsequently prompt the owner/manager to enhance the infrastructure so that more sophisticated benefits can be realised. That happens because the owner/manager reviews the extent to which the organisational benefits have been realised following each stage of infrastructure development. The study findings show however, that the extent to which the potential benefits will be realised by an organisation is far from guaranteed. While every potential benefit analysed within Chapter 2 was realised by at least one organisation, benefit realisation was not uniform. While some of the organisations (e.g. the HPO and ASL) realised highly sophisticated benefits, others did not (e.g. 3SE and LFF). Those organisations, while still progressing through the three stages of development, largely failed to realise any tangible benefit from their infrastructure. In accordance with the earlier findings of Poon & Swatman (1997), Webb & Sayer (1998), Williams (2000), Benyon-Davies *et al.* (2002) and DTI (2004a) the study findings reveal that barriers and problems to infrastructure development and deployment exist. Consequently, an analysis of the development process cannot be considered complete without a similar analysis of the barriers and problems that can act to block benefit realisation.

6.4 Discussion of Findings – Development Barriers and Problems

Figure 3.3 (reproduced below as Figure 6.3) is an integral component of the Conceptual Model of Web Infrastructure Development. Within that model, and as depicted within Figure 6.3, seven key categories of developmental barriers and problems are identified. Each of the barrier and problem categories contained within Figure 6.3 was further explored and analysed within Tables 3.3 to 3.8.

Figure 6.4 highlights that one of the key constructs contained within the Conceptual Model developed within Chapter 3 is that the initial development of a Web infrastructure can be blocked by the barriers identified by the author.

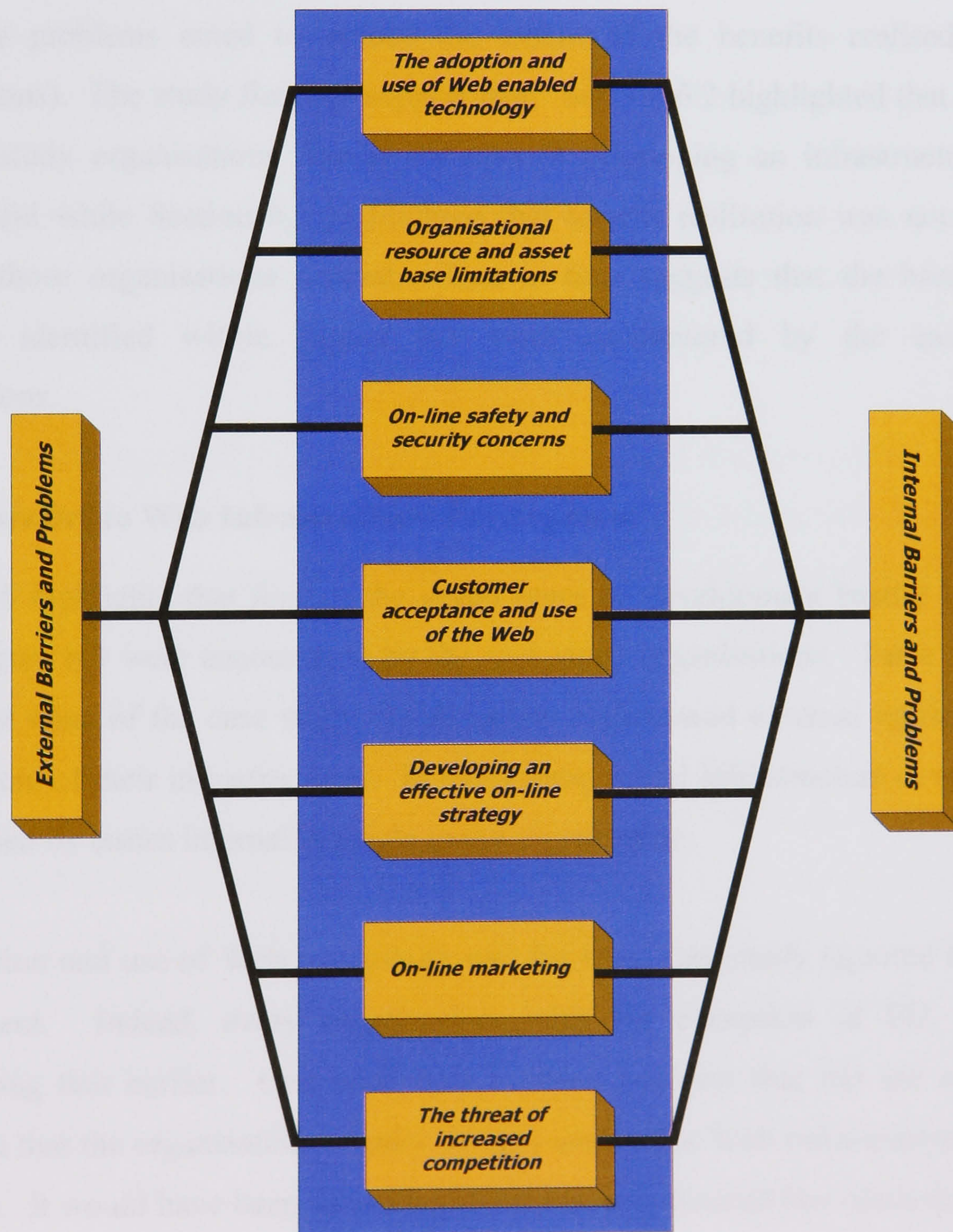


Figure 6.3 – Web Infrastructure Development Barrier and Problem Categories

Similarly, benefit realisation can be reduced (or blocked entirely) by the developmental problems identified by the author. The Conceptual Model asserts that those barriers and problems to Web infrastructure development can be either internal or external in origin. Whether internal or external, if they are encountered a Small Business will be unable to successfully further enhance its infrastructure and/or will be unsuccessful in realising commercial benefit from its subsequent deployment.

For that construct to be valid, this study's findings must support it. The study findings should show that the case study organisations initially experienced the barriers identified within Figure 6.3 (and that those barriers prevented the organisations from developing an infrastructure) and/or later experienced the problems identified (and that those problems acted to reduce the extent of the benefits realised by the organisations). The study findings support that. Section 6.2 highlighted that many of the case study organisations' initial attempts at developing an infrastructure were unsuccessful while Section 6.3 highlighted that benefit realisation was not uniform amongst those organisations studied. That in turn suggests that the barriers and problems identified within Figure 6.3 were encountered by the case study organisations.

6.4.1 Barriers to Web Infrastructure Development

Table 5.16 highlights that four of the seven types of development barrier identified within Figure 6.3 were encountered by the case study organisations. Table 5.16 also shows that none of the case study organisations experienced external barriers to the development of their infrastructures. In every case, initial infrastructure development was affected by issues internal in origin to the organisation.

The adoption and use of Web technology was the most commonly reported barrier to development. Indeed, every organisation, with the exception of ED, reported encountering that barrier. One must bear in mind however that ED are somewhat atypical in that the organisation actually designs and builds Web infrastructures for its customers. It would have been surprising if ED had experienced that particular barrier given the nature of their business and the services that they offer to their customers. The finding that the case study organisations encountered difficulties with the

adoption and use of Web technologies is in accordance with the earlier findings of Chesher & Skok (2000), Skinner (2000), Carter *et al.* (2002), Levy & Powell (2002) and Jones *et al.* (2003). Those researchers conclude that that issue represents a major internal barrier to the development of Web infrastructures by UK Small Businesses.

The experiences of VFC, SG, UKM, LG, 3SE and LFF provide a graphic example of Webb & Sayer's (1998) and the DTI's (2004a) conclusions that a major barrier to the initial development of an infrastructure is the owner/manager's lack of understanding of how technology can be used to help a business. Those organisations' experiences also support Boyes' *et al.* (2002) earlier finding that that barrier is compounded by the rate that technology changes. VFC are typical in that the owner/managers specifically commented that they were simply unable to keep abreast of technological change. While those owner/managers had a strong desire to utilise technology within the business they were unable to identify what technologies were available to them and what those technologies could do to help the business. What is more, they expressed little desire to acquire that knowledge for the simple reason that it would quickly become obsolete!

The case study organisations' experiences also support the proposition (discussed within Section 2.4.3) that Small Businesses often lack dedicated (or trained) ICT staff. None of the case study organisations (with the exception of ED) employed staff with either a formal ICT qualification or informally acquired ICT knowledge and expertise: their owner/managers' unfamiliarity with Web technologies and ICT in general was compounded since those owner/managers had no one within the organisation that could compensate for their own lack of expertise. That finding suggests that while the falling price/performance ratio of ICT (discussed within Section 2.3.1) can function as an enabler of the development process (Vescovi 2000, Sparkes & Thomas 2001, Tetteh & Burn 2001, DTI 2004a) in practice that 'enabler' is often absent. Similarly, while Poon & Swatman (1997), Cunliffe (2000) and Clapham (2002) maintain that low cost off-the-shelf software packages are now available with which to develop an infrastructure 'in-house', none of the case study organisations were able to avail themselves of that software because of their organisation's unfamiliarity with both the medium and technology. That analysis suggests that while the potentially low costs associated with the medium can act to facilitate infrastructure development, they

cannot compensate for an organisation's inexperience and unfamiliarity with ICT and Web technology. In a practical sense, the theoretically low costs associated with infrastructure development must be tempered by the finding that of those organisations studied, all but one was unable to exploit that 'enabler' because of their own ignorance of ICT and Web technology.

Table 5.16 highlights that the majority of the organisations studied perceived their own lack of resources and limited asset bases to be a significant barrier to the development of a Web infrastructure. LG's experiences are typical of that finding. LG lacked not only the organisational knowledge base needed to develop an infrastructure independently, but also found that compensating for that shortcoming (by hiring an external Web developer) greatly increased the costs associated with infrastructure development. Their experiences reflect the earlier conclusions of Chesher & Skok (2000), Skinner (2000), Vescovi (2000), Anckar & Walden (2001), Rao *et al.* (2003) and Fillis *et al.* (2004) that the use of the Web for commercial purposes actually involves a significant financial investment. The HPO likewise commented that the development (and on-going refinement) of an infrastructure had placed a significant strain upon that organisation's finances and required the organisation to secure further capital. The HPO recognise that their decision to integrate the use of the Web so closely within their business model is a high risk one. If the use of the Web does not deliver the organisational benefits originally sought, the company is unlikely to survive because of the capital demands that its development has placed upon the business.

As discussed above, while an infrastructure can *theoretically* be developed for little cost that can only be achieved if the organisation already has the expertise needed to do so. This study's findings suggest that (in accordance with the DTI (2004a)) the initial purchase cost of the hardware and software needed to develop an infrastructure represents a major barrier to infrastructure development for UK Small Businesses. Similarly, the experiences of VFC confirm Jones *et al.* (2003) and Martin's (2004) conclusions that the lack of appropriate skills on the part of Small Businesses greatly hinders Small Business infrastructure development. That organisation's experiences also highlight that just because a Small Business recognises a gap within its organisational knowledge base the owner/manager might still be unwilling to address

that via further training. As previously noted by Vescovi (2000), Anckar & Walden (2001) and Fillis *et al.* (2004) Small Business owner/managers are often reluctant to invest in formal training because they question the value that this would add to their business. VFC experienced that very situation. Despite that business's owner/managers recognising that their understanding of Web technology and ICT is limited (and that their lack of knowledge and understanding was negatively affecting the business) they were still not prepared to invest either the time or money to address that limitation because they did not believe that training would add any long-term value to the business. VFC (in common with every other organisation with the exception of ED) ultimately chose to address that barrier by compensating for their own inexperience by retaining the services of a Web developer. Consequently, the case study organisations not only found the adoption and use of Web technology to be a significant barrier to their use of the Web, but also found that their chosen strategy with which to overcome that barrier greatly raised their infrastructure's development costs thereby exposing each organisation to a further developmental barrier (asset and resource limitations). For example, SG, MH, HPO, UKM, LG, 3SE and LFF all commented that the costs of their development projects had been increased because they had had no choice but to use external developers. That suggests that the barriers to infrastructure development do not impact upon the development process in isolation. Rather, in dealing with one developmental barrier an organisation might very well expose itself to another. The case study organisations' experiences therefore suggest that it is not possible to identify generic coping strategies that can be deployed should an organisation encounter a particular barrier. That is because any 'coping strategy' would have to be capable of dealing with the specific situation of the organisation that was attempting to use it. For example, Taylor *et al.* (2001) and Clapham (2002) suggest that in order to guard against the development of an infrastructure that is misaligned to the business needs of its owners a Small Business should ensure that the advice and expertise of the owner/manager should be drawn upon. Those authors do not comment upon how that expertise could be acquired (if it is not already available) or the potential problems that acquiring it could create. For example, LG followed that advice and attempted to draw heavily upon the expertise of their Web 'expert' (an external developer) to counter their own lack of expertise. Unfortunately, their 'expert' was unwilling to offer advice or guidance to the organisation. Consequently, LG's infrastructure development project still entailed the

high development costs associated with the use of third-party experts while largely failing to address the barriers that the expert had originally been hired to overcome! VFC similarly relied upon the advice and guidance of the Web developer but (in accordance with Geissler (2001)) that Web 'expert' found that VFC's owner/managers were unable to provide him with a clear rationale and purpose for the infrastructure because of their lack of knowledge and understanding of both the Web as a medium and the technologies being deployed.

The study findings also reveal that seven of the organisations studied perceived the creation of an appropriate on-line strategy to have been a barrier to their infrastructure's development. The MH and VFC both developed their infrastructures because they were advised to do so by other business owner/managers. Neither business had a clear rationale for doing so other than that was what other similar businesses were already doing. Their experiences support the conclusions of Kellock (2000) who maintains that many UK Small Businesses develop infrastructures because of 'peer pressure'. Kellock (2000) further notes that those businesses often fail to achieve any significant benefit from infrastructure development because they lack a clearly defined role and purpose for the infrastructure within the business.

VFC, ASL, MH and UKM's experiences support the earlier findings of Igbaria *et al.* (1998), Cheshier & Skok (2000) and DTI (2004a) that Small Businesses routinely fail to recognise ICT as a strategic tool that can be leveraged to grow a business over the long-term. Those organisations all believed ICT to be largely associated with the day-to-day operational management of a business. Each organisation failed to develop a coherent strategic purpose for their Web infrastructure and relied heavily upon their chosen Web developer to create that for them. Unfortunately, those Web experts appeared unable to compensate for the owner/manager(s)' lack of strategic purpose for the Web infrastructure. For example, while the Web developers hired by VFC, ASL and the MH ultimately created a Web infrastructure that did deliver tangible benefits to those organisations, the developers hired by UKM, LG, 3SE and LFF did not. Ultimately, those organisations were unable to detect any benefit from the development of their Web infrastructures. That finding is similar to those of Poon & Swatman (1997), Webb & Sayer (1998), Benyon-Davies *et al.* (2002) and DTI (2004a) who also found that a significant proportion of the Small Business studied

were unable to detect any tangible benefit from the development of an infrastructure. This study's findings show that each organisation was highly critical of the Web developer used within each development project. LG's experiences are typical in that LG's owner/manager apportioned blame for her infrastructure's subsequent 'failure' squarely with the Web developer. However, as Geissler (2001), Jones *et al.* (2003) and Shiels *et al.* (2003) note, the Web developer's job often proves to be an impossible one if the organisation cannot articulate (or does not even know) what strategic purpose the proposed infrastructure should fulfil. The study findings graphically highlight that, as postulated by Levy & Powell (2002), the lack of clear strategic purpose represents a significant barrier to the development of an infrastructure.

The finding that many of the case study organisations largely failed to develop a coherent strategic purpose for their Web infrastructures supports the author's proposition that a second infrastructure development stage exists. That second stage involves the refinement of the infrastructure's first iteration such that the benefits originally sought can be consolidated (see Figure 6.1). The case study organisations' experiences highlight that if the strategic plan guiding development is either flawed (e.g. LFF) or entirely absent (e.g. LG) the resulting infrastructure will likewise be flawed. The findings reveal that all of the case study organisations that reported the development of an effective on-line strategy to be a barrier to their infrastructure's development all failed to realise any significant tangible benefits from their infrastructures' first iterations. Those organisations immediately began redeveloping their infrastructures in order to consolidate the realisation of the benefits originally sought by the owner/manager. That suggests that a 'flawed' development strategy is likely to lead to a 'flawed' infrastructure and that corrective action will quickly be required to address its shortcomings. In that situation, the expertise of a Web developer cannot fully compensate for the lack of strategic guidance and direction on the part of the owner/manager (since the owner/manager is the key driving force behind development). That suggests that within the three stage development process, the Web developer facilitates the realisation of the owner/manager(s)' goals of benefit realisation: if those goals are unclear or poorly conceived the external expert cannot fulfil their role effectively.

6.4.2 Developmental Barrier Analysis

None of the case study organisations encountered barriers to infrastructure development within the areas of on-line safety and security, their customer's acceptance and use of the Web (with the exception of LFF) or the threat of increased competition. Only four of the organisations studied reported the development of an on-line marketing strategy to have been a barrier to infrastructure development. That analysis suggests that certain barriers to development are more prevalent than others. Similarly, none of the organisations (as discussed above) encountered any external barriers to infrastructure development. However, one cannot conclude from that that those barriers do not exist. This study has not attempted to test the variables that underpinned the constructs contained within the conceptual model developed within Chapter 3 (i.e. the specific barriers and problems detailed within Tables 3.2 – 3.8). Rather, it has built theory and knowledge about the Web infrastructure development process via the systematic analysis of case study organisations whose experiences are relevant to the phenomena under study. In that way, the study findings cannot be generalised back to a wider population because the case study organisations studied were not representative of any specific population. Consequently, there is no evidence to suggest that simply because those organisations studied did not encounter all of the barriers detailed within the conceptual model other Small Businesses might not encounter them. Rather, the analysis of the study findings suggests that certain barriers to infrastructure development appear to be more common than others. This study has shown that, largely regardless of the nature or sophistication of the initial objectives set for an infrastructure (and the sophistication of the infrastructure actually being developed), it appears logical to conclude that the organisation will encounter barriers to development concerning the adoption and use of Web technology, resource and asset base limitations and the development of a coherent on-line strategy. That is because those barriers are relevant to any organisation largely regardless of its initial objectives. Conversely, the threat of increased competition and the issue of on-line security (for example) are more likely to only be relevant to those organisations with sophisticated initial on-line goals who are accordingly attempting to develop a sophisticated infrastructure. None of the organisations studied had such sophisticated objectives. It is therefore unsurprising that those 'sophisticated' barriers were not encountered by the organisations studied. The role of the barriers to development can

therefore be further explained if they are grouped into major and minor barriers (see Figure 6.4).

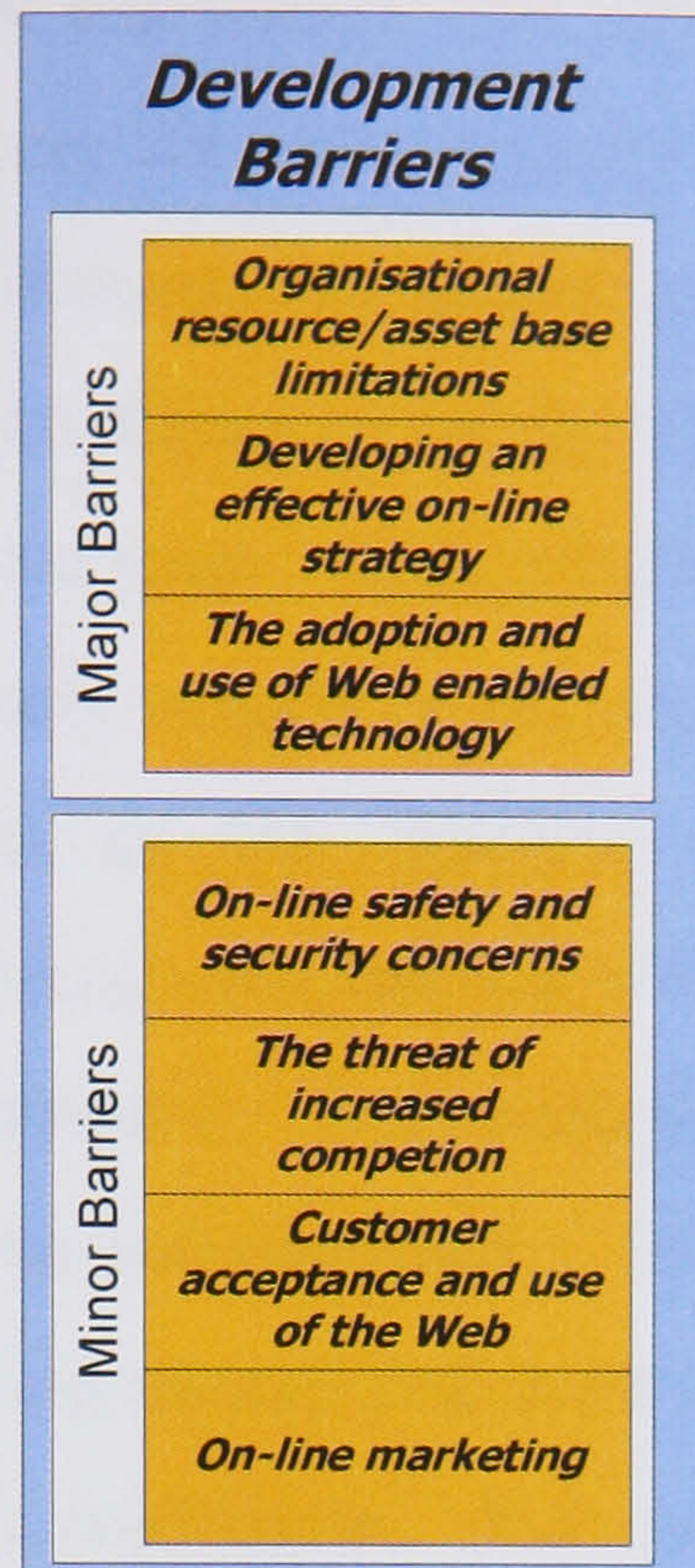


Figure 6.4 – Web Infrastructure Developmental Barriers

Figure 6.4 highlights those barriers that have the potential to block initial infrastructure development or impact upon the success with which the resulting first iteration will deliver benefit to a Small Business. Figure 6.4 proposes that (as discussed above) while all of the barriers identified within Chapter 3 have the potential to impact upon initial infrastructure development, the ‘major’ barriers will almost always be encountered. In contrast, the ‘minor’ barriers will only be encountered by those organisations with highly sophisticated initial on-line objectives. That theory is supported by the HPO’s experiences. That organisation (despite having the ‘sophisticated’ long-term objectives discussed above) deliberately undertook staged development. Within the HPO’s development strategy a relatively unsophisticated infrastructure (with relatively unsophisticated objectives) was initially developed. The HPO encountered only major barriers as a result. The minor barriers were not encountered since they were not relevant to the objectives set for the HPO’s initial infrastructure iteration.

6.4.3 Problems to Infrastructure Benefit Realisation

An analysis of Table 5.16 highlights that more problems to benefit realisation than barriers to initial infrastructure development were experienced by the case study organisations. That analysis supports the theory that as a Web infrastructure is

enhanced and developed to deliver more sophisticated benefits, the nature and number of problems to successful benefit realisation will similarly increase. An analysis of Table 5.16 also highlights that every barrier to infrastructure development encountered by the case study organisations subsequently caused problems with benefit realisation. That finding strongly implies two things. Firstly, that the initial refinement of an infrastructure (Figure 6.1's 'second stage' of development) will be undertaken largely to consolidate the benefits originally sought by the organisation (but whose realisation was either blocked or limited by the barriers encountered). Secondly, the sophistication of the problems being encountered will likewise increase in-line with the sophistication of the infrastructure. For example, ED initially encountered no barriers to the development of an infrastructure. However, as they enhanced their infrastructure (see Table 5.4) during second and third stage development they began to encounter problems with benefit realisation. For example, Table 5.19 reveals that while ED did not perceive their customers' acceptance and use of the Web infrastructure to be a barrier to initial development, they subsequently encountered problems with that issue. That particular problem greatly lessened the extent to which ED realised one particular benefit (that the infrastructure would distribute marketing and promotional materials to clients thereby lowering the business's marketing costs). In that way, the problem encountered acted to reduce the extent of the benefit being realised by the organisation. In contrast, while LFF successfully overcame the barriers to development that had initially been encountered, Tables 5.16 and 5.27 show that the business subsequently experienced problems from the same barrier/problem 'categories'. Table 5.12 highlights that LFF successfully overcame their unfamiliarity with Web technologies via the use of an external developer and did create a functional Web infrastructure. In that way they successfully overcame that particular barrier to development. However, Table 5.27 highlights that the business did subsequently experience more sophisticated problems related to the adoption and use of the technology as they attempted to refine the infrastructure such that it was able to deliver greater benefits to the business. For LFF, simply owning ICT delivered no benefit; following the creation of the infrastructure LFF realised that benefit would actually come from the way in which it was to be exploited. That finding is supported by the earlier findings of Blackburn & Athayde (2000), Chapman *et al.* (2000), Kellock (2000), Roberts (2000), DTI (2001, 2004a), Geissler (2001), Tetteh & Burn (2001) and Shiels *et al.* (2003) that it is the way in which ICT is exploited and

integrated at the strategic level that confers benefit and competitive advantage. LFF only attempted to gain a competitive advantage from the use of their infrastructure after it had been developed. The business consequently encountered more sophisticated problems only when they attempted to enhance the sophistication of their infrastructure such that it could offer them greater levels of benefit.

The experiences of the case study organisations suggest that (as discussed within Chapter 3) the effect of the problems to infrastructure deployment are realised in two ways within the development process. The problems to deployment can act to lessen the extent of the benefits being realised by the organisation, and can act to block the on-going long-term refinement of the infrastructure. The experiences of ED and LFF support that theory. For ED, their customers' refusal to adopt and use the Web infrastructure as ED wanted them to, limited the extent to which the envisaged benefit was subsequently realised. In that example, the effect of the developmental problem was to lessen the benefit being experienced by the organisation. For LFF a different picture is seen. LFF experienced problems regarding the development of a coherent on-line strategy and the adoption and use of the technology (among others). The effect of those problems was to block on-going development. The problems encountered by LFF acted to block progression from the second stage benefit consolidation development work to the third stage of on-going long-term infrastructure refinement.

The proposition that as an infrastructure's sophistication is enhanced the problems encountered by its owners will likewise increase in sophistication is supported by the earlier findings of Anckar & Walden (2001), Jones *et al.* (2003) and DTI (2004a). As discussed above, this study's findings show that as a Small Business's on-line objectives increase in sophistication, so do the problems that it encounters. That finding is further supported by the work of Carter *et al.* (2002), Oldfield (2002) and DTI (2004a) who also report a low incidence of sophisticated Web infrastructure usage by UK Small Businesses. This study has demonstrated why that is the case. As discussed within Sections 6.2 and Section 6.3, as the on-line ambitions of the business become more sophisticated the infrastructure needed to realise them must likewise increase in sophistication and complexity. However, when developing its infrastructure to satisfy its ambitions, it will encounter increasingly complex problems

with their realisation. Those problems become much harder for the Small Business to overcome as its on-line goals (and the supporting Web infrastructure required to realise them) become more complex. It is for that reason that (for example) 3SE and LFF were unable to progress from the second stage of development to the third. In accordance with the earlier findings of Hart *et al.* (2000), Chaston *et al.* (2001) and Rao *et al.* (2003) they were unable to develop anything other than an 'unsophisticated' functionally limited Web infrastructure because of the impact of the problems they encountered while attempting to further refine their infrastructures.

As was observed with the barriers to initial infrastructure development certain developmental problems were also more common. Asset and resource base limitation, the adoption and use of Web technologies and the development/refinement of a coherent on-line strategy were major problems for benefit realisation for the case study organisations.

In accordance with Martin & Matley (2001) and Rao *et al.* (2003) this study has found that while a Small Business might successfully develop the first iteration of its Web infrastructure it is likely to encounter further problems with its enhancement as it attempts to use more sophisticated technologies. VFC and ASL's experiences highlight that. Those organisations realised (following the creation of their Web infrastructures) that in order for the Web infrastructure to have a greater beneficial impact upon the business its sophistication would need to be enhanced. VFC wanted to integrate their Web infrastructure within the business's booking/ordering processes while ASL wanted its infrastructure to successfully generate independent sales for the business (see Tables 5.2 and 5.10). Both organisations were unable to realise those objectives because their understanding of the technologies involved was insufficient to support their realisation. Their experiences suggest that while the cost of such technologies can continue to fall, that reduction in cost does not necessarily help a Small Business to actually exploit the technology!

The study findings also show that every organisation (with the exception of ED and HPO) continued to encounter problems with the assets and resources available to them with which to refine and enhance their infrastructures. That finding is supported by the earlier work of Hsieh & Lin (1998), O'Keefe *et al.* (1998), Porter (2001), Taylor *et*

al. (2001) and Martin (2004) who also found that the continuing success with which an infrastructure can deliver organisational benefit is dependent upon its sophistication being increased via on-going development. Those researchers maintain that on-going development is entirely dependent upon the organisation having the resources to undertake on-going development work (whether or not the original build was outsourced to a third-party developer). This study's findings support that proposition since SG, MH, UKM, LG, ASL, 3SE and LFF all commented that while further refining their infrastructures was desirable, doing so would raise the on-going costs of the project. Likewise, while the HPO did not perceive their asset and resource base to have caused them problems with the continuing development of their infrastructure they commented that their business had had to secure further capital to fund development and that if the infrastructure failed to deliver the benefits being sought the company would be unlikely to survive. Thus, this study's findings highlight that infrastructure development is not a 'one-off investment'. Rather, because the development process is iterative and on-going so are the demands placed upon the organisation's assets and resources.

The study findings highlight that the use of external Web 'experts' often acts to increase an infrastructure's costs *over the long-term*. None of the case study organisations that used the services of a third party Web developer were able to enhance their infrastructures without the continuing involvement of that developer. Indeed ED (who actually design and build Small Business Web infrastructures) commented that they regularly develop Web infrastructures such that the customer must continue to use their services over the long-term. ED regards that as a legitimate and necessary component of their business model. The impact of that development approach is evidenced by the experiences of SG, VFC and the MH. Those organisations were provided with 'template' based Web infrastructures by their developers. Those infrastructures offered each business only limited opportunity to modify infrastructure content and no ability to enhance the sophistication of the infrastructure unaided. That caused each organisation on-going problems since each organisation was unable to further enhance its infrastructure unless a further financial investment was made. That analysis suggests that (just as was discussed within Section 6.4.1) by solving one development barrier and problem (unfamiliarity with Web technology for example) a Small Business might well expose itself to another

(increasing maintenance and development costs through retaining the services of a third party Web developer).

The study findings demonstrate that the failure to develop a coherent on-line strategy can represent a significant problem to the successful exploitation of the Web. In accordance with the earlier findings of Poon & Joseph (2000), Roberts (2000), Duhan *et al.* (2001), Geissler (2001) and Shiels *et al.* (2003) all of the organisations studied (with the exception of ED, HPO and ASL) largely failed to integrate their use of the Web within their organisation's wider strategic plans. That problem subsequently greatly affected the development processes of those organisations. In the absence of a coherent strategy, the organisations were largely unable to detect any tangible benefit being delivered by their infrastructure (a finding similar to those of Mullins *et al.* (2001) and DTI (2004a)). As proposed within Section 6.3.3 and (detailed within Figure 6.1) the on-going assessment of the performance of an infrastructure against the objectives set for it is an integral element of the development process. When that assessment cannot be undertaken (or is made largely subjective) because a strategy and objectives against which to assess performance do not exist, the desire to invest further resources in enhancing its sophistication will be low or absent entirely. For example, UKM, LFF and 3SE all perceive their infrastructures to now be actively harming their businesses. All three businesses attribute the relative failure of their infrastructures to their own failure to develop performance measures, quantifiable objectives and a strategy with which to guide infrastructure development and deployment. Those organisations' experiences mirror the earlier findings of Blackburn & Athayde (2000), Chapman *et al.* (2000), Kellock (2000), Roberts (2000), DTI (2001), Geissler (2001), Tetteh & Burn (2001) that the development of performance measures, objectives and strategies is a fundamental component of on-line 'success'. Without them, infrastructure development does not occur as part of a coherent process that takes the organisation from the unsophisticated to the sophisticated use of the Web within a carefully managed development process. Rather, development is chaotic and is based largely upon trial and error because the organisation lacks the means by which focussed and reasoned development can be undertaken. In that situation the organisation might choose to safeguard against further damage being caused to its real-world operations and persona by disinvesting in the infrastructure entirely or by refusing to develop the infrastructure other than by

correcting its most obvious failings. Should that happen, the development process is halted and the on-going refinement of the infrastructure does not take place.

6.5 The Model of Web Infrastructure Development

Sections 6.2 to 6.4 have discussed this study's findings. That has been achieved via the analysis of the study findings in relation to both the Conceptual Model of Web Infrastructure Development originally presented within Chapter 3 and the normative literature discussed at length within Chapter 2. Figure 6.5 has been developed from that analysis.

Figure 6.5 documents the Web infrastructure development process, the drivers of that process and the barriers and problems that impact upon it. Integral to the model are five central constructs;

- Web infrastructure development is an iterative process within which an infrastructure's sophistication increases as (re)development is undertaken.
- Initial and on-going development is motivated and rewarded by the organisational benefits that development work delivers. In that way, the organisational benefits offered by infrastructure development drive the development process and are hierarchical in nature.
- The owner/manager(s) of the business is/are the key catalysts for initial and on-going infrastructure development.
- Benefit realisation can be lessened or blocked entirely by the impact of certain barriers and problems.
- The impact of the barriers and problems to development can be realised at different points within the development process.

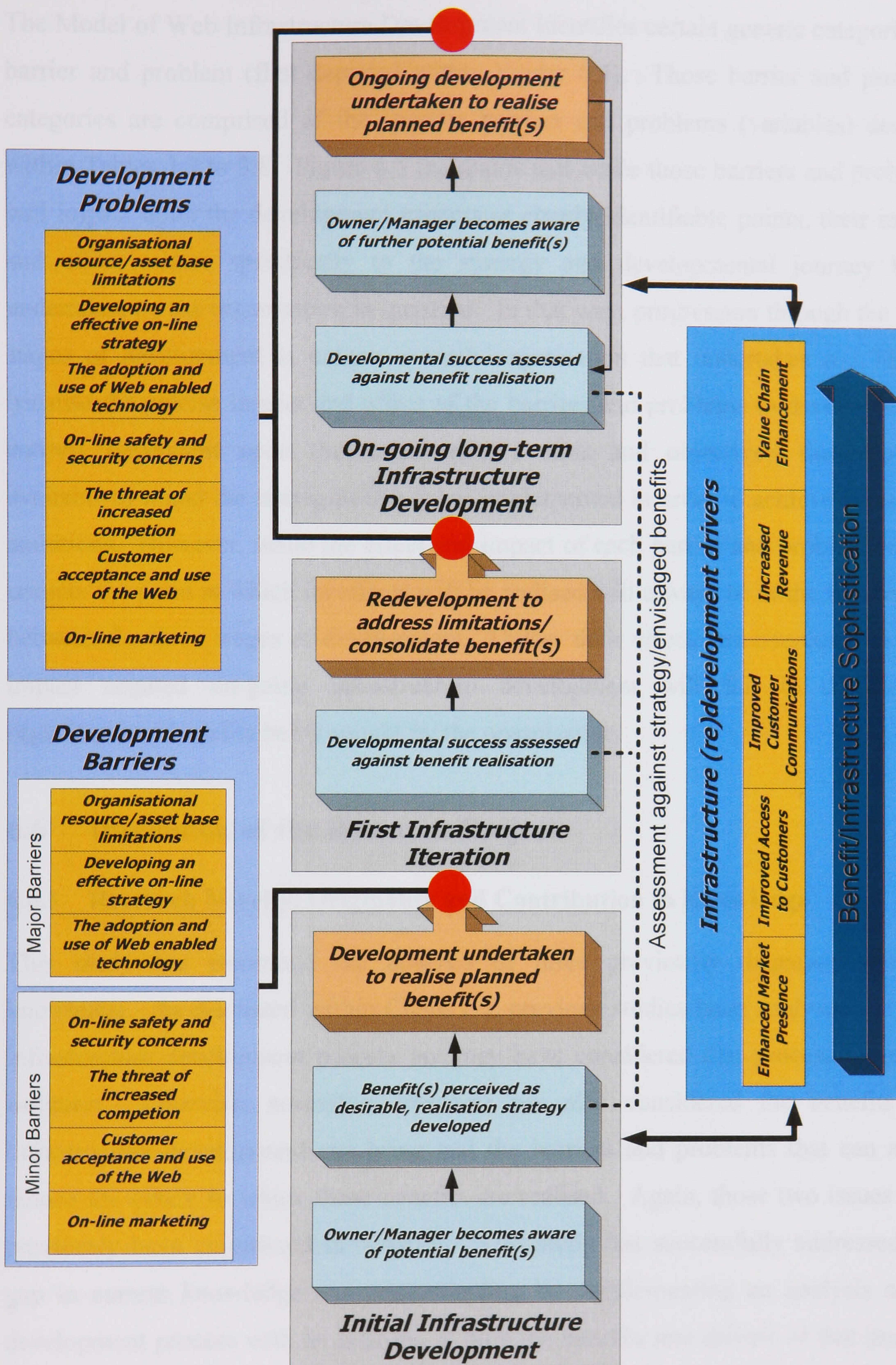


Figure 6.5 – The Model of Web Infrastructure Development

The Model of Web Infrastructure Development identifies certain generic categories of barrier and problem (first depicted within Figure 6.4). Those barrier and problem categories are comprised of the specific barriers and problems (variables) detailed within Tables 3.2 to 3.8. Figure 6.5 maintains that while those barriers and problems will impact upon the development process at clearly identifiable points, their impact and effect relates specifically to the strategy and developmental journey being undertaken by the organisation in question. In that way, progression through the three stages of development is unique to each organisation that undertakes it. That is because the precise impact and effect of the barriers and problems to development is entirely dependent upon that organisation's aims and objectives, the resources available to it and the strategies that it has implemented in order to achieve its on-line ambitions. However, while the effect and impact of each barrier and problem will be unique, the point at which its effects will be realised will always be at the intersection between the three stages of development. Unless their effects are overcome or their impact negated on-going infrastructure development will fail to deliver the organisational benefits being sought by the organisation.

6.6 Discussion of the Research Project

6.6.1 Research Novelty, Originality and Contribution to Knowledge

This study has combined the analysis of three previously disparate areas of knowledge. As discussed within Chapter 2, previous studies have analysed the Web infrastructure development process but they have considered that process largely in isolation. Likewise, normative literature has also considered the benefits that infrastructure development can bring and the barriers and problems that can act to reduce the extent to which those benefits are realised. Again, those two issues have previously been considered in isolation. This study has successfully addressed that gap in current knowledge and understanding by supplementing an analysis of the development process with an analysis of both the benefits and drivers of that process, and the barriers and problems that can affect infrastructure development. That approach is novel and represents an original contribution to knowledge.

This study has successfully identified the nature and impact upon the development process of the barriers and problems to development. That approach is novel because

previous studies have not analysed their impact upon the development process. Previous studies have considered only their potential impact upon benefit realisation. This study therefore makes a further contribution to knowledge by supplementing an analysis of the nature of the barriers and problems to development with an analysis of how the barriers and problems affect and impact upon the Web infrastructure development process itself.

The Model of Web Infrastructure Development is novel and original in the way in which it depicts the development process. Those previous models detailed within Tables 3.1 and 6.1 have considered the development process by reference to the functions of the infrastructure (e.g. E-mail communications, marketing informational information being made available, extranet features etc.). This study has analysed and documented the infrastructure development process by reference to the benefits that infrastructure development will bring. In that way it is more robust than those earlier models because it is more able to explain the developmental experiences of highly diverse organisations. Within that depiction and analysis the author has used the novel approach of analysing infrastructure development by reference to the benefits that infrastructure development will bring. The consideration of the development process by reference to its drivers and rewards is novel and therefore represents an original contribution to knowledge.

Within the Model of Web Infrastructure Development, development is depicted as a three stage process driven (as discussed above) by the rewards and benefits that development will bring. That approach is novel and original since the author has analysed development within the context of precise developmental stages rather than by reference to the properties of the infrastructure. The depiction of a three stage development process (creation, consolidation, re-development) is novel and therefore represents a further contribution to knowledge.

The author has supplemented an analysis of the infrastructure development process with a rich analysis of the impact of the identified barriers and problems. While previous studies have considered certain barriers and problems (for example, Porter (2001) considers the problems associated with customers' adoption of the Web infrastructure and that issue's impact upon organisational differentiation), they have

concentrated largely upon one single 'issue'. This study is novel in that it has considered multiple barriers and problem and has considered how their effects combine to affect infrastructure development. This study therefore provides a more detailed and richer analysis of the barriers and problems since their effects are not analysed *in isolation*. That approach is novel and represents an original contribution to knowledge.

The above analysis highlights that this study is novel in its approach to the analysis of the Web infrastructure development process, its drivers and the barriers and problems that can impact the process. That novelty encompasses five original contributions to knowledge. Those are;

- The combined analysis of the development process, the benefits that development can offer, and the barriers and problems that impact upon development represents an original contribution to knowledge.
- The identification of the precise nature and impact of the barriers and problems to development represents an original contribution to knowledge.
- The analysis of the Web infrastructure development process by reference to the drivers of that process (the organisational benefits that development delivers) represents an original contribution to knowledge.
- The analysis of a three stage development process that depicts the precise developmental stages that an organisation will pass through is novel and represents an original contribution to knowledge. That is because earlier research has considered infrastructure development by reference to the characteristics of a Web infrastructure (i.e. what the infrastructure appears to do).
- The analysis of a diverse range of barriers and problems that can affect Web infrastructure development is novel. That is because the interplay between those barriers and problems, and their combined effect upon infrastructure development has been explored. That full consideration of their impact upon the development process represents an original contribution to knowledge.

6.6.2 Extent to which the Research Aim has been Satisfied

This Ph.D has sought to address the apparent gap within current knowledge and understanding that appears to exist concerning the development of commercial Web infrastructures by UK Small Businesses. As highlighted within Chapter 2 previous research work has focussed closely upon infrastructure development, the organisational benefits that development can bring and the barriers and problems to development routinely encountered by Small Businesses. Crucially, that previous research has considered each issue largely in isolation. This study has sought to address that gap by developing novel theory about the interplay between, and relationship shared amongst all three areas. In that way the study has attempted to answer the following research questions.

- Why do UK Small Businesses encounter barriers and problems when they attempt to develop a Web infrastructure?
- How do the barriers and problems to Web infrastructure development impact upon both infrastructure development and benefit realisation?

In order to answer those research questions the author has sought to satisfy the following specific research objectives;

- Critically review the normative literature that considers the benefits, limitations and barriers to the use of the Web relevant to Small Businesses.
- Identify and analyse the potential effect and likely impact of the barriers and problems that affect Web infrastructure development within UK Small Businesses.
- Develop a conceptual model in order to build theory about the Web infrastructure development process, the benefits of infrastructure development and the barriers and problems that can curtail benefit realisation.
- Undertake empirical research via a robust research strategy that will provide the data necessary to enhance the theory contained within the conceptual model.
- Offer conclusions and recommendations for further work that will build upon the theory developed by the author in pursuit of the satisfaction of this study's research aim.

Chapter 2 analysed the normative literature that considers the Small Business Web infrastructure development process. In doing so Chapter 2 provided the secondary research and analysis necessary to satisfy the first research objective. The author ultimately refined, developed and enhanced the concepts and constructs analysed within Chapter 2 into the novel Conceptual Model of Web Infrastructure Development presented within Chapter 3. That Chapter also detailed the specific variables that underpinned the Conceptual Model. Those variables were contained within Tables 3.2 to 3.8 which detail the numerous barriers and problems to Web infrastructure development. Those tables, and the analysis contained within Chapter 2, is therefore sufficient to satisfy the second research objective.

Chapter 3 refined the theories into new constructs and presented them within a novel framework. That framework culminated with the development of the Conceptual Model of Web Infrastructure Development. That model not only considered the Web infrastructure development process, but also fully considered what organisational benefits can potentially be realised following infrastructure development and enhancement, and the role and impact of the barriers and problems to development identified by the author. In that way the third research objective was satisfied.

Chapter 4 documented the methodology adopted by the researcher in order to answer this study's research questions. That Chapter analysed the methodological choices that were available to the author and discussed why the author made the choices that he did. That methodology was subsequently utilised to collect the study's primary data. That data were presented within Chapter 5. Chapter 6 has discussed and analysed that data in relation to the study's research questions detailed above. That discussion and analysis has enabled the author to refine the Conceptual Model such that it contains the novel theory, knowledge and understanding required to explain the phenomena observed by the author in the field. Chapter 6 and Figure 6.5 have therefore addressed the fourth and fifth research objectives.

Through satisfying the specific research objectives, the author has successfully answered the research questions that this study sought to address. Through the careful and systematic collection and analysis of the study's data the author has explored and explained why UK Small Businesses encounter barriers and problems when they

attempt to develop a Web infrastructure and how those barriers and problems impact upon the Web infrastructure development process. The author has therefore successfully answered the research questions originally posed within Chapter 1.

6.6.3 Limitations of the Study

Section 6.6.2 has shown that the research questions originally posed by the author have been successfully answered. Consequently, the research strategy and research methods adopted by the author were sufficient to provide the primary data required to do so. However, it is also possible to identify certain limitations within the study.

It is reasonable to conclude that extraneous contextual factors might have influenced the experiences of those organisations studied by the author. It could have been possible that any of the case study organisations had the organisational potential to greatly benefit from the development of an infrastructure and the ability to do so but did not perceive that it would have been prudent (or even possible) to have done so because of other extraneous factors. For example, within the theories developed from the study's data, the owner/manager is portrayed as the key driving force within infrastructure development. However, the author's investigation and analysis of the factors actively influencing the owner/manager's decision making process were limited to those factors directly relevant to Web infrastructure development. Therefore, it remains possible that other factors (that fell outside of the scope of this research project) were indirectly influencing and impacting upon the phenomena of interest. Furthermore, the relationship between infrastructure success and strong organisational performance is not a direct one. Consequently, the case study organisations' perceptions as to the relative success of their Web infrastructures could have been influenced by other aspects of the business. Again, the study of those factors and variables fell outside of the scope of this study. Likewise, this study has not explored the existence of a possible 'time-lag' between infrastructure development and benefit realisation. It is possible that the apparent failure of an infrastructure to deliver a particular benefit for an organisation is not actually a failure at all. It is possible that the benefit merely has not been realised quite yet. Therefore, assessments of success or failure made by the study's respondents arguably did not fully take into account how long the desired benefits would take to be realised. The

study's scope limited itself to the acceptance of the relative success or failure of the Web infrastructures studied based upon the assessments of the owner/manager(s).

All the data collected by the author are self-reported. While, as discussed within Chapter 3, that was a deliberate strategy adopted in order to gain respondents' insights and interpretations of the situations that they found themselves within, the chance remains that their understanding of the situations that they found themselves within could have been flawed. While respondent validation ensured that the author's interpretation of their experiences corresponded to their own understanding of their experiences, the study data largely represents the owner/manager(s) experiences of the situations they found themselves within rather than the reality of the situation they found themselves within. While the author's epistemological stance recognises reality to be socially constructed, a different owner/manager in the same situation might have construed the situation quite differently. That would clearly have affected the data collected by the author and their subsequent interpretation.

The interview and validation techniques developed within Chapter 4 and subsequently deployed 'in the field' by the author relied upon each respondent being both willing and able to provide complete and accurate answers to the questions being posed (and through that provide data pertinent to the issues under analysis). The author recognises that respondents might not have provided accurate or complete data because of their own feelings of inadequacy, a lack of knowledge, or simple memory loss. Similarly, the data collected might have been biased by the respondents' desire to conform with social standards and norms of behaviour consistent with a 'successful entrepreneur' or 'business manager'. While the author took steps to guard against that (thereby protecting the validity and reliability of the data collected through steps such as participant observation, document analysis, the use of probes and check questions), the chance still remains that incomplete or erroneous data could have been collected.

The methodology adopted by the author has not attempted to generalise the study findings back to any given population. Rather, generalisation has been made only to theoretical propositions that have enhanced and extended knowledge and understanding of the issues under analysis. Organisations were selected for study specifically because they were able to offer the author a deep insight into the infrastructure development process and rich data regarding that, the organisational

benefits that it delivered and the barriers and problems to benefit realisation. Consequently, the experiences of the case study organisations cannot be considered typical of the wider UK Small Business sector. It would therefore be invalid to make claims or predictions about that larger population based solely upon the experiences of the organisations studied by the author.

6.6.4 Recommendations for Further Work

This study has not attempted to generalise its findings back to a wider population. The methodology adopted has focused upon insight and exploration rather than upon the quantitative statistical analysis of data and the wide generalisation of the study's findings. Purposive rather than representative sampling techniques were employed. Indeed, organisations were selected for study not because they were representative of a larger population but because they would offer the author rich data about the issues of interest. Their experiences cannot be considered to be representative of other Small Businesses. Therefore, while the study data have enabled the author to generalise to theoretical propositions (i.e. the Model of Web Infrastructure Development) that has been undertaken specifically to explain what was observed rather than to predict the frequency with which a specific variable might be observed again in the future within a different context and setting. As discussed within Section 6.6.3 that is recognised as a limitation of the study; its findings cannot be generalised to the wider UK Small Business sector. While this study's findings have successfully explained what was observed by the author and have enabled the author to build novel theory about the issues of interest, the study's data are not necessarily representative of the experiences of all UK Small Businesses or even a specific subset of that group. Future studies could address that limitation by testing the theoretical propositions developed within this study. In doing so, the extent to which this study's findings and data can be generalised to other specific UK Small Businesses could be ascertained.

This study has specifically considered the Web infrastructure development process. It has analysed that process by reference to its drivers and its inherent barriers and problems. An analysis of the wider business, social and economic context within which development was undertaken fell outside of this study's scope. Future work could therefore build upon this study's findings by supplementing an analysis of the

Web infrastructure development process with an analysis of the more general role that a Web infrastructure and ICT plays within Small Business 'success' and 'failure'. While this study explored why Small Businesses develop Web infrastructures it did not fully consider the myriad possible influencers of that decision. Consequently, that future work should also combine a study of the development process with the study of the decision making processes that occur within Small Businesses. That approach would enable those authors to situate infrastructure development within the context of the wider decision making process. That future work could offer a valuable insight into how Small Business owner/managers arrive at their decisions to (dis)invest within the Web (and technology in general) within the context of their wider business goals and personal objectives.

This study has highlighted the vital role that external Web developers play within the development process. Every case study organisation utilised the expertise of a Web developer and each organisation recognised the important role that the developer had played within their infrastructure's success or failure. Future research work could analyse more closely the role of the Web developer within Small Businesses Web infrastructure development projects. Such analysis fell outside the scope of this research project. Future work could build upon this study's finding that Web developers play an important role within the Small Business Web infrastructure development process by analysing the factors critical for developmental success *from the perspective of the Web developer*. That research could offer a further insight into the development process, its drivers, barriers and problems by analysing the relationship between the business's owner/manager(s) and Web developer. Given the important role of the Web developer within the development process such a study could reveal further enablers of the development process and further barriers and problems to its ultimate success.

This study has demonstrated the vital role that strategy development plays within the development process. Of those organisations studied those who report the highest levels of on-line success were also the ones with the clearest developmental strategies. The study data also shows that in the absence of a coherent developmental strategy subsequent infrastructure performance assessment is highly problematic. That in turn greatly affects the development process because the on-going assessment of the extent

to which the infrastructure is fulfilling the purpose for which it was created is an integral component of the development process. Therefore, future work could supplement an analysis of the Web infrastructure development process with an analysis of how organisational strategy is developed within Small Businesses. By analysing how strategy is developed, what factors enable the successful development of strategy and what factors curtail a Small Business's ability to develop and deploy it valuable insight into the Web infrastructure development process could be developed.

Chapter 7.0: Conclusions

7.1 Background Theory and Problem Domain

A diverse range of organisational benefits can be realised via the development and deployment of a Web infrastructure. Normative literature suggests that the commercial use of the Web is a strategy well suited to Small Businesses because of the potentially low costs required to undertake Web infrastructure development and the apparent ease with which those benefits can be realised.

Several previous studies have also considered the issue of Small Business Web infrastructure development. Those previous studies have analysed the development process and based upon that analysis, have modelled infrastructure development. Of those earlier models, many share similarities. For example, within those models many depict the infrastructure development process as a staged process that takes an organisation from the unsophisticated to the sophisticated use of the Web. Likewise, normative literature suggests that as more development is undertaken, increasingly sophisticated and desirable benefits will be realised.

Despite the existence of previous studies and the infrastructure development methodologies advocated, the effective commercial exploitation of a Web infrastructure is a strategy difficult to realise in practice for many Small Businesses. While it is possible to identify many barriers and problems to infrastructure development, one cannot accurately identify the scale, nature and impact that they will have upon the development process. That is because while previous studies have attempted to identify some of the barriers and problems to development, those studies are limited because they have not fully considered how their effects will impact upon the infrastructure development process of Small Businesses.

In essence three disparate streams of previous research can be identified; research that considers the Web infrastructure development process; research that considers the benefits that the development process can offer; and research that considers the barriers and problems to benefit realisation. In order to fully understand and analyse the Web infrastructure development process those three areas must be considered

together. That is because it is only by analysing the interplay that exists between those three (previously disparate) streams of knowledge that the impact and effect of each upon the other two areas can be understood. Unfortunately, previous studies have considered each area largely in isolation. Without a holistic approach, any analysis of the Web infrastructure development process, its drivers and rewards, and its inherent barriers and problems is flawed. It is only by recognising and analysing the interconnectedness of those three areas, that a robust and thorough understanding of infrastructure development can be gained. Therefore, current knowledge and understanding of the Web development process, its drivers and its inherent barriers and problems is not fully understood.

When the three 'key areas' discussed above are considered within the context of the Small Business Web infrastructure development process, four constructs can be identified;

- infrastructure development occurs within an iterative process within which an infrastructure's sophistication is increased as more development is undertaken.
- the development process is motivated by the organisational benefits delivered by the infrastructure
- internal and external barriers and problems to development will be encountered during the development process
- the effect of those barriers and problems will be realised at different points within the development process

Each of those constructs was encapsulated within the Conceptual Model of Web Infrastructure Development. The model was developed in order to focus the study at an early stage while still allowing the author to build novel theory about the development process, its drivers, barriers and problems.

7.2 Methodology and Fieldwork

This study has sought to analyse why UK Small Businesses encounter barriers and problems when they attempt to develop Web infrastructures and how those barriers and problems impact upon both infrastructure development and benefit realisation. To answer those research questions a case study research strategy was adopted. Within

that strategy the author developed new constructs relevant to the issues under analysis from those identified within normative literature.

In order to build the theory necessary to answer the research questions the Conceptual Model was used as the springboard from which novel findings could be found and analysed. The author did not attempt to 'test' the model. Rather it was used because there is a role for existing theory and knowledge within theory building studies. It was used by the author to provide the broad initial framework that guided the study's primary research. To build novel theory an integrated inductive research approach was utilised within the context of this interpretive study. A multiple case study strategy was developed by the author. Multiple data collection tools were used. Primary data collection involved the use of semi-structured key informant interviews. The data from those interviews were supplemented by researcher observation, document analysis, artefact analysis and respondent validation. Those multiple sources of evidence maximised the credibility of the study and protected against threats to its validity and reliability. In that way the research methodology was capable of generating the data needed to answer the research questions facing the author.

7.3 Empirical Work

In order to begin to answer the research questions originally posed in Chapter 1 the author initially collected data as discussed above. The data were subsequently analysed via the use of text-based tables and matrices and through the thick description of that which was observed. The study findings were subsequently used to develop the novel theory necessary to answer the study's research questions. That novel theory was encapsulated within the Model of Web Infrastructure Development.

The Model of Web Infrastructure Development reveals that Small Business Web infrastructure development is an iterative process that has three key stages. The first stage of development takes a Small Business from the non-use to the active use of the Web via the development of an infrastructure's first iteration. The second stage of development entails development work that is focussed upon consolidating the benefits originally sought by the infrastructure's stakeholders. The third stage of

development involves the on-going long-term refinement and enhancement of the infrastructure.

Within the infrastructure development process, development is motivated by the rewards potentially on offer. In order to realise more sophisticated organisational benefits, the sophistication of the infrastructure created to realise them must also be enhanced. It is for that reason that on-going development work is undertaken. Within the development process periodic assessments are made regarding the extent to which the desired benefits have been realised. Should that assessment reveal that the benefits originally envisaged have been realised, further development work will be undertaken so that ever more sophisticated levels of benefit will be delivered. Should that assessment reveal however that the benefits originally envisaged have not been realised (or have not been realised in sufficient quantity) development work will concentrate instead upon addressing the perceived shortcomings of the infrastructure.

Within the novel three stage development process, certain barriers and problems to infrastructure development can be identified. Those barriers and problems are both unique and diverse but can be categorised by reference to their broad characteristics. Those barriers and problems are either internal or external in origin. Regardless of their origin, they have the potential to impact upon both the development process and the success with which the envisaged benefits will be realised by a Small Business.

The barriers to development must be overcome by the Small Business in order for the first stage of development to be successfully completed. However, it is likely that their effects will be still be present and so the Small Business will undertake consolidatory development work in order to fully realise the benefits that originally prompted the development of the infrastructure. It is only at that point that on-going enhancement-focussed development work will begin.

Despite its developmental successes, the Small Business is still highly likely to encounter problems to the successful exploitation (and on-going long-term development) of its Web infrastructure. The developmental problems act to lessen the extent to which a particular benefit will be realised in practice and can act to block on-going development work entirely.

In its totality the empirical work undertaken within this study (and captured within the Model of Web Infrastructure Development) reveals the existence of five key constructs central to the Small Business Web infrastructure development process:

- Web infrastructure development is an iterative process within which an infrastructure's sophistication increases as (re)development is undertaken.
- Initial and on-going development is motivated and rewarded by the organisational benefits that development work delivers. In that way, the organisational benefits offered by infrastructure development drive the development process and are hierarchical in nature.
- The owner/manager(s) of the business is/are the key catalysts for initial and on-going infrastructure development.
- Benefit realisation can be lessened or blocked entirely by the impact of certain barriers and problems.
- The impact of the barriers and problems to development can be realised at different points within the development process.

7.3 Contribution to Knowledge and Directions for Future Work

In answering this study's research questions, the author has made a demonstrably original contribution to knowledge in five key areas (discussed at length within Section 6.6.1). Those contributions reflect the novel approach adopted by the author in his examination and analysis of the issues of interest. Those five original contributions to knowledge are;

- The combined analysis of the development process, the benefits that development can offer, and the barriers and problems that impact upon development represents an original contribution to knowledge.
- The identification of the nature and impact of the barriers and problems to development represents an original contribution to knowledge.
- The analysis of the Web infrastructure development process by reference to the drivers of that process (the organisational benefits that development delivers) represents an original contribution to knowledge.
- The analysis of a three stage development process that depicts the developmental stages that an organisation will pass through is novel and represents an original contribution to knowledge. That is because earlier

research has considered infrastructure development by reference to the characteristics of a Web infrastructure (i.e. what the infrastructure appears to do).

- The analysis of a diverse range of barriers and problems that can affect Web infrastructure development is novel. That is because the interplay between those barriers and problems, and their combined effect upon infrastructure development has been explored. That full consideration of their impact upon the development process represents an original contribution to knowledge.

Future studies should build upon the work of the author. That work should attempt to test the validity of this study's findings thereby ascertaining the extent to which the study findings can be generalised to other UK Small Businesses. The author has made no attempt to undertake statistical generalisation with this study's findings since any such claims for knowledge would be fundamentally flawed. Inherent within the methodology adopted by the author is the recognition that this study's findings can be generalised only to theory. Far from being a weakness, this is one of the study's strengths – by generating theory that can explain the *particular*, the *wider* phenomenon can also be understood. In that way, this study *explains* why what was observed was observed, rather than predicting the frequency that a variable of interest will be observed again in the future. Future work should also build upon those issues of interest uncovered by this study, but which fell outside of its scope (for example, a closer examination of the decision making process at play within Small Businesses and an examination of the relationship between the external Web developer and the Small Business owner/manager).

Overall, this study has successfully generated novel theory and knowledge about the Web infrastructure development process, the organisational rewards that development can bring and the barriers and problems that affect the extent to which those benefits will be realised in practice by Small Businesses. The author has therefore successfully satisfied this study's specific research objectives and its overall research aim. In doing so, the author has successfully answered the research questions that this study sought to address.

References:

- Abels E G, White M D, Hahn K. (1997) Identifying User Based Criteria for Web Pages. *Internet Research: Electronic Networking Applications and Policy*. 7(4):252-262.
- Abels E G, White M D, Hahn K. (1999) A User-based Design Process for Web Sites. *OCLC Systems and Services*. 15(1):35-44.
- Ali H, Birley S. (1999) Integrating Deductive and Inductive Approaches in a Study of New Ventures and Customer Perceived Risk. *Qualitative Market Research: An International Journal*. 2(2):103-110.
- Amaratunga D, Baldry D. (2001) Case Study Methodology as a Means of Theory Building. *Work Study*. 50(3):95-104.
- Anckar B, Walden P. (2001) Introducing Web Technology in a Small Periphery Hospitality Organisation. *International Journal of Contemporary Hospitality*. 13(5):241-250.
- Anderson G. (1990) *Fundamentals of Educational Research*. 1st edition, Fielder Press. Basingstoke.
- Attaran M. (1999) Internet-Based Business Opportunities: Buyers Beware of Scams. *Information Management and Computer Security*. 7(4):176-177.
- Auger P, Gallagher J M. (1997) Factors Affecting the Adoption of an Internet-Based Sales Presence for Small Businesses. *The Information Society*. 13(1):55-74.
- BBC. (2005) "Rivals Back Internet Research Lab" [Online] [Accessed 4.50 p.m. 19th December 2005] Available from <http://www.bbc.co.uk/1/hi/technology/4534398.stm>
- Baker C R. (1999) An Analysis of Fraud on the Internet. *Internet Research: Electronic Networking Applications and Policy*. 9(5):348-359.
- Barclays. (2005) Barclays Small Business Survey: Start Ups and Closures Half One 2004.
- Bell H, Tang N K H. (1998) The Effectiveness of Commercial Internet Web Sites: a User's Perspective. *Internet Research: Electronic Networking Applications and Policy*. 8(3):219-228.
- Bennett R. (1997) Export Marketing and the Internet - Experiences of Web Site Use and Perceptions of Export Barriers Among UK Businesses. *International Marketing Review*. 14(5):324-344.

- Benyon-Davies P. Jones P. Williams M D. (2002) *The Experience of E-Business Amongst SMEs*. Proceedings of the 12th Business Information Technology Conference: Semantic Futures, Manchester. UK.
- Blackburn R, Athayde R. (2000) Making the Connection:the Effectiveness of Internet Training in Small Businesses. *Education + Training*. **42**(4/5):298-298.
- Boyes J A. (2001) *Web Site Effectiveness Assessment: A Preliminary Study*. MSc Dissertation. The University of Salford, U.K.
- Boyes J A, Bamber C J, Motara Y, Sharp J M. (2002) *Managing Your PC the 5S Way*. Proceedings of the Second International Conference on Systems Thinking in Management, Salford, United Kingdom. pp. (A6) 18-24.
- Boyes J A, Irani Z. (2002) *Web Sites and Small Businesses: A Research Agenda Exploring Problems and Barriers*. Proceedings of the 12th Annual Business Information Technology Conference (Semantic Futures). Manchester. UK.
- Boyes J A, Irani Z. (2003) *Barriers and Problems Affecting Web Infrastructure Development: The Experiences of a UK Small Manufacturing Business*. Proceedings of the Americas Conference on Information Systems, Tampa, Florida, August 2003.
- Boyes J A, Irani Z. (2004) An Analysis of the Barriers and Problems to Web Infrastructure Development Experienced by Small Businesses. *International Journal of Information Technology and Management*. **3**(2/3/4):189-207.
- Boyes J A. (2005) Back to School with Business. *Quality World*. **31**(2):46:49.
- Boyes S, Boyes J A (2006) Applying Project Management Skills. *Speech & Language Therapy in Practice*. Spring 2006.
- Brock J K. (2005) Organisational Use of the Internet. *Internet Research*. **15**(1):67-87.
- Bryman A. (2001) *Social Research Methods*. 1st edition, Oxford University Press. Oxford.
- Cabinet Office. (2004) "Internet Access" [online] [cited 2.00 p.m. 7th July 2004] Available from <http://www.cabinetoffice.gov.uk>
- Carter S, Tagg S, Ennis S, Webb J. (2002) "Lifting the Barriers to Growth in UK Small Businesses – A Report to the Federation of Small Businesses" [online] [cited 1.30 p.m. 14th June 2002] Available from <http://www.fsb.org.uk>
- Cavana R Y, Delahaye B L, Sekaran U. (2001) *Applied Business Research: Qualitative and Quantitative Methods*. 1st Edition, John Wiley & Sons Australia Ltd. Milton, Queensland.
- Chapman P, James-Moore M, Szczygeil M, Thompson D. (2000) Building Internet Capabilities in SME's. *Logistics Information Management*. **13**(6):353-360.

- Chaston I, Badger B, Mangles T, Sadler-Smith E. (2001) The Internet and E-Commerce: an opportunity to examine organisational learning in progress in small manufacturing firms. *International Small Business Journal*. **19**(1):13-27.
- Chen K, Sockel H. (2004) The Impact of Interactivity on Business Web Site Visibility. *International Journal of Web Engineering and Technology*. **1**(2): 202-218.
- Chesher M, Skok W. (2000) *Roadmap for Successful Information Technology Transfer for Small Businesses*. Proceedings of the 2000 ACM SIGCPR Conference on Computer Personnel Research, Chicago, Illinois, United States. pp.16-23.
- Clapham P. (2002) A Site for Sore Eyes? *Institute of Electrical Engineers Review*, March 2002. pp.8-11.
- Clayton K. (1999) A Research Report on a Survey of Micro Business Prepared for the Australian Society of CPAs. Australian CPA Society, Study 99/09/2535.
- Coa M, Zhang Q, Seydel J. (2005) B2C E-commerce Web Site Quality: an empirical examination. *Industrial Management and Data Systems*. **105**(5):645-661.
- Connel J, Lynch C, Waring P. (2001) Constraint, Compromises and Choice: Comparing Three Qualitative Research Studies. *The Qualitative Report*, **6**(4), available from <http://www.nova.edu/ssss/QR/QR6-4/connell.html>
- Creswell J.W. (1994) *Research Design: Qualitative and Quantitative Approaches*. 2nd edition, Sage Publications Ltd, London.
- Cryer P. (2000) *The Research Student's Guide to Success*. 1st edition, Open University Press, Buckingham.
- Cunliffe D. (2000) Developing Usable Web Sites – A Review & Model. *Internet Research: Electronic Networking Applications and Policy*. **10**(4):295-308.
- Daniel E, Wilson H, Myers A. (2002a) Adoption of E-Commerce by SMEs in the UK. *International Small Business Journal*. **20**(3):253-270.
- Daniel E, Wilson H, Myers A. (2002b) Innovation in Small and Medium Sized Enterprises: the case of e-commerce adoption in the UK. *International Journal of Innovation, Management, Policy and Practice*. **4**(2):?? ?? (accepted not yet published so find pp later)
- Davis F D. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*. September 1989:319-340.
- Day A. (1997) A Model for Monitoring Web Site Effectiveness. *Internet Research: Electronic Networking Applications and Policy*. **7**(2):109-115.
- Deming W E. (1982) *Out of the Crisis*. 13th Edition, MIT, Cambridge, Mass.

- Department of Trade & Industry. (1998) “*Competitiveness White Paper*” [online] [Cited 11.10 a.m. 15th March 2002] Available from <http://www.dti.gov.uk/comp/competitive/summary.htm>
- Department of Trade & Industry. (2001) “*Telecom Times 19 07 2001*” [online] [cited 11.15 a.m. 15th March 2002] Available from <http://www.dti.gov.uk/cii/regulatory/telecomms/newsletter/ukonline.htm#f1>
- Department of Trade & Industry. (2002) “*Business in the Information Age: International Benchmarking Study*” [online] [cited 10.00 a.m. 22nd September 2004] Available from <http://www.dti.gov.uk>
- Department of Trade & Industry. (2004a) “*Business in the Information Age: The International Benchmarking Study*” [online] [cited 9.35 a.m. 22nd September 2004] Available from <http://www.ukonlineforbusiness.gov.uk>
- Department of Trade & Industry. (2004b) “*Information Security Breaches Survey*”
- DePoy E, Gitlin L N. (1994) *Introduction to Research: Multiple Strategies for Health and Human Services*. 1st edition, Mosby-Year Book Inc, St. Louis.
- Dholakia U M, Rego L L. (1998) What Makes Commercial Web Pages Popular? An Empirical Investigation of Web Page Effectiveness. *European Journal of Marketing*. **32**(7/8):724-736.
- Doherty N F, Ellis-Chadwick F, Hart C A. (1999) Cyber Retailing in the UK: the potential of the Internet as a retail channel. *International Journal of Retail and Distribution Management*. **27**(1):26-36.
- Duhan S, Levy M, Powell P. (2001) Information Systems Strategies in Knowledge-Based SMEs: The Role of Core Competencies. *European Journal of Information Systems*. **10**(1):25-40.
- Dutta S, Evrard P. (1999) Information Technology and Organisation within European Small Enterprises. *European Management Journal*. **17**(3):239-251.
- Easterby-Smith M, Thorpe R, Lowe A. (2002) *Management Research: An Introduction*. 2nd Edition, Sage Publications Ltd. London.
- Edvardsson B, Thomasson B, Ovretveit J. (1994) *Quality of Service – Making it Really Work*. 1st edition, McGraw Hill Book Company. London.
- Eisenhardt K M. (1989) Building Theories from Case Study Research. *Academy of Management Review*. **14**(4):532-550.
- Fariselli P, Oughton C, Picory C, Sugden R. (1997) Electronic Commerce and the Future of SMEs in a Global Market Place: networking and public policy. *Small Business Electronics*. **12**(1):261-275.

- Fielding N. (1993) 'Interviewing' (Chapter 8 in Gilbert, N. (Ed.) *Researching Social Life*. 1st edition, Sage Publications Ltd. London.
- Fillis I. Johansson U. Wagner B. (2004) Factors Impacting on E-Business Adoption and Development in the Small Firm. *International Journal of Entrepreneurial Behaviour and Research*. **10**(3):178-191.
- Gardner F, Lehmann J. (2002) Some Unaccounted For Aspects of Qualitative Evaluation and Research. *Qualitative Research Journal*, **2**(2):16-27.
- Gates B. (1995) *The Road Ahead*. 1st edition, Penguin Books Ltd. London.
- Geissler G L. (2001) Building Customer Relationships On-line: The Web Site Designers' Perspective. *Journal of Consumer Marketing*. **18**(6):488-502.
- Gephart R. (1999) Paradigms and Research Methods. *Research Methods Forum*, 4(Sept 1999).
- Get Safe Online (2005) "National Campaign Launched" [online] [cited 12.10 p.m. 2nd November 2005] Available from http://www.getsafeonline.org/nqcontent.cfm?a_id=1366#_endref1
- Ghauri P, Gronhaug K, Kristianslund I. (1995) *Research Methods in Business Studies*. 1st edition, Prentice Hall Europe. Hemel Hempstead.
- Glaser B, Strauss A. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research*. 1st edition. Aldine Publishing, Chicago.
- Gronroos C. (1988) The Six Criteria of Good Perceived Service Quality. *Review of Business Journal*. **9**(3):10-13.
- Guba E G, Lincoln Y S. (1994) "Competing Paradigms in Qualitative Research" in Denzin N.K and Lincoln Y.S (editors), *Handbook of Qualitative Research*. 1st edition, Sage Publications, Thousand Oaks. pp105-117.
- Guba E.G, Lincoln Y.S. (1998) "Competing Paradigms in Qualitative Research" in Denzin N.K. and Lincoln Y.S. (editors), *The Landscape of Qualitative Research: Theories and Issues*. 1st edition, Sage Publications, Thousand Oaks, pp.195-220.
- Gummerson E. (1991) *Qualitative Methods in Management Research*. 1st edition. Sage Publications, Newbury Park.
- Hart C W L. (1988) The Power of Unconditional Service Guarantees. *Harvard Business Review*. July/August, pp.59-67.
- Hart C, Doherty N, Ellis-Chadwick F. (2000) Retailer Adoption of the Internet – Implications for Retail Marketing. *European Journal of Marketing*. **34**(8):954-974.

- Hatch O. (2000) "Privacy in the Digital Age: A Resource for Internet Users". United States Senate, Committee on the Judiciary. Washington, DC 20510-6275.
- Haynes P J, Becherer R C, Helms M M. (1998) Small and Mid-Sized Businesses and Internet Use: Unrealised Potential? *Internet Research: Electronic Networking Applications and Policy*. **8**(3):229-235.
- Hoffman D L, Novak T P, Chatterjee P. (1995) Commercial Scenarios for the Web: Opportunities and Challenges. *Journal of Computer Mediated Communications*. **11**(3):105-125.
- Hoffman D L, Novak T P. (1996) Marketing in Computer-Mediated Environments: Conceptual Foundations. *Journal of Marketing*. **60**(3):50-68.
- Hoffman D L, Novak T P. (1996b) The Challenges of Electronic Commerce. *The Information Society Special Issue on E-Commerce*. **13**(January-March 1996):43-54.
- Hoffman D L, Novak T P, Peralta M. (1999) Building Consumer Trust Online. *Communications of the ACM*. **42**(4):80-85.
- Hoffman D L, Novak T P. (2000) How to Acquire Customers on the Web. *Harvard Business Review*. May-June 2000 pp.179-188.
- Howard J. (2001) Internet Usage in Business – 2001 Market Report. *Keynote Reports*.
- Howitt S. (1999) Internet Usage in Britain – 1999 Market Report. *Keynote Reports*.
- Hsieh C T, Lin B. (1998) Internet Commerce for Small Businesses. *Industrial Management and Data Systems*. **98**(3):113-119.
- Huberman A M, Miles M B. (1998) Data Management and Analysis Methods. In Denzin NK, Lincoln YS (eds) *Collecting and Interpreting Qualitative Materials*. 1st edition, Sage Publishing, Thousand Oaks.
- Hussey J, Hussey R. (1997) *Business Research – A Practical Guide For Undergraduate and Postgraduate Students*. 1st edition, MacMillan Press Ltd. London.
- Hyde K.F. (2000) Recognising Deductive Processes in Qualitative Research. *Qualitative Market Research: An International Journal*. **3**(2):82-89.
- IBM (2005) "Software Glossary" [online] [cited 11.10 a.m. 27th January 2005] Available from <http://www-3.ibm.com/software/webservers/portal/library/InfoCentre/wps/glossary.html>
- Igbaria M, Zinatelli N, Cragg P, Cavaye A L M. (1997) Personal Computing Acceptance in Small Firms: A Structural Equation Model. *MIS Quarterly*. September 1997:279-305.

- Igbaria M, Zinatelli N, Cavaye A L M. (1998) Analysis of Information Technology Success in Small Firms in New Zealand. *International Journal of Information Management*. **18**(2):103-119.
- IMRG. (2004) "A Cracking £2.5bn e-Christmas" [online] [cited 10.25 a.m. 16th September 2004] Available from <http://www.imrg.org>
- IMRG. (2005) "Web Shopping Hits All Time High" [online] [cited 4.30 p.m. 19th December 2005] Available from <http://www.imrg.org/imrgrepts.nsf/>
- Irani Z, Ezingard J N, Grieve R J. (1998) Costing the True Costs of IT/IS Investments in Manufacturing: A Focus During Management Decision Making. *Logistics Information Management*. **11**(1):38-43.
- Jankowicz A D. (2000) *Business Research Projects*. 3rd edition, Business Press. London.
- Johnson G, Scholes K. (1999) *Exploring Corporate Strategy*. 5th edition, Prentice Hall Europe. London.
- Jones J M, Vijayasarathy L R. (1998) Internet Consumer Catalogue Shopping: Findings From an Exploratory Study and Directions for Future Research. *Internet Research: Electronic Networking Applications and Policy*. **8**(4):322-330.
- Jones C, Hecker R, Holland P. (2003) Small Firm Internet Adoption: Opportunities Forgone, a Journey not Begun. *Journal of Small Business and Enterprise Development*. **10**(3):287-297.
- Juran J M. (1951) *Quality Control Handbook*. 3rd Edition, McGraw-Hill Publishing, New York.
- Jutla D, Bodorik P, Dhaliwal J. (2002) Supporting the E-Business Readiness of Small and Medium Sized Enterprises: Approaches and Metrics. *Internet Research: Electronic Networking Applications and Policy*. **12**(2):139-164.
- Katz J, Aspen P. (1998) Internet Dropouts in the USA. *Telecommunications Policy*. **22**(4/5):327-339.
- Kellock B. (2000) Are you mail or email? *Machinery and Production Engineering*. **158**(4014):3-4.
- Kianni G R. (1998) New Game, New Rules: Will The Traditional Mentality Work in the Marketplace? *Management Research News*. **21**(6):1-9.
- Lake H. (1999) "How Divers Turned on the Profit Stream" [online]. [Cited 8.30 p.m. 8th February 2000] Available from <http://www.sunday-times.co.uk/news/pages/infotimes/better-e-business/timspebeb01011.html?99>

- Lange T, Ottens M, Taylor A. (2000) SMEs and Barriers to Skills Development: a Scottish perspective. *Journal of European Industrial Training*. **24**(1):5-11.
- Levy M, Powell P. (2002) Information Systems Strategy for Small and Medium Sized Enterprises: An Organisational Perspective. *Journal of Strategic Information Systems*. **9**(2000):63-84.
- Limehouse D. (1999) Know Your Customer. *Work Study*. **48**(3):100-102.
- Lu M T, Yeung W. (1998) A Framework for Effective Commercial Web Application Development. *Internet Research: Electronic Networking Applications and Policy*. **8**(2):166-173.
- Lubbe S, Remenyi D. (1999) Management Information Technology – the Development of a Managerial Thesis. *Logistics Information Management*. **12**(1/2):145-156.
- Lynn G S, Maltz A C, Jurkat P M, Hammer M D. (1999) New Media in Marketing Redefine Competitive Advantage: a comparison of small and large firms. *The Journal of Services Marketing*. **13**(1):9-20.
- MacPherson M. (2000) Quality: The Next Big thing in the Dot.Com World. *Quality World*. **26**(7):10-11.
- Martin L M, Matley H. (2001) "Blanket" Approaches to Promoting ICT in Small Firms: Some Lessons from the DTI Ladder Adoption Model in the UK. *Internet Research: Electronic Networking Applications and Policy*. **11**(5):399-410.
- Martin L M. (2004) E-Innovation: Internet Impacts on Small UK Hospitality Firms. *International Journal of Contemporary Hospitality*. **16**(2):82-90.
- Mason J. (1996) *Qualitative Researching*. 1st edition, Sage Publications. London.
- Mendo F A, Fitzgerald G. (2005) A Multidimensional Framework for SME E-business Progression. *Journal of Enterprise Information Management*. **18**(6):678-696.
- Mehrtens J, Cragg P B, Mills A M. (2001) A Model of Internet Adoption by SMEs. *Information and Management*. **39**(2001):165-176.
- Microsoft (2005) "Developers' Glossary" [online] [cited 11.05 a.m. 27th January 2005] Available from <http://www.eu.microsoft.com/hwdev/resources/glossary.asp>
- Miles M B, Hubberman A M. (1984) *Qualitative Data Analysis: A Sourcebook of Methods*. 1st edition, Sage Publishing. Thousand Oaks.
- Misic M M, Johnson K L. (1999) Benchmarking: a tool for web site evaluation and improvement. *Internet Research: Electronic Networking Applications and Policy*. **9**(5):383-392.

- Morse J M. (1994 23:43) "Emerging from the Data": the cognitive processes of analysis in qualitative inquiry. In JM Morse (ed) *Critical Issues in Qualitative Research Methods*. 1st edition. Sage Publishing, Thousand Oaks.
- Mullins R, Duan Y, Hamblin D. (2001) A Pan-European Survey Leading to the Development of WITS. *Internet Research: Electronic Networking Applications and Policy*. **11**(4):333-340.
- Nominet (2005) "Registration Statistics" [online] [cited 4.10 p.m. 19th December 2005] Available from <http://www.nominet.org.uk/intelligence/statistics/registration/>
- O'Donnell A, Cummins D. (1999) The Use of Qualitative Methods to Research Networking in SMEs. *Qualitative Market Research: An International Journal*. **2**(2):82-91.
- O'Keefe R M, O'Connor G, Kung H J. (1998) Early Adopters of the Web as a Retail Medium: Small Company Winners and Losers. *European Journal of Marketing*. **32**(7/8):629-643.
- Office of Communication. (2004) "The Ofcom Internet and Broadband Update – April 2004" [online] [cited 3.15 p.m. 16th September 2004] Available from http://www.ofcom.org/research/consumer_audience_research/telecoms_int_bband_updt/may2004/?a=87101
- Office of Communication. (2005) "The Communications Market 2005 – Overview" [online] [cited 5.20 p.m. 19th December 2005] Available from <http://www.ofcom.org.uk/research/cm/overview05>
- Office of the E-Envoy (2001) "UK Online Annual Report 2001" [online] [cited 9.30 a.m. 15th May 2002] Available from http://www.e-envoy.gov.uk/ukonline/champions/anrep_menu.htm
- Office of National Statistics. (2003) "National Statistics Omnibus Survey" [online] [cited 1.00 p.m. 7th July 2004] Available from <http://www.statistics.gov.uk>
- Office of National Statistics. (2004a) "Internet Access News Bulletin" [online] [cited 10.30 a.m. 7th July 2004] Available from <http://www.statistics.gov.uk>
- Office of National Statistics. (2004b) "2002 E-Commerce Survey of Business: value of e-trading by non-financial UK businesses" [online] [cited 9.30 a.m. 7th July 2004] Available from <http://www.statistics.gov.uk>
- Oldfield H. (2002) What SME's Think. *Quality World*. **28**(6):10-14.
- Palumbo F, Herbig P. (1998) International Marketing Tool: The Internet. *Industrial Management and Data Systems*. **98**(6):253-261.

- Parasuraman A, Zeithaml V A, Berry L L. (1985) A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing*. **49**(Fall 1985):41-50.
- Patel N V, Irani Z. (1999) Evaluating Information Technology in Dynamic Environments: A Focus on Tailorable Information Systems. *Logistics Information Management*. **12**(1/2):32-39.
- Peppers D, Rogers M. (1995) A New Marketing Paradigm: Share of Customer, not Market Share. *Managing Service Quality*. **5**(3):48-51.
- Perry C. (1998) Processes of a Case Study Methodology for Postgraduate Research in Marketing. *European Journal of Marketing*. **32**(9/10):785-802.
- Pollard C E, Hayne S C. (1998) The Changing Face of Information System Issues in Small Firms. *International Small Business Journal*. **16**(3):70-88.
- Poon S, Joseph M. (2000) Product Characteristics and Internet Commerce Benefit Amongst Small Businesses. *Journal of Product and Brand Management*. **9**(1):21-34.
- Poon S, Joseph M. (2001) A Preliminary Study of Product Nature and Electronic Commerce. *Marketing Intelligence and Planning*. **19**(7):493-499.
- Poon S, Swatman P M C. (1997) Small Business Use of the Internet: Findings from Australian Case Studies. *International Marketing Review*. **14**(5):385-402.
- Porter M E. (2001) Strategy and the Internet. *Harvard Business Review*. March 2001 pp.63-78.
- Quelch J A, Klein L R. (1996) The Internet and International Marketing. *Sloan Management Review*. Spring 1996, pp.60-75.
- Raman N V, Leckenby J D. (1998) Factors Affecting Consumer Webad Visits. *European Journal of Marketing*. **32**(7/8):737-748.
- Rao S S, Metts G, Mora Mange C A. (2003) Electronic Commerce Development in Small and Medium Sized Enterprises. *Business Process Management Journal*. **9**(1):11-32
- Raymond L. (2001) Determinants of Web Site Implementation in Small Businesses. *Internet Research: Electronic Networking Applications and Policy*. **11**(5):411-422.
- Rayport J F, Sviokla J J. (1994) Managing in the Marketplace. *Harvard Business Review*. November-December 1994, pp.141-150.
- Rayport J F, Sviokla J J. (1995) Exploiting the Virtual Value Chain. *Harvard Business Review*. November-December 1995, pp.75-85.

- Remenyi D, Sherwood-Smith M. (1999) Maximise Information Systems Value by Continuous Participative Evaluation. *Logistics Information Management*. **12**(1/2):14-31.
- Roberts A. (2000) Editorial - E-commerce/E-business/E-strategy. *Engineering Management Journal*. **10**(6):250-251.
- Robson C. (2002) *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*. 2nd edition, Blackwell Publishers Ltd. Oxford.
- Rowley J. (1998) Internet Food Retailing: The UK in Context. *British Food Journal*. **100**(2):85-95.
- Rowley J. (2002) Using Case Studies in Research. *Management Research News*. **25**(1):16-27.
- Rowley J. (2005) The Evolution of Internet Business Strategy: The case of UK Estate Agency. *Property Management*. **23**(3):217-226.
- Sadowski B M, Maitland C, Van Dongen J. (2002) Strategic Use of the Internet by Small and Medium Sized Companies: An Exploratory Study. *Information Economics and Policy*. **14**(2002):75-93.
- Saindis E, Gill R, White A. (2001) *Emergent Strategies in SMEs*. Proceedings of the Fourth SME International Conference: Manufacturing, Aalborg, Denmark.
- Saunders M N K, Lewis P, Thornhill A. (2000) *Research Methods for Business Students*. 2nd edition, Pearson Educational Ltd. Harlow.
- Sekaran U. (2000) *Research Methods for Business*. 3rd edition, John Wiley & Sons Inc. Chichester.
- Shewhart W A. (1931) *Economic Control of Quality of Manufactured Product*. 1st Edition, Van Nostrand Co. Inc., Princeton, New Jersey.
- Shiels H, McIvor R, O'Reilly D. (2003) Understanding the Implications of ICT Adoption: Insights from SMEs. *Logistics Information Management*. **16**(5):132-326.
- Shih C E. (1998) Conceptualising Consumer Experiences in CyberSpace. *European Journal of Marketing*. **32**(7/8):655-663.
- Silicon. (2004) "Rise in Small Firms Turning to E-Commerce" [online] [cited 5.40 p.m. 17th September 2004] Available from <http://networks.silicon.com/webwatch/0.39024667.10005736.00.htm>
- Sillence S, MacDonald S, Lefang B, Frost B. (1998) Email Adoption, Diffusion, Use and Impact within Small Firms: a survey of UK companies. *International Journal of Management*. **18**(4):231-242.

- Silverman D. (2000) *Doing Qualitative Research: A Practical Handbook*. 1st edition. Sage Publications. London.
- Singh S. (2000) *The Science of Secrecy – The History of Codes and Codebreaking*. 1st edition, Fourth Estate Ltd. London.
- Skinner S. (2000) “*The Durlacher Quarterly Internet Report SME Edition*” [online] [cited 3.35 p.m. 15th March 2002] Available from http://www.durlacher.com/press_download/DQIRAugust.pdf.
- Small Business Service. (2002) “*Report for Small Business Service Research Programme: the value of ICT for SMEs in the UK*”
- Small Business Service. (2004a) “*Small Business Service Publishes Small and Medium-sized Enterprise (SME) Statistics for the UK*” [online] [cited 3.40 p.m. 16th September 2004] Available from <http://www.sbs.gov.uk/default.php?page=/press/news162.php>
- Small Business Service. (2004b) “*Small and Medium Enterprise (SME) – Definitions*” [online] [cited 2.50 p.m. 27th August 2004] Available from <http://www.sbs.gov.uk/default.php?page=/sitehelp/sitemap.php>
- Small Business Service. (2005) “*DTI News Release URN 05/92 25/8/2005*”
- Sparkes A, Thomas B. (2001) The Use of the Internet as a Critical Success Factor for the Marketing of Welsh Agri-Food SMEs in the Twenty-First Century. *British Food Journal*. **103**(5):331-347.
- Stake R E. (1994) “Case Studies” in Denzin N.K and Lincoln Y.S (editors). *Handbook of Qualitative Research*. 1st edition, Sage Publications. Thousand Oaks, pp236-247.
- Strader T J, Shaw M J. (1999) Consumer Cost Differences for Traditional and Internet Markets. *Internet Research: Electronic Networking Applications and Policy*. **9**(2):82-92.
- Strategy Unit. (2005) “*Connecting the UK: the Digital Strategy*” [online] [accessed 5.45 p.m. 19th December 2005] Available from http://www.strategy.gov.uk/downloads/work_areas/digital_strategy/report/index.htm
- Swartz E, Boaden R. (1997) A Methodology for Researching the Process of Information Management in Small Firms. *International Journal of Entrepreneurial Behaviour and Research*. **3**(1):53-65.
- Taylor M J, England D, Gresty D. (2001) Knowledge for Web Site Development. *Internet Research: Electronic Networking Applications and Policy*. **11**(5):451-461.

- Tetteh E, Burn J. (2001) Global Strategies for SME-Business: Applying the SMALL Framework. *Logistics Information Management*. **14**(1/2):171-180.
- The Times. (2004) “*Virus Fear for British Business*” [online] [cited 3.50 p.m. 16th September 2004] Available from <http://www.business.timesonline.co.uk/printfriendly/0..2020-8310-264098.00.html>
- Thomas P. (2002) Secret Service Providers. *PC Advisor*. Issue 84, pp.151-155.
- Udo G J. (2001) Privacy and Security Concerns as Major Barriers for E-Commerce: A Survey Study. *Information Management and Computer Security*. **9**(4):165-174.
- UKOnline for Business. (2000) “*Majority of Small Businesses Developing an E-Strategy According to Latest IM Research*” [online] [cited 10.45 a.m. 15th March 2002] Available from <http://www.ukonlineforbusiness.gov.uk/main/news/mainnewsviewer.jsp?contentID=1061>
- Van Nierkirk D N, Berthon J P, Davies T. (1999) Going With the Flow: Websites and Customer Involvement. *Internet Research: Electronic Networking Applications and Policy*. **9**(2):109-116.
- Venkatesh A. (1998) Cybermarketscapes and Consumer Freedoms and Identities. *European Journal of Marketing*. **32**(7/8):664-676.
- Venkatesh V, Morris M G, Davis G B, Davis F D. (2003) User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*. **27**(3):425-478.
- Venkatraman M, Dholakia R R. (1997) Searching for Information in Marketspace: Does the Form – Product or Service – Matter? *The Journal of Services Marketing*. **11**(5):303-316.
- Venkatraman M. (2000) Five Steps to a Dot-Com Strategy: how to find your footing on the Web. *Sloan Management Review*. **41**(1):15-30.
- Vescovi T. (2000) Internet Communication: The Italian SME Case. *Corporate Communications: An International Journal*. **5**(2):107-112.
- Walters D, Lancaster G. (1999) Using the Internet as a Channel for Commerce. *Management Decision*. **37**(10):800-817.
- Webb B, Sayer R. (1998) Benchmarking Small Companies on the Internet. *Long Range Planning*. **31**(6):815-827.
- Weiber R, Kollman T. (1998) Competitive Advantages in Virtual Markets – Perspectives of “Information Based Marketing” in Cyberspace. *European Journal of Marketing*. **32**(7/8):603-615.

- Williams M. (2000) “*E-Commerce Inquiry to Business 2000 (Office of National Statistics)*” [online]. [Cited 12.00 p.m. 15th March 2002] Available from http://www.statistics.gov.uk/themes/economy/articles/General/Extracts_downloads/E_Commerce_Inquiry_2000.pdf
- Wilson S. (1997) Certificates and Trust in Electronic Commerce. *Information Management and Computer Security*. 5(5):175-181.
- Wyatt S. (1999) “*They Came They Surfed They Went Back to the Beach: Why Some People Stop Using the Internet*”. Prepared for the Society for Social Studies of Science conference, San Diego, October 1999. Available from <http://virtualsociety.sbs.ox.ac.uk/text/reports.htm>
- Yakhlef A. (1998) The Internet as a Locus for Value Creation. *Management Decision*. 36(9):610-614.
- Yin R K. (1994) *Case Study Research: Design and Methods* Sage Publications. London. Applied Social Research Methods Series Volume 5.
- Zhu K, Kraemer S, Xu S. (2003) Electronic Business Adoption by European Firms: a Cross-Country Assessment of the Facilitators and Inhibitors. *European Journal of Information Systems*. 12(4):251-268.

Appendices

Appendix 1 Validated Interview Transcript

SQ1 – Organisation Name & Address

SG, Skipton, North Yorkshire.

SQ2 - Organisation URL

www. [REDACTED].co.uk

SQ3 – Nature of Business

Art gallery

SQ4 – Annual Turnover

£ [REDACTED]

SQ5 – Number of Employees

6 (Owner & Wife, Commercial/General Manager, 3 staff)

SQ6 – Interviewee & Organisational Position

Ben M. (Commercial & General Manager)

SQ7 - When did you develop a Web infrastructure?

The gallery first established a web site in April 2002 to coincide with the move to the business's current premises. That first 'version' was developed by the business's owners' son who was also made responsible for maintaining the wider infrastructure and updating the site's content. At that time the web site was simple in nature and limited itself to providing basic information about the location of the business and some contact details. As the business has grown and become more successful its owners' took the decision to expand the infrastructure further so that it better reflected the real world persona of the gallery and included more functionality (e.g. transactional functionality). Similarly, the 2nd version of the web site was developed to address the perception held within the business that the existing web site did not portray an acceptable image of the gallery to the wider public due to its limited content, features and overall design.

A local professional web designer was commissioned to re-develop the infrastructure in January 2004. The total cost of all redevelopment work was £2000 and the redevelopment took approximately 6 months. The impetus for the redesign also came from the main supplier to the business (although that also coincided with the owners' growing concerns that the site did not adequately represent the gallery) – even though the gallery is wholly owned by Jonathon S. the gallery is contractually obliged to solely represent DeMontfort Fine Art (DFA) and at least 70% of the gallery's wall space must be given over to their prints and originals. In return, DFA provides SG with printed marketing and promotional materials, brochures, general business advice and specific marketing advice. Consequently, DFA suggested that the existing site could be improved and that suggestion was accepted by the owners. Hence, the primary objective for the redevelopment was to give the web site a more professional 'look and feel'. DFA offered the gallery the use of their web site 'template' who's content can be further customised. That offer was not taken up since Ben perceived the template to be overly complex. While DFA offered suggestions regarding the potential look and feel of SG's site via the use of the DFA template, Jonathon decided not to take up their offer and managed the redesign project himself. Jonathon provided the web designer with a loose 'brief'. From that the designer developed a

mock-up template driven web site that Jonathon subsequently agreed to and ‘signed off’. SG left many of the decisions regarding the navigation, look and feel of the site to the designer since Jonathon was keen to see ‘what was available’ without limiting the designer’s freedom to explore different ways of satisfying the original brief. That decision also reflected Jonathon’s unfamiliarity with the medium. The designer was also made responsible for creating the wider infrastructure that supports the web site – securing site hosting, domain name registration and pay-pal payment facilities was undertaken by the designer. The on-going maintenance of the infrastructure involves Ben accessing a secure area of the web site that gives him access to the template’s pages so that he can update the site’s information and content. While the original brief was flexible one specific objective was to include transactional functionality within the site hence one of the infrastructure’s current objectives is to generate on-line sales. Likewise, the site was also designed so as to appeal to the collector market and so its primary objective is to function as an electronic catalogue for the business and replicate the business’s traditional printed promotional/marketing literature via a ‘new’ medium.

Ben currently maintains the infrastructure without the on-going involvement of the designer who originally developed the web site template currently in use. Likewise, Ben is also responsible for maintaining with wider web infrastructure. While the designer originally arranged hosting for the site (for example) all responsibility for the infrastructure’s upkeep passed to SG upon completion of the redevelopment project. Ben has sought guidance from DFA as to what information to include within the web site over the last 4 months however.

Future objectives for the infrastructure have been developed by Ben and involve widening the product range available for sale via the web site (e.g. statues) to increase sales volumes of those products and widen market awareness of their availability.

SQ8 – Did the Infrastructure meet its original objectives?

Ben and Jonathon perceive that the infrastructure has been successful in meeting its objectives – its primary objective is to function as a marketing tool and potential customers are now regularly referred to the site and it successfully generates sales enquires. Typically however, those enquiries are converted into sales off-line since the business has found its customers reluctant to complete a sale without first speaking to the gallery owner/manager about their prospective purchase. In total 12 prints/original sales have been made entirely through the infrastructure but Ben and Jonathon believe that apparently ‘low’ figure does not fully reflect the infrastructure’s beneficial impact upon the business in terms of generating leads and helping to ‘close’ sales.

Ben believes that since the business established relatively simple objectives for the infrastructure it has managed to achieve them by its very existence! For example, through its own existence it has fulfilled its primary objective of functioning as a further potential promotional tool for the business.

SQ9 – Have the Infrastructure’s Objectives Changes Over Time?

The infrastructure’s objectives have changed over time with the largest change occurring in early 2004 with the redevelopment of the infrastructure. At that time the gallery developed clear promotional objectives for the infrastructure following DFA’s

encouragement to further develop the web site. While DFA did not insist upon that redesign, SG were 'strongly encouraged' to update their site in order to enhance the reputation of both companies. The relationship with DFA is unusual since they are both the largest supplier to the business and a major customer (since they supply prints/originals to SG but also buy Jonathon's work for sale within their own catalogues) and so Jonathon was keen to develop that business relationship further. Consequently, while DFA in no way insisted upon the infrastructure's redevelopment Ben and Jonathon recognised that acting upon their suggestions could greatly benefit both businesses – that belief is reflected by the extensive changes made to the web site and by the strong promotional objectives set for the wider infrastructure.

SQ10 – What Benefit(s) has the Infrastructure Delivered?

The infrastructure has delivered three main benefits; on-line sales, sales enquiries and the further promotion of the business. However, the infrastructure's primary benefit is perceived to be its ability to promote and market the business through its ability to replicate printed materials. For example, since SG is the only dedicated DFA gallery within the area the ability to advertise and promote that fact amongst a geographically dispersed customer and potential customer base delivers clear benefits to the business. This use of the infrastructure supports both the local market (who use the infrastructure to research their purchases) and the wider market that are searching for the works of specific artists rather than a specific gallery that might or might not contain products of interest. Likewise, by closely tying the site's content to the DFA product range the business can appeal to those customers searching specifically for DFA artists and prints.

The use of the infrastructure has also enabled the business to widen its product range. Space is physically limited within the gallery and the business cannot display every product on its walls (because of both space and cash-flow constraints). However, the infrastructure is used to advertise the entire catalogue of DFA prints and originals. Consequently, that use of the infrastructure has enabled the business to develop two distinct sales strategies – the physical gallery is used to replicate Jonathon and Ben's tastes in art (thereby appealing to their existing off-line customer base) while the infrastructure is used to promote and advertise works that neither Ben nor Jonathon would choose to display within the gallery (but for which there is a market). That strategy enables the business to appeal to two distinct markets without tying up capital within products that might not actually sell. Hence, the infrastructure portrays the entire product range that the gallery can potentially supply while the physical gallery is managed so as to appeal to the specific group of customers that share Ben's tastes in art. In that way the infrastructure enables the business to appeal to everyone's tastes.

SQ11 – What impact has the Infrastructure had upon the Business?

Ben perceives the infrastructure to have had a very positive impact upon the business through the sale of Jonathon's work. For example, the site is regularly used to offer potential customers examples of his past works and this has led to sales and commissions.

The use of the infrastructure has also enabled the business to offer a much wider product range and this has led to the sales of works that were not offered within the physical gallery (*see also SQ10*).

The infrastructure likewise enables the business to quickly tailor their prices to prevailing market conditions. For example, the price of prints that are no longer available from DFA (but which are held in stock by SG) can be increased while slow moving items can be reduced to clear stock. To support that use of the infrastructure the site's content is updated at least fortnightly based upon market conditions and stock availability. Ben intends to expand that aspect of the infrastructure within the next 12 months to further increase both profit levels and sales volumes. Ben believes that the use of the infrastructure will be crucial to achieving those goals since the gallery cannot be physically made any bigger but the infrastructure can be expanded almost indefinitely (*see also SQ12*).

SQ12 – How is the Infrastructure's Impact upon the Business Managed?

The infrastructure is managed in a 'fluid' manner. For example, data is not collected to gauge its success in generating 'hits' but Ben does collect data relevant to its success/failure in promoting the business. The source of every enquiry to the business is recorded and that data is reviewed later by Ben and Jonathon. Consequently, the infrastructure's performance is managed in the same manner as all other sales leads in order to simplify the marketing analysis process. Therefore, while the business does not use server-side infrastructure performance measures the business's sales model entails close discussion with its customers so infrastructure performance data is collected via those discussions with customers. That analysis has revealed no differences between the on-line and off-line markets.

To maximise the infrastructure's ability to promote the business and its products, site information is updated both fortnightly (pricing information) and quarterly (when new catalogues are published by DFA). The infrastructure now details 300 – 400 prints and originals which are available for sale (either from existing stock or which can be sourced by the gallery). To safeguard against customers purchasing a print/original that is out of stock only those products currently in-stock can be purchased through the infrastructure without first contacting the gallery. Therefore, the majority of items for sale via the infrastructure instruct customers to contact the gallery to 'check stock availability' before a sale can be completed. Ben maintains that image gallery by being pro-active with suppliers to check that each print/original is still available for sale. While replacing that 'manual' system with one that utilises an automated stock management system (which in turn updates on-line stock/pricing information) would greatly lessen the time currently spent on that activity the management of such a system would be beyond Ben's technical ability. Likewise, Ben is reluctant to integrate all aspects of sales and stock control within such a system since the business's existing procedures and processes work well. Ben regularly searches other galleries' web sites to keep abreast of the market and that has revealed that every other DFA gallery makes the same prints available hence SG sell largely 'generic' products. All in-stock on-line sales can be completed solely through the infrastructure (although that is unusual since customers usually visit the gallery or phone to discuss their requirements) with pay-pal being used to take payments and DHL being used to courier purchases to customers. Those on-line sales are recorded and managed in the same way as all off-line sales.

In practical terms the infrastructure management strategy being deployed means that there is little in-house need for any IT or hardware infrastructure management or maintenance. The decision to adopt that strategy was deliberate since Ben and

Jonathon recognise that they are not IT 'experts' and wanted to develop a usable system that could be maintained in-house. Overall, Ben is pleased with the ease with which the web site can be updated and maintained (*see also SQ15*) but also recognises that within the business there is little awareness or management of the wider infrastructure that supports it.

SQ13 – Has the Infrastructure Failed to Achieve any of the Objectives Set for it?

In both its iterations the infrastructure has largely met the objectives originally set for it. While the infrastructure was redeveloped during 2004 to address the concerns of its owners the first site was deemed to have been largely successful. Likewise, the 2nd iteration of the web site and infrastructure has not failed to meet any of its original objectives. Ben believes however that that apparent 'success' might be the result of the relative simplicity of both versions of the web site. Since relatively low expectations were established for the infrastructure it could not have failed to satisfy them. That perceived 'simplicity' was not deliberately engineered into the business's on-line strategy – it is a welcome by-product of their approach.

One objective that the infrastructure has somewhat failed to satisfy concerns the sale of original art not provided by DFA. Due to the physical size of many originals and the problems associated with capturing high-quality digital images of them, Ben has been unable to promote and sell some original art work through the infrastructure. That problem does not apply to originals sourced through DFA since DFA provide the gallery with a high quality digital image for use within the web infrastructure. Consequently, the infrastructure can only be used to promote artwork for which a high quality digital image can be either provided or produced in-house.

SQ14 – What Actions Were Taken as a Result of this Failure?

The decision to redevelop the web infrastructure in January 2004 was made to address the perceived 'failures' of the infrastructure up to that point. Since there is no real perception of 'failure' no actions have been required.

SQ15 – Have you Encountered Problems with the Infrastructure?

Jonathon's lack of IT expertise meant that the redevelopment of the infrastructure was outsourced to a designer – Jonathon gave his ideas for the site to the designer who subsequently translated those ideas into a working 'mock-up' site. However, Ben now feels that the 'template' site developed has caused some problems; the site's layout cannot be easily changed (new information cannot be added to the entrance page for example) and existing information cannot be reformatted (for example, new content for artists' individual pages can only be added to the bottom of the page thus making navigation within the site more complex than it could be). Likewise, the site cannot be changed to give further emphasis to individual pages or the information that the pages contain. That limitation is believed to adversely affect the extent to which the infrastructure can be used for promotional purposes; upcoming gallery events, promotions or new artists cannot be easily marketed via the infrastructure for example. Similarly, the site does not contain a search function. Ben believes that limits its usability. In the absence of a search facility users must display high levels of patience while they manually browse pages to find what they are looking for. At the same time Ben recognises that it will be extremely difficult to address that limitation. Ben does not have the technical knowledge to add that feature to the existing infrastructure himself and does not believe that the current 'template' supports that feature. That in

turn will require a capital outlay (since the web designer would have to be used to add extra functionality to the template) which will raise the on-going costs of the infrastructure. Even if that feature was added to the infrastructure Ben would still find it extremely difficult to categorise the products so that a search function would be able to find them (for example, categorisation by size of print, artist, subject, genre, colour scheme, edition, price or a combination of each). Likewise, Ben has concerns as to how easily the web site can be found by popular search engines. To address that problem Ben has considered purchasing 'key words' with Google and using 3rd party search engine optimisation companies. However, Ben's lack of understanding of the technologies involved means that he does not feel fully able to assess the value-for-money provided by that potential solution.

The on-going cost of the infrastructure has also caused some problems. All expenditure within the business must (ultimately) be sanctioned by Jonathon and that further complicates the management of the site and the infrastructure that supports it. Similarly, since the supporting infrastructure was developed by the web developer Ben is unsure of what is actually involved in maintaining it (for example, Ben and Jonathon are unsure of which company actually hosts the site or when their domain name will need to be renewed and do not fully understand how the on-line payment mechanism (pay-pal) operates with regard to costs and commissions).

The high value of the products offered within the site has also caused some problems with regard to the volume of sales generated on-line. Ben believes that since their prints are (relatively) expensive their cost dissuades potential buyers from committing themselves to a purchase without first seeing the print 'in the flesh'. While the gallery offers customers a 14 day refund if they are unhappy with their purchases they are unwilling to replicate that within the web infrastructure because they are concerned that such an on-line feature would be abused by some 'customers'. Similarly, the lack of real-time stock and availability information within the infrastructure could be losing the business sales (since an on-line sale cannot be completed without first phoning the gallery). Ben also recognises that there is currently no way in which he can confirm or disprove that perception.

Due to an oversight at the design stage in January 2004 Ben currently has no access to server-side web site performance statistics. Since the web designer was not asked to provide this information as part of the on-going maintenance of the site that information is not available to the business. While Ben is not sure as to exactly how useful hit rate information (for example) might be for the management of the infrastructure, at present such information is simply not available.

SQ16 – How did these Problems Affect the Infrastructure's Development?

The business's desire to sell product via the infrastructure has affected its development. At present there is no simple way in which stock levels can be updated for the infrastructure and there is little overlap between the management of on-line and off-line stock levels. While stock control is managed via a spreadsheet (for the gallery) changes to that information are not automatically reflected within the information contained within the web site. Since the infrastructure cannot automatically 'close' a sale (customers must ring the gallery to check product availability) the infrastructure's main contribution to the business is in generating enquiries rather than completed sales.

While Ben feels comfortable with his IT skills and with the template provided by the designer he recognises that the ability to update the site is somewhat limited (since it is a fixed template) and that he lacks the technical competence to redesign amend the site himself to address its perceived shortcomings. Therefore, while Ben is aware of the infrastructure's limitations (its lack of a search function for example) he is also aware that he cannot correct those shortcomings without the further involvement of the web designer. While Ben would be prepared to manage some of the more technically complex elements of the infrastructure Ben also recognises that this would entail a very steep 'learning curve' for him if he were to stop using a web template and work directly with the HTML source files. Similarly, since the web infrastructure is used as a 'data base' of past and present products (new additions are made to the site but old catalogue prints are not deleted from it) there remains the possibility that the site is actively advertising products that cannot be supplied. However, that is not perceived to be a major problem since all sales are subject to the 'ring for availability' caveat.

SQ 17 – Were any of these Problems Outside of your Control?

The decision to use (and continue) using pay-pal as the preferred on-line payment mechanism was taken because of Ben's previous experiences of attempting to establish an on-line merchant account with Barclays for his previous employer. That proved to be extremely complex and that has coloured his decision to offer Visa/Mastercard payment facilities within the SG web infrastructure – if a customer wishes to pay by credit card they have to ring the gallery to complete the transaction.

The template based structure of the web site acts to limit its use; its layout and functionality cannot be amended by SG without the further involvement of the web designer. While that approach has given consistency to the site (and has negated the need to manage the wider supporting infrastructure) it has impacted upon its ability to function as a promotional tool. Similarly, Ben has little control over the infrastructure's on-going upkeep (for example, Ben is not sure who owns the URL or who hosts the site). SG recognises that that development strategy greatly simplified the development process but also accept that it has limited their ability to easily change or 'improve' the infrastructure in the future.

SQ18 – Have you been Unable to Overcome any of these Problems

The business would have liked to have exploited the infrastructure as a marketing tool via the collection and use of visitor/customer contact data but the infrastructure has failed to generate that information; customers appear unwilling to register for future correspondence via the contact pages. Ben attributes that 'failure' to the infrastructure being unable to fully support the personal nature of the business's sales model.

It has also proven to be impossible to digitise original artists' work for sale via the infrastructure. Consequently, art work that is not supplied by DFA cannot easily be ported onto the infrastructure because the quality of the digital images produced by SG tends to be unacceptably low - many of those prints and originals cannot be scanned and digitised (e.g. 6' x 6' print!) and so cannot be advertised and sold via the infrastructure.

I agree that the above transcript accurately and fairly details the discussions held between James Boyes and Ben M held on the 4th November 2004 at SG, Skipton.

Signed,

.....

Ben M.

Appendix 2 Validated Transcript Covering Letter

Mr J Boyes
■ Bramshill Close
Warrington
WA3 ■

25th November 2004

Dear Ben,

Thanks again for agreeing to take part in my research – I'm sorry that it's taken me a few weeks to get the transcript back to you. Pressures at work have prevented me from spending as much time as I would have liked to on my PhD!

As we discussed I've prepared the attached transcript based upon our conversation. I have structured the transcript around my question set in order to give it some structure. I would be very grateful if you could read the transcript through and sign it off to indicate that you agree with my interpretation of our discussions. If there is anything that you would like me to change please let me know and I'll prepare a revised one for you. If you would like to add any further comments or information please let me know and I'll change the transcript.

If you would like to talk anything through with me before signing the transcript my direct number is 078 66 ■ 50.

Yours sincerely,

James Boyes.