

**Sense Making of IT Innovations and Management
of IT Innovation Information in Small to Medium
sized Enterprises: Towards a Purposeful Inquiry
and Purposeful Intervention Concept**

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Abstract

The introduction of a modern globalised economy and the advent of the Internet and the World Wide Web have imparted a need for businesses operators to be constantly informed about relevant Information Technology (IT) innovations. Some of these IT innovations can affect business success and survival; the focus of this research was on the IT sense making and management of IT innovation information within regional Small to Medium sized Enterprises (SMEs). This research included an interpretivist sensemaking inquiry into the IT-related capabilities of SMEs. The first objective of this field-based inquiry was to examine how SMEs managed their IT information environment and how they made sense of IT innovations in practice. The second objective was to introduce practical change that demonstrably improved these two IT-related activities.

A review of the relevant literature revealed little in the way of theoretical frameworks that were capable of achieving these objectives. As a result, this research developed and tested several new research tools which were developed and tested, such as the frameworks for 'Inquiry and Intervention'. These frameworks were developed using an applied methodology known as the Soft Systems Methodology (SSM). The frameworks were then operationalised using the action research methodology within eight SME case study situations. The result of this activity was the provision of many valuable findings and insights, which related to how SMEs made sense of IT innovations in practice and how they managed their respective IT innovation information environments. Other key findings were noted, such as the highly centralised nature of the IT sense making process and the unstructured, ad-hoc nature of the IT innovation evaluation process. The IT information management of these SMEs was also noted as being poor, since they operate within an extremely rich information environment; however, most chose to make sense of IT innovations using only lean information sources. The types of IT innovation information sources identified in this study included both formal and informal, such as family and friends. The primary source of this information was from vendors of IT products and services and consultancy firms that had little or no understanding about the IT needs of each business.

Having first conducted an inquiry into the SME case study situations the focus then turned towards introducing an intervention. This intervention was in the form of a series of developmental workshops that was successful in demonstrably improving the IT sense making and IT innovation information management of those SMEs who participated. Other notable contributions made by this study include:

- A concept that allows Theory to inform Practice and Practice to inform Theory
- A picture of SME IT sense making processes in practice
- An evaluation of the SME management of their IT information environment

- A new model development process for structuring research situations using Soft Systems Methodology (SSM)
- Contribution to research design via the model development process which used modern systems thinking concepts
- Contribution to research design via a new 'Questionnaire' development and multi-staged data gathering and analysis technique
- Contribution to research design via the development and testing of an 'Purposeful Inquiry and Purposeful Intervention' concept

The research presented in this thesis also provided several benefits for those that practice in this IT area, such as:

- An evaluation of the strengths and weaknesses of the SME information environment and sense making processes
- An indication of the IT adoption or consideration process, which is highly relevant to IT marketing firms, IT vendors and IT practitioners that seek to improve organisational IT evaluation and decision making
- Provision of a new conceptualisation process that gives practitioners the opportunity to focus on both problematical and non-problematical situations
- Provision of a newly developed and tested questionnaire development and use process
- A framework for the Action Research workshop Intervention, which may also be used to structure, organise and facilitate the workshop and/or to facilitate continual improvement processes or systems

The main outcome of this research is the creation of a new 'Purposeful Inquiry and Purposeful Intervention' concept. The 'Inquiry' component is comprised of a conceptual model that expresses a new way of thinking about IT innovations, a new way of making sense of IT innovations and a new way of managing the IT innovation information environment. This inquiry model was also deemed to be highly useful to the research participants. The 'Intervention' component also contains a conceptual model of the action research workshop process; this was identified to be lacking in the literature and is therefore also highly desirable. Overall, the relevance of this research and its outcomes can be extended to the broader Australian context since SMEs are noted as major contributors to our nation's economy.

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Statement of Original Authorship

This is to certify that this submission is all of my own work, except where otherwise acknowledged. I also certify that the work was completed under the supervision of USC.

_____ (08-01-08)
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CHAPTER 1: INTRODUCTION

1.0 OVERVIEW

The research presented in this thesis conducts an interpretivist sense making inquiry into the IT innovation information management and the IT innovation sense making activities within eight regional Small to Medium sized Enterprises (SMEs). The initial aim of this field-based inquiry is to gather an understanding of the human activity and the organisational processes associated with these IT innovation activities. Having gathered this understanding the research then aims to introduce practical change. This practical change is introduced through a series of Action Research workshops. The purpose of these workshops is to demonstrably improve the IT innovation sense making process and the management of IT innovation information environments within those SMEs studied. To achieve these research aims and objectives this project applies both the Action Research methodology and several modern systems thinking concepts as applied methodologies. The main outcomes of using these concepts are the development and testing of two conceptual models that supported the inquiry and intervention process within the SME situations which resulted in introducing practical change for the participants. Both conceptual models are combined with other research design elements to form the main outcome of this research which is the Purposeful Inquiry and Purposeful Intervention (PIPI) concept.

The focus of this inquiry is on the owners and managers of an SME. A small business in this context is one that employs fewer than 20 full-time employees, whilst a medium sized business is one that employs fewer than 200 full-time employees (Cameron & Clarke 1996). Contemporary forces that have arisen due to economical, global, and technological developments has imparted a need for these owners and managers to; firstly, manage large amounts of globally transmitted information concerning new IT innovations; and secondly, to make sense of these new IT innovations in context. Given this situation, one of the aims of this research is to conduct a purposeful field-based inquiry that examines these two key areas. Insights and understanding gained from the

initial inquiry are then used as the basis for instigating demonstrable improvement within both of these nominated key areas. This demonstrable improvement takes the form of them improving the management of their IT information environment and their IT sense making processes. It is anticipated that these improvements will enhance their ability to participate in an increasingly information and technology-based world. It is also anticipated that these improvements will support these SMEs as they transfer to a modern globalised economy. This modern economy is an aspect that is discussed further in the next section (1.2).

The remainder of this first chapter continues by providing background to the overall research area of concern (Section 1.1); this section discusses the modern economy and identifies several opportunities and threats for Australian SMEs. The next section (1.2) outlines several more specific areas of concern for SMEs. The overall purpose of this section is to further tighten the focus of the research towards the SME situation by identifying specific weaknesses and relevant areas of concern for Australian SMEs. These SME related issues are then combined with the initial concerns generated in the background section. Both sections are then distilled into a summarised list of Areas of concern (Section 1.3). This list is then used as a general guide to further refine the focus of this research. Overall, these first two sections highlight the relevance and significance of this research to its domain of inquiry.

The next section (1.4) outlines the research aims and objectives, which are then converted by the researcher into several research questions and propositions. Section 1.5 follows with a discussion that outlines the two research questions and three research propositions. The next section (1.6) follows with a discussion concerning the methodology that was selected for this research. This section briefly outlines the action research methodology, which was chosen because of its appropriateness for addressing the research questions and propositions and the researcher's philosophical posture. The next section (1.7) provides a brief introduction to the 'Purposeful Inquiry and Purposeful Intervention' concept that is being developed, tested and presented through this thesis. In short, this PIFI concept is the intellectual framework of ideas that is used to achieve its aims and

objectives and to address the research questions and propositions. Section 1.8 follows with a discussion relating to the contributions that this research makes to both academia and practice. The final section (1.9) briefly introduces Checkland and Holwell's (1998) FMA framework, which is used in the first chapter to outline the overall structure of the research and the remainder of the thesis. This section also provides a summary of this first chapter.

1.1 BACKGROUND & SIGNIFICANCE

The purpose of this section is to establish the relevance and significance of this research to the broader Australian community. It is also intended to briefly introduce the modern economy concept in order to show how several factors such as globalisation and the many breakthroughs in IT are arguably held responsible for its creation. Several discussions are also presented which raise the importance as far as Australia and its SMEs are concerned for making a successful transition to this modern economy. Several concerns are identified, such as the transitory nature of the modern economy concept and the many anticipated problems associated with making a successful transition from a more traditional labour and capital oriented economy to one that has a high emphasis of both information and IT. This section also examines several modern economy initiatives, in order to show how some of these initiatives are actually government lead IT programs of change which are underpinned by intellectual frameworks that are neither applicable nor relevant for Australian SMEs. The section concludes with a discussion that relates to another more generalised purpose, which suggests that research within this modern economy domain is both highly relevant and extremely useful.

The notion of a modern economy has many different interpretations around the world. Terms such as the knowledge-based economy, the new economy and the information-based economy have been used to describe this economic phenomenon. It has also been referred to as the 'connected economy' (Drobik 2000). Terms such as the 'modern', 'new' or 'knowledge-based' economy are widely used to highlight the importance of

combining business enterprise with education, know-how, innovation, e-commerce and use of the Internet and other IT in order to generate economic growth and improved productivity across all industries (Drobik 2000). A key feature of many of the fastest growing economies such as Ireland, Finland, Singapore, Hong Kong, Taiwan and the United States is the broad political and public consensus around this theme, as a forward-looking response to the challenges of generating wealth and new jobs in the modern economy (DITR 2002).

The modern economy has arguably developed because of several global and technological factors. Globalisation and the introduction to mainstream society of the Internet and the World Wide Web (WWW) have generated ubiquitous technological change. Weber (1993) claims that this modern economy concept started as a result of the revolution in the IT sector. Rayport and Sviokla (1995) believe the rise of the virtual market space, namely the Internet, next to the physical marketplace has caused this shift away from the traditional physical market place. Mandel and Kunii (1999) put forward the notion that the evolution of the Internet, as a pervasive phenomenon, means that the traditional factors of production (capital and labour) are no longer the main determinants of an economy's power. The arrival of electronic forms of business has facilitated a shift from the mass labour paradigm of past decades to a knowledge-worker paradigm that is likely to dominate the economy for the future (Mirchandani 2001).

The modern economy has been described by the New Economy Branch of the Australian Department of Industry Science and Resources (DISR) as a concept that has occurred over the last 15 years and transformed the nature of the world's economy. A list of the key characteristics of the modern economy, according to the New Economy Branch of the DISR (2001), is as follows:

- Increasing economic integration across national boundaries
- Increasing pace of technological and social change
- Increasing pace of flow and transformation of information and knowledge
- Productivity growth linked to the rising influence of IT

- Entrepreneurship in creating growing firms

This summary reveals a heavy emphasis on the concepts of information, the rising pace of change and an increase in the importance of IT within the modern economy. The DISR (2001) also notes that firms wanting to operate in the modern economy also recognise that:

- Competition is global
- Speed is of the essence
- Collaboration, strong alliances and supply chains are needed to leverage intellectual capital
- Organisational structures are changing to ensure that organisations respond faster and more efficiently to customer demands. This means that firms must use the knowledge of all employees, foster growth in intellectual capital through life-long learning and manage and treat this as an asset.
- The use of Electronic Commerce (EC) and the Internet is an integral part of business operations
- The importance of sustainability, with triple bottom-line reporting includes other non-fiscal aspects such as supporting the commitment to social cohesion and environmentally sustainable development

This information reveals that businesses choosing to operate in this modern economy must recognise the need to consider; the size of this global marketplace; its continual pace which is 24 hours and seven days a week; the nature of conducting business which includes the collaborative exchanges of both information & knowledge; and finally the integration and sustainability of business development as major factors of consideration. The most important aspect here is the continued importance and use of both information and IT as a tool that underpins many of these modern economy activities.

There are many countries striving towards operating in this modern economy. Some of these countries have been shown to 'push' on-line concepts onto selected businesses and

industry sectors. Problems emerge when we consider the possibility that some of these businesses may or may not appreciate having to engage an on-line technology because of some political or government driven policy. There is evidence that suggests these global and technological changes are not appreciated by all. For example, better on-line integration with the wider world has many advantages; however, it has been accompanied by changes underpinning the cohesion and interdependence of some of these communities with mixed influences upon the individuals living in them (Wilde & Swatman 2001). For example, the 'UK Online' initiative is one that is clearly based upon government ideals that ultimately reflects a significant IT-based alteration to the habits of both business and individuals alike. The UK Online program is further discussed in the literature review chapter.

For the most part, these changes have created a need for large and small businesses alike to consider operating in new ways using new technologies in a relatively new economy. The basic proposition here is that technological changes have ushered in a real need to manage organisations in fundamentally different ways than in the past (Wielmaker et al. 2001). Arthur (1996) believes that it is a mistake to believe that what works in one economic world is appropriate for the other. Arthur (1994 & 1996) also suggests that business now needs a different set of rules, the rules of the modern economy.

There is some speculation that SMEs that have been operating in the traditional economy will find it difficult to make this transition. Even larger firms will need to manage the modern economy concept differently from the traditional economy; Wielmaker et al. (2001) believes this stems from their strength in dealing with the traditional economy. They note that large firms have become so efficient with the traditional economy that their initiatives are embedded in their routines and logic. Because of their 'historical luggage' these larger firms will have more trouble than start-up firms in the modern economy. Even firms that are well-established will need to consider managing the differences between the traditional and the modern economy; they must also free themselves from an overly rigid commitment to developing in the way of the traditional economy (Wielmaker et al. 2001).

In Australia, the national economy can be seen as one that is in transition towards a modern or knowledge based economy. This is an economy where all sectors have become knowledge-intensive, and not just those usually called high-tech. Although no country has a fully developed modern economy in the above sense, many economies, including Australia, are moving closer to that state (DISR 2001). Australia is well placed to gain the productivity improvements and economic growth of the modern economy; this could be due to its strong uptake of new online technologies, well-developed information and telecommunications infrastructure and high level of education (DITR 2002). Given the transitional nature of the Australian and the modern economy there is some concern as to how SMEs will react to something that is itself in a transitional state.

Australia is not the only country affected by these economical forces for change. The forces driving the modern, knowledge-based economy can be seen to be fundamentally reshaping the world's economy (APEC 2000). Taken as a whole, the introduction of this economical phenomenon means that SMEs have to seriously consider their capabilities in this modern globalised economy. The relevance and importance of this has been noted by The National Office of the Information Economy (1998), who notes that success in this modern economy is seen as key to Australia's overall business survival. This could be partly due to the high number of knowledge based industries which account for an increasingly large portion of the business sector value-added in Australia (DISR 2001). Overall, it does appear that Australian SMEs must consider operating in this modern economy in ways that differ from their traditional methods and avoid their historical luggage.

1.2 JUSTIFICATION & MOTIVATION

The purpose of this section is to present several specific areas of concern for SMEs that motivated the research inquiry and intervention process. This section also provides justification for conducting an inquiry and intervention into the chosen SME situation.

An area of concern for Australian SMEs is the possible erosion of business opportunities. The use of IT has been said to help improve business competitiveness on-line by providing the opportunity for SMEs to compete on equal terms with larger organisations (Mellor 1998). Conversely, some believe that because of these technology changes larger organisations will now impinge on the traditional strengths of SMEs. These SMEs have traditionally been able to gain advantages over larger businesses by developing personalised relationships with customers, customising their offerings, and efficiently targeting niche markets (White 1998). The cost effectiveness and accessibility of the Internet means that larger organisations can now cater for smaller niche markets that have traditionally been under SME ownership. Because of these concerns, the chosen focus for this research is Australian SMEs.

Another concern for SMEs stems from them being different from larger organisations. Literature exists which indicates several fundamental differences between large organisations and SMEs. A pan European survey has demonstrated that a firm's relative size and position directly reflects upon its IT adoption rates and intensity of IT usage (Routes to the Information Age, 1999). Fallon and Moran (2000) also found significant links between the size of a firm and its level and intensity of IT activity. Iacovou et al. (1995) identify not only size as an important factor but also the levels of internationalisation, types of exporting activities, awareness of benefits, types of customers and imposition by larger trading partners. There is other evidence to suggest that IT adoption and usage varies not only with size but across sectors and within sub-sectors. This is perhaps due to size variations that are measured as number of employees, turnover, and asset values (Matlay 2000). A recent study conducted in New Zealand also identified possible differences between regional businesses. Locke and Cave's (2002) study noted a marked difference in usage of IT between various regions in New Zealand. Because of these differences the focus for this research is further refined to include regional SMEs.

Other studies have shown that smaller businesses have unique computing needs as well as distinctive technological acceptance patterns (Rogers 1995; Craig & King 1993).

SMEs have also been cited as having highly centralised structures with 'Chief Executives' making most of the critical decisions (Blili & Raymond 1993). SMEs have relatively informal, flat and centralised structures in comparison to larger organisations (Hale & Cragg 1996). IT alignment can also be much more rapid in SMEs than in large organisations because of their superior responsiveness (Wiele & Brown 1999). SMEs have also been noted as having limited understanding (Thong 1999, Yellow Pages Small Business Index (SBI) 1999, Marshal & McKay 2002), resources (Lawrence et al. 1998, Yellow Pages SBI 1999), and capabilities (Thong & Yap 1995; Yellow Pages SBI 1999) to expend in these important strategic situations. SMEs have been shown to lack the resources of larger firms, and they are reported to be highly susceptible to short range planning (Welsh & White 1981). SMEs are also noted as having a smaller concentration of diversity and skills and experience (McAdam 2002), and are unlikely to have a breadth of experience and knowledge (Raymond et al. 1998). SMEs are by nature resource limited in comparison to larger organisations (McAdam 2002). Barrier (1994) and Kinni (1995) define these resource limitations as human, material and financial. The relevance here is that a drain on SME resources has been shown to hinder their overall ability to function (Ryans 1995).

SMEs have also been shown to engage generalists rather than specialists (Craig & King 1993). SMEs also have difficulty in attracting and retaining skilled staff in comparison to larger firms (Gable 1991; Nootboom 1988). SMEs have also been shown to experience problems with estimating the time and effort required for Information System (IS) projects. This ultimately increases the risk of IS adoption failure (Gable 1991). It has been documented that SMEs are unable to absorb this failure as well as larger better-equipped businesses (Montazemi 1988). Both Fuller (1985) and Montazemi (1988) provide evidence that suggests the act of purchasing technology which does not match the business needs of smaller organisations may have devastating effects on their survival. Thong (1999) claims that this type of situation could lead to smaller firms becoming wary of new IS. Ultimately, Jennings and Beaver (1993, 1995 & 1997) maintain that the fundamental difference between SMEs and larger firms occurs because they operate in different situations with differing circumstances.

Traditionally, global and technological change has generally been dealt within SMEs by their respective owners and managers. This is because it usually falls upon the small business owner manager to recognise the opportunities and threats within their chosen target market (Matlay 2000). The reactive or proactive approach of owners and managers to rapid IT change in the marketplace is also crucial to the IT adoption and implementation process. Management's perception and commitment to IT benefits are also seen as key features in the IT adoption and implementation process (Poon & Swatman 1997). There is also research that points to the owner's involvement and enthusiasm for IT innovations as being a critical success factor, particularly during the IT implementation stage (DeLone 1983 & 1988; Lees 1987, Cragg & King 1993). As a precaution, Cragg & King (1993) warn of the dangers associated with the owner spending too much time on this type of activity.

The overall significance of the individual surfaces when it is considered that the knowledge, skills and experience of owners and managers are said to make the crucial difference in grasping the new opportunities offered by the World Wide Web (Matlay 2000). The individual capabilities of management are becoming increasingly important to the decision making process, particularly with the adoption of new technologies. In this context, sound information gathering skills have been found to considerably reduce IT related adoption costs and uncertainty. This reduction in uncertainty and adoption costs also raises the likelihood of early implementation of new technologies (Thomas et al. 1991). Supri et al. (2000) found that technological change and its implications on smaller firms' strategy will make IT even more important and that knowledge and skills of both management and the workforce are likely to be the key to competitive differentiation. SMEs also appear to need improvement in their gathering of information concerning new technologies. Problems associated with a lack of information have been shown to be detrimental to the SME adoption or non-adoption process (Poon & Swatman 1997; Thong 1999; Yellow Pages SBI 1999; Marshall & McKay 2002).

Thong and Yap (1995) propose that if the owners of business are unaware of, or alternatively they do not understand, the technology available to them then they are most unlikely to adopt the innovation. Thong (1999) adds that the levels of knowledge regarding the innovation by the owner/manager combined with organisational characteristics such as the size and internal IS knowledge also influences the adoption rate of technologies. One interesting observation that emerged from an Australian study (Marshall & McKay 2002) was that SME owner-managers were sometimes poorly equipped to assess the advice of outside consultants. Thus some managers in their study sought external advice, but felt unsure of how to evaluate the recommendations made by these consultants. These studies underline the benefit of improving technology related information gathering skills, and suggest that by improving the information gathering skills of SME owner managers a reduction in uncertainty and a reduction in adoption costs should occur. The improvement of IT information gathering skills within SMEs is one of the main aims of this research.

One final motivating factor for focusing on regional SMEs comes from Fuller (1996) who points to a growing body of literature which suggests an increase in the technical abilities of workers in larger firms. This increase could be explained in part by research conducted by DeLone (1981) & Raymond (1987) that found larger firms are more likely to own computers, or to make sophisticated use of IT innovations; this could cause a serious social disparity to develop between the workers of larger and smaller businesses. For example, knowledge workers would only be developed because they have the opportunity to work within a larger business. Making a successful leap to the modern economy within Australia, given its larger concentration of SMEs, could prove to be a difficult transition.

1.3 RESEARCH AREAS OF CONCERN

The main objective of this section is to further refine the focus of this research by outlining several important areas of concern. The overall output from this section is a

summarised version of several key areas of concern that this research examines. This list is also used to further refine the research focus. The first area of concern stems from the concept of a modern economy. Taken as a whole, the introduction of the modern economy means that SMEs have to examine and improve numerous IT-related capabilities. The significance of this concern was shown to be an important objective at a higher level given that the National Office of the Information Economy (1998) sees success in this modern economy as key to Australia's overall business survival.

The second section (1.2) identified the need to consider the many individual characteristics of SMEs and their owners and managers. This was due to the heavy emphasis on the technology-based capabilities within the modern economy, and the many fundamental differences between larger businesses and SMEs. The need for supporting these types of businesses was considered important because making poor decisions concerning new innovations in IT was shown to be detrimental not only to these SMEs but also Australia's future economic survival. This section further raised the overall significance and importance of firstly examining and secondly improving the IT innovation sense making and IT innovation information management capabilities of Australian SMEs.

It appears that many SME owners and managers are now faced with managing massive amounts of globally transmitted information concerning new IT innovations. They also have to make sense of these new IT innovations in the context of their own unique business with very little support. All of this activity was also shown to occur against a global backdrop of forced IT-related initiatives and global economic change. Overall, the management of this information is an important activity for SMEs because it not only provides the basis for organisational and individual sense making but also for the IT decision making process. Overall, this research is concerned with the following key aspects:

- The nature of the modern economy

- The information management capabilities of SMEs, with a particular reference to information concerning new IT innovations
- The IT sense making processes of SMEs
- The IT sense making capabilities of SMEs
- The IT-related capabilities of Australian SMEs and their ability to successfully operate in a modern and increasingly globalised economy
- Improving the capabilities of SMEs with regard to the management of their IT information environment and their IT sense making capabilities.

These summarised areas of concern are used to provide assistance to the structure and focus of the following sections.

1.4 RESEARCH AIMS AND OBJECTIVES

The purpose of this section is to outline the research aims and objectives. The majority of the content of this section arises from the discussions and concerns outlined in the previous sections. This section is concluded with a discussion that outlines the research aims and objectives.

Given the nature of the modern economy, the need for SMEs to successfully operate in this increasingly globalised environment and the capabilities of SMEs with regard to the management of their IT information environment and their IT sense making capabilities, this research seeks to achieve a number of aims and objectives. One of the initial objectives of this research is to examine the information that SMEs use to help them make sense of new IT innovations in practice. The research also seeks to examine the IT information environment that SMEs operate in and their overall IT innovation information management capabilities. The primary aim of this research is to conduct a series of field-based inquiries that generate understanding and awareness of these SME activities. This understanding and awareness is then used as a basis for instigating practical change via a series of developmental workshops. The second aim of this

research is to establish a framework of ideas that enables the research to demonstrably improve several IT-related aspects of those SMEs that participate in this study. One underlying feature that emerged from articulating the research area of concern is that it is an extremely important activity for Australian SMEs to keep abreast of the global IT state of affairs. Overall, the research seeks to achieve the following objectives:

- To explore and understand the information environment that SMEs are dependant upon to make sense of new IT innovations
- To explore and understand how SMEs make sense of these new IT innovations in practice
- To discover ways to improve the IT sense making and management of IT innovation information capabilities of SMEs
- To develop and test a framework of inquiry that incorporates a purposeful intervention process that is relevant and capable of demonstrably improving the IT-related capabilities of SMEs.

These stated research aims and objectives are further refined by the development of several research questions and propositions.

1.5 RESEARCH QUESTIONS & PROPOSITIONS

The purpose of this section is to outline the research questions and research propositions that arose from the aims and objectives stated in the previous section. Two research questions and three propositions are developed to address the research aims and objectives. The research questions are as follows:

R.Q.1. How do SMEs make sense of new IT innovations in practice?

R.Q.2. What information are they reliant upon to support the sense making of new IT innovations in practice?

The first question seeks to understand how SMEs actually go about making sense of new IT innovations in practice. The second question examines the information aspect because it has a high degree of significance to the IT sense making processes. Overall, the research questions provide an opportunity to gather an initial understanding of each SME situation. This provisional understanding is then used as a foundation for introducing change within each of the participating SME situations.

The introduction of the following research propositions is considered important and necessary since this research project involves the development and testing of a series of intellectual frameworks that are designed to achieve the previously stated aims and objectives. The opportunity to develop these propositions also stems from the selection of the action research methodology and the use of other systems thinking concepts that are primarily engaged as applied methodologies. Further discussions outlining these systems thinking concepts are presented in chapter 3.

Given these considerations, the propositions developed for this research are as follows:

P.1. That a model of ‘Inquiry’, which is underpinned by Systems Thinking concepts, provides a suitable foundation for conceptualising the research situation as an ‘IT Innovation Information System’ which is both useful and appropriate for conducting a ‘Purposeful Inquiry’ that identifies the sense making processes and the information SMEs are dependant upon to help them make sense of new IT innovations in practice.

P.2. That a model of action researcher ‘Intervention’, which is underpinned by Systems Thinking concepts, provides a suitable foundation for conceptualising and conducting ‘Purposeful Intervention’ activities that demonstrably improve both the IT information management and IT sense making capabilities of SMEs.

P.3. That the ‘Purposeful Inquiry’ and ‘Purposeful Intervention’ models combine to provide a useful and appropriate way of identifying, addressing and

demonstrably improving the IT information management and IT sense making capabilities of SMEs.

In summary, the research questions and research propositions are addressed by engaging several systems thinking concepts such as Checkland's (1981) Soft Systems Methodology (SSM), Checkland and Holwell's (1998) FMA and the Action Research methodology discussed in the next section.

1.6 RESEARCH METHODOLOGY

The purpose of this section is to briefly introduce the Action Research (AR) methodology and the reasons why it was chosen for this research project. A more detailed discussion is presented in chapter 4 (Research Design). The research presented in this thesis is presented from an interpretivist perspective that takes a holistic and sense making approach to addressing the research questions and research propositions. The study seeks to understand the activity that exists in relation to IT sense making within SMEs. In addition to this is the examination of the information that SMEs use to support the activities of IT sense making. It is important at this juncture to realise that this research does not attempt to test any hypotheses; rather, it attempts to address the research questions and to confirm or reject the research propositions. It is also important to note that the research propositions necessitate an intervention which yields demonstrable improvement in SME capabilities. In order to achieve the research aims and objectives a methodology that was conducive to these interpretivist beliefs and the research goals was used. Given these constraints the researcher selected to operate the 'Purposeful Inquiry and Purposeful Intervention' framework using the AR methodology.

The most commonly used description of the methodology known as AR is that supplied by Rapoport (1970). Action research 'aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework' (Rapoport 1970, p. 499).

Researchers that have recently discussed the importance and usefulness of using AR in the context of the discipline of IS include Avison et al. (1999), Baskerville and Wood-Harper (1996), Lau (1997), Nielson (1999) and Stowell, West and Stansfield (1997). Within the discipline of IS researchers Susman and Evered (1978) were amongst the first to use AR. Their main objective was to develop the self-help abilities of those people facing the problem. Both Susman and Evered (1978) and Rapoport (1970) concur that social inquiry should see the participants benefit from some form of collaborative learning experience.

Action researchers need to also presume that complex social systems cannot be reduced for meaningful study, nor can sociological experiments ever achieve repeatability. The contention of AR is that social elements can be studied best by introducing change and then observing the effects of these changes (Baskerville & Pries-Heje 1999). Action research also provides optimal access to practice (Galliers 1990). The strength of the approach is the strong interaction between research and practice. The weakness is the limited support provided to structure the research process and findings. In order to mitigate some of the concerns with AR this research also develops and tests a framework of ideas that is used to both support and guide the action research workshop situations. This framework of ideas is presented as a conceptual model of Action Research workshop Intervention. The conceptual model is also used as a device for reporting and discussing the manner and outcomes of the AR workshop process.

There are many modes and types of AR to choose from (Lau 1997). This study uses a combination of the Appreciative mode (Cooperrider & Srivastua 1987) and the Participatory mode (Park 2001; Cronholm & Goldkuhl 2004). These modes of operating the AR methodology and the reasons for their selection are presented in section 4.1. Overall, the selection of the AR methodology as the most appropriate research approach is supported because of the interpretivist sense making and collaborative nature of this research.

1.6.1 Three Stages of Researcher Intervention

The purpose of this section is to provide a brief overview of the overall intervention process. One of the initial aims of this research is to conduct an inquiry concerning the IT information and IT sense making aspects. Once an initial understanding is gathered the project then looks at ways of improving the capabilities of SMEs. The main benefit that attracted businesses to the research was the chance to explore and understand their own situation. Another benefit to these participants was the promotion of their self-help capabilities. To achieve these objectives the research needed some form of intervention. The need for an intervention also comes from the selection of Action Research as the project's methodology.

In this research project, there are three stages of researcher intervention which are presented in Figure 1.1.

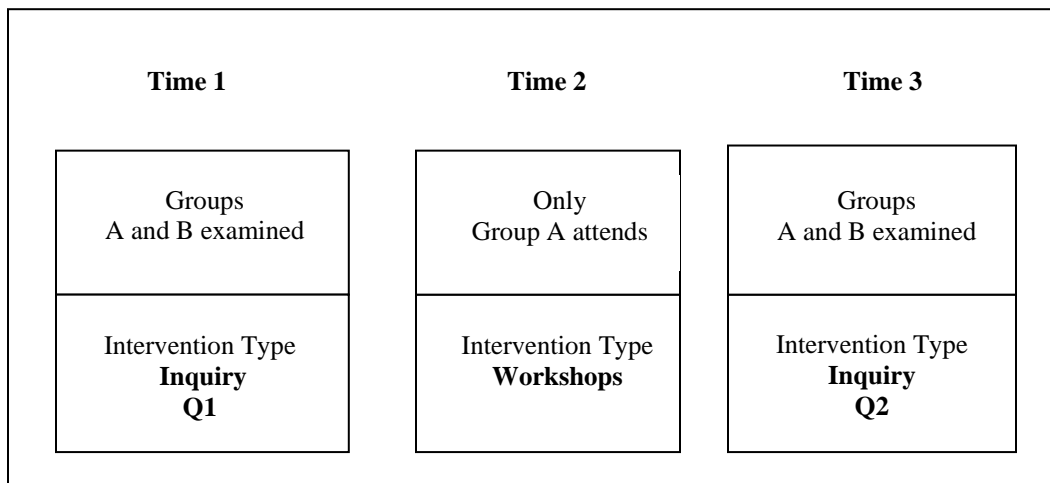


FIGURE 1.1 THREE STAGES OF RESEARCHER INTERVENTION

The first intervention is the implementation of a questionnaire in a field-based interview to support the conducting of a Purposeful Inquiry (Q1). The second intervention, the AR workshops, takes the form of a series of two-hour training sessions that are purposefully designed to help SMEs improve their sense making of IT innovations and management of IT innovation information capabilities. The role of the researcher in this part of the

project is primarily as an observer and facilitator of the workshop process. The third intervention is the second inquiry and this instance of intervention is labelled Q2.

This research examined eight SMEs. The number of cases to select and the composition and selection of these case studies is further discussed in the research design chapter (Section 4.4). Of these SMEs four (4) were invited to participate in a series of developmental workshops. This group of SMEs was labelled group 'A'. The remainder were labelled group 'B'. Group B was precluded from attending these workshops. This was necessary to effectively identify the practical outcomes from the workshop intervention process. Both groups were examined before and after the workshop intervention via the first and second field-based inquiries (Q1 and Q2). The purpose of this second inquiry was to indicate whether demonstrable improvement was achieved as a result of the workshop intervention process and to determine if the researcher introduced practical change. The opportunity to split these two groups also developed because of the multi-staged data gathering and analysis technique. This type of separation offered the opportunity to conduct many comparison and reflection activities. The main reason for using two groups is to show if the developmental workshop process actually provided any demonstrable improvement within the SMEs that participated. The demonstrable improvement that occurred within group A is outlined in chapter 6 (Section 6.3.2).

1.6.2 FMA as an Applied Methodology

The purpose of this section is to outline the first of two applied methodologies used in this research. The applied methodology discussed in this section is Checkland and Holwell's (1998) Framework, Methodology and Area of interest (FMA) framework. The second applied methodology is discussed briefly in this section with a more detailed discussion presented in chapter 3.

Checkland (1985) maintains that a researcher's epistemological position should be declared in advance. Checkland and Holwell (1998) also suggest that a declaration in advance of the 'aims of the inquiry' and the intended research method is needed. Without

this form of declaration, any learning outcomes can only be considered as being no more than anecdotal. Checkland (1985) argues that a researcher should be able to declare in advance the framework of ideas (F), the methodology (M) and the area of concern (A). Checkland (1991) maintains that the elements of any research can be expressed using the elements of FMA. Checkland and Holwell (1998) explain the FMA framework as a particular set of conceptual ideas ‘F’ that are used in a methodology ‘M’ to investigate some area of interest ‘A’ as shown in figure 3.1.

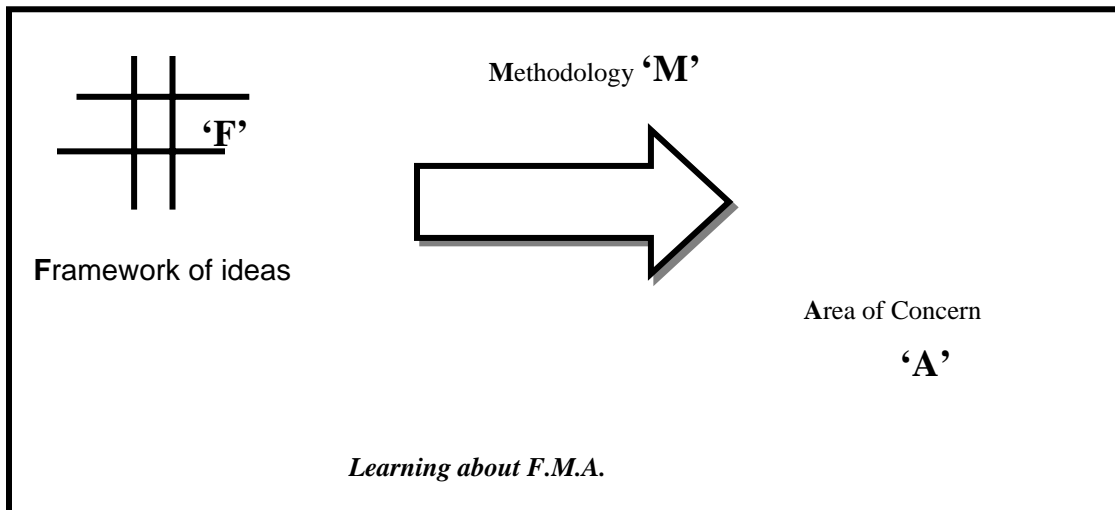


FIGURE 1.2 THE FMA FRAMEWORK (ADAPTED FROM CHECKLAND & HOLWELL, 1998)

This research uses Checkland and Holwell’s (1998) FMA framework as an applied methodology to help outline the intellectual ideas that surfaced during the development of the PIPI concept and its two conceptual models (F) and to structure the overall research process. The chosen methodology (M) is the AR methodology which is further discussed in chapter four. The use of the AR methodology also incorporates the conceptual model of the AR workshop intervention developed in this chapter. The (A) is the SME area of concern, which was outlined in chapter one.

The FMA is as an applied methodology to enable those involved in the inquiry to make sense of the emergent characteristics, since the researcher’s ideas about the F the M and the A may all change as the inquiry unfolds (Checkland 1985). In addition, those that

conduct a social inquiry guided by the FMA framework have the opportunity to reflect about the Area of interest and about the adequacy of the F and the M (Checkland & Holwell 1998). The FMA is also used in this study to guide the researcher through a process of critical inquiry and reflection (Stowell et al. 1997). The critical reflection process focuses on the adequacy of the F and M used in this research and these discussions take place in chapter six. The use of FMA also permits those that are not involved in the inquiry to scrutinise the learning outcomes and to make judgements about the credibility of the inquiry (Checkland & Holwell 1998; Checkland & Scholes 1999). The aspect of credibility of the inquiry and the learning outcomes generated by this research is addressed along with the research questions and research propositions in chapter six.

1.6.3 Soft Systems Methodology as an Applied Methodology

The purpose of this section is to briefly outline the second applied methodology used in this research. The methodology discussed in this section is the Soft Systems Methodology (SSM) (Checkland 1981; 2000). The methodology is used in this research as a tool for designing the two conceptual models and to support the two field-based inquiries. One of the core ideas of SSM relates to people taking intentional, designed, organised or managed activity. This is termed purposeful human activity (Checkland 1981). SSM has a modelling phase based on conceptualising organisational processes by using a Human Activity System (HAS). The use of HAS models in IS always assumes that the purpose of creating an organised IS is to serve some real-world action; namely, organised provision of information is always linkable to action (Checkland 1983). SSM is also well known and widely used as a soft systems approach to modelling ill-defined problems within a social setting (Checkland & Scholes 1990). However, these models are “only a means to an end, which is to have a well-structured and coherent debate about a problematical situation in order to decide how to improve it.” (Checkland & Scholes 1990, p.43). The idea of improving problem situations using models appears to be the focus of SSM (Checkland 1981). Models used in SSM are not simplified conventional

descriptions of something; rather they are ideal design ‘concepts’ of what they represent or alternatively, ideas or a frame of reference to think about something. SSM calls these ‘conceptual models’ which does tend to confuse people with the normal connotation of model which is a formal description of some phenomenon (Ledington & Ledington 1996). These conceptual models can be used to help us think about people involved in real world purposeful activity. SSM conceptual models can also be used a basis for structuring a set of questions about the situation. For example, in traditional SSM, the analyst would engage the conceptual model with the situation and derive questions to structure a debate about change (Davies & Ledington 1991). This study uses the first conceptual model to guide the questionnaire development process and this aspect is outlined in section 4.4.1.

Checkland and Scholes (1990) separated out two modes of SSM in action. SSM mode 1 is the explicit application of SSM to guide action research. SSM mode 2 is a conceptual framework to be incorporated in everyday thinking. The main feature is the recognition of two equally important strands of analysis – a logic-based stream of analysis and a stream of cultural analysis. Both streams may be regarded as stemming from the perception of purposeful actions (Checkland & Scholes 1990). The enquiry stream seeks to illuminate the problem situation. This is accomplished by comparing models with perceptions of the real-world situation. These comparisons structure debate about change. The second stream examines the intervention itself and the situation as a social and political system. The logic driven and cultural stream interact. The selected activity that is found relevant to people in the problem situation will be determined by the culture in which it is immersed (Checkland & Scholes 1990).

This research uses the SSM as an applied methodology to support both the modelling process and the two field-based inquiries. The traditional model of SSM involves seven phases. This research only utilises two of these phases in the SSM to derive the two conceptual models and this can be seen as a limited application of the methodology. This limited application is an aspect that is discussed in section 3.5. Section 3.5 also further outlines the SSM and its overall relevance and use to this research.

1.7 PURPOSEFUL INQUIRY AND PURPOSEFUL INTERVENTION CONCEPT

The purpose of this section is to briefly outline the overall approach which was used to support and facilitate the research. Discussions about the Purposeful Inquiry and Purposeful Intervention concept are expanded and presented in chapter 3.

In order to address the research questions and the research propositions the research inductively develops two models or frameworks of ideas. Both conceptual models are created using Checkland's (1981; 2000) SSM as an applied methodology. SSM is used to help define and represent the two separate systems being used in this research. This aspect is further discussed in section 3.5. The methodology is engaged within this research as an applied methodology and as such its use is limited. SSM is first used to create a root definition of the intended research situation. The root definition within the language of SSM depicts careful and concise descriptions of purposeful human activity (Checkland & Holwell 1998). The SSM root definition is then used to construct a conceptual model of an 'IT innovation information system' and a conceptual model of 'AR workshop Intervention'. The first conceptual model is then used to support the field-based inquiry. The constructs portrayed in the model of an 'IT innovation information system' are essentially used to create a compartmentalised questionnaire that is then implemented in the field. The questionnaire contains a series of questions designed to explore each of the constructs portrayed in the model. The use of this compartmentalised approach is necessary to identify the human activity in relation to each of the particular constructs represented in the conceptual models. This was supported by incorporating the interrogative pronouns Who, What, Where, When, and Why as a sub-framework of ideas to be used during the interview process. This sub-framework was applied to each construct. Once completed, the outputs of the questionnaire were examined individually (for example, all of the constructs portrayed in the model) and holistically (the whole model); further details of this are presented in chapter 4.

The main output of the first field-based inquiry (Q1) takes the form of qualitative quotes from user texts. These insights that are themselves comprised of text responses taken from the interviewees during the field-based interviews. These responses have been distilled by the hermeneutic data analysis process and presented in this research as informative strings of text. These text quotes or informative strings of text are themselves interpretations of people performing these activities. These interpretations were then analysed using the principles of hermeneutics which is presented in chapter 4 (section 4.4.4). These interpretations help the researcher understand 'how' they went about this activity, and they allowed the researcher to put structure to their situation. They also identified any strengths and weaknesses, which were then further enhanced and addressed within the confines of the AR workshops. Essentially the model of an 'IT Innovation Information System' was used to inquire and the output of this first inquiry was then used to facilitate change within those SMEs that attended the developmental workshops. The usefulness of this first conceptual model was demonstrated by its ability provide valuable understanding and insights concerning each SME situation that was explored.

Having conducted the first inquiry (Q1) the focus then turned to the second part of the intervention process: the AR workshop. Several participating SMEs attended a series of developmental workshops designed and facilitated toward improving their relevant IT related capabilities. After this AR workshop Intervention process each of the participating businesses were given a period of several months in which no contact with the researcher was made. This lag in time allowed the third stage of the intervention process to take place. The purpose of this second inquiry (Q2) was to implement the same questionnaire that was used in Q1 to determine if any changes were made and what demonstrable improvement occurred in the group of businesses that attended these workshops. Comparisons were then made between the situations before and after the AR workshop Intervention process. Another objective was to see if any improvement occurred in the group without the second stage of intervention (the workshops). Both inquiries (Q1 and Q2) provide valuable insights into each of the situations explored. The use of this second inquiry (Q2) was not intended to support any repeatability aspects.

1.8 CONTRIBUTIONS OF RESEARCH

The benefits of this research project extend to the general research community since several new research frameworks were established and then tested in various SME case study situations. It is anticipated that the understanding generated by this research will make a contribution to academia and those practitioners dealing with similar IT related situations. The contributions to knowledge presented in this dissertation have arisen through the development, application, and assessment of several new frameworks. Although they are useful individually, the Purposeful Inquiry component and the Purposeful Intervention component are combined within this research to support the previously nominated objectives.

It is anticipated that the research will contribute to knowledge in the following areas:

- Contribution to academic literature by providing a concept that enables Theory to inform Practice and Practice to inform Theory
- Contribution to the IS literature by providing a new research concept that enables social forms of inquiry and intervention
- Contribution to SSM theory via the application of several SSM concepts in a new way
- The creation of a new conceptualisation process for structuring research situations that are either problematical or non-problematical
- Further testing and refinement of the previously published model of an 'IT Innovation Information System' (Ledington & Glen 2001)
- The provision of a new way of thinking about IT innovations for those in practice
- The provision of a new way of making sense of IT innovations for those in practice
- The provision of a new way to manage IT innovation information for those in practice
- A picture of both IT sense making in practice and IT innovation information management practices within regional SMEs

- An evaluation of the strengths and weaknesses of the SME information environment
- Further operationalisation of the Inquiry-In-Inquiry concept (Ledington & Glen 2002)
- Contribution to research design via conceptual model development (use of modern systems thinking concepts), questionnaire development and field use, a new multi-staged data gathering and analysis techniques and the development and testing of an ‘Purposeful Inquiry and Purposeful Intervention’ concept

The main contribution to knowledge will be the provisional understanding regarding the IT information environment that regional SMEs operate in. In addition to this will be the understanding about the IT sense making processes of regional SMEs. Another major contribution is the creation and testing of a new ‘Purposeful Inquiry and Purposeful Intervention’ concept which may be used by both academics and practitioners to improve the IT information management and IT sense making capabilities of SMEs or simply to ‘Purposefully Inquire’ or to ‘Purposefully Intervene’ in situations. These contributions are further discussed in chapter 6 (Section 6.4).

1.9 STRUCTURE AND PRESENTATION OF THESIS

This section is provided to show how the research thesis and the research project are put together and communicated. The section uses Checkland and Holwell’s (1998) FMA framework to help explain the overall research strategy and the structure of this thesis.

The research presented in this thesis has a total of six (6) chapters. The first chapter sets the scene for what is to follow and outlines the chosen Area of concern (A). The chapter includes several discussions concerning the overall aims and objectives of the research including the research questions and propositions and the contributions to knowledge. The second chapter follows with a critical review of the literature. The literature reviewed examines the foremost frameworks, models, constructs and intellectual ideas (F) that

have been used to date to study similar IT situations. The chapter identifies several problem themes within the existing literature. An additional purpose of this review process is to provide the methodological justification for developing a new approach to examining the relationship between SMEs and new IT innovations.

The third chapter presents the framework of ideas (F) that this research develops and uses. It introduces the need for systems thinking concepts and for conducting social forms of inquiry. The chapter develops and presents the two intellectual frameworks that combine to form the overall approach taken by this research. The chapter also outlines the relationship between these two explicitly separate systems. This new PIPI concept is the framework of ideas (F) that is used to conduct both the purposeful inquiry and the purposeful intervention aspects of the research.

The fourth chapter outlines and discusses the research design found to be most appropriate for this particular research. The chapter also articulates the researcher's chosen AR methodology (M), and the methods and techniques used to accomplish the research objectives. The chapter further outlines the AR workshop interventions and the unique multi-staged data collection and analysis process. The chapter is concluded with a summary of the research design.

The fifth chapter presents the findings from operationalisation of the 'Purposeful Inquiry' and 'Purposeful Intervention' frameworks. This chapter presents the key findings and insights generated by this study.

The sixth chapter begins by conducting several comparison and critical reflective learning activities. This final chapter continues with generating more learning about the Area of concern (A) as a result of applying the frameworks of 'Purposeful Inquiry and Purposeful Intervention' (F) and then reflecting upon their operationalisation having used the AR methodology (M) across multiple case study situations. Having completed this critical reflection process the chapter then addresses the two research questions and the three research propositions. The chapter also presents the implications for theory and

practice along with making recommendations for future directions for research. This sixth and final chapter concludes the thesis.

CHAPTER 2: LITERATURE REVIEW

2.0 OVERVIEW

The purpose of this chapter is to review the literature that is both relevant and useful for addressing the stated research aims and objectives. This second chapter contains a critical review of several leading frameworks (F) that have been used to research differing aspects of the IT-business relationship. The subject matter of the review focuses on the leading models and theories that have been used within the areas of IT adoption, acceptance, diffusion and the IT evaluation and investment process. The main outcome of this review is the identification of several research related issues which are used in this study as justification for the development of a new framework of ideas which is presented in chapter 3. The research issues identified at the end of this review process are also compared with the findings generated by the application of this new framework in chapter 5. The frameworks reviewed here have their origins in many different disciplines ranging from information systems, management, accounting, human resources, psychology and marketing through to areas relating to the social and behavioural sciences. These frameworks have been selected because of their relevance to this research and their overall prominence and use. The ideas examined in this second chapter are as follows:

- The Technology Acceptance Model (Davis et al. 1989)
- The Theory of Planned Behaviour (Ajzen 1991; Mathieson 1991)
- The Decomposed Theory of Planned Behaviour (Taylor & Todd 1995)
- The Integrated Model of Information Systems Adoption (Thong 1999)
- The DTI Adoption Ladder (adapted from Martin & Matlay 2001)
- The Innovation Diffusion Theory (Rogers 1983:1995; Brancheau & Wetherbe 1990; Agarwal & Prasad 1997).
- The Innovation Decision Process Theory (Rogers 1995)
- The Balanced Score Card Approach (Kaplan & Norton 1992; 1996)

The literature review process is not oriented toward the traditional identification of any theoretical gap or testable hypothesis. Perry (1998) notes that the traditional literature review has some initial theoretical frameworks modelled with boxes and arrows charting the body of knowledge and identifying gaps. By contrast, this research conducts an interpretivist review which uses this literature as a sense making tool in a continual and iterative process of discovery and learning. Yin (1994) put forward the notion that theoretical gaps need not be expressed as precise, testable, closed yes/no propositions or hypotheses, but as general broad, open research issues. Overall, the literature review process will highlight several issues that are relevant to this research and its chosen Area of concern (A). The literature review chapter is concluded with a summary that presents several research related issues and themes that emerged from this literature review process. This study uses these research issues and themes as justification for the development of a new framework of ideas which is presented in chapter 3. The literature presented here is related back to this project via a comparison with the key findings generated by this field study in chapter 5 (section 5.8).

2.1 THE TECHNOLOGY ACCEPTANCE MODEL

Over the past few decades, many businesses have adopted new IT innovations. Because of this activity, constructs such as IT usage and behaviour have become central themes to the research regarding Information Systems (IS) and IT innovations. Within the discipline of IS, the Technology Acceptance Model (TAM) is one of the leading research frameworks used to study the determinants of IT acceptance. The TAM has historically been quite useful in that it has spawned numerous research studies and contributions to knowledge, particularly in the area of IT acceptance (Mathieson 1991; Gefen & Straub 1997; Saga & Zmud 1994; Chau 1996; Taylor & Todd 1995; Adams et al. 1992). The TAM put forward by Davis et al. (1989) addresses IT adoption, implementation and diffusion in terms of two main constructs; the 'Perceived Ease of Use' and 'Perceived Usefulness'. The underlying principle of this causal model shown in figure 2.1

hypothesises that IT use is affected by behavioural intentions that are themselves affected by attitudes toward use.

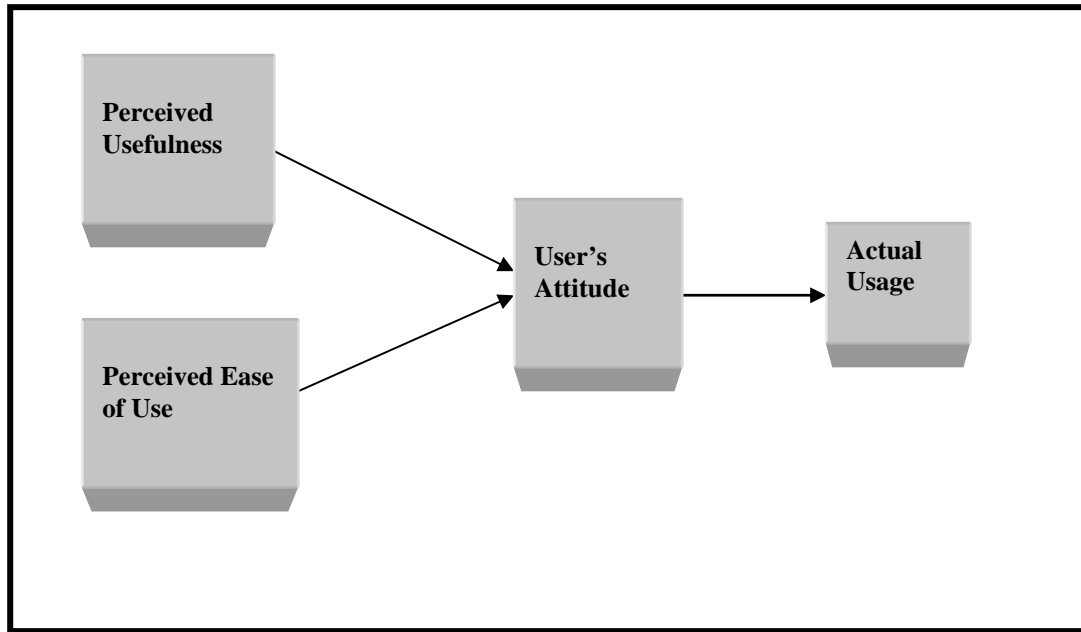


FIGURE 2.1 THE 'TECHNOLOGY ACCEPTANCE MODEL' (ADAPTED FROM DAVIS 1989).

Predominantly developed from the ideas of Ajzen and Fishbein's (1975 & 1980) Theory of Reasoned Action (TRA) and with support from other theories such as expectancy theory, self-efficacy theory, cost-benefit research, innovation research, and the channel disposition model, the TAM postulates that 'computer usage' is determined by behavioural intention to use a system, and that this is jointly determined by a person's attitude toward using the system and its perceived usefulness. The goal of the TAM is to provide an explanation of the determinants of computer acceptance that are, in general, capable of explaining user behaviour across a broad range of end-user computer technologies and user populations, while at the same time being both parsimonious and theoretically justified.

The TAM has been used by many researchers to examine the implementation and post-implementation aspects of a particular technology. These include Adams et al. (1992), Chin and Todd (1995), Davis (1989 & 1993), Davis et al. (1989), Davis and Venkatesh

(1996), Gefen and Straub (1997), Igbaria et al. (1997), Mathieson (1991), Szajna (1994), Taylor and Todd (1995), Venkatesh (1999) and Venkatesh and Davis (1996). The validity of the TAM was also tested by Mathieson (1991) by comparing the TAM with another model based upon Ajzen's (1991) 'Theory of Planned Behaviour' (TPB). Mathieson (1991) claimed that TAM was easier to apply in practice; however, it only supplied very general information about users' opinions of a system, while the TPB provided information that was more specific. The Theory of Planned Behaviour is reviewed in the next section (refer to section 2.2).

Other problems with the TAM are noted by Chau and Hu's (2001) study which has indicated limitations, particularly when applied within a professional context. The authors found that professionals are more pragmatic and concentrate more on the 'usefulness' of a technology than on the 'ease of use'. From a managerial standpoint, their findings suggest that cultivating positive attitudes towards using technology, as well as positive perceptions of the technology's usefulness, are important for fostering the acceptance of a technology. Thus, management needs to formulate implementation strategies that would increase the likelihood of staff seeing IT as compatible with their work practices.

Another major limitation of this TAM framework is the exclusion of the role that social influence plays. Davis et al. (1989) have in hindsight called for an investigation into the conditions and mechanisms governing the impact of social influences on usage behaviour. Venkatesh and Morris (2000) maintain that the social influence construct was not included in the original model because of theoretical and measurement problems. The TAM does attempt to include some social considerations through the subjective norm construct. Subjective norm is defined by Ajzen and Fishbein (1975) as the degree to which an individual believes that people who are important to them think they should perform the behaviour in question. These norms may vary for any given situation and innovation context. Subjective norm is therefore a determinant of intention and behaviour and they expose themselves by shaping potential adopter beliefs about when and why to adopt an innovation (Ajzen & Fishbein 1975; Davis et al. 1989).

Mathieson (1991) and Taylor and Todd (1995) have operationalised the subjective norm construct. In these studies, peers and superiors were shown to influence the subjective norm construct. In the context of technology usage, subjective norm has also manifested itself as peer-influence and superior influence (Mathieson 1991; Taylor & Todd 1995). Zaltman et al. (1973) suggests that these conditions correspond to contingent authority decisions. Authorities make the initial decisions to adopt and targeted users have few alternatives but to adopt the innovations.

Another more recent study that used the TAM has revealed further limitations with this framework. Cheung, Chang and Lai (2000) found that the 'facilitating conditions' and 'social factors' are the two most important factors affecting Internet usage. This survey demonstrates that the TAM is not specifically suited for examining Internet technologies. This severely weakens any potential this model has within the modern economy, since this is reported to be underpinned by the Internet. In short, it appears the TAM suffers from the requirements of scientific research methods; most of the identified problems with applying this framework seem to stem from measurement and construct related aspects. Another issue is the relevance of this framework as a tool to investigate contemporary technologies such as the Internet.

2.2 THE THEORY OF PLANNED BEHAVIOUR

The Theory of Planned Behaviour (TPB), developed by Ajzen (1991), extends his original work on the Theory of Reasoned Action (TRA) (Ajzen & Fishbein 1980). The TRA framework has previously been applied in many research situations to examine technology implementation aspects (Berger 1993). Several of these studies have revealed the influence of 'prior experience' to be an important aspect of behaviour (Ajzen & Fishbein 1980; Bagozzi 1981; Fishbein & Ajzen 1975; and Triandis 1979). In the TPB model, behaviour is a direct function of behavioural intention and perceived behavioural control. Ajzen (1991) considers behavioural intention to be formed by one's attitude, subjective norm (social influences) and perceived behavioural control. Knowledge,

according to Fishbein & Ajzen (1975), helps shape intention. One immediate observation from comparing the TPB with the TAM is the existence of several more constructs which is shown in figure 2.2.

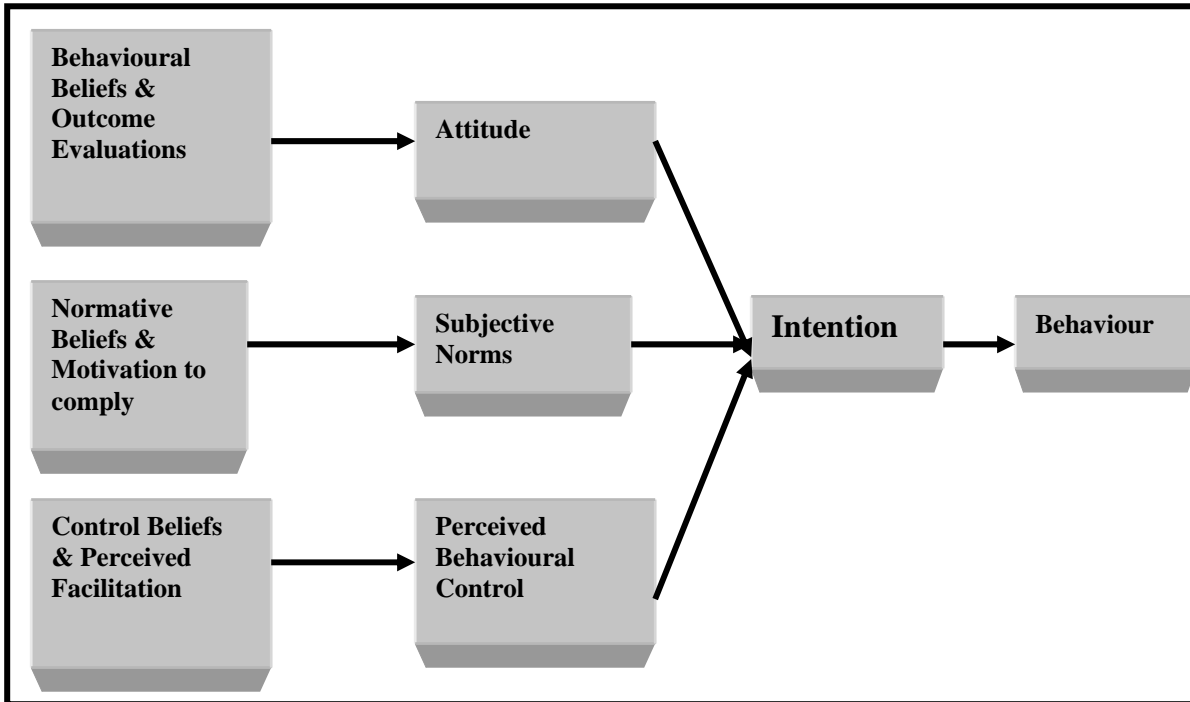


FIGURE 2.2 THE THEORY OF PLANNED BEHAVIOUR (ADAPTED FROM MATHIESON 1991)

This framework of ideas has been widely used across a range of disciplines including marketing (Berger 1993), medicine (Randal & Gibson 1991), psychology (Mathieson 1991) and Information Systems (Taylor & Todd 1995). Ajzen (1991) acknowledges several limitations with the model. In particular, the relationship between the belief structures and the determinants of intention are not particularly well understood. This poor understanding has produced some inconsistencies in the results obtained when using this TPB framework.

One particular SME adaptation of the TPB was that developed by Harrison et al. (1997). The authors used the TPB in an attempt to explain and predict an SME executive's decision to adopt information technology. New factors for consideration in Harrison et

al's (1997) adaptation include both owner manager characteristics and firm characteristics. Other characteristics include:

- Decision processes based on attitude
- Subjective norm
- Perceived control regarding IT adoption
- Firm size, sector and status
- Individual characteristics

One immediate problem with this adaptation is the continued omission of any construct that examines social influences; in particular, the social influences that affect the behaviour and intention toward an IT innovation. The neglecting of social influences has been shown to have a negative effect within research situations (Orlikowski & Baroudi 1991).

Another prominent adaptation of the TPB developed within the discipline of IS is that suggested by Taylor and Todd (1995). The Decomposed Theory of Planned Behaviour' (DTPB) attempts to overcome the limitations of Ajzen's (1991) version, particularly in relation to attitudinal, normative and control beliefs. Problems with using the earlier model are claimed to be overcome by the authors simply by 'decomposing' the model into multi-dimensional belief constructs (Taylor & Todd 1995). The authors feel that when these belief constructs are decomposed to lower levels they become clearer and more readily understood and objectively measured. They argue that this decomposition process allows them to point to specific factors that may influence technology adoption and usage. Their suggested factors include:

- The perceived characteristics of an innovation
- Relative advantage
- Compatibility of the innovation with the adopter's existing values
- Previous experiences and current needs

Most of the elements expressed in their version relate to cognitive aspects that require a high level of social understanding and social consideration. Given the approach to its development, this model can be seen to ignore important elements such as social influences, subjective norms, and the personal innovativeness construct which moderates between user perceptions and intention (Agarwal & Prasad 1998). This framework also suffers from reductionism in that it seeks to decompose elements to a measurable level. This situation fails to take into consideration the broader social context. These contextual elements are further articulated in the next section.

2.3 THE INTEGRATED MODEL OF INFORMATION SYSTEMS ADOPTION

Other prominent frameworks that have emerged from the IS discipline include the 'Integrated Model of Information Systems Adoption' (Thong 1999). This framework has been used to examine the IT adoption process within the confines of smaller businesses. The model specifies three contextual variables such as:

- Decision-maker characteristics
- IS characteristics
- Environmental characteristics.

The author suggests that these elements are the primary determinants of IS adoption in small businesses. Thong's study found that businesses with CEOs that portrayed innovativeness and a high level of IS knowledge were those that were more likely to adopt. Other IS research (Iacovou et al. 1995) revealed other important factors thought to affect the adoption of IT; these include:

- Organisational readiness
- External pressures to adopt
- Perceived benefits

‘Organisational Readiness’ refers to the level of financial and technological resources of the firm (Saunders & Clark 1992). Also, organisational readiness can be related to the resources of the firm. This readiness is related to the level of sophistication of IT usage and IT management. Raymond (1990) suggest that sophisticated firms are less likely to feel intimidated by technology, and more likely to possess a superior corporate view and have access to the required technological resources of hardware, expertise and a competent project leader.

Iacovou et al. (1995) maintain that ‘External Pressure’ to adopt refers to influences from the organisational environment. The two main sources of external pressure are competitive pressure and, more importantly, imposition by trading partners. Competitive pressure refers to the level of capability of the firm’s industry and its competitors. This pressure can also surface from trading partners. Pressure from trading partners is a function of the potential power of the imposing partner and its chosen influence strategy (Provan 1980). The notion of external pressure from trading partners has also been identified by Hart and Saunders (1994), Swatman and Swatman (1991) and Webster (1994).

‘Financial Readiness’ is another dimension that needs to be considered according to Iacovou et al. (1995), who refer to the financial resources that are available for installation, implementation and any subsequent enhancements and ongoing expenses during usage, such as communication charges and usage fees. Important factors that inhibit adoption can include the cost and complexity of a technology, the need to change internal systems, a lack of technological skills and a lack of system integration (Pfeiffer 1992; Saunders & Clark 1992). Empirical evidence suggests economic costs and the lack of technical knowledge are two of the most prominent factors to consider (Cragg & King 1993).

Ryan and Prybutok (2001) have also argued for a context-based model of IT adoption. Their study suggested that technological context factors are appropriate for inclusion in traditional models since the characteristics of an organisation’s existing IT and

commitment to IT influences the overall IT adoption process. Chau and Tam (1997) also argue that IT adoption needs to be studied with variables tailored to the contextual environment and the specificity of the innovation. Tornatzky and Fleischer (1990) present a framework that incorporates three contextualised components thought to influence IS adoption:

- Organisational context
- Technological context
- External environment context

The ‘Organisational Context’ depicts the characteristics of an organisation. It incorporates the processes of an organisation that stifle or promote adoption. The ‘Technological Context’ focuses on the technology present in an organisation and how these technologies affect or influence IT adoption processes. The ‘External Environment’ relates to circumstances and climate such as industry and government regulation. One problem with this framework, according to Zmud (1982) and Chau and Tam (1997), is that specific variables within Tornatzky and Fleischer’s (1990) framework require customising for each IT innovation under investigation. As with the TAM, most of the ideas presented in this section have to be customised for each IT innovation in focus. This situation limits the overall potential of these theoretical ideas.

2.4 THE DTI ADOPTION LADDER

The ‘UK Online’ is an example of a government lead initiative purposefully created for the modern economy discussed in chapter one. It campaigns to make the Internet work for everyone by developing the UK as one of the leading business knowledge economies (Martin & Matlay, 2001). The focus of this initiative is on both businesses and individual people. Its objectives originated from the government’s achievement of IT-related targets and goals. These UK goals have themselves been shown to influence European countries in that there are many similar goals and objectives in the ‘2000 E-action Plan’ introduced

by the European Council (2000). This European initiative also focuses on individuals and businesses alike. The European Commission has joined forces with the European Council to call for individuals and businesses to be ‘online and digitally literate’ (European Commission 2000). Real world problems can emerge when we consider the effectiveness and the suitability of the intellectual framework that underpins this important activity.

Several problems associated with the UK initiative for SMEs have been reported to originate from the framework that underpins much of this activity. The Department of Trade and Industry (DTI) developed and uses the adoption ladder (figure 2.3) to achieve its ‘UK online’ objectives.

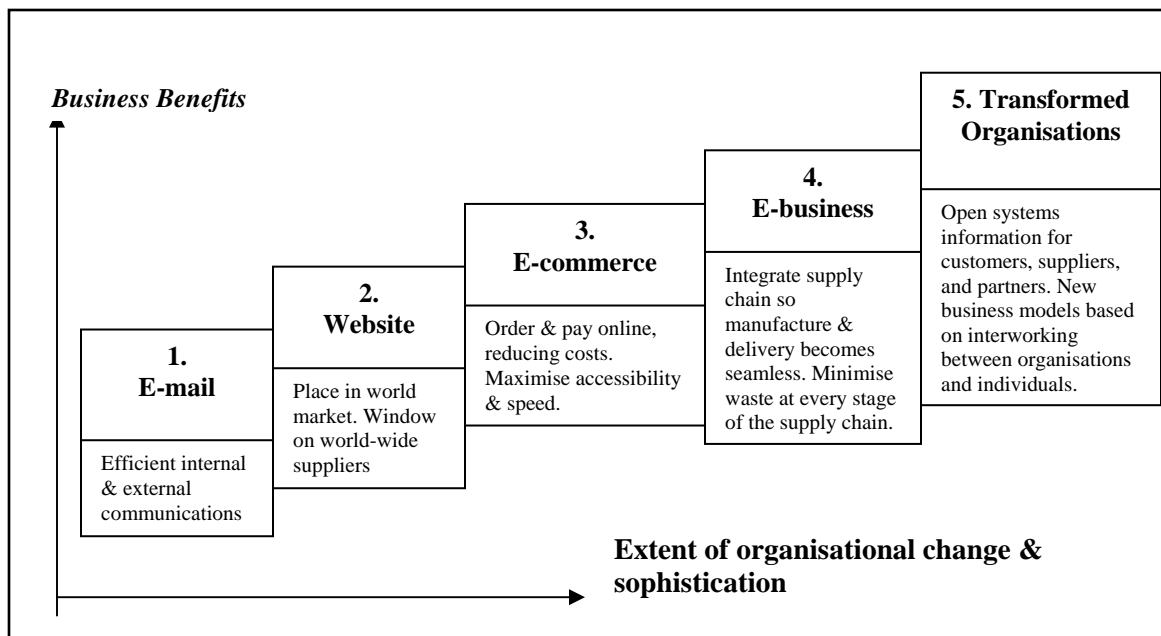


FIGURE 2.3 THE DTI ADOPTION LADDER (ADAPTED FROM MARTIN & MATLAY 2001).

The DTI framework purports to represent the IT adoption process in the small business context. The process model approaches e-business through a series of sequential stages that are well planned and identified in advance. This model has been extensively used by the DTI to conduct examinations of small business activity in relation to their progress with the Internet (Martin & Matlay, 2001). Apart from acknowledging that not all firms will begin the adoption process at stage one, no other type of flexibility is built into this linear model (Martin & Matlay 2001).

There is also a claim that this framework fails to consider many notable and necessary constructs thought needed for a thorough inquiry such as industry, gender, innovation, entrepreneurship, economic factors and many other key organisational aspects such as a firm's financial and human resources (Martin & Matlay 2001). The authors argue that many modern economy initiatives have neglected to address the diverse nature of small firms and their unique needs. Linear models may seem attractive as a simplified way to describe IT adoption and use; however, they may fail to illustrate the pertinent and complex process that may take place at the micro level within individual firms (Fallon & Moran, 2000). Most attempts to use linear thinking to explain activity in smaller firms has also been shown to have a tendency to over simplify complex issues and circumstances (Brock 2000). This linear approach also fails to consider any cyclical learning aspects that may occur over time, such as when a business seeks information about a new IT innovation and then learns more about it over time before they decide to adopt a technology.

2.5 THE INNOVATION DIFFUSION THEORY

Having reviewed several leading technology acceptance and adoption frameworks, this section now examines the notion of diffusion of innovations. Rogers (1995) points out that Ryan and Gross's (1943) study at Iowa State University was the genesis of most of the modern diffusion research. Rogers (1995) maintains that the interview based methodology used by Ryan and Gross (1943) has remained the predominant 'diffusion' research methodology ever since. There are a number of variables that can influence the diffusion of an IT innovation; the four main factors, according to Roger's (1995) Innovation Diffusion Theory, are as follows:

1. The innovation itself
2. How information about the innovation is communicated

3. Time
4. The nature of the social system into which the innovation is being introduced

Rogers (1995) acknowledges that this categorisation does not explicitly include non-adopters since there is an implicit assumption that everyone will eventually adopt. This proposition is flawed since it assumes IT adoption will occur as a matter of course. Moore (1991) suggests that people in each of the different adopter categories are systematically different and depicts these differences across categories as cracks in the bell curve. Very little evidence exists to substantiate claims of differences across adopter categories and non-adopters. However, Agarwal and Prasad (1998) provide personal innovativeness as a possible construct that allows categorization of individuals into different adopter categories, as a moderator of the relationship between user beliefs and intention to adopt.

Moore and Benbasat (1991) have discussed the similarities between the 'Perceived Usefulness' construct in the TAM and the Relative Advantage construct in the Rogers (1983) framework. Moore and Benbasat (1991) have criticised the TAM construct of 'perceived usefulness' as suffering from measurement problems simply because it was so broadly based. The authors cited Rogers's definition of relative advantage as "the degree to which an innovation was perceived as being better than its precursor" (Moore & Benbasat 1991, p.195). Tornatzky and Klein (1982) also criticised the construct of relative advantage for being poorly explicated and measured. It appears the rigour of the scientific research methods have resulted in several constraints that weaken the usefulness and effectiveness of this framework.

The results of applying diffusion theory have been somewhat mixed. Fichman (1992) put forward the notion that classical diffusion variables are not sufficient to predict the adoption of complex organisational IT. He calls for other variables to be investigated. Another important omission from diffusion research is the non-volitional, unthinking reaction to cues. Triandis (1980) points to the influence that habits have on behaviour; that is, when a behaviour becomes routinised through repetition, a person ceases to make

any conscious decisions to act, yet still behaves in the accustomed way. When operationalised, this automatic behaviour can be a significant adjunct to the rational intention-based decision process (Triandis 1980). Wynkoop (1991) contends that the Innovation Diffusion Theory is based on voluntary decisions. One of its primary limitations therefore is its incompleteness in the area of organisational implementation of innovations, particularly after authoritarian decisions. Employers and managers are authority figures that can make their desires on IT known explicitly through expressed preferences and mandates, or implicitly via incentives and/or controls. Innovation researchers have neglected this area, leaving the definition of these independent and outcome variables very exploratory (Wynkoop 1991).

Other researchers such as Attewell (1992) have conceptualised IT innovation diffusion in terms of decreasing knowledge barriers. It is argued that these barriers are created when organisations have limited skills and technical knowledge. Attewell (1992) maintains that many businesses put off adopting IT until these barriers are lowered or somehow circumvented. The suggestion here is for an improved information system that keeps knowledge at optimal levels so that these barriers are circumvented. A key aspect relevant to this research is the development or improvement of these organisational activities. One final concern with this body of knowledge is that most IT innovation diffusion research has concentrated on the stages of acceptance, use and user satisfaction (DeLone 1988; Igarria et al. 1997; Lees 1987; Raymond 1985; Yap et al. 1992). Lee and Runge (2001) maintain that very little empirical research has focused on upstream issues such as the adoption decision making process and its antecedents, particularly in relation to smaller business. Therefore, this research explores several upstream issues, such as the IT sense making and IT innovation information management of SMEs. It is anticipated that this contribution may support understanding some of these antecedent activities.

2.6 THE INNOVATION DECISION PROCESS THEORY

The Innovation Decision Process Theory (Rogers 1995) maintains that innovation diffusion is a formal process that occurs over time and can be seen as having five distinct stages as shown in figure 2.3.

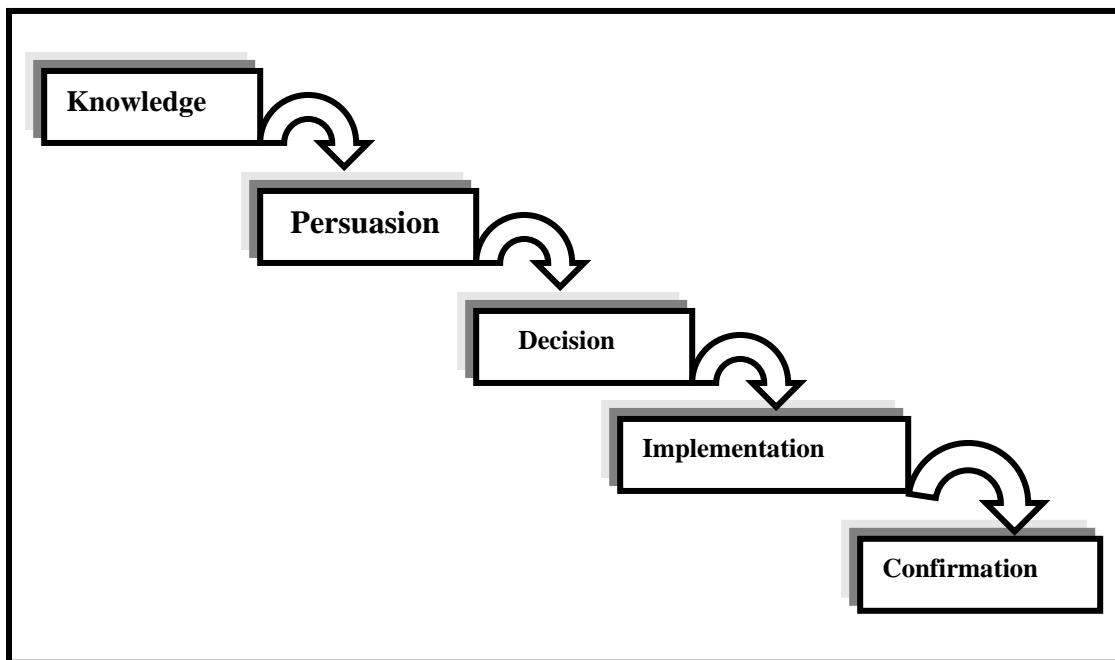


FIGURE 2.4 THE INNOVATION DECISION PROCESS THEORY (ADAPTED FROM ROGERS, 1995).

According to this process model, potential adopters of an innovation must first learn about the innovation, be persuaded as to the merits of that innovation, decide to adopt and implement the innovation and then confirm the decision after an IT innovation has been adopted. A criticism of this is that problems arise with this theory when we consider the use of strategic information and developing knowledge and meaning within all five processes. Limitations with the theory relate to the transition of understanding and knowledge between these five learning stages. The author states that the five stages are distinct in nature, which means that an organisation cannot redefine relevant criteria necessary during a unique or emergent IT situation. Rogers also fails to articulate any understanding relating to information sources that are appropriate for an organisation to obtain the necessary knowledge to start this process. The model does not mention how

information is gathered to provide this knowledge about the IT innovation and the information needed for the decision making process itself.

Another problem with the prior work conducted into IT innovation diffusion is that most authors have conceptualised the process of adopting IT innovations as one that exists on a continuum (Brancheau & Wetherbe 1990; Rogers 1983:1995; Agarwal & Prasad 1997; Kirton 1976). Karahanna et al. (1999) also considers that the diffusion of any innovation occurs in a temporal sequence. This temporal aspect fails to consider the changing nature of knowledge and understanding as exposure to the technology matures. Another problem here is very few studies have considered vendor characteristics and their effects on the decision outcome of IT managers (Tam & Hui 2001). Vendors have also been shown to shape market demand by deciding on the mix of IT products, setting prices and product launch schedules. Tam and Hui's (2001) results suggest that IT managers are subject to strong brand effect in the technology decision making process. The authors used a discrete choice model to examine effects of vendor characteristics on purchase decisions. Their intention was to empirically assess the effects of product variety, brand name, average price and network externalities in the selection of computer vendors. Attewell (1992) also notes that these vendors play a key role in the computerisation of many organisations. A problem emerges here when it is considered just how understanding these vendors are of the strategic and operational activities of the businesses they sell IT and IS products, goods and services to; vendors may not know what type of IT innovation is best for each unique business setting.

2.7 EVALUATING TECHNOLOGICAL VALUE & BENEFITS

Having examined the notions of technology acceptance, adoption and diffusion this section focuses on the performance and measurement related aspects of technological innovations.

Over the past few decades, many attempts have been made to quantify the benefits and value of investments in IT. Unfortunately, most of these traditional methods have focused

on purely objective and financial measures such as return on investment (ROI). For example, Parker and Benson (1988) base their notion of IT benefit on Michael Porter's value chain (Porter 1985). IT worth, in their definition, is characterised as the ability of an innovation to enhance business performance. Wiseman (1992) extended the ideas of Parker and Benson by differentiating between IT value and IT benefit. The author asserted that IT value is both larger and more important than IT benefits, since benefits can include relatively important areas such as user comfort. For example, Wiseman (1992) believes that a user can develop a strong attachment to an old system and therefore it can acquire some sort of value despite being out of date and inefficient.

Measuring and justifying IT investments is a very complicated activity. Very few frameworks and methodologies exist for predicting and measuring financial returns on technology investments (Piccili & Wagner 2003). The authors contend that business operators are now finding it difficult to gauge the appropriate IT investment and reap appropriate returns. Recent research attempts to determine the ideal point in time during the product life cycle to measure such returns (Piccili & Wagner 2003). For example, Enterprise Resource Planning (ERP) technologies are being adopted across industry sectors as a pre-requisite for business infrastructure necessary for operating within the 21st century (Davenport 2000). The scale of change that accompanies many ERP projects means that any cost savings are often deferred for several years (Hitt et al. 2002). This requires further investigation.

Farby et al. (1993), Lang (1994) and Willcocks (1994) have indicated that organisations are experiencing trouble due to a variety of reasons such as missing important aspects and using ad hoc methods when they evaluate IT, particularly when using a purely economic approach. They suggest that the act of investing in IT innovations is somewhat problematical given the apparently ad hoc approach organisations take to this activity. The ad hoc argument is corroborated by the Hochstrasser and Griffith (1991) study which found that 84% of the organisations they examined invested in IT without using any systematic methods to calculate either the true costs or benefits of technology.

The Balanced Score Card (BSC) is one purely financial approach that has found its way into evaluating IT within the business. Kaplan and Norton (1996) proposed this method in order to evaluate a company's progress from four different perspectives, which are as follows:

1. The Financial Perspective
2. The Perspective of Internal Processes
3. The Client's Perspective
4. The Innovative Perspective

Their rationale was that the traditional financial measures, such as the Return On Investment (ROI), should be supplemented with operational measures such as customer satisfaction, internal processes and the ability to innovate. The authors believe that these extra measures would assure future financial results, and drive the organisation towards its strategic goals while keeping all the four perspectives in balance. Unfortunately, the authors tender no advice regarding how an organisation keeps the four elements in check on a continual basis. The approach also takes an objective view of IT performance that sees an innovation only being measured by its contribution to those organisational dimensions that can be determined and tracked by the model. Kaplan and Norton (1992) have likened the balanced score card to the dials and indicators in an airplane cockpit giving managers complex information at a glance. Unfortunately, these dials do not show that two passengers have food poisoning because they ate the fish or that several other passengers fell out of the back door of the airplane mid flight.

Martinsons et al. (1999) used a modified BSC specifically for the evaluation of IS projects. They concluded that the BSC does not explicitly include the value of social elements. Neither classical economics nor traditional accounting practice recognises that the social elements of a business have a value and contribute to the worth of the business (Land 2000). The overall importance and the value of human contributions in relation to their capabilities with IT were reflected in the Bharadwajs (2000) study. Firms that have a high IT capability (including human capital) were shown to outperform other firms that

have a low IT capability on both profit and cost-based measures (Bharadwaj 2000). This finding represents a paradigm shift with regard to the contributions human capital makes in organisational IT performance. Other problems associated with this purely financial approach surface when the difficulty associated with placing a dollar value on all dimensions related to IT value and benefits is considered. Hayes and Garvin (1982) maintain that the ROI focus produces incentives to disinvest and promotes short-term profit taking. Gold (1983) suggests that there is great difficulty in establishing costs and benefits of technological innovation and argues for a paradigm shift from capital budgeting evaluation methods to a 'continuous horizons' approach that better recognises the long term benefits and contributions of technology.

One final point of interest comes from Merrill (1993) who conducted a survey that indicated only a third of managers could identify gains in productivity from IT. 38% did not even know which criteria they used to quantify these benefits and half were less than satisfied with the performance. Overall, the literature reviewed in this section has shown that many authors have attempted to establish an approach to evaluating the performance and value of technological innovations. However, most have established their thinking at a purely rational or economic level. The activity of assessing the benefits and payoff of technology has been shown to be both difficult and ineffective. Keen (1991) summarises this problem: "Many a scholar, consultant and practitioner has tried to devise a reliable approach to measuring the business value of IT at the level of the firm, none has succeeded" (Keen 1991, p.162). Keen (1991) also draws an analogy between research and development (R&D) and technology, arguing that neither create benefits as such since these are the result of complex effects with time lags that can be lengthy.

2.8 SUMMARY

This chapter has identified and critically examined the literature relevant to IT adoption, acceptance and diffusion and the process of evaluating and measuring IT productivity and performance. The ideas relating to IT acceptance and IT adoption were shown in this chapter to be grounded within the discipline of psychology via the Theory of Reasoned Action (Ajzen & Fishbein 1975 & 1980) and the Theory of Planned Behaviour (Ajzen 1985 & 1991). This could explain why these two areas of IT adoption and acceptance share so many intellectual ideas that relate human behaviour and IT usage. Most of these frameworks have also been developed using strong productivity-orientated constructs (Adams et al. 1992; Agarwal & Prasad 1997; 1998; Chin & Todd 1995; Davis 1989; 1993; Davis & Venkatesh 1996). Chau and Hu (2001) put forward the notion that the proliferation of innovative IT applications has made the examination or re-examination of existing IT acceptance theories and frameworks increasingly important. An identified limitation of the adoption literature is that most of these studies on IS adoption have only been conducted on larger organisations (Yap 1990) rather than SMEs. There is also an increasing amount of evidence to suggest that traditional adoption frameworks neglect the realities of implementing IT in organisations, especially when adoption decisions are made at the organisational, division or workgroup rather than individual level (Gallivan 2001).

Another prominent line of thinking reviewed in this chapter examined adoption and usage from a Diffusion of Innovation approach (Rogers 1983; Tornatzky & Klein 1982). This was shown to use constructs thought to be determinants of IT adoption and usage such as: individual characteristics (Brancheau & Wetherbe 1990); information sources and communication channels (Nilikanta & Scammell 1990) and IT innovation characteristics (Hoffer & Alexander 1992; Moore 1987; Moore & Benbasat 1993). Taken as a whole, the research on IT adoption and diffusion has itself converged on a core set of theoretical frameworks that seek to explain target-adopter attitudes and their IT-related behaviour (Gallivan 2001). The activities associated with taking an economic approach to

evaluating and measuring IT using either performance or productivity constructs were also shown to be problematical as discussed below.

Overall, the main research issues that emerged from this review process are as follows:

- The ideas relating to IT acceptance, adoption and diffusion can, and have traditionally been applied to the implementation and post-implementation stages of IT (Cragg & King 1993; DeLone 1983; Gable 1991; Lees 1987; Montazemi 1988; Raymond 1985; 1990; Thong et al. 1994; 1996).
- The TAM (Davis et al. 1989) was seen to have many drawbacks, such as its limitations in different contexts and in particular the professional context which was an aspect noted by Chau and Hu's (2001) study. The TAM also excludes several social aspects such as the role social influences plays in IT situations (Mathieson 1991). The TAM was also noted to be unsuitable for technologies such as the Internet (Cheung, Chang & Lai 2000).
- The TPB (Ajzen, 1991 & Mathieson, 1991) which like the TAM has the drawback of excluding social influences (Orlikowski & Baroudi 1991). The determinants of intention also are not well understood (Taylor & Todd 1995).
- The DTPB (Taylor & Todd 1995) was also noted as not incorporating social influences and it also suffered from the process of decomposition which introduced problems relating to reductionism.
- The Integrated model of IS Adoption (Thong 1999) requires customising for each individual IT innovation under focus (Chau & Tam 1997).
- The DTI Adoption Ladder (as shown by Martin & Matlay, 2001) was problematical for many reasons. The linear model had no inbuilt flexibility for SMEs (Martin & Matlay 2001) and it was also shown to neglect the diverse nature of individual SME situations (Brock 2000). Brock (2000) also noted that this model oversimplified something that is very complex.
- The Innovation Diffusion Theory (Rogers 1983:1995; Brancheau & Wetherbe 1990; Agarwal & Prasad 1997) was noted to suffer from measurement problems (Moore & Benbasat 1991) and its constructs were poorly explicated and measured

(Tornatzky & Klein 1982). The results of its application have produced mixed results (Fichman 1992) and the definition of its variables can only be described as very exploratory (Wynekoop 1991).

- The Innovation Decision Process Theory (Rogers 1995) was noted as being problematical because of its linear and fixed stages of progression. The theory was also found not to include important aspects such as IT vendor characteristics (Tam & Hui 2001).
- The notion of measuring IT productivity and performance was found to be problematical in many areas (Piccili & Wagner 2003). IT value was noted as being different to IT investment (Wiseman 1992). The time lag in the IT investment process was also noted by Keen (1991). Taking a purely economic approach to IT investments was seen as being problematical by Farbey et al. (1993) and Willcocks (1994). The overall evaluation process was shown to be ad-hoc (Griffith 1991). The contribution that humans make to IT performance and investments were only recently recognised (Land 2000). The activity of identifying productivity gains from IT investments was also noted as being difficult (Merrill 1993).

Most of these frameworks can be seen to suffer from or to be overly concerned with the scientific research methods in particular the scientific principle of observation, which sees the absence of any declared form of intervention. Such an intervention could be designed to introduce some form of IT-related self help capability or to introduce practical change as a result of the intervention process. This study shows this to be problematical in the sense that it has restricted the ability of these frameworks to fully understand and appreciate the situations that they researched. Another theoretical issue is the absence of a framework that supports two differing research objectives such as purposeful inquiry and purposeful intervention. By contrast, this research presents an approach that enables such a dual role to be performed. This study has two main research objectives. The first is to gather an understanding of the chosen SME research situations (A) and to provide guidance or support to these business operators so they can continually improve how they make sense of IT in context. In addition, there were no

frameworks that made provisions for the informal activities associated with IT sense making and IT information management. In short, taking a purely scientific or economic approach is not totally suited to examining IT and human activity, in particular the interpretation of information and the cognitive aspects related to the sense making of new IT innovations in practice. A review of these research issues is now presented as summarised problem themes, which are presented as follows:

- Preoccupation with developing ideas for larger organisations as opposed to SMEs
- Acceptance, Adoption and Diffusion literature was shown to be theoretically limited to implementation and post-implementation activities only
- Most of these frameworks can be considered static or containing fixed ideas that are being applied to dynamic and constantly changing IT situations
- There are problems with the scientific research method given the presence of social elements and dimensions that do not lend themselves to being objectively measured and scientifically evaluated
- The reductionist approach is problematical because it misses the broader context within complex social situations such as the role social influences play
- Economic rationalism is not suited to IT given the recent introduction of the benefits and value provided by human capital that cannot be measured using dollars and cents
- No apparent self-help abilities are built into any of the frameworks reviewed
- No framework had provisions for informal aspects such as the activities associated with the sense making of IT innovations and IT information in practice
- The dichotomy of Adoption and Non-adoption in the IT decision making process removes any other possible state, such as a consideration process that results in neither adoption or non-adoption of a new IT innovation

The main learning from this review is that a new approach would need to take into consideration the historical developments and understanding gathered from this review process. This approach also needs to address the problem themes noted above. It must also support a theoretical understanding of the situation, and provide real support and guidance for SMEs in general. In short, the new approach should be reflective of the past and build on this theory by incorporating the knowledge that these frameworks have furnished to date. The primary issue that arose from this second chapter is the need for a broader and more holistic examination of the complex IT-business relationship. This is in contrast to selecting discrete elements (parts) for closer examination at the expense of ignoring the broader context (the whole).

The next chapter develops and presents framework of ideas (F) that incorporates the learning and problem themes which were identified in this second chapter.

CHAPTER 3: FRAMEWORK OF IDEAS

3.0 OVERVIEW

The purpose of this chapter is to outline the 'Framework of Ideas' that is developed and used within this research. Using the FMA, the first chapter can be seen as having outlined the Area of concern (A) for this research. Chapter two then followed which examined the foremost Frameworks (F) and Methods (M) that have traditionally been applied to this area of concern. Having outlined the (F) in this chapter, the next chapter discusses the Methodology (M) chosen by the researcher.

The framework of ideas (F) developed and presented in this chapter is the 'Purposeful Inquiry and Purposeful Intervention' (PIPI) concept. This concept has a dual role to perform in this research because it is used to conduct both a Purposeful Inquiry into the chosen research situation (A) and a Purposeful Intervention via the Action Research (AR) workshop intervention process. Although the inquiry forms part of the intervention process, the term AR workshop intervention is used here to simplify the communication process. The introduction of the workshop intervention relates to both the research requirement for introducing practical change and having selected the AR methodology discussed in the next chapter. The use of this framework of ideas is also extended to include the reflective learning activities which are conducted using Checkland and Holwell's (1998) FMA as a reflective learning tool. These discussions are presented in the final chapter.

The chapter commences with section 3.1, which outlines the philosophical posture of the researcher. The next section (section 3.2) presents a review of the historical developments within the Discipline of Information Systems (IS), which shows that contemporary Information Systems are social systems. Section 3.3 outlines the notion of Systems Thinking and its relevance to this research. The next section (section 3.4) introduces

several theories relevant to conducting a social Inquiry and Intervention. The section essentially conducts a second literature review that is more focused on the PIPI concept and its development. Section 3.5 then outlines the second applied methodology used in this research, namely the Soft Systems Methodology (SSM). Section 3.6 then presents the framework for the 'Purposeful Inquiry' whilst section 3.7 follows with a description of the framework for the 'Purposeful Intervention'. The next section (section 3.8) brings both frameworks together to form the 'Purposeful Inquiry and Purposeful Intervention' (PIPI) concept. Section 3.8 also outlines the steps and activities associated with using the PIPI concept and the relationship between these two separate frameworks. The chapter is then concluded with a summary of this third chapter (Section 3.9).

3.1 RESEARCHER'S PHILOSOPHICAL POSTURE

The purpose of this section is to highlight the chosen ontological and epistemological position adopted by the researcher. These positions were adopted to help address the stated research questions and research propositions. These discussions about the philosophical posture of the researcher are continued with a discussion concerning the action research methodology in chapter four.

Several researchers within the discipline of IS put forward a persuasive case regarding the importance of stating one's philosophical beliefs in advance (Checkland & Holwell 1998; Galliers 1997a; Hirschheim et al. 1995). Their line of reasoning centres around the notion that a researcher's philosophical posture has a direct effect on the choice of research approach and methods selected for studies. The relevance here is that the function of a philosophy, according to Checkland and Scholes (1990), is to provide the mental machinery for dealing with a large variety of situations. Guba and Lincoln (1994) consider that the beliefs of a researcher also relate to ontology, epistemology and methodology; these are the nature of reality, beliefs about how knowledge is acquired and the nature of how methods are used or studied respectively. These three elements are graphically represented within the research triangle shown in figure 3.1.

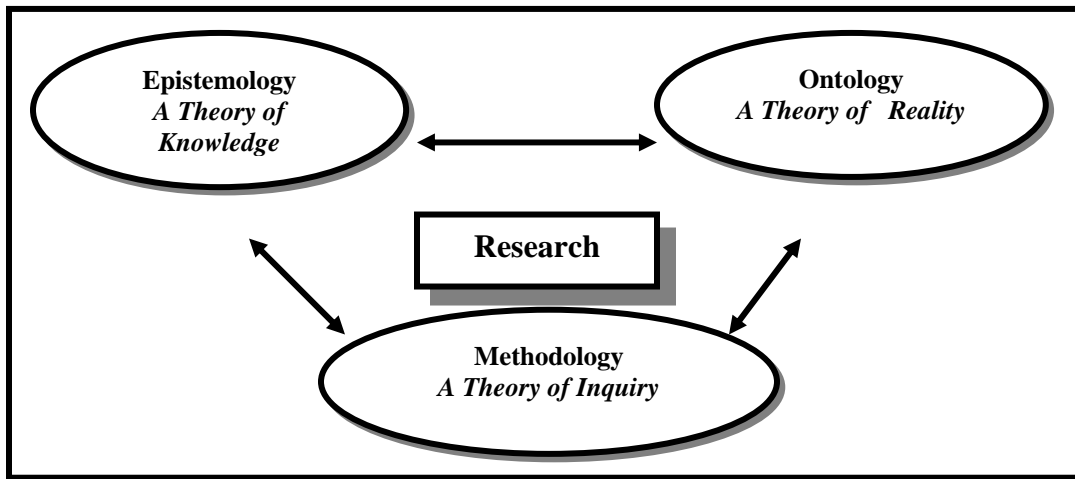


FIGURE 3.1 THE RESEARCH TRIANGLE (ADAPTED FROM GUBA & LINCOLN, 1994)

This section uses this research triangle to provide structure to the discussion regarding the researcher's ontological and epistemological posture. Both sections are concluded with a discussion which indicates the chosen posture of the researcher. The third methodological element of the triangle is examined in the next chapter (Research Methods). All three elements presented in this research triangle are representative of bodies of knowledge that provide both information and guidelines. These bodies of knowledge may also be expressed as a paradigm. The notion of a paradigm, developed by Khun (1962), has itself generated much debate. This is because a paradigm holds a body together through concepts such as ideologies, values, judgements, theories and frames of reference (Burrell & Morgan 1979). The concept of a paradigm may also be examined at the ontological, epistemological and methodological levels. Paradigms may be distinguished by the assumed nature of reality and relationship between a researcher and reality, together with the techniques used by a researcher to discover reality (Deshpande 1983; Guba & Lincoln 1994; Perry et al. 1997). In the context of this research, a paradigm represents a collectivity which has a developed posture; in some instances this exists at the ontological, epistemological and methodological levels.

The following paragraphs outline a number of paradigms. The purpose is to consider and evaluate which paradigm is best suited to both the researcher and the chosen research situation. Orlikowski and Baroudi (1991) put forward three research paradigms: positivist, interpretivist and critical. Other researchers such as Burrell and Morgan (1979) and Guba and Lincoln (1994) have tendered four research paradigms, which are intended to inform scientific inquiry, such as positivist, post-positivist, critical and constructivist. Critical researchers use theory to intervene in the transformation of the mental, emotional and social structures of respondents and therefore often incorporate long-term ethnographic and historical research into organisational process and structure (Guba & Lincoln 1994). Constructivism considers reality to be a result of an individual's beliefs or values and rejects the concept of objective reality, treating it as relative (Perry et al. 1999). Reality can also be seen as something that is constructed by an individual, which in turn incorporates subjective biases, which then leads to multiple realities (Hirschman 1986; Perry et al. 1999). Like critical theory, constructivism investigates the values and ideologies beneath the surface of research findings. Thus, findings are created by the interactions between the researcher and other participants through a variety of methods, including in-depth interviews, dialogue and action research (Guba & Lincoln 1994).

The two paradigms most relevant to these discussions have also been classified as hard or soft. Checkland and Holwell (1998) also refer to these as functionalist and interpretivist respectively. They maintain that a functionalist view of information systems tends to focus on the goals of an organisation and how IS should be designed to support these rational goals; this is designed to aid rationalised activities and rational decision making. Conversely, the interpretivist approach views the organisation as being multi-faceted, with the IS providing data and communications facilities that are used by organisational participants in making sense of the world and the negotiated actions to be taken. The functionalist and interpretivist paradigms have also been labelled as positivist and phenomenological. Fitzgerald (1997) contends that the use of the label phenomenology is confusing because it is broad in nature and because phenomenology can also be considered to be a methodology in its own right. To mitigate this issue, Fitzgerald (1997) suggests the use of the term interpretivist. This research utilises the term of positivism

and interpretivism as the two main paradigms that inform research. The research triangle presented previously in figure 3.1 allows the fundamental differences between the two main paradigms to be examined; figure 3.2 contains their fundamental elements.

| | |
|---------------------|--|
| Ontology | Positivism adopts the ' Realist ' posture <i>Interpretivism</i> adopts ' Relativist ' posture |
| Epistemology | Positivism adopts an ' Objective ' position <i>Interpretivism</i> adopts a ' Subjective ' position |
| Methodology | Positivism uses the ' Scientific ' approach <i>Interpretivism</i> uses ' Hermeneutic/dialectic ' approach |

FIGURE 3.2 POSITIVIST & INTERPRETIVIST FUNDAMENTALS

The following sections discuss and briefly explain these fundamental differences between the two paradigms in terms of their epistemology, ontology and methodology. The goal of these discussions is not just to indicate the overall posture of the researcher but also to discuss in detail these fundamental elements. The clarification of these fundamentals will reveal a more detailed description of the posture of the researcher at the ontological and epistemological level whilst the methodological level is outlined in the next chapter.

3.1.1 Epistemological Posture

The purpose of this section is to discuss the two main epistemological positions that are used within the discipline of IS; as described in the previous section, these are positivism and interpretivism. This section also outlines the most appropriate epistemological position for the researcher. The chosen epistemology for this research will be shown as one that takes an interpretivist stance to support the achievement of its aims and objectives.

An epistemology is essentially a framework that supports the creation of acceptable and valid knowledge. The discipline of IS has extensively debated the limitations of research paradigms, particularly those of positivist research (Burrell & Morgan 1979; Lincoln & Guba 1985; Chua 1986; Orlikowski & Baroudi 1991). The selection of a positivist or scientific approach to social investigations has been argued to be inappropriate for an inquiry into social situations (Checkland 1981; Stowell & West 1994). Whilst the positivist perspective still dominates there is now an increase in interpretivist research (Klein 1999; Ngwenyama et al. 1999; Lee & Liebenau 1997; Walsham 1995). Interpretivist researchers view positivist analysis methods as being relevant in a rational world with clear and rational aims and objectives. Interpretivists believe that this rational world does not exist, and as a result they consider each situation as unique. Each person is considered to construct his or her own reality as part of a broader frame of reference that includes a shared human apparatus (Archer 1988).

The term interpretivist originates from the Greek word 'hermeneuion' and the English meaning of this word is 'to interpret' (Gummesson 2000). The interpretivist paradigm is mainly concerned with understanding and interpreting human behaviour from the actor's own frame of reference (Hussey & Hussey 1997). The fundamental idea is that reality is socially constructed rather than objectively determined (Easterby-Smith et al. 1991). At a basic level, interpretivism seeks to examine the meaning of text as opposed to its measurement; although the interpretivist posture is in direct opposition to positivism (Guba & Lincoln 1994), it is the most appropriate approach to IS and social research according to Kanungo (1993), Walsham (1993), Myers (1995), Butler and Fitzgerald (1997).

This section has shown that positivism requires that only observable and measurable phenomena can be researched. Positivism has been criticised for its assumption that the social science researcher can be an independent, value-free actor in the research process (Guba & Lincoln 1994; Hirschman 1986). The selection of a positivist or scientific approach to social investigations was shown to be inappropriate for an inquiry into social situations (Checkland 1981; Stowell & West 1994). Realism, rather than positivism is a

more appropriate epistemological guide for case study research (Perry 1998). This aspect is further discussed in section 4.2 (Case Study Method). Positivism was therefore deemed to be ill suited to this study; this was because of the research requirement to conduct an inquiry within a complex social setting. Given these considerations the researcher therefore adopted the interpretivist posture.

3.1.2 Ontological Posture

The purpose of this section is to discuss the two main ontological positions available to researchers; these are realist and relativist. This section evaluates and contrasts these two positions with the chosen epistemological posture outlined in the previous section. The section is concluded with the identification of the most appropriate ontological posture for the researcher. Given the research situation outlined in chapter one and the researcher's interpretivist epistemology mentioned in the previous section (3.3.2), the most appropriate posture for this research will be shown to be that of a relativist.

As discussed in the previous section, positivists conduct research to seek facts and causes of phenomena through explaining, predicting and controlling variables in order to discover the true nature of reality (Deshpande 1983). Neuman (1997) maintains that a realist seeks to obtain knowledge using an objective or non-interactive posture; this is achieved through using methods such as testing hypotheses, which are declared in advance and are either proved or disproved. At the ontological level positivism usually relies on realism. Realism is often characterised by some researcher objectivity; in other words, case study research efforts usually involve the collection of perceptions of 'unobservable' external world phenomena (Hunt 1991). Realism, according to Hunt (1991), does not suffer from the limitations of relativism. Positivists also need to consider several other axiological elements, which are used to support the credibility of their findings. For each finding, the validity can be objectively measured using quantitative or statistical methods.

Lincoln and Guba (1985) also contend that positivism seeks to make valid, reliable and objective contributions to knowledge, and that the ontology of this paradigm assumes that there is only one reality. Realism does however have an ontology that recognises that an understanding of reality may be obtained, although this is imperfect (Guba & Lincoln 1994; Merriam 1988). This imperfection could be due to the researcher's limited capacity to comprehend the complexity brought about by the multitude of perspectives with which external reality has to be explored (Merriam 1988; Perry et al. 1999). Realism is arguably more suited for inquiries that are pre-paradigmatic in nature, which also require a basis for theory development (Borch & Arthur 1995).

By contrast, an interpretivist researcher needs to adopt the ontological position of a relativist. This is because interpretivists conform to the notion that there are many realities, and that these are generated by the research participants in context. Interpretivist researchers do not view the separation of a subject and researcher as being an effective posture, since these realities may also differ to that of the researchers. Therefore, the criterion for evaluating interpretivist research must be considered different to those of positivist research. Overall, the ontological, epistemological and methodological approach that typifies the natural sciences has been misapplied to social settings (Mingers 1992). The scientific approach for social research is therefore not suited to researching social phenomenon, because not all situations have clearly defined variables, well-defined relationships or even predictability, since making predictions from observations may itself introduce change as humans respond to having predictions made about them (Checkland 1981).

Given the justifications presented in this section and the interpretivist posture adopted by the researcher, the most appropriate ontological posture of the researcher is therefore relativism.

3.2 INFORMATION SYSTEMS AS A SOCIAL SYSTEM

The purpose of this section is to further confirm the research selection of conducting a social inquiry and to identify the theoretical direction of the IS discipline. The research presented in this thesis is predominately intended for the discipline of IS; this section will therefore review the historical developments of information systems and IS research. This section performs a summary of the models that have been used within the discipline, using the work conducted by Cecez-Kecmanovic (2002), who provides a summarised perspective on the development and evolution of the IS discipline over the past 50 years. The purpose of these discussions is to show the progression of the discipline from one that started with a production model to one that now sees IS as a social system.

The idea of an Information System (IS) that collects and processes data to produce information was born in the early 1950s when the first computers were used for calculation and accounting purposes. This model equates an IS with computer data processing, rendering IS an exclusive province of technology, as shown in figure 3.3.

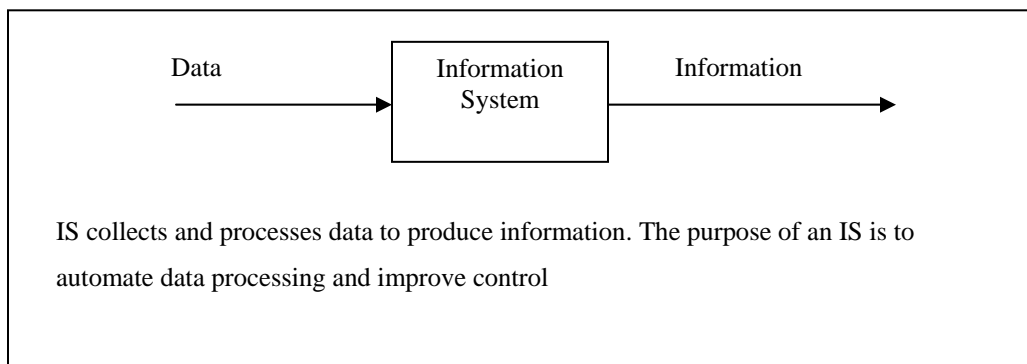


FIGURE 3.3 THE PRODUCTION MODEL OF IS (ADAPTED FROM CECEZ-KECMANOVIC 2002)

After decades of developments in electronic data interchange (EDI), intranets, extranets and the Internet the model of IS then expanded to include linkages with suppliers, partners and consumers. The growth of Electronic Commerce resulted in a new concept termed the inter-organisational model of IS, as shown in figure 3.4.

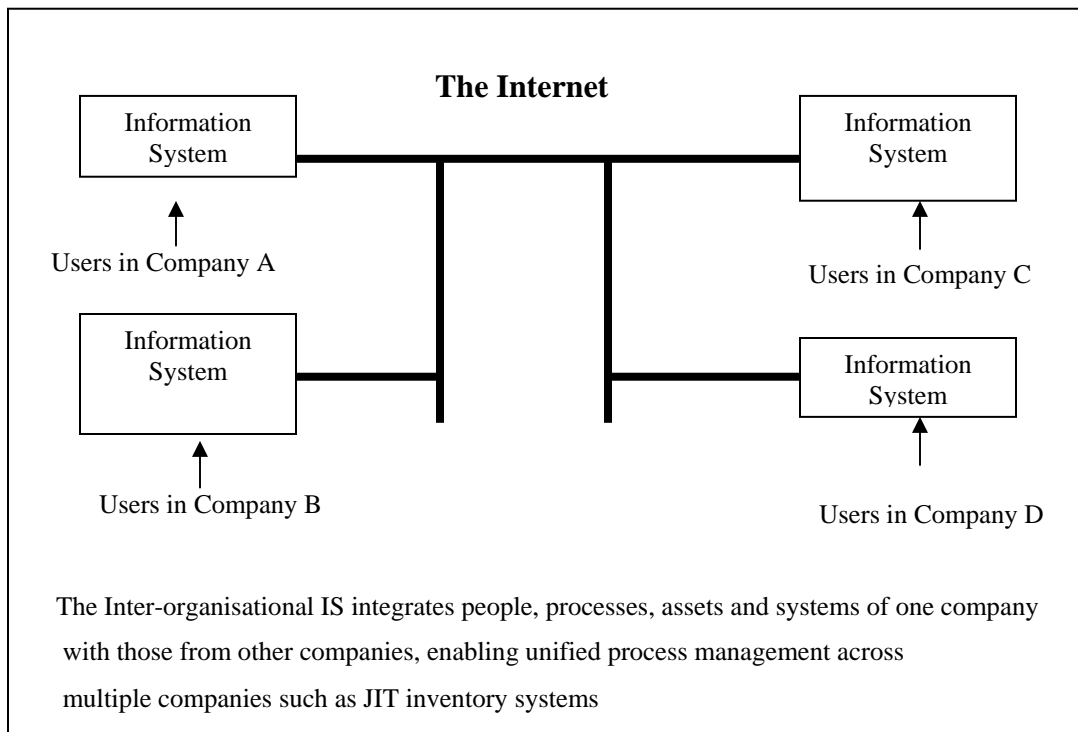


FIGURE 3.4 THE INTER-ORGANISATIONAL MODEL OF IS (ADAPTED FROM CECEZ-KECMANOVIC 2002)

This model integrates people, processes, assets and systems of one company with those from other companies, enabling a unified process management across multiple companies, such as supply-chain management and Just-In-Time (JIT) inventory. This new model required a change in perspective. In managing Electronic Commerce and inter-organisational IS, companies began to struggle with organisational, social, political, legal, and personnel issues and challenges, rather than those which were predominantly technical and technological, that were far too complex and interrelated for them (Cecez-Kecmanovic 2002).

Further developments in technologies such as IT changed the focus away from traditional data processing models and towards mediation of communication and collaboration of among people. This is a radically new idea which resulted in the new model of IS, as shown in figure 3.5.

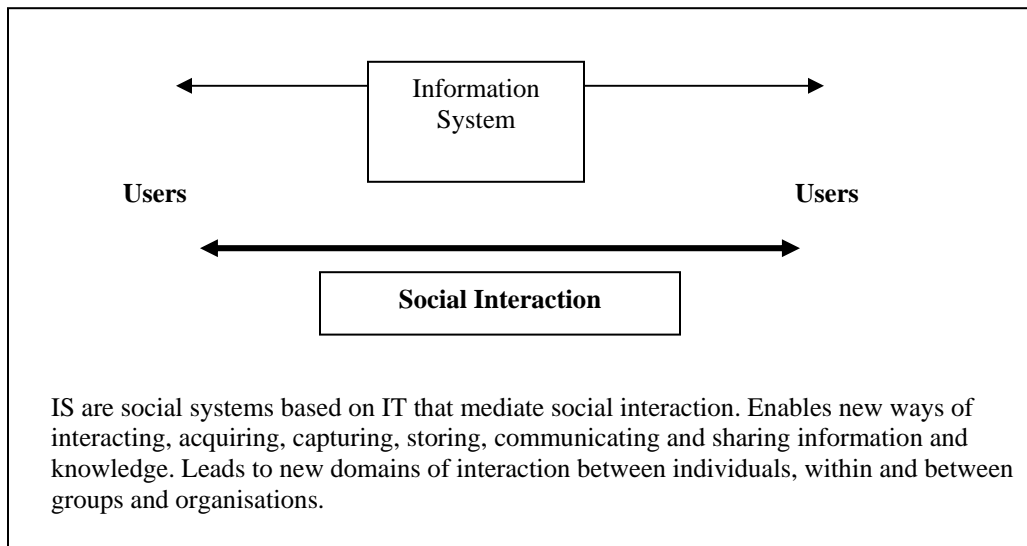


FIGURE 3.5 IS AS A SOCIAL SYSTEM MEDIATING SOCIAL INTERACTION (ADAPTED FROM CECEZ-KECMANOVIC 2002)

This final model recognises the social nature of IS (Cecez-Kecmanovic 2002). IS are now seen to be social systems that use technology to perform certain functions. This represents a paradigm shift in thinking about what an IS actually is. IS are now perceived as part of organisational processes/activities that are made up of and performed through linguistic interaction of actors, which takes place against an assumed background knowledge. By enabling and mediating social interaction beyond space-time constraints of face-to-face interaction, IS becomes embedded in social systems, thereby transforming communications and potentially enhancing mutual understanding, co-ordination and co-operation amongst individuals and groups (Cecez-Kecmanovic 2002). Many IS authors such as Klein and Hirschheim (1983), Boland (1985), Markus and Robey (1986) and Lyytinen and Hirschheim, (1988) have been claiming for years that IS are actually social systems that are themselves a component of a much wider domain of human language, linguistic and social interaction.

The evolution of the idea that IS are conceived as social systems enabled by IT has had considerable implications for the way IS are developed, the methods used for their development and the body of knowledge required from IS professionals (Cecez-

Kecmanovic 2002). As the model of IS changed, so too did the tools for inquiry. From the beginning, the research subject (A) and the methods (M) showed diversity and complexity (Klein 1999). These historical developments within the discipline of IS have combined to reinforce the selection of a systems thinking approach and the chosen epistemological focus for this inquiry of interpretivism. The shift toward IS as a social system has been shown to lead to an increase in the popularity of interpretive research approaches.

3.3 SYSTEMS THINKING

The purpose of this section is to briefly outline and then highlight the relevance of systems thinking to this research. The relevance of using systems thinking also extends to the two applied methodologies used in this research (SSM & FMA) since it is one of the prominent philosophies that underpins them. The notion of systems thinking is also used in this research to mitigate some of the problems associated with taking a reductionist approach to researching technology and information aspects within the enterprise. The reductionism problem was identified in the literature review process.

Several of the frameworks presented in the literature review chapter such as the TAM (Davis et al. 1989) and TPB (Ajzen 1991; Mathieson 1991) were seen to suffer from reductionism. Reductionism is the assumption that an entity can be divided into its component parts, where the cumulative explanation of the parts and their relations fully explains the entity (Dent & Umpleby 1998). Systems function as a whole, so they have properties above and beyond the properties of the parts that comprise them. These are known as 'Emergent Properties' (O'Connor & McDermott 1997). O'Connor and McDermott (1997) argue that the whole system properties cannot be understood by breaking the system into constituent parts and that the only way to find out how a system functions and what its emergent properties are is to see it in action as a whole.

In pioneering the beginnings of cybernetics, Ludwig Von Bertalanffy (1962) first established the Society for General Systems. He believed that an exaggerated narrow specialisation was too reductionist and hence causing humankind to make a critical oversight – the oversight of the whole. He argued holism as a ‘new world view’ as opposed to it being a specialised science with its own narrow scope. Systems thinking is the practice of those who are holistic enough in their thinking, decision making and action to cover all essential attributes because they are broad and interdisciplinary (O’Connor & McDermott 1997). Kast & Rosenweig (1985) state that “the holistic view is basic to the systems approach. In traditional organisational theory, as well as in many of the sciences, the subsystems have been studied separately, with the view to later putting the parts together into a whole. The systems approach emphasises that this is not possible and the starting point has to be with the total system” (Kast & Rosenweig 1985, p.105.). Holistic thinking does have some limitations in that true holism may never be attained because it needs to include every possible attribute (Mulej & Kajzer 1998). Although this cannot be achieved, Mulej and Kajzer (1998) have introduced the ‘Law of Requisite Holism’ to mitigate this limitation.

Research within the discipline of IS has identified two big waves in the Systems Theory formation process (Jackson 1991). The first group spans from the 1940s to the early 1970s. The traditional theories aim at generality of their theoretical findings and keep to a functional, hard-systemic, very reliable dependence of a process outcome or output on the process input, which is prevalent in the natural sciences. Jackson (1991) labels this group as traditional and all after this period as modern. These modern approaches aim at solving rather specific issues on the basis of the principles of systems thinking and at further elaboration and development of those principles, and they keep to either a hard-systemic theory, covering probabilistic rather than reliable dependence of the process outcome on the process input (Jackson 1991). There are also two prominent streams within modern systems thinking which includes the Critical Systems and Interpretive streams. Both streams have different priorities to the natural sciences, in particular their observation methods. This research uses the interpretive stream of systems thinking because of the

researcher's declared epistemology (see section 3.1.1) and the use of the Checkland's (1981: 2000) SSM (see section 3.5).

The basic concepts in the systems approach for understanding organisational phenomena include the System, the Emergent Properties and Holism (Churchman 1968). Systems thinking can be viewed as a particular way of thinking, an epistemology. The value of systems thinking to problem solving is in thinking holistically and adapting methods of the approach that will improve both the understanding about the problem and the context in which it resides. This aspect is important because a practitioner's perception of a system will change as their awareness or appreciation of the situation increases (Vickers 1965). Systems thinking also attempts to address the issue of generalising across systems. Churchman (1971) introduces the idea of systems thinking or systems inquiry as being a process of seeing things differently to see an organisation as a process and to seek new perspectives on a problem. Overall, the mainstream systems literature has so far paid little systematic attention to the small business arena, despite this being potentially a very significant sector for the systems thinking community (Warren 2003).

Given the ideas presented above, the PIPI concept and the two conceptual models developed in this chapter are presented as an application of modern pragmatic systems thinking concepts. The most prominent systems thinking concept used in the creation of the PIPI concept is the Soft Systems Methodology (SSM), which is discussed in section 3.5.

3.4 RELEVANT IS AND SYSTEMS THINKING LITERATURE

The purpose of this section is to discuss relevant IS and Systems Thinking literature. These aspects are relevant to the design of an inquiring system which is needed for such a social inquiry. The intervention literature is also briefly reviewed with further discussions concerning the intervention presented in next chapter. The section starts by examining several forms and types of social inquiry, followed by the IS theory relevant to

interventions. For example, the literature regarding Information Seeking and Use, Information Scanning, Interpretation and Learning areas are reviewed. This section therefore conducts a second literature review process that is more relevant to both the development of the PIPi concept and the constructs presented in the conceptual model which is used for the inquiry.

3.4.1 Pragmatic forms of Inquiry

The purpose of this section is to discuss theory relevant to pragmatism and inquiry. Pragmatism is a practical approach to problem solving and as a philosophy it has a doctrine that defines the function of thought as a guiding action, and that truth is pre-eminently to be tested by the practical consequences of one's belief (Shields 2005). Pragmatism made its entrance into history under the banner of modernism, with its emphasis on scientific progress and a quest for gathering the truth, as opposed to being just the possessors of truth. It was enlisted to address the crisis of knowledge and authority. Diggins (1995) found that although pragmatism ultimately failed to achieve its promise, it embodied both the spirit of the time it was created and the culture in which it flourished. Pragmatics can also be used as a method of settling metaphysical disputes that otherwise might be interminable (Hildebrand 2005). It has a focus on tracing practical consequences for participants of inquiry. The goal of harmonising ideals and practical realities often fails because this task involves the application of general and fixed concepts to a particular and fluid practicality (situation). What is needed is a strategy to deal with the emergent, unusual or problematical cases. Pragmatism seems to offer such a strategy (Hildebrand 2005) and it spans from the seminal works of Dewey, James and Pierce to the contemporary neopragmatism of Rorty (Diggins 1995).

Dewey wrote extensively about the way knowledge is shaped (Bishop et al. 2004). Dewey also argues that knowledge never leaves the realm of theory and remains forever subject to change. He argues that all inquiry involves transforming the environment; it is an activity. Knowledge making is by its definition transformative. The type and extent of

transformation has to do with the goals of the inquiry. For Dewey, an inquiring mind will change the environment somehow. Dewey (1916) also asserted that in education there was a lack of emphasis on the discovery, and that teaching covers already formed ideas instead of how to form ideas. Hickman (1990) noted that Dewey challenged the traditional notion of knowledge. He considered knowing as a technological artefact and knowledge as an artefact of technological inquiry, as situational and mutable and not the mirror of reality. Technology therefore, can act as a tool for inquiry and it does not necessarily need to be the object of inquiry. It can be either the by-product of inquiry or the object of the inquiry. These tools only function within situations and their use is primary whilst their origin is secondary. Meaning and use is therefore contextual and determined by usage and these meanings/ uses can multiply (Hickman 1990).

Dewey's educational goal (1916) was focused on growth, not just for students but for society in general. By growth he means a type of interaction with the environment through which both the organism and the environment mutually adapt to shape each other. His goal was to provide society with what it needs to perpetuate itself, to create conditions of growth that are most conducive to further growth (Dewey 1916). The necessary condition he claimed to create such growth was democracy. Democracy was introduced through opening up the channels of communication and the commitment to both dialogue and criticism. He felt that through these processes of open communication and dialogue (as part of an inquiry) both the individual and society will be transformed for the better.

Dewey also developed a philosophy that he called the Theory of Inquiry (Dewey 1938). His Theory of Inquiry is based on his observations of living organisms. He noted that organisms always live within an environment. Through the activity of organisms, they and their environment change, and adjust to, each other. Organisms are in a state of flux and movement (Dewey 1938). In order to maintain life they seek equilibrium with the environment. If equilibrium is out of balance they seek to restore the balance. The aim of life is growth, a self-renewing process through action upon the environment (Dewey 1916). In their pursuit of equilibrium humans have come to communicate and use

language. Through language we evoke different activities performed by different persons so as to produce consequences that are shared by all participants (Dewey 1936). Dewey's Inquiry Theory is rooted in pragmatism, a tradition of philosophy and social action that rose to prominence in the work of Peirce, James, Addams and Dewey (Bishop et al. 2004).

Dewey (1910) argued the scientific version of inquiry suffered from an inward-looking perspective, which he considered as reductionism. Dewey pushed for a new way to analyse and understand problems by looking outside the problem situation. This activity was an attempt to examine the wider system through looking for relationships with the problem situation. Dewey's (1910) was also concerned about analysis, which he supplemented by incorporating 'synthesis' which introduced a need to examine different stakeholder perspectives in a situation, in particular, looking for 'how' they see the problem. Another influential academic that incorporated the notion of synthesis was Churchman who incorporated Dewey's ideals about synthesis into his inquiry method via an emphasis on asking questions about context (Churchman 1979).

Churchman's notion of context incorporated the values and appreciation of stakeholders. When conducting an inquiry, Churchman (1961) argues that the social scientist must also take into consideration a given subject's value and not merely show a person how to better their goals it should also provide estimates for them for what their goals really are – something they may not be aware of. Churchman was known for being a champion of both the systems approach to systems planning and to Operations Research (OR). An important activity of the OR was to apply mathematical models to systems. He used mathematical modelling such as probability statistics as part of his systems approach to managerial systems planning (Churchman 1968). Churchman was also aware of the limitations of these mathematical models.

The systems approach, according to Churchman (1968), employs models, in order to holistically view a system, A model is way in which the human thought process can be amplified (Churchman 1968). A model can also be used as a method to approximate

some reality (Churchman 1979). One limitation of using systems thinking is that these models are always embedded in a larger system (Churchman 1968). Churchman (1979) developed his own system for inquiring, called the 'Design of Inquiring Systems'. To address scientific research issues such as objectivity and quality of results regarding research with human subjects Churchman argued that the essence of the systems approach is the design of an inquiring system that is most capable of unfolding the relevant issues concerning the human condition (Churchman 1979). He engaged five human scientists and famous philosophers; Leibniz, Locke, Kant, Hegel, and his systems mentor Singer. He shows how each has their own unique insight to offer, and also highlights how each insight is incomplete (Churchman 1971).

Churchman's work has influenced a number of influential IS scholars such as Ackoff, Ulrich and Checkland. Ackoff co-founded the OR program with Churchman. Ackoff also used Dewey's ideas in his attempt to promote innovative human activity problem solving techniques. Ulrich extended the systems approach to better understand system boundary aspects and 'Critical Systems Heuristics' (Ulrich 1983). Ulrich's (1983) approach to solving human activity problems also draws heavily on the notion of purpose. Purpose is an emergent property of complex thinking, humans take purposeful actions toward problem solving and problems occur when purpose is frustrated. Purpose is distinguished from vision and goals because it includes the why action is being taken aspect. Ulrich's version of synthesis incorporates the thinking about the purpose by those trying to solve problems. The designer of the solution may see a different purpose than users. Purpose therefore, defines the relationships that are important for a system to transform its inputs into outputs. Stakeholders, according to Ulrich (1983), do not know what they don't know. He uses this reasoning to justify and an approach that encourages stakeholder perspectives which creates a broader appreciation of the problem situation. He argues that this is in an attempt to include elements that may have been forgotten or blind-sighted.

Checkland extended Churchman's work by distinguishing between 'hard' systems problems that can be generally defined adequately and 'Soft' systems problems that can be messy, vague and have social and or political components. Checkland went on to

develop a process for addressing 'soft' system problems in his SSM (Checkland 1981). Checkland (1985) argues that his SSM is doubly systemic in that it is itself a learning system and within that system it uses models of Human Activity Systems. He accepts that these models are not models of parts of the real world, but rather only models of ways of perceiving the real world. In Churchman's language, SSM is a Singerian Inquiry System one which accepts that an inquiry is never ending and is intent, in a heroic mood, on both attacking and defending the status quo. In his design of an inquiring system Checkland (1985) argued that the social scientist, through the process of intervention in human affairs, cannot separate theory and practice in the way that the natural scientist can. Such an intervention requires a steady interaction between Theory and Practice. The SSM is discussed in further in section 3.5.

Interestingly, Dewey in his Theory of Inquiry prefers to use the term Inquiry over Research and both Churchman and Checkland also prefer the term Inquiry over research within their respective inquiring systems. The Purposeful Inquiry aspect of this research both uses and is influenced by the pragmatic systems thinking concepts discussed in this section.

3.4.2 Information Systems Design (ISD)

The purpose of this section is to discuss the Information Systems Design (ISD) process. This is because the two conceptual models used in this research are presented as information systems themselves. In terms of Information Systems Design (ISD), Checkland and Holwell (1999) identify two main schools of thought and they label these as the hard and soft approaches. Wilson (2001) maintains that there are a number of ways in which hard and soft can be defined, but the definition often cited is in terms of the degree of agreement about what the problem is among the particular population of individuals to whom the problem is of concern. Both the hard and soft approaches to ISD incorporate differing viewpoints and concerns for investigating problem situations and developing information systems (Wilson 2001). Checkland and Holwell (1999) maintain

that a hard approach views information as a support device that is related to decision making in organisations. This approach utilises hypothesis testing as an appropriate mode for conducting research. Conversely, the soft approach relates information to meaning attribution and sense making. It utilises semiotics, hermeneutics and interpretive action research as modes of inquiry into real world problem situations (Checkland & Holwell 1999). The main contention here is that information and information systems serve and help support people taking purposeful action in the real world. The term 'Purposeful' is conceptualised in the PIFI concept as having a purpose that is expressed as meaningful, intentional and deliberate researcher activities.

Stowell (1999) maintains that the application of IT makes a fundamental contribution to the dissemination of information; however, these technological devices in themselves are not information systems. The technical process is primarily concerned with the translation, storage and transmission of signals, but it is the understanding and interpretation (literal and contextual) of the resulting code by a human that makes it worthwhile information. An information system can therefore be considered fundamental to human interaction; its actors may use for example other elements such as computers as sources of business intelligence. Thus, an information system can be viewed as an assortment of intelligence-gathering devices used in a specific way by an individual so as to enable them to manage their environment (Stowell 1999).

Placing too much emphasis on only the technical characteristics of a system rather than the human or social aspects can produce negative consequences, both in terms of the system developed and with respect to individual aspects such as user satisfaction (Hirschheim & Smithson 1988). Stowell (1999) believes that the main difficulty facing an analyst is a practical one, in that IT requires a functional explanation but information needs understanding. Checkland (1993) adds that information system developers must themselves go beyond the technical considerations in the IS development process and look for social factors that may influence the functionality and development of an organisational information system.

Denning et al. (1989) claim that the objects of a social inquiry are different from those in the natural sciences because users, stakeholders and developers are not natural objects but rather are conscious subjects. Consciousness, according to Denning et al. (1989), is considered important because it is aimed at developing social systems, which are essentially sense-making systems that are formed around shared meanings. Participation within a social inquiry has also been argued by many authors to be a fundamental component of AR studies (Reason & Bradbury 2000, Baskerville & Wood-Harper 1996, Stowell et al. 1997, Checkland & Scholes 1999). It has also been argued by Checkland (1983) as being a means of providing a paradigm shift from the observation and measuring methods that constitute scientific forms of inquiry.

Checkland and Holwell (1999) maintain that we need to re-think what is entailed in providing information systems that support real world organisations. It is clear that the normative view of organisations as having clear objectives, pursuing these objectives with rationality and employing information systems to support analytical processes is not a complete picture of how organisations operate in practice. The normative view is however a useful presumption – it supports the design of an information system meeting ideal requirements (Davis 2000). Checkland and Casar (1985) also believe it useful to consider a social inquiry as being a system in itself, since this system can be described. This advice is used within this research in that the description of the chosen research situation takes the form of two conceptual models. These representations depict the chosen research situation as an Information System, which is intended to support the people who conduct purposeful action.

Arising from these discussions is the notion that an information system within the enterprise is one that:

- May be non-formalised
- May involve a social network of actors
- May involve participants and stakeholders across enterprise boundaries
- May involve IT as a support device for organisational IS

Given these principles, the unit of analysis for this research cannot therefore be an individual but must rather be the whole 'situation' itself. This requires the use of the soft approach to ISD. This is because the purposeful inquiry component of this research involves social aspects such as organisational culture, politics and the ever changing nature of human interpretation of IT innovation information. The use of a social inquiry is also supported by the decision to use the AR methodology which is discussed in the next chapter. It is also supported by the growing interest in social research methods within the discipline of IS, which was discussed in section 3.2.

Overall, the literature on designing systems to help define, appreciate and synthesise human activity problems is still rather diverse and has not really been drawn upon by mainstream IS practice or education (Metcalf 2003).

3.4.3 Critical Systems Heuristics and Systemic Intervention Theories

The purpose of the following sections is to conduct a critical review of the critical systems heuristics and systemic intervention literature. These sections present several prominent ideas from the Critical Systems Thinking (CST) literature including the extensive work that has been carried out in this intervention area by Midgley (1997; 2000; 2003; 2006). The section will show a theoretical shift from the positivist scientific observation methods to interventionist theories and strategies which were created using CST principles. The main reason for this section is to compare and contrast this CST literature with the interpretive approach used in this study. Given the researchers use of the AR methodology (M) further discussions concerning the interpretive ideas about intervention are presented in chapter four.

Another example of a 'Soft Systems' approach to problem solving is CST (Cordoba 2002). CST is a systems approach that emerged from the OR paradigm. It encourages critical analysis of stakeholder understandings of social contexts prior to the selection and

or design of planning methods and it seeks to manage power related issues and to bring about true emancipation for those in the problem context (Flood & Jackson 1991). CST embraces five major commitments (Jackson 1991). This research was unable to meet these basic CST principles because the PIFI concept was developed in advance without consultation with relevant stakeholders. Several important CST contributions in this area including the Theory of Systemic Intervention, the Total Systems Intervention and Boundary Critique Theory are discussed in the following sections.

Dewey (1938) conceptualised knowledge as an artefact and argued that the outcome of any successful inquiry does not require certainty in that it is not the mirror of reality. He maintained that an inquiry should be more than just a way to see ‘new things’ it should provide ‘new ways’ of seeing. He sees the ‘nature’ of inquiry as an active experience to resolve a tension and he maintained that this is more critical than knowledge because it involves a controlled transformation and this transformation has an emphasis on ‘intervention’ rather than description. Midgley (2003) maintains that the usual starting point for natural science is primarily about observation. Instead, the starting point with Intervention is defined as ‘Purposeful Action’ by an agent to create change. While some argue that ‘Intervention and Observation’ are opposites, Midgley argues that observation (as undertaken in natural science) should be viewed as just another type of intervention. An ‘Intervention’ could be viewed as flawlessly pre-planned change based on accurate predictions of the consequences of action. This is the mechanistic worldview that systems thinking seeks to challenge (Midgley 2003). Midgley (2003) has redefined the method of scientific observation as comprising a type of intervention.

3.4.4 The Theory of Systemic Intervention

Midgley (2000) first put forward the notion of Systemic Intervention as a philosophy, methodology and practice. He then went on to unfold his theory for ‘Systemic Intervention’ using a normative framework (Midgley & Ochoa-Arias 2001). This work provided an exciting agenda for future CST research (Midgley & Ochoa-Arias 2001).

Midgley (2003) then called for the development of a methodology of systemic intervention. Midgley (2006) offers a methodology for systemic intervention that:

- (1) Emphasises the need to explore stakeholder values and boundaries for analysis
- (2) Challenges marginalisation, and
- (3) Draws upon a wide range of methods to create a flexible and responsive systems practice.

Drawing on a wide range of methods was also termed mixing methods or the Multimethodology (Mingers & Gill 1997) of combining science methodologies. Mixing methods was an approach used by Midgley in his attempt to develop a systemic intervention theory (Midgley 1997). There is also a growing interest in utilising more than one methodology and method possibly from different spheres of thought within the same intervention (Torlak 2001).

This research draws on one research methodology, Action Research, and two applied methodologies, the SSM and the FMA framework. All three theories share interpretive, pragmatic, and soft systems thinking aspects.

3.4.5 The Total Systems Intervention (TSI)

Flood and Jackson's (1991) approach to creative problem solving uses the Total Systems Intervention (TSI). The TSI is a meta-methodology which interprets and brings into action a range of problem solving methodologies and it views problem solving as a process of intervention where practitioners can learn about and manage complex interacting issues (Wilby 1996). TSI evolved from a practical implementation of the principles of CST to its development into a methodology. Tsoukas (1993) claims TSI to be the practical face of CST. Unfortunately, TSI is beset by logical and conceptual problems which render its use problematic. It appears to confuse logical types; its use of metaphors tends to be circular and unnecessary. It is contingently linked to CST and it relies on commonsense, eclectically drawing on other problem-solving methods, but it is

unable to present a distinctively new, theoretically sound and methodologically consistent approach (Tsoukas 1993).

3.4.6 The Boundary Critique Theory

A practical application of the Theory of Systemic Intervention was developed by Midgley (1992) and Midgley et al. (1998) who introduced the theory of boundary critique. The theory essentially models the overlapping concerns of stakeholder groups. The emerging theory of boundary critique is another attempt to solve ways of improving problem situations. Midgley (1992) asserts that defining improvement to a problem situation is a systems problem, involving boundaries that must be determined in order to create an Intervention. Making decisions about which boundary to accept in preparing an intervention strategy is crucial. Changes to the boundary that defines the system are likely to change the nature or meaning of a given intervention, and this may require a new intervention to be formulated (Midgley 1992). Changing the purpose of the system (model) and this would change the intervention. Therefore, the purpose needs to be declared in advance.

Midgley et al. (1998) feel that this boundary critique is a key area of critical systems thinking. The theory suggests that researchers should remain aware of the need to access a diverse variety of stakeholder views in defining problems and to sweep in relevant information. It offers an understanding of how conflicts between stakeholders can be stabilised, leading to the marginalisation of some stakeholder groups and the issues that concern them. This indicates the importance of taking processes of marginalisation into account during interventions, and promoting and revaluing the contributions that can be made by marginal groups. The means by which the theory of boundary critique informs intervention is through the design of methods. Methods can be developed specifically to explore the boundaries of problems. The design takes into account the need to preserve the contributions of marginalised groups (Midgley et al. 1998).

3.4.7 Information Seeking and Use

This section looks at the main framework identified that relates to both information seeking and use. Cheuk (1998) researched the information seeking and use processes in the workplace. She employed a sense-making approach to develop an Information Seeking and Use framework (ISU). The framework comprises seven different situations which are as follows:

1. Task Initiating – participants perceive that they have a new task to work on
2. Focus Forming – participants perceive they have to gain a better understanding of how they carry out the task or solve problems
3. Ideas Assuming – participants are forming ideas about how to carry out tasks or solve problems
4. Ideas Confirming – participants try to confirm ideas they have assumed
5. Ideas Rejecting – participants encounter conflicting information or they cannot obtain answers needed to confirm their assumed ideas
6. Ideas Finalising – participants seek formal consensus to finalise ideas
7. Passing on Ideas – participants are presenting ideas to a targeted audience

Cheuk's exploratory study isolated one major finding relevant to this research. She found that these seven steps were not followed sequentially; people moved between these seven stages in multi-directional paths. This finding somewhat contradicts other studies presented previously showing information and decision making activities occurring on a continuum. The author provides the necessary evidence that indicates the continual flux of the process of human information seeking and use. According to Cheuk (1998), this framework can fully support people's movement through the dynamic process of information seeking and use; however, he fails to expand on several important aspects such as what information channels or sources are used. Another issue with this framework is that it can be seen as being reactive in nature, because a task must first be identified before it can be addressed. This is in contrast to the framework developed in this research that takes a more proactive stance toward IT information seeking and use and IT sense making situations in general.

3.4.8 Information Scanning, Interpretation and Learning

The research presented here also adopted a sense making approach, which sees the organisation represented as a context for sense making (Weick 2001). Weick (1995) states “sense making is best described as a developing set of ideas with explanatory possibilities rather than as a body of knowledge” (p.11). Weick (2001) relates sense making to the activity of Cartography. There is some terrain that mapmakers want to represent and they then use various modes of projection to make this representation. What they map depends on where they look, how they look and what they want to represent and their tools for representation (Monmonier 1991). For Weick (2001) sense making as cartography must imply the idea that there are an indefinite number of plausible maps and the activity of sense making is largely social. Individuals are seen as engaged in an ongoing process through which they attempt to make their situations rationally accountable to themselves and others (Morgan et al. 1983). The closer one remains to the language of the subject the greater the validity of the map (Weick 2001).

The positive relationship between information use and a firm’s performance has also been supported in the organisational literature (Thomas et al. 1993). An extensive stream of research regarding organisational decision making also shows that managers perceive and use information differently, depending on information sources (Anderson et al. 1994; O’Reilly 1982; Reimers & Fennema 1999). Information accuracy and reliability are other dimensions of quality that capture the degree to which the information corresponds to the truth, or the trustworthiness, of the information (Zmud 1978). Managers are more likely to trust information of high quality and hence are more likely to rely on it in making decisions or evaluating performance (Mooreman et al. 1993).

Task complexity is the difficulty, ambiguity and lack of clarity involved in the decision-making task (Huber & Daft 1987). To reduce the uncertainty inherent in complex assessments, managers are more likely to use information (Menon and Varadarajan 1992). Managerial decisions concerning IT innovations can be seen as being dominated by information. A lack of information could be considered as a major inhibitor to innovation. Ignorance of information can also be labelled as an inhibitor in that managers

are aware of information elsewhere but they choose not to access it. These managers can also be completely unaware of additional information, therefore placing them at a competitive disadvantage (Daghfous & White 1991).

Organisations can now be seen as open systems that process information from their environment. This environment contains some level of uncertainty so the organisation must seek information and then base organisational action on that information. Information that is gathered cannot be interpreted by organisations; it is people (individuals) that perform this activity (Weick 2001). Organisations must also develop information processes capable of detecting trends, events, competitors, markets and technological developments relevant to their survival (Weick 2001).

Managers can also be seen as gathering and then interpreting information. Managers may not agree on interpretations in that reaching convergence characterises the act of organising (Weick 1979). Weick suggests that many individuals participate or play some role in scanning or data processing, but the point at which information converges and is then interpreted is an activity that is performed at the top management level. This aspect was also identified within this study. Weick (2001) provides a framework that represents the relationships between organisational scanning, interpretation and learning as shown in figure 3.6.

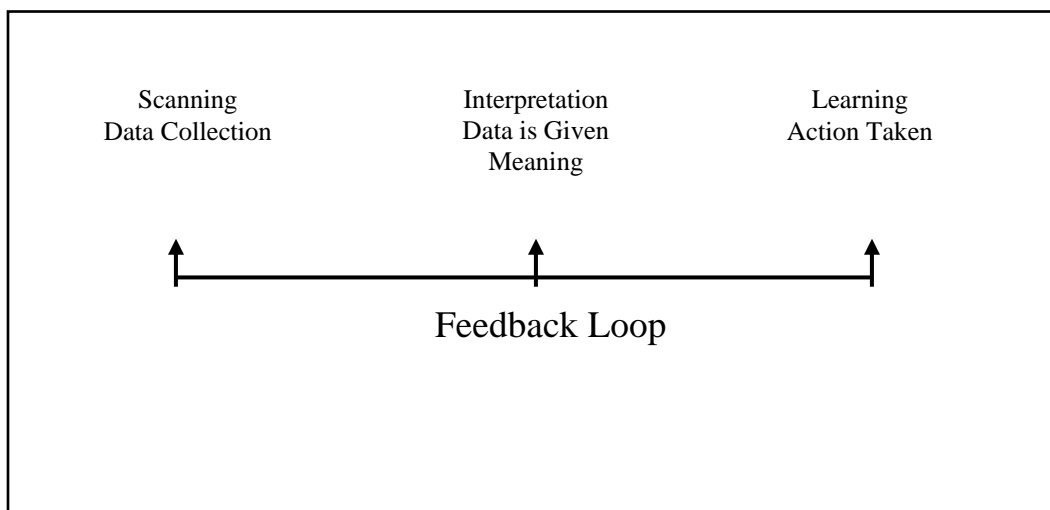


FIGURE 3.6 THE RELATIONSHIP BETWEEN SCANNING, INTERPRETATION AND LEARNING
(ADAPTED FROM WEICK 2001)

This framework of ideas has major implications for management, since the author believes that the job of management is not to do operational work but to interpret. Interpretation is described by Weick as the process through which information is given meaning and actions are then chosen. Managers need to be just as attentive to meaning as they are to money. As organisations move more and more vigorously into electronic information processing they will increasingly be constrained by the limits of human processing capacity. The author puts forward the notion that the key to these processing limits is improving the meaning attribution process; this improvement can increase human processing capacity. “Unless these qualitatively different kinds of logic are developed, disseminated and valued by the organisation people will find themselves increasingly unable to make sense of the products of information technology” (Weick 2001, p 456). Almost every organisational activity or outcome is, according to the author, some way contingent on this interpretation. This can only happen if participants within the organisation sense and interpret the environment and respond to it. Many activities such as decision making, strategy formulation, organisational learning, goal setting and innovation and change are connected to interpreting the external environment. These ideas indicate a need for managers and business owners to keep abreast of the external environment in particular the global IT state of affairs.

Overall, this section has indicated a real world need for effective information and information systems that are capable of supporting the complex activity of gathering, interpreting and attributing meaning to IT innovation information in context.

3.5 SOFT SYSTEMS METHODOLOGY AS AN APPLIED METHODOLOGY

The purpose of this section is to introduce the second of two applied methodologies used within this research. Checkland’s (1981: 2000) Soft Systems Methodology (SSM) is used as an applied methodology in this research and its application is limited to supporting the

conceptual modelling process. The classical form of SSM has seven phases as shown in figure 3.7. This research only uses elements within the third and fourth phases of the SSM to create a framework to support both the inquiry and the intervention activities. This limited application of SSM is in contrast to the full use of the classical seven phase approach. The reasons for this limited application are discussed in this section. Ultimately, the use of SSM is limited to producing two separate conceptual models using what Checkland termed his law of conceptualisation (Checkland 1981). This section commences with a discussion about the suitability and appropriateness of using SSM. The section is concluded with a review of the main benefits of using SSM as an applied methodology to support the research aims and objectives.

The selection of SSM was heavily influenced by the use of the Action Research (AR) methodology, which is further discussed in the chapter 4 (Research Design). The use of the AR methodology required the consideration of other approaches that either complement or are supportive or conducive to AR projects. According to Mansell (1991), the methodologies most useful for AR include Operational Research (OR), SSM (Checkland 1981), Socio-technical Systems Design (Mumford 1983) and the Viable Systems Model (Beer 1985). Other approaches considered include the Multi-view approach (Wood-Harper et al. 1985) and the Cognitive-Mapping approach (Kelly 1955 & Axelrod 1976).

The Socio-technical approach (Mumford 1983), the VSM (Beer 1979) and the Multi-view approach (Wood-Harper et al. 1985) were not selected because they need to be applied to a particular situation that has specific system requirements and context. The Viable Systems Model (VSM) (Beer 1979) illustrates core organisational systems and processes and the information that flows back and forth to its managerial system. The VSM has a hierarchical structure that reduces its usefulness in contemporary organisational dynamics within SMEs. This is unsuitable for the research presented in this thesis, since it involved the examination of eight separate SME case study situations. Ultimately, this would mean eight different situations needed to be assessed and analysed in context, with the result being that eight different models would need to be generated in

advance. Because this research seeks to conduct a systems thinking examination of the chosen research situation the Cognitive-Mapping approach (Kelly 1955 & Axelrod 1976) was precluded, since it represents a disjointed or fragmented approach within its modelling processes and representations.

To address shortcomings of traditional organisational models an alternative view was to develop both a process oriented organisation and a process-orientated view of the organisation (Ljungberg & Larsson 2002). One common example of the process-oriented view is Business Process Reengineering (BPR) (Hammer & Champy 1995). BPR is a model for reengineering the organisation using radical change processes. It is a top down approach and it has also been criticised for downplaying the role people and knowledge play within the organisation (Galliers 1997a). Another approach to process modelling which had a concern for people and their individual perceptions of the organisation can be found within SSM (Checkland 1981).

During the early 1960's the department of Systems of Lancaster University, now known as the department of Systems and Information Management, commenced research into the application of Systems Theory to real world problem situations (Ledington 1992). During the seventies, numerous developments and several iterative refinements in this area established an initial statement of the methodology. Drawing from both the action research methodology and systems science, Checkland introduced the methodology commonly known as the Soft Systems Methodology (Checkland 1981). According to Baskerville and Wood-Harper (1998), action research concepts for the gaining of professional knowledge permeate the SSM approach. First reported by Checkland (1981), this approach to real world problem solving has received considerable interest from both academia and practice.

In the development of SSM, Checkland incorporated the 'Systems Theory' concepts developed by Bertalanffy (1962) and the 'Appreciative System' ideas of Vickers (1965) into his version of systems thinking. Both Vickers and Checkland believe that the world is full of complex interactions or a flux of ideas and events. Checkland (1981, p. 1)

states, “To manage anything in everyday life is to try to cope with a flux of interacting events and ideas which unrolls through time...the manager tries to improve situations which are seen as problematical, or at least less than perfect, and the job is never done because as the situation evolves new aspects calling for attention emerge, and yesterdays solutions may now be seen as today’s problems”.

As an enquiry tool, SSM has been predominantly utilised in its traditional form of seven phases, shown in figure 3.7.

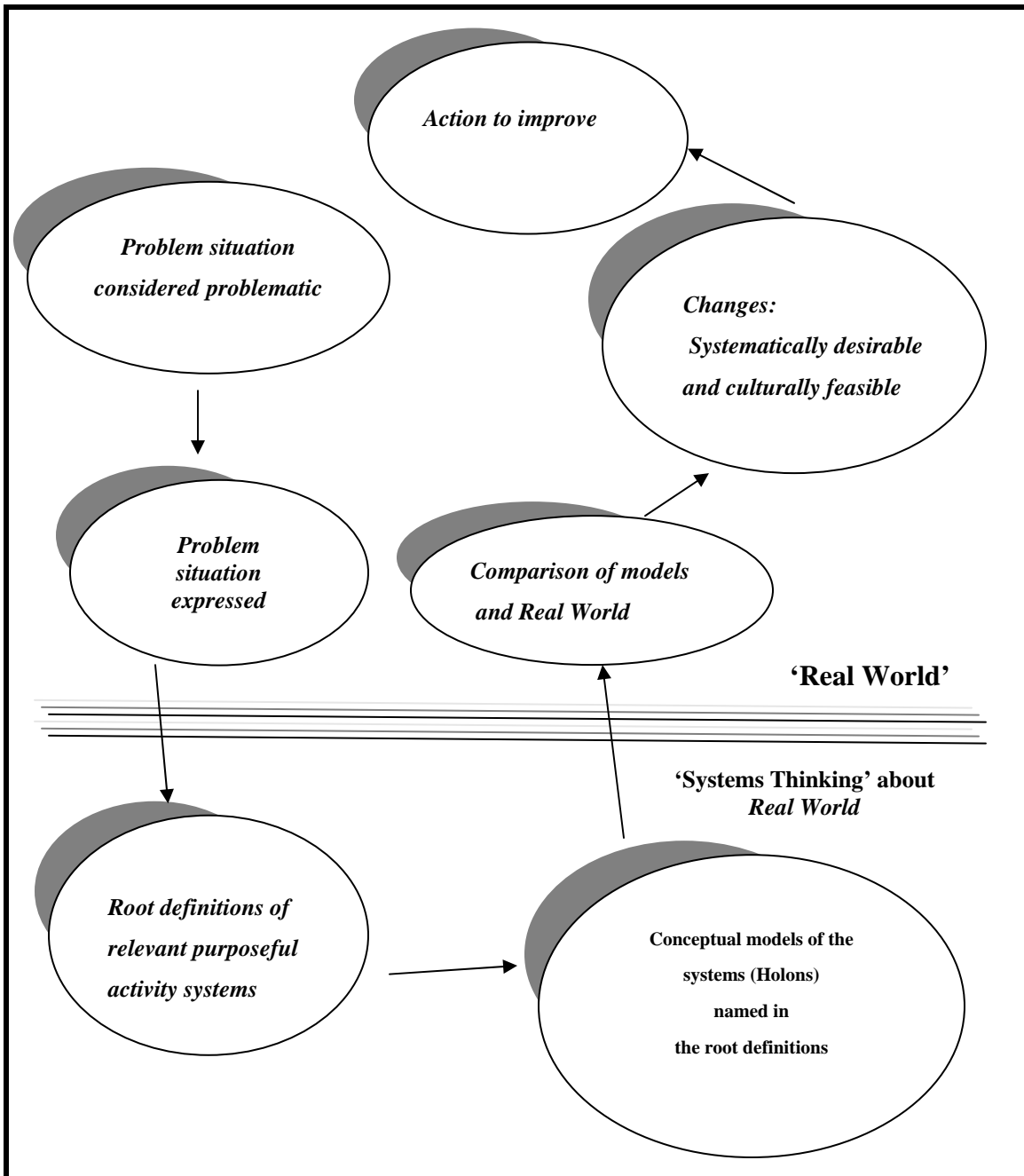


FIGURE 3.7 CLASSICAL PHASES OF SSM (ADAPTED FROM CHECKLAND & SCHOLES, 1990)

The traditional steps of SSM, according to Checkland and Scholes (1990), consist of identifying a problem situation considered to be problematic and expressing the situation in plain language. The intermediate steps are called collectively 'systems thinking' about the real world, which involve developing 'root definitions' of associated 'purposeful activity' systems that give rise to 'conceptual models' of potential systems (Holons). The process concludes with a comparison stage, where these models are held up against the real world situation. From this suggestions of changes that are culturally feasible and systematically desirable are shown, these result in actions to be taken can be considered as purposeful human activity to improve the problem situation (Checkland 1990). The activity of developing and using Rich Pictures has been applied as a tool in their own right (Bronte-Stewart 1999).

This research uses Chapter 1 in place of SSM phases 1 and 2. The first chapter outlined the Area of concern (A) for this research project. SSM Phase 5 was not used – instead a Questionnaire was used in an Interview process to guide and maintain the focus of the Inquiry. The Questionnaire was derived from the first conceptual model. The questionnaire development process is outlined in section 4.4.2. The traditional SSM Phase 6 and 7 were replaced by the use of the AR methodology and a series of developmental AR workshops were conducted in a manner where multiple perspectives were raised and democratic dialogue about change in relation to the conceptual model and the situation was generated.

One of the core ideas of SSM relates to people taking intentional, designed, organised or managed activity. This is termed purposeful human activity (Checkland 1981). Modelling purposeful human activity is complex since there are many stakeholders with differing worldviews. Purposeful activity becomes a negotiated social response. SSM has a modelling phase based on conceptualising organisational processes by using a Human Activity System (HAS). The processes depicted within these models are derived and based on an explicit declaration of perspective of what makes the activity meaningful. These models also include monitoring and controlling activities. The basic shape of the

HAS-based modelling approach (Checkland, Forbes & Martin, 1990) is described as follows: find out about the problem situation that has provoked concern; select relevant concepts that may be integrated into human activity systems; create HAS models from relevant accounts of purposeful activity; and use models to question the real-world situation in a comparison phase. The debate initiated by the comparison normally entails the findings of accommodations between conflicting interests. The purpose of the debate is to collectively learn a way to improving problem situations by activating the people involved a learning cycle of collaborative dialogue. The use of HAS models in IS always assumes that the purpose of creating an organised IS is to serve some real-world action; namely, organised provision of information is always linkable to action (Checkland 1993). Designing an IS will require attention to the purposeful action which IS serves, and hence to the meanings which make those particular actions meaningful and relevant to particular groups of actors in a particular situation (Checkland 1993). Soft systems are essentially collections or groups of people undertaking some purpose (Beynon-Davies 2002).

SSM is also well known and widely used as a systems approach to modelling ill-defined problems within a social setting (Checkland & Scholes 1990). However, these models are “only a means to an end, which is to have a well-structured and coherent debate about a problematical situation in order to decide how to improve it.” (Checkland & Scholes 1990, p.43). The idea of improving problem situations using models appears to be the focus of SSM (Checkland 1981). Models used in SSM are not simplified conventional descriptions of something; rather they are ideal design ‘concepts’ of what they represent or alternatively, ideas or a frame of reference to think about something. SSM calls these ‘conceptual models’, which does tend to confuse people with the normal connotation of model, which is a formal description of some phenomenon (Ledington & Ledington 1996). These conceptual models can be used to help us think about people taking real world purposeful activity.

Within the discipline of IS, SSM has been extensively used to enquire into problem situations (Avison & Wood-Harper 1990; Stowell 1995; Stowell & West 1994). The use

of SSM within the discipline of IS has also spawned numerous other ideas. Several IS researchers have retained the underlying philosophy of SSM and developed their own adaptations of the methodology. For example, Wilson (1984) developed an Information Engineering approach, Wood-Harper et al. (1985) developed their Multi-view approach and Beer (1985) used several ideas from SSM to develop his 'Viable Systems Model' (VSM). Wilson (1984), Checkland and Scholes (1990) and Davies and Ledington (1991) all agree that although many authors vary their approach, the common thread is the two states of communication which are the physical or existing world and the conceptual or logical worlds. The distinction between these two worlds, according to Davies and Ledington (1991), is not a trivial separation, for while the whole of the methodology is a systematic form representing idealised action, certain real world aspects are considered distinctive to those conceptualised aspects.

SSM conceptual models can be used a basis for structuring a set of questions about the situation. For example, in traditional SSM, the analyst would engage the conceptual model with the situation and derive questions to structure a debate about change (Davies & Ledington 1991). Further, the root definitions and models will be the opinion of an expert (analyst) that is somehow relevant. The idea that somehow these intuitive models are conceptually designed ideals is to overstate the power and status of the analyst/modeller (Davies & Ledington 1991). Ultimately, there is no basis for the model and the situation having any form of relationship, except through the interpretations of the analyst (Checkland & Scholes 1990).

Checkland and Scholes (1990) separated out two modes of SSM in action. SSM mode 1 is the explicit application of SSM to guide action research. Mode 2 SSM is a conceptual framework to be incorporated in everyday thinking. The main feature is the recognition of two equally important strands of analysis – a logic-based stream of analysis and a stream of cultural analysis. Traditional SSM follows two interacting streams or modes of enquiry: cultural enquiry and logic-based enquiry. Both streams may be regarded as stemming from the perception of purposeful actions (Checkland & Scholes 1990). The enquiry stream seeks to illuminate the problem situation. Comparing models with

perceptions of the real-world situation accomplish this. These comparisons structure debate about change. The second stream examines the intervention itself and the situation as a social and political system. The logic driven and cultural stream interact. The selected activity that is found relevant to people in the problem situation will be determined by the culture in which it is immersed (Checkland & Scholes 1990).

SSM may be used in other non-traditional modes of operation. Arising from the first mode of enquiry is the mode of Engagement, which seeks to allow ideas and to structure debate without limiting the source they come from as traditional SSM does (Ledington & Ledington 2001). Engagement works heavily on two principles. The first is the principle of social constructivism (from Interpretive sociology), which is essentially the idea that the social world is created by the individual and their consciousness (Burrell & Morgan 1979) and the second is that the world is considered to be a set of shared meanings which are created by individuals that live in the world (Ledington & Ledington 2001). Engagement recognises that to change or improve a situation a change in perception is required. This form of sociology is concerned with the nature of the world, socially constructed meanings and maintaining the current status quo (Ledington & Ledington 2001).

What makes this approach different from positivism is that the Engagement is based on the idea that change comes through reconstruction of ones environment, through purposeful and meaningful discourse (Ledington & Ledington 2001). Ideas are discussed and debated and they lead to change that is both measurable and tangible in the real world (Vickers 1965). In SSM the engagement comes from using the models to structure a debate about change; the ideas in the models are used and questions form the basis for engagement. Engagement is another mode of SSM that seeks to engage people with the ideas derived from the inquiry mode. Engagement moves away from making the analyst an 'expert' and uses the ideas of the people in the situation as well as their own ideas. Whilst the Engagement analyst has to monitor and manage the overall process of learning, the ideas for change are not limited to models or even debates about models. Instead, Engagement uses ideas derived from an inquiry to structure a debate. The ideas

for change come from the people and the analyst working together in a realm of mutual sense making spurred on by the principles of interpretive inquiry (Ledington & Ledington 2001).

According to IS researchers Ledington and Donaldson (1997), the literature regarding SSM has been concerned with four central themes, which are:

1. The development of soft systems thinking from its foundation in the hard systems approach
2. The formalisation and codification of the methodology
3. The position of SSM with respect to social theory
4. The application of SSM in specific contexts and particularly in the field of IS

This research falls within theme 4, which is the application of SSM within the field of IS research; however, it does apply the methodology in a limited but new way. This research does not follow the complete SSM path of seven phases. The SSM is used in an applied way. It only utilises the root definition, which is in phase three, and the conceptual modelling process from phase four. Overall, this research operates SSM in a new way, thereby contributing to SSM theory. This aspect is further discussed in the contribution to theory in the final chapter.

The main benefit from using SSM is the initial creation of two conceptualised models of an 'IT innovation information system' and the 'AR workshop intervention'. These conceptual models are expressed using the applied methodology, SSM. The motivational thinking behind the first conceptual model is that businesses need to constantly maintain an appreciation of the relevance of technological innovations to their unique situation. Therefore the conceptual model of an innovation information system can also be considered as a model of appreciation, or sense making, of new technological innovations for the firm. The notion of appreciation develops from Vickers (1965) and the generic sense-making ideas that are embedded within the principles of SSM, particularly when it is applied in its traditional form.

Having introduced and explained the SSM, the aims and objectives of this research are again presented in order to highlight the relevance of using SSM to support them:

- To explore and understand the information environment that SMEs are dependant upon to make sense of new IT innovations
- To explore and understand how SMEs make sense of new IT innovations in practice
- To discover ways to improve SME capabilities in this area
- To develop and test a framework of inquiry that incorporates a purposeful intervention process that is relevant and capable of demonstrably improving the IT-related capabilities of SMEs

The selection of SSM as an applied methodology can be seen as being suitable to these aims and objectives given the following reasons:

- The idea of expressing a situation is central to SSM
- SSM supports the depiction of an information system that has no end
- SSM expresses an information system as a cycle of human and organisational activity which incorporates the social, political and cultural aspects
- This human activity focus supports an inquiry into 'how do' situations such as the how do aspect presented in the 1st research question
- SSM also supports the continual revision of these activities based upon learning about it in context which provides a discourse on ways to continually improve problem situations

The methodology of SSM is one that can be considered to be both phenomenological and philosophically idealistic in nature rather than one that is based upon purely empirical or scientific standards. The underlying philosophy of SSM is idealist, in that conceptual models are not of systems that exist in the real world. SSM is not positivist because it assumes that there are no objective facts to be had, only interpretations valid from a particular point of view (Checkland 1981). SSM is also a practical expression of the

interpretive paradigm (Mansell 1991). The fundamental philosophy of the SSM approach focuses on learning; it is hermeneutic, and constitutes what Churchman (1971) describes as a 'Singerian Inquiring System'. Such a system generates change through the setting up of representations, known as conceptual representations, which show a view of a problem situation. Overall, the use of SSM as an applied methodology has been shown to be a practical and pragmatic means for developing and designing the two conceptual models to guide the purposeful inquiry and purposeful intervention processes which are used to achieve the research aims and objectives outlined in chapter one.

3.6 THE FRAMEWORK FOR 'PURPOSEFUL INQUIRY'

The purpose of this section is to present the SSM-based root definition and the conceptual model which is used to guide and support the 'Purposeful Inquiry' component of this research. The section outlines the SSM activities relating to root definitions and conceptual models. The section is concluded with the presentation of the first of two conceptual models created using the applied methodology SSM. The first conceptual model is used for the inquiry whilst the second is used for the intervention, which is presented in the next section (Section 3.5).

When undertaking social inquiry using SSM, various conceptual models are constructed to support debate among participants (Checkland & Scholes 1999). Unfortunately, the term 'conceptual model' used within SSM can often be misleading (Ledington & Ledington 1996). The normal connotation of the term model is of a formal description of some phenomenon. In SSM, however, a conceptual model can be seen as a logically derived framework for interpretation (Ledington & Ledington 1996). Developing conceptual models of Human Activity Systems (HAS) is a core concept of SSM. In all HAS there will be a number of differing interpretations or worldview of its purpose (Beynon-Davies 2002). SSM incorporates these different interpretations and worldview by developing its conceptual models using root definitions. The root definition expresses

the core purpose of the HAS (Checkland 1981). Checkland (2000) also sees the purpose of a HAS as being defined by a set of acceptable outcomes.

During the development of SSM Checkland focused on functionality and producing 'activity models'. He argued at the time that the elements Customers, Actors, Transformation, Weltanschauung, Owners and Environmental constraints should be incorporated into the model in one go. This became the origin of the CATWOE concept. In traditional SSM, the analyst would select a relevant system and construct via the CATWOE framework a root definition. This root definition would then be the basis for creating a conceptual model that would be 'compared' or used to explore or enquire into the problem situation. Checkland's (1981) CATWOE framework is as follows:

Customers: The victims or beneficiaries of the transformation

Actors: Those who would do the transformation

Transformation: The conversion of Input to Output

Weltanschauung: The worldview that makes the Transformation meaningful

Owners: Those that could stop the Transformation

Environmental constraints: Elements outside the system which it takes as given

Underpinning the CATWOE is the pairing of transformations with the worldview, which makes it meaningful. Experience suggests that this attempt to include everything from the CATWOE into one conceptual model actually produces a range of difficulties. One possible solution is to adopt a Constrained Activity Modelling (CAM) approach in which only the core functionality of the HAS is considered (Ledington & Ledington 2001).

The CATWOE framework was not used to derive the root definitions for this research. The primary reason for this was the absence of important information concerning several elements of the CATWOE. For example, at the start of the research when the conceptual models were created there were no specific customers or actors but instead just a broad focus on the SME area of concern (A). The transformation was also unclear since the researcher sought to conduct an inquiry first in order to find out about the situation before

thinking about the intervention process. The worldview and owners were also not identified until after the conceptual model was created. As a consequence, this research does not utilise the CATWOE framework as a tool for determining the adequacy of the root definitions. Several determinations can be made about the adequacy of these ‘root definitions’ via discussions concerning the research questions and research propositions, which are addressed in the final chapter. These determinations about the root definitions are also presented during general discussions about the overall relevance and usefulness of the conceptual model for the inquiry and the conceptual model for the workshop intervention.

Checkland (2000) recently introduced the LUMAS model in an attempt to move away from the overly complex CATWOE framework. The LUMAS is conceptual action thinking approach to creating relevant systems (root definitions). Checkland (2000) developed his LUMAS model not to generate generalisable solutions because he conceptualises problem situations as being complex and ill-defined. His main concern was that these techniques might be applied across a number of very different situations and he wanted to help people think about and question their situation. Given all of these differences this research inductively derives the root definition purposefully having first identified a suitable research area of concern (A) and having reviewed the literature relevant to the area of concern. The first root definition used for this inquiry component is presented as follows:

“A system that allows its users to become informed about relevant IT innovations. A system which learns to appreciate potential IT innovations with respect to a business situation by: gathering intelligence, as messages about IT innovations, from appropriate communication channels; recognising this intelligence as relevant to the situation and evaluating it by comparing images of the IT innovation with the situation; and refining its understanding of IT innovations and the situation through this evaluation”

Having developed and presented the SSM-based root definition the focus now turns to creating a conceptual model. This process was iterative in nature and required some level of competence. This competence relates to the ability to construct a conceptual model that is capable of achieving the desired outcomes contained in the root definition. The researcher developed several preliminary models. This iterative modelling process ceased when the researcher determined that the system developed would provide the core functionality to produce the desirable outcomes projected in the root definition (Checkland & Scholes 1990). The resulting conceptual model is shown in figure 3.8. If this model was used as depicted it should provide the acceptable outcomes presented in the root definition (Checkland 1981). This determination is conducted in the final chapter via an assessment of the research outcomes and implications.

An important aspect to consider, when examining the model in figure 3.8, is the absence of activity numbers on several constructs. The reason for this relates to the three inter-related cycles of activity that this model provides. The constructs that are not numbered are related to the second dynamic cycle, which sees the continual revision of the definition of appropriate communication channels and the refinement of several criteria. The three cycles of this first conceptual model are further discussed in the final chapter.

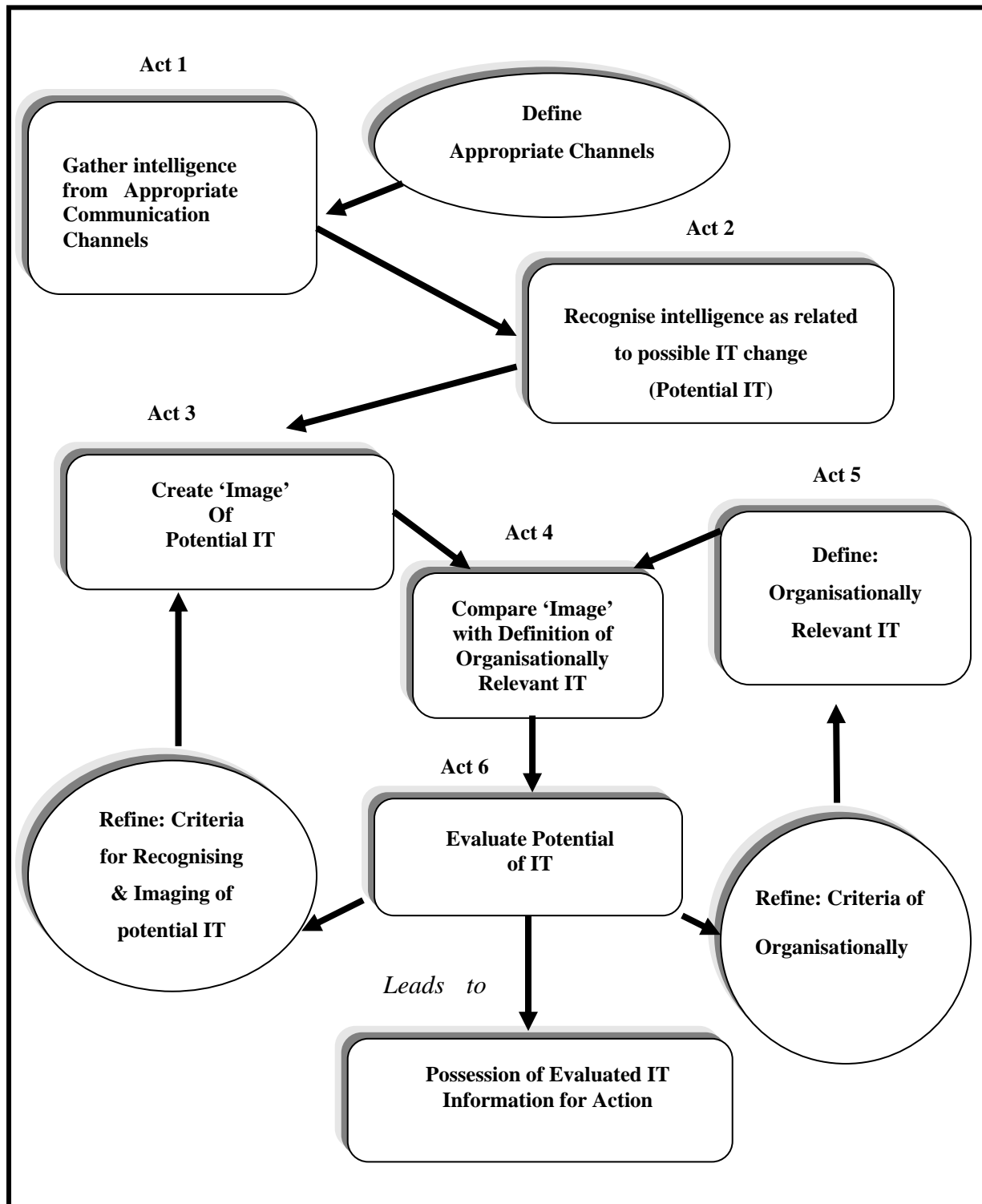


FIGURE 3.8 THE CONCEPTUAL MODEL OF AN 'IT INNOVATION INFORMATION SYSTEM'

The conceptual model of an 'IT Innovation Information System' is not used to commence the inquiry. The preliminary role of this conceptual model is to provide a representation of the chosen research situation. This system is then used to guide the development of a field questionnaire. It is this field questionnaire that is used to gather information from the situations being explored via a face-to-face interview. The questionnaire development process is discussed in the next chapter in section 4.4.2. Having developed the conceptual model for the inquiry, the next section focuses on developing the conceptual model for the AR workshop intervention.

Overall, this research engages SSM in a new way since the SSM is traditionally used in ISD and problem solving activities. This research uses the methodology to create two conceptual models that are themselves expressed as an information system. The two models are used to provide both structure and focus so that a purposeful inquiry and intervention can be performed. The inquiry process led to the intervention, which opened up discussions between multiple stakeholders. These discussions resulted in negotiated debate about relevant change. The model for the inquiry was not modelled on a problem situation, which further extends the possible uses for SSM. This aspect is discussed in the contributions to theory in the final chapter. SSM proved useful as a modelling tool because it helped conceptualise a research situation, which included both a purposeful inquiry and a purposeful intervention process.

3.7 THE FRAMEWORK FOR 'PURPOSEFUL INTERVENTION'

The dual purposes of this research are to conduct an inquiry and also to perform an AR intervention. Having discussed the conceptual model for the inquiry, the purpose of this section is to discuss the conceptual model, which is used to support and guide the AR workshop intervention process. As in the previous section, this section engages the applied methodology of SSM as a modelling tool. The section also presents another SSM-based root definition and the second SSM-derived model. This conceptual model is

initially used to guide the researcher through the workshop intervention process. It is later used during the reflective learning activities presented in chapter six.

The primary role of the first conceptual model is to support an inquiry into the chosen research situations. The insights gathered from this inquiry are fed back into the situation via the AR workshop intervention process. Insights gathered from AR inquiries offer a unique perspective that is unavailable to practitioners that utilise other research methods (Eden & Huxman 1996). The main aim of AR projects should be to improve practice rather than to produce knowledge (Elliot 1991). Within the discipline of IS, Susman and Evered (1978) maintain that researchers that use the AR methodology should also improve or promote the self help abilities of their research participants. They believe that developing problem solving capabilities and self-help skills should be one of the practical outcomes of AR projects, and that this will support the validity of the study over a much longer term. The research aimed to generate these practical outcomes via the AR workshop intervention process.

Conducting a social inquiry also requires careful consideration of what constitutes knowledge and how that knowledge was created (Burrell & Morgan 1979; Checkland & Holwell 1998). The methodology and principles chosen by an inquirer will also influence how an inquirer sets about undertaking the creation of new knowledge. Checkland and Holwell (1998) argue that recognising that any inquiry will be unrepeatable introduces the problem of how to organise the process of social inquiry in a manner perceived by others as being valid research. Undertaking an inquiry in complex social situations and defending any knowledge created is a difficult task, because each problem situation that is explored is unique to its own setting (Checkland & Holwell 1998). Putting structure to, or predicting the learning outcomes from a social inquiry are also not possible, according to Checkland (1993) and Susman and Evered (1978). Checkland (1993) believes that the learning outcomes from social inquiry ought to be agnostic in that they should not be directed towards some perceived or desired learning outcomes. However, Checkland and Scholes (1999) suggest that some organisation of the pursuit of knowledge is necessary to support the communication of knowledge created from social inquiry. This is needed to

ensure that any new knowledge can be useful and insightful and is created in a manner that shows that a credible effort was undertaken with due care and attention (Checkland & Holwell 1998).

Given these issues the second conceptual model is also developed to support a discussion that defends the introduction of knowledge. The conceptual model is used to support the Intervention process and serves as a guide for the researcher. It is also used to support the knowledge claims that arise from the AR intervention process during the reflective learning activities in chapter six. In short, the first conceptual model is used for the inquiry whilst the second is concerned with the AR workshop intervention process. The second conceptual model was created because the AR workshop aspect was not covered in the first conceptual model.

The root definition for the intervention model was also developed by the researcher with the same constraints and ideas used in the development of the first root definition presented in the previous section (3.6). Given the discussions presented in the preceding paragraphs, the root definition for the conceptual model of an ‘Action Research Workshop Intervention’ can be seen as follows:

‘A system to facilitate the development of IT-related capabilities within SMEs, by systematically operating structured intervention projects and developmental workshops in order to achieve demonstrable improvement in the management of their IT information environment and sense making of technological innovations capabilities’

Having developed the root definition, the focus now turns to creating the conceptual model of the AR workshop intervention process which is presented in figure 3.9. Like the first model, this was also developed iteratively. The researcher developed several preliminary models. This iterative process ceased when the researcher determined that the system developed would provide the desirable outcomes projected in the root definition (Checkland 1981).

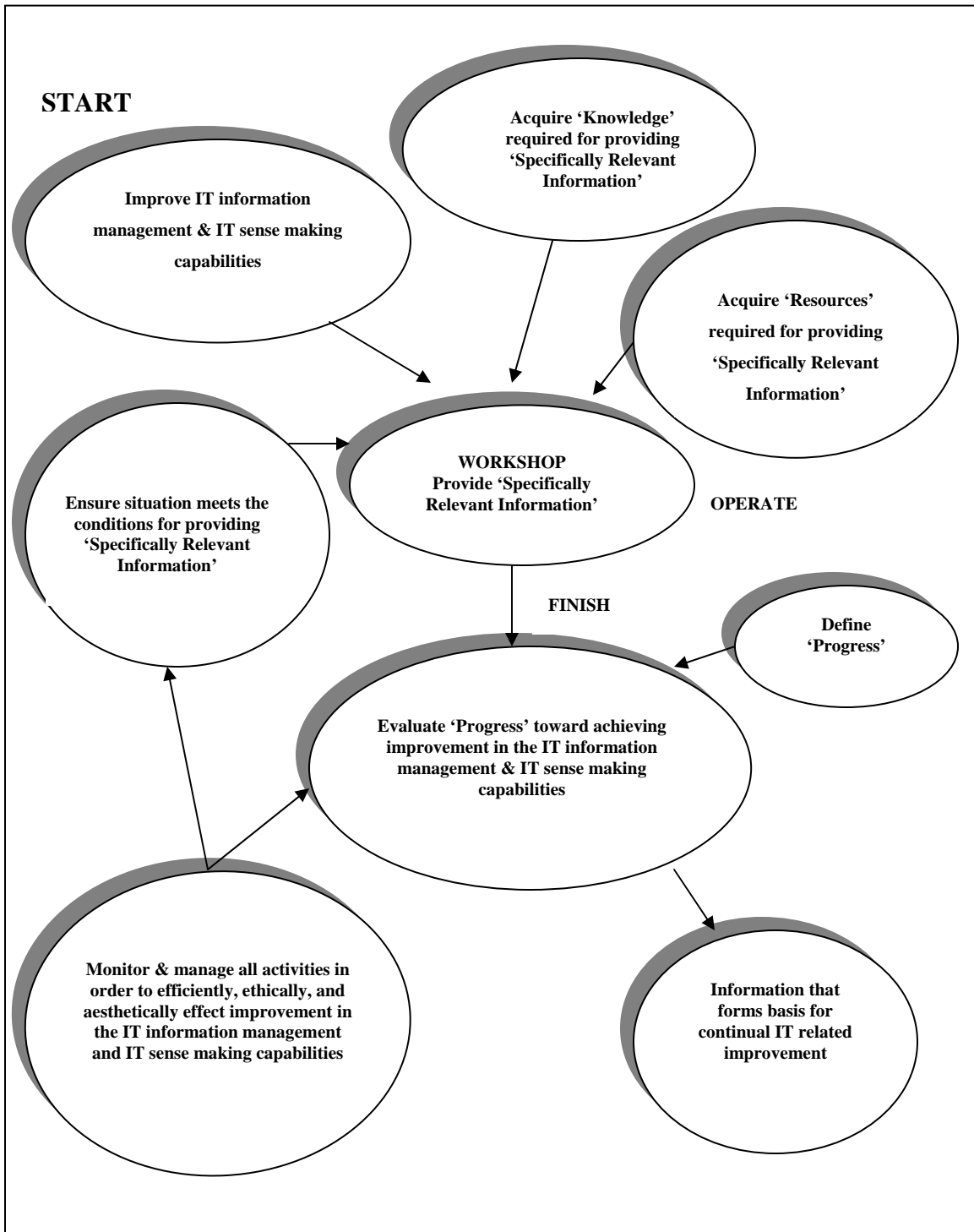


FIGURE 3.9 A MODEL OF THE 'DEVELOPMENTAL WORKSHOP INTERVENTION'

Like the first conceptual model, the second is not implemented into the research situation; it is instead used by the researcher as a procedural and resource framework that supports the activities associated with the AR workshop process. The constructs presented in this second model are now discussed. This discussion provides both a description of the activities portrayed in the model and an indication of the manner in which the workshop process was conducted.

The first element of workshop model outlines the purpose of the workshop, which was to improve the IT information management processes and the IT innovation sense making capabilities of those SMEs in group A. This purpose emerged from the research aims and objectives, in particular the two research questions. The usefulness of this model can be extended to include a range of other objectives that are defined in the purpose of the workshop. The second element relates to the acquisition of the knowledge required for providing 'Specifically Relevant Information' (SRI). The SRI in this case comprised several forms of knowledge. The first relates to the researcher's knowledge; more specifically, this is the researcher's ability to present the SRI. The knowledge also includes the situational insights about the research situation under examination and the information that was gleaned from each of the SME case study situations during the first round of inquiry (Q1). Of relevance to this second element was the inclusion of the researcher's own life experience, which included years of academic experience presenting informed tutorials and lectures. In short, this activity pertains to the ability of the researcher to effectively conduct or facilitate the workshops.

The third element then relates to the acquisition of the necessary resources to conduct the workshops. The researcher provided many resources, such as: the outputs from the field-based questionnaire (Q1) and notes about intellectual and theoretical ideas (theory) that was relevant to the situation under examination; and other physical materials such as a portable whiteboard. This whiteboard was used to present the SRI and to discuss relevant concepts and issues. This element required the allocation of a dedicated room or venue to present the SRI and conduct the workshop process. All workshops were conducted within the business premises of each participating SME. This aspect is further discussed in section 5.3 (the developmental workshop intervention) in chapter five.

The fourth element relates to the need for the researcher to ensure that the situation, which is each SME within group A, meets the requirements for presenting the SRI; in short, that there was a declared desire for each business in group A to want to participate. In other words, if a business did not want to improve there would be no need to present the SRI or to conduct the workshop. This aspect eliminates the wasting of valuable time and resources of both the researcher and the business concerned. Of note here was the elimination or preclusion of staff members from the workshop process. The original plan was to involve all organisational participants; however, given the presence of motivational aspects and the dedication required, this process was limited to those that managed or owned the business. This was necessary since the owners and directors took this activity seriously, because they had declared a desire to improve. This decision emerged as a result of the understanding gained during the first round of the inquiry, and was carried forward into the second inquiry.

The fifth element relates to the actual conducting of the workshops. The main activity here was the provision of the SRI to those that participated (group A). The researcher conducted each workshop differently because of the differences noted in each of the situations explored such as different owner characteristics and industry participation. The researcher also operated the workshop in the appreciative and participative mode, which allowed the participants the opportunity to see their situation from their own perspective and to act as co-researchers. In other words, the researcher sought to enable them to picture and construct their own perception of their situation. The outcome of this process was the identification of existing processes and activities that they perceived as being a strength, weakness, opportunity or threat. In short, the researcher facilitated a SWOT analysis relevant to each business. The SWOT did not incorporate the information from other SMEs that participated in this process. Of note here was the provision of examples that were used to prompt or guide these activities; these were generated by and related to the other SMEs in group B. The examples also emerged from the researcher's awareness of the theoretical knowledge gleaned during the literature review process, which was presented in chapter two of this thesis. The opportunity for process-based improvements

are numerous and varied; however, the workshop process could be improved by performing more workshops over an extended period of time. In short, the researcher felt that the final workshops were better, more informative and useful to each participant because of the continual exposure to performing this activity. This workshop aspect was also the most challenging given its developmental nature and the uniqueness of this process in comparison to conducting structured lectures and tutorial activities. Further work is needed in this area to improve the workshop process. This aspect is further discussed in the future directions section (6.4) in the final chapter.

The sixth element relates to the definition of progress. Of note here is the opportunity to construct both internal and external versions of the definition of progress. In other words, the researcher may develop one for themselves; the researcher's supervisor might also develop another version. The participants may also develop their own definition relevant to their unique setting and requirements.

The seventh element relates to the evaluation of progress toward achieving improvement in the IT-related capabilities. In order to address this aspect, the researcher incorporated into the research propositions the notion of demonstrable improvement, which is discussed in section 5.7. An assessment of this progress was also provided to the workshop participants. Each of the SMEs that participated in the workshop was exposed to an informal exit interview. This exit interview was not incorporated into the data collection and analysis process, due to the complexity of this process and the psychological aspects relating to the researcher being given answers that may have been polite rather than factual. The researcher feels that because of the time and effort that was expended in the inquiry and workshop process the participants would feel obliged to pass positive comment only. This was indeed the case; none of the participants made any comments that were deemed by the researcher to be poor. Further work in the development of a protocol to support an exit interview process would be worth pursuing. However, the primary intent of the researcher was to improve the capabilities of group A rather than to assess the results or performance of the facilitator during the workshop process from a participant's perspective. The term 'Progress' was used in preference to 'Success' because detailed determinations about the workshops were not made until after

the second inquiry (Q2). The outcome of this second inquiry helped the researcher to evaluate the progress made by those SMEs that participated by comparison to those SMEs that did not attend the workshops (group B). This comparison or cross-case analysis is presented in section 5.5.

The eighth element relates to providing the information that forms the basis for continual improvement. The participants were shown the three dynamic cycles that exist in the first model of an IT Innovation Information System. This information was given to the participants during the workshop process along with a copy of the first model. Further inquiries would need to be performed over an extended period of time to assess if this information-based situation remains true. The researcher inquired whether the participants felt that they were now empowered to improve their situation. In other words the inquiry examined whether or not the participants took away from the workshop process the necessary information to support them with continual improvement. Again, due to psychological aspects, this determination would prove to be difficult because the researcher feels that any negative answers would be a reflection on the intellectual capabilities of those that participated. In short, each participant did provide anecdotal evidence which suggested they had the information they needed; however, as previously discussed, this aspect would be hard to quantify. The main learning elements for each participating SME were identified during the second inquiry and presented in section 5.5.

The ninth element relates to the monitoring and management of the activities portrayed in the second model. Determinations about the performance of the researcher were made with the researcher's supervisors and other peers. The role of monitoring and managing these activities may have also been extended to include the business owners and managers; however, this would require them to adopt the second model and contextualise it to their respective situations. In other words, if they wanted to perform their own workshops, perhaps to extend these ideas to their respective staff, the model would then need to be used, implemented and then managed and so on. This is an aspect that relates to the dynamic and cyclical nature of the SSM-based models. In short, if they wanted to continually improve their IT-related capabilities the participants might also use this workshop intervention model on a regular basis. This last aspect was not considered in

this study given the requirement to instruct and train organisational members in all the elements that are part of this model. For example, the staff of the business would need to become competent instructors or facilitators themselves. The theoretical, resources and time needed to achieve this outcome were deemed by the researcher to be inappropriate for this study. This is an aspect that needs further exploration.

Overall, the researcher feels that due to the exploratory and developmental nature of this research the second model proved to be invaluable in many areas. Its use was a key tool in assisting the researcher to think about and then provide all the necessary aspects to generate the required improvement. The model was also useful to report the manner in which this part of the research was conducted. The model can also be considered to be a major contribution to both action researchers and practitioners in general because it performs a number of functions that have proven to be beneficial to the workshop intervention process. This contribution is further discussed in section 6.3 (implications for theory & practice).

Both SSM derived conceptual models may also be compared with the general topology of modelling; the three levels of abstraction, according to Beynon-Davies (2002), are as follows:

1. Conceptual models which are the highest level of abstraction. These models represent some universe of discourse but contain little or no implementation detail.
2. Logical models which seek to encapsulate key elements of the universe of discourse and bridge between conceptual and physical models.
3. Physical models which are close to a description of reality and contain detailed plans for implementation.

The two models developed in this chapter fall into the first category because the conceptual models for the inquiry and intervention process were not originally designed to be implemented; hence they initially had no real-world implementation details. Also, the researcher did not want to model a perfect system that matched reality, because this

reality or perfect system may not exist. This philosophical aspect is further discussed in the next chapter. Also, the primary purpose of developing the inquiry model was to guide the inquiry process through the questionnaire development process discussed in section 4.4.1. The primary purpose of the workshop intervention model was to assist and guide the researcher with the activities associated with the workshop process. Therefore, the second model was not implemented into the case study situations.

Both conceptual models can however be used to support reflection among interested individuals so as to foster an appreciation of the learning outcomes to a larger audience. It is also important within interpretivist approaches to retain the idea that learning is undertaken in an iterative cycle and is ideally never-ending (Champion & Stowell 2002). The iterative use of both models is an aspect that is discussed in the final chapter.

3.8 THE PURPOSEFUL INQUIRY & PURPOSEFUL INTERVENTION CONCEPT

The purpose of this section is to present the newly developed and tested concept that enabled this research to achieve its stated aims and objectives. The section also outlines the procedural aspects of the PIPI concept. It also outlines the relationship between its two conceptual models that were used for this research project.

The two conceptual models that the PIPI concept uses for this research project were previously presented in sections 3.6 and 3.7. The term ‘Purposeful’ is conceptualised in the PIPI concept to indicate the intentional researcher-led aims and objectives. In order to achieve these aims and objectives the researcher, via the use of these two conceptual models, conducted meaningful and purposeful activities, which provided demonstrable and practical outcomes. The term ‘Purposeful’ also indicates the potential ongoing nature of the PIPI concept via the continued use of its two conceptual models. Of note here was the publishing, in a refereed journal, of the first component of this PIPI concept. The

notion of 'Inquiry in Inquiry' was derived from the first conceptual model and was previously published (Ledington & Glen 2001) as a model for organisational inquiry.

A number of other research opportunities exist for the PIPI concept. Although this concept needs further testing and refinement to effect continual improvement and a more refined appreciation of the concept itself, its range of uses and potential application are many. The application of the PIPI concept has currency in a number of differing situations and disciplines. For example, the PIPI concept may be applied to another area of concern (A). This concern could then be researched accordingly and the researcher could then create, using the abridged version of SSM that the PIPI concept uses, a conceptual model of the situation (F). The conceptual model may then be used as a framework to guide and maintain the focus of the questionnaire development process. The new questionnaire development technique that was created for the PIPI concept is discussed in the next chapter. The questionnaire derived from the conceptual model may then be used in an interview process with relevant stakeholders in order to appreciate the situation (A). After the inquiry data analysis is then completed and the researcher re-enters the situation to conduct a series of AR workshops, which are designed to improve aspects that are relevant to the framework of inquiry. After the workshop the inquiry process is repeated to identify any demonstrable change as a result of the AR workshop process. The demonstrable improvement that occurred in group A is presented in section 5.7.

The PIPI concept and the two conceptual models used for this research project were also influenced by Checkland & Holwell's model of discussion of Information Technology (1998, p. 116) shown in figure 3.10.

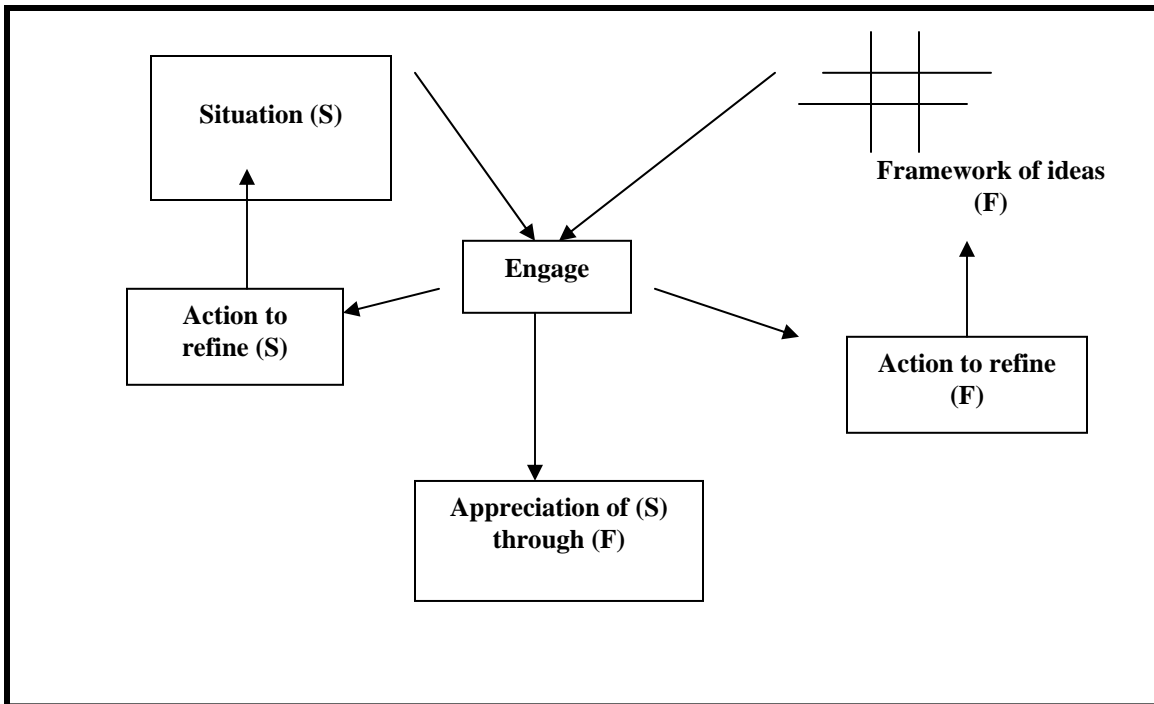


FIGURE 3.10 MODEL OF IT DISCUSSION (Adapted from Checkland & Holwell 1998)

It follows from Checkland and Holwell’s adaptation that this Inquiry, which explores the IT innovation information management and the IT sense making processes of SMEs, is the situation (S) under investigation. The frameworks of ideas in this instance are the newly developed conceptual models of an IT innovation information system (F) and the action research workshop intervention system (F), which combine to form the PIPI concept. An appreciation of the situation being investigated is obtained by engaging the Frameworks (F) initially as a theoretical lens for the Inquiry and then to improve the situation being investigated (S). The overall process also provides feedback to improve or contextualise either framework (F) through an iterative and democratic discussion with relevant stakeholders as the research process unfolds through its three stages of researcher intervention, which were discussed in chapter one (section 1.6.1).

3.8.1 Procedural Description of the PIPI concept

The purpose of this section is to outline the steps involved with the application of the PIPI concept. The PIPI concept is derived from applying modern systems thinking concepts. The application of these ideas provided support for data analysis through its Purposeful Inquiry and the sharing of ideas, which provided an opportunity for all relevant stakeholder perspectives to be combined and communicated during the Purposeful Intervention process. A procedural description of the use of the PIPI concept is as follows:

Step 1.

The chosen research situation is conceptualised using SSM and portrayed as an information system that is designed with a purpose. The conceptual model developed for the inquiry was presented as an 'IT Innovation Information System'.

Step 2.

Constructs represented in the first conceptual model are then used to guide the development of a field questionnaire. Each construct within the model has several types of questions that are used to explore the purposeful human activity relevant to that particular construct; this aspect is discussed in detail in the next chapter. The respective questions for each construct are then amalgamated to form the overall questionnaire. This questionnaire is then operationalised in the field in a one-to-one interview protocol with the relevant stakeholders, using the sub-framework of interrogative pronouns such as who, what, when, where and why to explore every construct portrayed in the first model.

Step 3.

The field questionnaire is then operationalised in the first inquiry (Q1). The questionnaire is primarily designed to gather qualitative insights about the relevant activity in the situation explored. These insights are predominantly qualitative; however, some quantitative elements may be incorporated, such as ratio scales. These insights reveal some of the human activity in relation to each of the constructs. These collections of

insights are initially examined as parts of the conceptual model. The parts are then examined as a whole in order to holistically appreciate the situation being explored.

Step 4.

Insights about each SME situation are gathered and analysed using the principles of hermeneutics. The Hermeneutic data analysis aspect is discussed in detail in the research design chapter. Essentially the model is a point of reference that is taken in the field, albeit expressed as a questionnaire, and then operationalised. This research activity can be described using the language of SSM as a comparison activity; this is the comparison between the systems thinking world, for example the researcher's conceptualisation about the situation and reality. In this research reality is conceptualised as the eight SME case study situations that were used in this research project. The outcomes of this step provide discussions surrounding this comparison activity. They also form the basis of the 'Specifically Relevant Information' needed for the AR workshop, described in the conceptual model of the developmental workshop intervention. The conceptual model is seen here to generate dialogue about change in the situation in focus.

Step 5.

Half of the participating 8 SMEs are invited to attend the AR developmental workshops. This step employs the use of two separate groups labelled A and B. This grouping method was used to support the identification of demonstrable improvement as a result of the AR workshop process. For example, one such improvement might be organisational and individual enhancement as a result of attending the workshops. The declared purpose of the AR workshop for this project was to improve SMEs capabilities with regard to their IT information management and their IT sense making activities.

Step 6.

After the workshops are completed the researcher has no contact with both groups for a period of three to four months. This allows the introduced changes to take effect. After this time lag, the same field questionnaire used in Q1 is operationalised a second time to conduct a second Inquiry (Q2), which examined the effect of the AR workshop intervention. The insights from the first questionnaire are compared with the insights

from the second questionnaire to support the identification and to provide the required evidence to justify that demonstrable improvement actually took place because of the researcher intervention activities. A summarised version of the outcomes of this approach is as follows:

Step 1 – Insights are obtained about each SME situation. This information forms the basis of understanding ‘how’ they actually go about managing their IT environment and their IT sense making activities.

Step 2 – A new questionnaire development and implementation process is created and tested. For example, the questionnaire can be developed from the framework (F) used to explore the research situation (A).

Step 3 – Qualitative insights about each situation are gathered, which provides understanding about how activities are conducted in practice.

Step 4 – A Strengths and Weaknesses analysis is performed. The information obtained from this analysis then forms the basis of the ‘Specifically Relevant Information’ that is needed to conduct the workshop. The identified strengths are amplified and the weaknesses are addressed through collaborative dialogue.

Step 5 – A series of workshops are held to improve IT related capabilities. This step also engages a conceptual model of action researcher activity. This is another research outcome that is both important and relevant.

Step 6 – This step is primarily designed to provide the necessary evidence to support the notion that researcher intervention in the AR workshop actually introduced practical change that improved the participant’s IT-related capabilities.

These steps form the basic framework and the procedural manner in which this research is conducted; however, more detailed discussions are presented in chapter 4 which outlines further research design considerations for the PIPI concept. Other discussions about PIPI are presented in chapter 6, which reviews the operationalisation of the PIPI concept in practice to determine what would be done differently if used again. Overall, the PIPI concept was purposefully designed to not suffer from the traditions of the

classical model of problem solving and the scientific research methods used by natural scientists.

3.8.2 Relationship between Inquiry and Intervention Systems

The purpose of this section is to outline the relationship between the two separate systems presented and used in the PIPI concept. The relationship is described in this section using theory from the discipline of Informing Science.

The PIPI concept has within it the explicit presence of two separate information systems each purposefully designed and used to achieve differing research related aims and objectives. These two systems are described in this section as system 'A' and system 'B'. System A is the first information system which was used by the researcher to support and guide the 'Purposeful Inquiry' process, whilst system B is the second information system which was used to support and guide the 'Purposeful Intervention' process. The output of the first inquiry (Q1) then informed system B, the AR Workshop Intervention system. System B then informed system A through the deliberate process of a second Purposeful Inquiry (Q2) thereby completing one complete cycle of A and B informing each other as shown in figure 3.11.

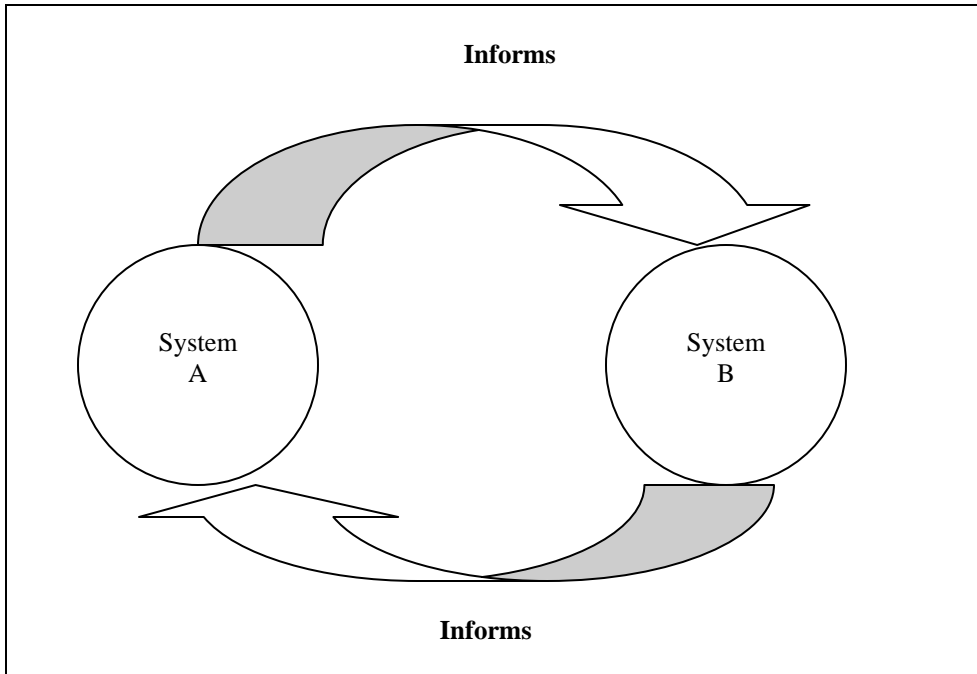


FIGURE 3.11 SYSTEM 'A' AND SYSTEM 'B' RELATIONSHIP (ADAPTED FOR THIS RESEARCH)

The two systems presented in figure 3.11 inform each other via the use of information and the three stages of researcher intervention used for this research (see section 1.6.1). The first intervention process was the first inquiry (Q1); the second intervention was the AR workshop intervention; whilst the third intervention was the second inquiry (Q2). One description of inform comes from Boland (1987) who notes that information is the 'Inward Forming' of a person that results from an engagement with data. Accordingly, to inform would mean to form in, to form into, and to form within a person, a subject. Modes of informing are specific to each person's concerns, as are the topics they want to be informed about (Martin & Metcalfe, 2001). Dervin (1983) contends that all information producing is internally guided and since it is generally accepted that all human observing is constrained, and sense-making further assumes that all information is subjective.

The discipline of IS shows linkages to a host of other fields such as the discipline of Informing Science. Informing Science has been shown to share a common goal with the

discipline of IS (Cohen, 1999) via its definition. The definition of 'Informing Science' applies to disparate fields that share the common goal of providing a client with *'information' in a 'form', 'format', and 'schedule' that 'maximises its effectiveness'*. Cohen (1997) also notes that this includes three interrelated components: the Client (has a task to perform), the Delivery System (for providing information) and the Informing Environment that creates information to aid the clients to complete their task. Cohen (1999) adds that Informing Science also considers the 'Informing Environment' at three levels of abstraction:

- (1) The instance of a systems use
- (2) The creation of new instances of informing, and
- (3) The creation of new designs for informing

The relationship between the two systems in PIPI can be described using these three ideas.

1. The instance of use for system A in this research consists of two primary users. The first user is the researcher who utilised system A to aid the first and second inquiry process. The second users of System A are the SMEs that adopted and used the system to improve their IT innovation sense making and IT innovation information management. System A also informs these SMEs by guiding their purposeful action and monitoring their environment looking for possible IT change or IT intelligence which then improves their IT choices. The system-in-use sees SMEs using the first system as a tool for enhancing their ability to appreciate and gather IT intelligence and to improve their IT consideration processes. According to Martin and Metcalfe (2001) there is a theoretical need to better understand SME 'informing' practices and improve their choices. Being part of a learning community requires that knowledge workers must also keep themselves informed of developments in their area of expertise.
2. The creation of new instances of informing for SMEs occurs when the management of the first system improves with use. Also the researcher's ability to support these activities increases through each cycle of the systems use.

3. The creation of new designs for informing occurs as each cycle of figure 3.11 is completed. Reflective learning activities performed after each systems use would modify, alter or improve the design of each system thereby creating new designs for informing as each cycle is completed.

In summary, the process of one system informing the other is how this research conceptualises the relationship between the two explicit systems in the PIPI concept. This simple description of one system informing the other system was enriched in this section by using theoretical ideas from the discipline of Informing Science. These ideas were used to show how and when each system is used and how and when each system informs the other. Further discussion about how the PIPI concept relates to the Informing literature are presented in chapter 6.

3.9 CHAPTER SUMMARY

This chapter has discussed the philosophical posture of the researcher using Guba and Lincoln's (1994) Research Triangle. The three elements of the triangle relate to the Epistemological, Ontological and Methodological aspects of research. The Epistemology position declared by the researcher was interpretivism, the Ontology posture was declared as Relativist, whilst the final corner of this triangle, the Methodology, is discussed in the next chapter. The chapter also outlined the developments within the IS discipline which highlighted the gradual migration of the discipline towards recognising Information Systems as social systems. The chapter introduced systems thinking which was engaged to mitigate the reductionist concerns which were identified at the end of the literature review chapter. The chapter then conducted a second literature review with a major focus on pragmatic forms of 'Inquiry' and systems thinking 'Intervention' theories. The section also included information seeking and use and information scanning, interpretation and learning. This section was incorporated to cover both IS and Systems Thinking literature relevant to the development and use of the PIPI concept and the constructs represented in the model used to support the inquiry.

This chapter also introduced the second applied methodology (SSM). The primary benefit obtained by using this approach is the initial creation of several conceptualised models. These two models are essentially a framework of intellectual ideas that are expressed as a conceptualised model of a Human Activity System (HAS) developed within the confines of the applied methodology known as SSM. The motivational thinking behind the first conceptual model also relates to a theoretical need for businesses and knowledge workers to constantly maintain an appreciation of IT state-of-affairs. The conceptualised models of an 'IT innovation information system' and the 'AR Workshop Intervention' developed in this chapter are based upon a generic model of inquiry (SSM) and the appreciative characteristics that are embedded within the applied methodology of SSM. The conceptual model of an IT innovation information system is therefore a model of appreciation (or sense making) of new IT innovations. The notion of appreciation is also founded on the generic sense-making ideas that are embedded within the principles of SSM, particularly when it is applied as a methodological framework itself.

In conclusion, this chapter outlined the Framework of Ideas (F) used for this research. The next chapter continues with other discussions that have affected the overall design of this research such as the AR methodology and the methods (M) which were chosen to operationalise this new Framework (F).

CHAPTER 4: METHODS

4.0 OVERVIEW

The purpose of this chapter is to outline the methods and methodology (M) which are used in this study in conjunction with the framework of ideas (F) that was presented in chapter 3. The framework of ideas (F) and these methods (M) are primarily used in this study to support an examination of the area of concern (A). Having previously described the researcher's chosen epistemological and ontological paradigms the first section of this chapter (section 4.1) outlines the methodology (M) most relevant to this research. The section describes the Action Research (AR) methodology and explains the type of AR used in this study. The section then outlines the researcher's intervention strategy and the role that they play within the three stages of intervention. Section 4.2 introduces the case study method, which is used in conjunction with the AR methodology as a basis for building theory from multiple case study situations (Eisenhardt 1989). The following section (section 4.3) briefly outlines other axiological elements that influenced the overall research design. The section also utilises Walsham's (1995) guidance for making generalisations from qualitative field studies. Section 4.4 then outlines the data collection and analysis methods. The section discusses the questionnaire development process and field-based interview protocol used to gather data from the SME case study situations. The critical hermeneutics data analysis method used is then described. Section 4.5 follows with a brief discussion regarding the ethical treatment of the research participants. Section 4.7 concludes the chapter with a presentation and summarised description of the research methods and overall structure of the research design deemed most suitable and appropriate in light of the research aims and objectives described in chapter 1.

4.1 ACTION RESEARCH

Having previously outlined the epistemological and ontological posture of the researcher in chapter three this section concentrates on the methodology that is appropriate to both this research and the researcher's philosophical beliefs. The section outlines the historical creation of the Action Research (AR) methodology and its relevance to both academic research and practice. The section also discusses the different types of AR used within the discipline of IS. The main reason for selecting the AR methodology relates to the research goal of introducing practical change in the SME research situations and the need to conduct a social inquiry.

There are many competing definitions and interpretations of the term AR (Lau 1997). The most commonly used description of AR is supplied by Rapoport (1970): that it "aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework" (Rapoport 1970, p. 499). Lewin (1947) was the first researcher to use the AR method at the 'Research Centre for Group Dynamics' within the University of Michigan. However, the term action research was arguably coined by Collier and Lewin (French & Bell 1984). Lewin used AR to study social psychology within a framework of 'field theory' (1946). The main reason for the development of AR was the complexity associated with analysing complex situations that contained unique social elements. Arising from this type of social problem situation was the notion of social interaction. Lewin (1947) advocated the belief that the only way to truly understand something was to have some form of intervention that instigated change. Rather than just observing, the researchers at the Tavistock Institute decided to introduce some form of intervention. Lewin (1947) believed that studies addressing this social interaction have within them the functionality that provides a basis for action, research and training. These three elements of action, research, and training are considered to be the corner stones of action research, as shown in figure 4.1.

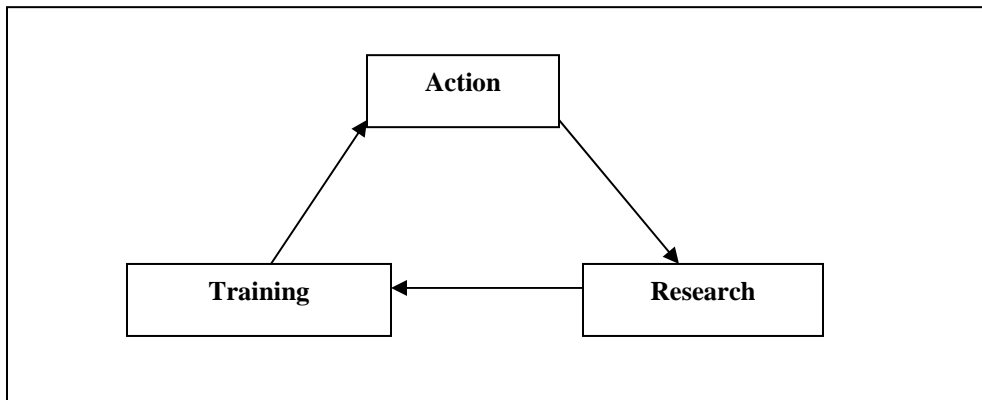


FIGURE 4.1 THE 'ACTION RESEARCH' TRIANGLE (ADAPTED FROM LEWIN 1947).

Lewin et al. (1939) required AR experiments to be based in the field, and believed that the output of these experiments should be fed back into theory. Academics and proponents of AR have argued that theory alone has little power to create change and that there needs to be a richer interplay between theory and practice (Gustausen 2001). Habermas (1973) also felt that AR participation locks the researcher into the practical side in such a way that theoretical discourse is lost. He maintains that liberation starts with theory and not with practice. This relationship between theory and practice, according to Gustausen (2001), can be seen as having three interdependent discourses;

1. Discourse on theory
2. Discourse on practice
3. A mediating discourse on how to link them

This study deals with these issues by engaging an applied methodology that is used for several reflective activities that are used to generate discourse on both theory and practice. Checkland and Holwell's (1998) FMA framework presented in chapter 1 is used at the end of the three stages of intervention to reflect on both the situation that was explored and the theory used to explore it. In this instance the theory discourse related to the model of 'Inquiry' developed using SSM, which was presented in chapter three. The discourse on practice was discussed during and after the AR workshops. The mediation

discourse on how to link them is conducted during the critical reflection activities presented in chapter 6 of this thesis.

Within the field of IS, researchers Susman and Evered (1978) were amongst the first to extend the original ideas about AR. Their main idea was to develop the self-help abilities of those people facing the problems. Susman and Evered (1978) concur with Rapoport (1970) that social inquiry should see the participants benefit from a collaborative learning experience. Susman and Evered (1978) articulate the AR methodology as an approach toward social research that combines the generation of theory with changing the social system through the researcher acting on or in the social system. They believe that this activity is a means of both changing the system and generating knowledge about it. Galliers (1987) supports the notion of adding to the collective knowledge of participants through intervention and interaction. Galliers (1987) also contends that groups should learn about themselves or their organisation.

AR is one of several qualitative research methods used in the field of IS (Galliers & Land 1987; Galliers 1990). The use of AR as an explicit research methodology was first introduced to the IS discipline by Wood-Harper who incorporated several AR concepts into his action-based systems development methodology called Multiview (Wood-Harper et al. 1985). Researchers that have recently discussed AR in the context of the IS discipline include Avison et al. (1999); Baskerville (1999); Baskerville and Wood-Harper (1996:1998); Lau (1997); Nielson (1999); Stowell, et al. (1997); Checkland (1981) and Wood-Harper (1985). Lau (1997) notes that, over the past twenty-five years, there had been a gradual shift from a predominantly positivist view of AR to alternative modes of this type of inquiry.

AR is particularly important for the study of Information Systems Development (ISD) because of its orientation toward change (Baskerville & Pries-Heje 1999). Action research is also claimed to be particularly important in situations where organisational change processes are needed (Baskerville & Wood-Harper 1996). The AR methodology presumes that complex social systems cannot be reduced for meaningful study, nor can

sociological experiments ever achieve repeatability. The main contention of AR is that social elements can be best studied by introducing change and then observing the effects of this change (Baskerville & Pries-Heje 1999). AR is characterised by intervention experiments that operate on problems or questions perceived by practitioners within a particular context (Baskerville 1999). Heller (1986) distinguishes between research action and action research. In a research action a real world problem is investigated, but there is a greater emphasis on fact-finding than implementation of recommendations. In AR there is less of an emphasis on fact-finding and more on implementation of a plan designed to solve the problem.

Apart from having many ways of defining the AR methodology there is also a range of differing types and modes of application. Discussions of AR within the IS discipline often proceed as if there were one definitive AR method (Baskerville & Wood-Harper 1998). The authors identified ten distinctly different forms of AR within the discipline of IS. Cooperrider and Srivastua (1987) provide that AR, especially in the guise of organisational development, has largely failed as an instrument for advancing second-order social organisational transformation because of its focus upon critique at the expense of appreciation. The authors believe that action research maintains a problem-oriented view of the world, which then diminishes the capacity of researchers and practitioners to produce innovative theory capable of inspiring the imagination, commitment and passionate dialogue required for the consensual reordering of social conduct. Cooperrider and Srivastua (1987) call for a social and behavioural science that is defined in terms of its generative capacity. They tender appreciative inquiry as a mode of action research that meets this need. The research presented in this thesis does not focus on a problem per se, but instead engages the methodology with a purposeful intent. The purposeful intent relates to introducing demonstrable improvement in several nominated areas. The interventions used in this study are discussed in the following section.

Lau (1997) developed a taxonomy for AR that comprises four modes; Action Research, Participatory AR, Action Science, and Action Learning. Action science is distinguished by its central emphasis on the spontaneous, tacit theories-in-use that participants bring to

practice and research. Participatory AR is distinguished by its additional involvement of the practitioners as both subjects and co-researchers. The most typical form of AR is the participatory method (Baskerville 1999). Heron and Reason (2001) claim that the traditional role of researcher and subject needs to be replaced with a more co-operative relationship between a co-researcher and co-subjects. Cronholm & Goldkuhl (2004) describe participatory AR as collaborative in nature, with the collaboration occurring between the researcher and business practitioners to reach some goals. Participatory AR (Park 2001) also has a spirit of democracy and the three main objectives are the 'gathering and analysing of information', 'strengthening community ties' and to 'sharpen ability to think and act critically'

Participatory AR approach has extended the traditional approach to AR by realigning the roles of the researcher and subject. This increased participation is a major change to traditional AR (Baskerville 1999). Researchers and clients bring their own distinctive sets of theoretical knowledge into the AR process. Researchers provide their knowledge of AR and general IS theories whilst the clients bring situated, practical theory. As a result, control over the social setting is realigned and the setting is free to self-reorganise as opposed to being artificially determined by external researchers (Baskerville 1999). The indirect effect is the full collaboration of all participants thereby extending the social scope of AR. Participatory AR also enriches the research community by drawing researcher-practitioners into the research process (Baskerville 1999).

A criticism of the participatory method relates to the collaborative approach, which diminishes the researcher's ability to control the process and the outcomes of the research (Baskerville 1999). This lack of control makes it difficult to apply AR as an instrument in an orchestrated research program. Practitioners with serious problems typically drive the venue for AR. Scholars are not as free to "pick and choose" the problem they wish to investigate. Participatory AR empowers client members with partial control over theoretical developments. The research in this thesis enables such an approach. This research uses the participatory method and takes a collaborative approach; however, the researcher leads the way by initially developing the area of concern (A) and commencing

the design of the inquiry and intervention process. This aspect enabled the researcher to select the area of concern (A) that they sought to explore. This particular contribution to AR and the participatory method of AR are further discussed in the final chapter.

Others IS researchers such as McKay and Marshall (2001) have conceptualised the AR process as having two interlinked cycles. The first cycle relates to the ‘problem solving interest’ whilst the second cycle is focused on the research ‘area of concern’. Unfortunately, the relationship between these two interlinked cycles is not described sufficiently. Checkland (1991) also conceptualises the AR process as comprising cycles. Checkland uses a cycle to describe the AR process. The cycle consists of iteratively reviewing the ‘Research themes’, ‘Real-world problem situation (A)’, and ‘Reflections based on the framework (F) and methods (M) used to generate findings’ as shown in figure 4.2.

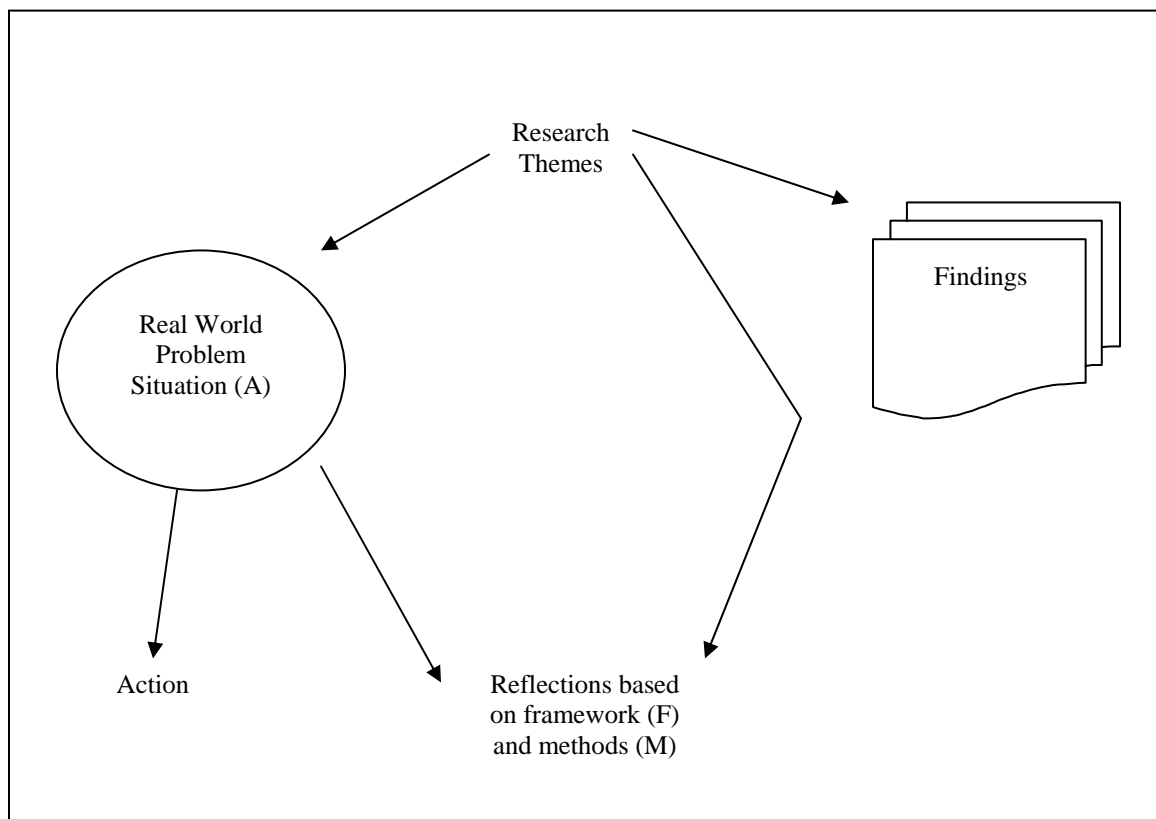


FIGURE 4.2 THE CYCLE OF ACTION RESEARCH (CHECKLAND 1991)

Cronholm & Goldkuhl (2004) prefer to use the term 'practices' as opposed to the term 'cycle' which is used by Checkland (1991) and McKay and Marshall (2001). A practice, they claim, is a meaningful entity of a holistic character and consists of human actions, humans and their shared practical understanding, and codification of understanding in a common language and also material objects used in the practice (Goldkuhl & Rostlinger 2002). The three practices that they use include the 'theoretical research practice', the 'business change practice', and the 'regular business practice'. According to the authors, these three interlinked practices are designed to run simultaneously.

A relevant theoretical concern with the AR methodology is the limited support provided to structure both the research process and the findings (Mathiassen 2000). A similar concern is the level of planning required for AR projects. Checkland (1981) states that this is because research "cannot be wholly planned and directed down particular paths" (1981, p.153). In order to address this theoretical concern this research provides several conceptual models that are used to initially guide the research inquiry process and then to conduct the workshop intervention. Both conceptual models are then used to indicate the process and manner in which the researcher conducted the interventions and generated the research findings in chapter 6.

The selection of the AR methodology also complements the philosophy of the researcher, since the AR methodology is regarded by many academics to be more of an interpretivist approach than other more traditional scientific methods. "Action research is recognised as an interpretivist approach to the acquisition of scientific knowledge, having sound foundations in the non-positivist tradition" (Baskerville et al. 1992, p.11). Reductionism and repeatability are not ideals of valid knowledge from AR projects (Checkland 1981). AR can be used in many modes to generate new theory and reinforce or contradict existing theory, and it can be combined with other research methods for diversifying a research program (Baskerville 1999).

Baskerville (1999) claims three unavoidable effects of adopting the interpretivist view of inquiry are when the researcher intervenes they become part of the study; the adoption of

an idiographic viewpoint for inquiry; and the acceptance of qualitative data collection and qualitative data analysis. Qualitative analytical techniques like hermeneutics are common to AR (Baskerville & Pries-Heje 1999). The idiographic viewpoint follows from the acceptance that each social setting involves a unique set of interacting human subjects. Any meaningful inquiry must consider the frame of reference and underlying social values of the subjects (Baskerville 1999). According to Baskerville and Wood-Harper (1996), the ideal situation for using the AR method is characterised by a social setting where:

1. The researcher is actively involved with expected benefit for both researcher and the organisation
2. The knowledge obtained can be immediately applied with no sense of the detached observer
3. The research is a cyclical process that links theory and practice

This research conceptualises the AR process as a cyclical activity that links theory and practice via the iterative use of its two models. The AR approach taken in this study incorporates the appreciative aspects (Cooperrider & Srivastua 1987) within the inquiry. This is because the first model is not oriented toward a problem situation. The second model used for the workshop interventions incorporates the participatory mode of AR because the researcher and subjects both adopt the role of co-researchers. Overall, the selection of AR as the most appropriate approach methodology is supported because of its interpretivist orientation, and the dual nature of this research, which seeks to conduct both an inquiry and a practical workshop intervention. The selection of the AR methodology is also supported by the need to conduct a social inquiry into a complex social situation and to collaboratively introduce identifiable and demonstrable improvement. This aspect is expanded in the next section, which focuses on the three different interventions that are conducted in this study.

4.1.1 The Action Research Intervention

The purpose of this section is to outline the AR strategy, which includes three intervention processes. The section both models and discusses the AR strategy chosen given the purposeful nature of these three interventions. The cyclical nature of this process and the elements that flowed from each stage of the three-staged intervention process used are also examined.

One of the main aims of this research is to conduct an inquiry into the relationship that exists between SMEs and new IT innovations. Once this initial investigation is complete, ways of improving several IT-related capabilities of the SME participants are examined. This is important given the discussions presented in chapter 1, which highlighted the importance of some IT innovations to both business performance and business survival, particularly in the context of the modern economy discussed in section 1.1. The main benefit that attracted people to participate in these three interventions was the chance to explore and understand their own unique situation. Another benefit espoused by the researcher was the promotion of their self-help abilities and the promise of organisational improvement. This workshop training activity was intended to help them perform better both within the IT sense making process and with their management of IT innovation information. In order to achieve these aims the research needed to include some form of purposeful intervention. The need for intervention was also supported by the researcher's selection of the AR methodology discussed in the previous section.

Baskerville and Wood-Harper (1996) present seven key strategies for conducting AR, which are designed to improve its contributions. The seven strategies are presented first along with the relevant discussions for this research, which are presented in italics. The seven principles are as follows:

1. **Consider the Paradigm Shift.** Be sure the AR method is appropriate for the research and research questions and of interest to its audience. *The use of the AR methodology to address the area of concern (A) and the relevance of the*

- methodology to the two research questions was substantiated in the previous section.*
2. **Establish a Formal Research Agreement.** Seek informed consent from research subjects including “warrants” that authorises research in the organisation. *All of the SME research participants signed the necessary consent forms and this ethical aspect is discussed in section 4.5.*
 3. **Provide a Theoretical Problem Statement.** The theoretical framework must be present otherwise the intervention action is no longer valid as research. *The theoretical framework used for both field inquiries is the first conceptual model of an IT innovation information system. The theoretical framework used for the workshop intervention process is the second conceptual model of an AR workshop intervention.*
 4. **Plan Data Collection Methods.** AR is empirical, though the collected data is typically qualitative and interpretive. Carefully design and specify the data collection techniques clearly. *The type and the multi-staged nature of the data collection process are outlined in section 4.4.3.*
 5. **Maintain Collaboration and Subject Learning.** Careful preservation of collaboration among participants, particularly for those that use participatory methods where the subject will have key knowledge, both of theory and the practice setting. This is critical for discovering important aspects of the theory under test. Avoid dominating the diagnosis and action planning phases. *The collaborative and subject learning elements are covered in section 5.3 and 5.7 respectively and this is further supported by use of participatory mode of AR.. The demonstrable improvement section highlights the learning that occurred for the research subjects.*
 6. **Promote Iterations.** AR is typically iterative and action should continue until the immediate problem situation is relieved. Actions that relieve an immediate problem setting are powerful evidence of the practical effectiveness of an underlying theory. *The number of iterations is presented in figure 4.3 and the evidence supporting the notion that demonstrable improvement occurred as a result of this iterative approach are presented in section 5.7.*

7. **Generalise Accordingly.** The generality of theories developed in action are founded in deductive generalisations. Generalised statements must be tempered accordingly and they cannot be made on the basis of observations (a statistical notion), but rather on a representative sample of one. *The hermeneutic data analysis process and its resulting findings are further supported by the use of Walsham's (1995) ideas about generalisations that are possible from qualitative field studies.*

In this study, the first and third AR intervention took the form of two field-based inquiries (Q1 and Q2), which were guided by the questionnaire presented in appendix A. The second intervention was the developmental workshops that occurred in between these two inquiries as shown in figure 4.3. The main aim of the workshop process was to help SMEs improve several IT-related capabilities.

| Time 1 (T1) | Time 2 (T2) | Time 3 (T3) |
|--|---|--|
| Both Groups Included | Only Group A attends workshop | Both Groups Included |
| Type of Intervention Questionnaire (Q1) | Type of Intervention Developmental Workshops | Type of Intervention Questionnaire (Q2) |

FIGURE 4.3 THREE STAGES OF RESEARCHER INTERVENTION FOR THIS RESEARCH

The first and second inquiries (Q1 & Q2) are essentially conducted as interviews that are guided by the questionnaire and the interrogative sub-framework. The term questionnaire is used here to reflect the nature of these inquiries, which use the same questionnaire for both interventions. The difference in time between T1 and T2 was only four to five weeks. This time lag allowed for the workshop activities to be organised with the participants. Also, during this time the researcher analysed the data collected via the implementation of the field questionnaire (Q1). The development of this questionnaire is

discussed in detail in section 4.4.1. The findings generated from the first inquiry (Q1) then formed the basis for providing the specifically relevant information needed for the second conceptual model, which was only used for the developmental workshop process. The workshop process resulted in three two-hour sessions, which were conducted in situ. Only those SMEs in group A attended the workshops. Once the developmental workshops were finished another time delay was introduced to allow the second stage of intervention to take effect. The period of time between T2 and T3 was approximately three months. This length of time allowed any transformations to take effect. It also allowed the researcher time to assess the workshop activities before the second and final round of inquiry.

At time 3 (T3), the researcher re-entered both group A and B situations to implement the field questionnaire (Q2). The same questionnaire used in Q1 was again applied in this Q2 situation to enable groups A and B to be compared. This comparison examines the situation before and after the developmental workshops. The purpose of this was neither to support any replication logic nor to re-test the questionnaire, but rather to identify any demonstrable improvement in the SMEs that attended the workshop intervention. In short, the aim was to identify the effect of the workshop on the group who attended (group A), together with the effect that not attending the workshop had on group B. Upon completion of workshop, the researcher created a second 'Inquiry', which further supported the gathering of additional findings and insights.

The role of the researcher in the first and third interventions (Q1 & Q2) was primarily as an inquirer. The role of the researcher in the workshop intervention was twofold. The first was to be a facilitator for the workshops and the second was to act as a co-researcher with those participant subjects in group A. To support this developmental workshop process the researcher developed and used a conceptualised model of the AR workshop situation. As previously discussed, this conceptual model was also portrayed as an information system using the applied methodology SSM (Checkland 1981). The relevance of this second workshop model also extends to the research participants in that they were shown the model as an item of discussion. These deliberate discussions were intended to limit

the scope of the workshop given the tendency for other aspects that were not relevant or applicable to be included. The reason for this focus is to bind the inquiry to both the explored situation and the conceptual model of inquiry. This measure was essentially introduced to limit the scope of the workshop to only specifically relevant information that related to this inquiry. This is in contrast to improving some other ancillary or non-related area such as sales. Addressing such a question assists and improves their situation; however, it does waste valuable resources and also fails to support this particular inquiry and workshop intervention process. During the workshops, both observations and notes were taken. These notes and observations were incorporated into the findings and situational insights generated by the second inquiry and combined with the findings from Q2 to help determine and demonstrate practical improvement within the SMEs that attended these workshops.

The relationship between the first and second conceptual models was presented in section 3.8.2 using theory from the discipline of informing science. The section outlined how one model informs the other. Essentially, the action outputs of the first inquiry (Q1) are fed into the workshop situation as both researcher understanding and Specifically Relevant Information (SRI). The outputs of the second intervention (the workshops) are then fed into the second inquiry (Q2) to help identify any changes as a result of the workshop process. The outcomes of the second inquiry also support the preliminary findings generated from the first inquiry (Q1).

Overall, the criterion by which this research is judged internally is its practical success as measured by the readiness of actors to acknowledge that learning occurred, either explicitly or through implementation of changes (Checkland 1981). Therefore, the questionnaire used in both field inquiries had to incorporate some provisions, which indicated from the actor's perspective that learning actually occurred. This aspect was incorporated via the use of several ratio scales, which are presented at the end of the questionnaire and discussed in detail in the questionnaire development section 4.4.1. The results of these scales are presented in section 5.7 (demonstrable improvement). Further

details about the AR workshops are presented in chapter five (section 5.3) along with some examples of SRI.

4.2 THE CASE STUDY RESEARCH METHOD

The purpose of this section is to discuss the method that this research employs to support the achievement of the aims and objectives stated in chapter 1. This method is used along with the AR methodology discussed in section 4.1. This section is concluded with a summary that presents the case study protocol that was developed to support achievement of the research aims and objectives mentioned in chapter 1.

The area of concern (A) for this research was stated in chapter 1 and chapter 3 as being a situation. Yin (1994) indicates that a unit of analysis for such a situation may include individuals, groups, organisations or specific projects. Several options were available for this study, such as an inquiry that examined individuals, groups or organisations; however, given the holistic and interpretivist nature of this inquiry and intervention the researcher focused on the whole situation. Other options relevant to this discussion include the question of how many situations should be examined. There is some speculation as to how many cases a researcher should study (Cavaye 1996).

Eisenhardt (1989) provides guidance for building theory from multiple case studies. Her approach was developed in response to a decade of strong and repeated calls for more qualitative, contextual and interesting research (e.g. Burrell & Morgan 1979). The central argument of this approach is on building theories from case study research that use multiple cases which provides a powerful means to create theory because they permit replication and extension among individual cases. Replication simple means that individual cases can be used for independent corroboration of specific propositions. This corroboration helps researchers to perceive patterns more easily and to eliminate chance associations. Extension refers to the use of multiple cases to develop more elaborate theory. Different cases often emphasise complementary aspects of a phenomenon. By

piecing together the individual patterns, the researcher can draw a more complete theoretical picture.

A second argument for building theory from multiple case studies relates to the importance of methodological rigour, which can be supported by identifying suitable research questions, developing well-designed instruments such as interview schedules and questionnaires, and theoretical sampling and controls. Theory building and theory testing have similar, although not identical, methodological demands for rigor. Eisenhardt (1989) paid little attention to single-case research. This aspect was argued by Dyer and Wilkins (1991) as being paradoxical. Dyer and Wilkins (1991) point to the high-quality nature of theory that is emerging from single case study situations. Dyer and Wilkins (1991) claim that the approach to theory generation is paradoxical because it includes many aspects that are related to hypothesis-testing research because of its focus on construct development and their measurability. Their main contention is that this approach misses the richness of individual cases.

There is a suggestion that multiple cases study situations should be used, particularly in postgraduate research, because they allow for cross-case analysis, which provides for richer theory building (Perry 1998). Studying multiple cases may not enable the same rich descriptions as studies of single cases, but multiple cases enable analysis of data across cases, which gives the researcher the opportunity to validate findings that are not merely the end result of idiosyncrasies of the research setting (Miles & Huberman 1994). Selecting information-rich cases is advisable because such cases can provide valid and meaningful insights (Perry 1998). The validity, meaningfulness and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected than with sample size (Perry 1998). Others such as Lincoln and Guba (1985) recommend sampling selection to the point of redundancy.

Multiple case studies can also be considered as multiple experiments and not as multiple respondents in a survey. This allows replication logic and not sampling logic to be used; this means that representativeness is not the criterion for case selection (Stake 1994). There is also a recommendation to select cases that are predicted to result in similar

findings; these should be selected to support literal replication and to provide greater support for insights (Yin 1994). Selecting cases with different characteristics also ensures variation sampling, which can provide valuable insights (Perry 1998). Ultimately, there are no precise guidelines as to how many case situations are needed (Perry 1998; Romano 1989; Patton 1990).

As a guide, Eisenhardt (1989) suggests between four and ten cases, because with fewer than four it is often difficult to generate theory with much complexity and its empirical grounding is likely to be unconvincing. In practice, four to six groups probably form a reasonable minimum for a serious project (Hedges 1985). Miles and Huberman (1994) suggest no more than fifteen, because exceeding this size can make a study unwieldy. Perry (1998) outlines the widest acceptable parameters as falling between two to four as a minimum and ten, twelve or fifteen as the maximum. The case study literature rarely specifies how many cases should be developed; ultimately the decision is left to the researcher (Romano 1989).

Given the above considerations, the SME cases were selected on the following basis.

- The eight SME situations provided a richness of information necessary for an effective inquiry and the building of theory (Eisenhardt 1989) and to support the making of generalisations from qualitative field studies (Walsham 1995)
- Each SME had a desire to seek improvement in either their IT innovation sense making or their IT innovation information management

Overall, the selection of eight different SME case study situations was based on providing the necessary information-richness to support building theory from case studies (Eisenhardt 1989) and to complement the overall research aims and objectives. The cases were selected purposefully because the researcher sought SMEs that wanted to improve how they made sense of technological innovations and their technological information management activities. In other words, the participants wanted to participate because they perceived some form of benefit to their existing situation. The selection of cases did take into consideration the ability of each situation to complement this research and also

provide some form of value to the research process. The purposeful approach extends to the conceptual model of an IT innovation information system. This was espoused as a useful artefact. Each SME was given a copy of the first model to use in their situation. In other words, they were given a tool that they perceived as being relevant and useful for their situation. The ability of each SME to contextualise the model to their own situation is discussed in the cross-case examination discussions presented in chapter 5 (section 5.5).

The SME case study situations selected for this research were chosen in accordance with the purposeful sampling strategy as suggested by Patton (1990). Purposeful sampling can be seen as being in direct contrast to random sampling (Perry 1998). Random selection of case study situations is neither necessary nor preferable for this study given the previous considerations (Eisenhardt 1989). The underlying principle common to all fifteen strategies offered in purposeful sampling is that each strategy is selected on the basis of providing information richness in the case study situations; that is, cases that are worthy of an in-depth analysis are chosen (Patton 1990).

Having selected the research participants, the researcher then developed a case study protocol. The use of a case study protocol to control the contextual environment is an important consideration in the design and application of qualitative research (Emory & Cooper 1991). The development of a case study protocol allows researchers to declare in advance the procedures and requirements. This protocol also provides direction for the researcher, which might improve the reliability of the research findings (Perry 1998). The essential components of the protocol, according to Yin (1994), include the following items:

- An overview of the study
- The field procedures to be followed
- Interview questions
- A guide for the research report

This research presents an ‘overview’ of the study in the chapter one. An overview of each SME is also presented in chapter five, Section 5.1. The ‘field procedures’ are discussed in

several sections such as the questionnaire development and the data collection section in this chapter, and the reflective learning discussions presented in chapter 6. A sample of the 'interview questions' is presented in appendix A, and a guide for the 'research report' was presented at the very end of chapter 1 and described using the FMA framework.

The main reason for selecting the case study method related to the social nature of this inquiry and intervention. Other considerations included the ability of the researcher. This is because a researcher is said to have little control over human behavioural factors that further reinforces the appropriateness of the case study method (Yin 1994) given the nature of this social inquiry. The case study method supports research that seeks to explore the 'how' and 'why' research questions that are relevant to both contemporary events and the current business environment. Given the 'how do' nature of the research questions and the state of the modern economy, discussed in chapter 1 (section 1.1), the case study method was deemed to be the most suited for this research.

4.3 AXIOLOGICAL METHODS

The purpose of this section is to briefly discuss several axiological elements that have also influenced the overall design of this research. The section is concluded with a summary of the axiological options selected for this research.

Research conducted within the discipline of IS has many different factors to consider. These factors range from conducting laboratory experiments to field studies, surveys and case studies. Researchers may also choose from qualitative and quantitative methods (Avison 1991). The traditional focus of IS research can additionally be seen as evolving from its preoccupation with data and technology to contextual, organisational, behavioural and social elements (Cecez-Kecmanovic 2002). This was an aspect that was noted in chapter three (section 3.2). Given the direction of the IS discipline and the complex nature of IS research, many IS researchers are also becoming more concerned about contextual elements and contextual analysis (Lee 1991; Davies & Myers 1994). As

a consequence of this, the following sections outline the axiological elements that complement these ideals and the researcher's philosophical posture.

4.3.1 Rigour and Validity

The challenge of establishing rigour and validity in action research projects has seen much debate within IS (Checkland & Holwell 1998; Klein & Myers 1999; Reason & Bradbury 2000; Avison et al. 2001; Champion & Stowell 2002). Baskerville and Pries-Heje (1999) argue that action research methods can be improved or refined to increase their rigour in IS research. The authors merge some of the techniques of grounded theory (Glaser & Strauss 1967) with the theory formulation steps in action research. The result, they claim, is a theory-rigorous method. Baskerville and Pries-Heje (1999) attempt to add rigour to the action research process by using the grounded theory technique. They believe that AR embodies a strategy for studying change. This strategy involves the formulation of a theory, intervention and action taking in order to introduce change and analysis of the ensuing modification of the study object (Baskerville & Pries-Heje 1999).

Grounded theory, according to Strauss and Corbin (1994) and Glaser and Strauss (1967), is one such method which aims to generate descriptive theory from data collected from a research setting. The theory is expected to provide predictions and explanations from observations. It then goes on to provide suggestions based on the evidence gathered from the setting. It is predominantly inductive and is usually used to generate theory. However, it may be considered 'exploratory' in nature; Orlikowski (1993), in her application of grounded theory, describes it as being exploratory. Grounded theory is a research method that seeks to develop theory grounded in data that is systematically gathered and analysed, and it suggests that there should be a continuous interplay between data collection and analysis.

Establishing rigour is also regarded by some as being an essential element for all qualitative research (Rose & Webb 1998). In order to demonstrate the value of findings qualitative researchers must be able to demonstrate the rigour of the whole research

process (Morse 1991). Lincoln and Guba (1985) put forward other criteria that are more useful to interpretivist research. They tender the notion of 'Credibility' as opposed to 'Validity', 'Dependability' rather than 'Reliability' and 'Transferability' rather than 'Generalisability' (external validity); these support the credibility or validity of qualitative research.

Validity and reliability are also essential elements to consider in any research because they refer to the degree of confidence researchers and academics have in the results of a study (Zikmund 1991). Validity refers to minimising research errors, ensuring the accuracy of the results. It is concerned with the extent to which the findings accurately represents what is happening in the situation, or alternatively whether the data collected represent a true picture of what is being studied (Hussey & Hussey 1997). Reliability refers to the consistency of achieving the same results if the study was replicated (Yin 1994). This notion of repetition logic is predominantly useful to the positivist approach (Hussey & Hussey 1997). Therefore, the relevance of this repetition logic is limited when conducting interpretivist research.

There are several types of validity that need to be considered in case study research. These types of validity are, according to Yin (1994), as follows:

- Internal validity
- External validity
- Construct validity

'Internal' validity concerns the question of whether the findings are correct in relation to the reality (Merriam 1988). To enhance the internal validity of this research a multiple case design was adopted. A holistic approach was also incorporated which, according to Mathison (1988), is one way of improving internal validity. Other methods used to enhance the internal validity included the use of triangulation (Denzin 1970). Triangulation is the process of using more than one method of data collection in an effort to understand a situation more completely than when using a solitary method or source of data (Miles & Huberman 1994). Triangulation was established in this research by using

multiple case situations, collecting primary and secondary data, interviewing multiple participants and making observations. Other methods included academic supervision and academic review to ensure that the analysis and the findings were insightful and not ambiguous. A methodological issue with triangulation is that it might become a way in which those conducting the inquiry try to prop up one inappropriate or poorly conducted data collection method with another (Sohier 1988).

‘External’ validity refers to the ability of the results to being generalised to other situations. This research does not attempt to validate or test any hypothesis and so external validity for this research is not relevant (Merriam 1988). Transferability is a further test for research quality that is similar to the notion of external validity which, for qualitative research, aims to develop analytical generalisation (Hirschman 1986). Transferability was enhanced for this research via the process of recording rich descriptions of data and by using cross-case analysis to highlight any similarities and differences during the data collection processes. ‘Construct’ validity refers to ensuring that suitable measures are used for the concepts under investigation (Yin 1994). This aspect is more relevant to scientific forms of inquiry and its relevance to this study is limited.

For case study research external validity can also be improved by using multiple sources of data to support triangulation, a chain of evidence in the data collection and reviews of draft write up of data analysis and reports by key parties (Yin 1994). There is no objective or universal approach to guarantee validity; there are, according to Ratcliffe (1983), only interpretations of it. The validity of action research can also be established in the action outcomes, because in the world of business it is the outcomes and results of action that provide justification (Greenwood 2001). The validity of an inquiry undertaken within the context of a complex social setting is fraught with difficulty because the inquiry cannot be demonstrated through the use of repeatability (Checkland & Holwell 1998). It is also very difficult to control an action research project (Avison et al. 2001). Checkland & Holwell (1998) put forward the notion of recoverability as being a useful way of establishing validity. Recoverability means that interested parties can follow the

inquiry process so that learning may occur and learning outcomes are understandable. Checkland and Holwell (1998) promote their FMA as a means of providing structure for action research or field studies. However, the FMA framework is said to offer little in the way of discussions concerning the manner in which the inquiry was conducted (Champion & Stowell 2002). Champion & Stowell (2002) believe that in complex and messy human situations, the participants and some non-participants will need to make some judgments concerning the character or authenticity of any inquiry process if the outcomes are to be accepted as valid and credible.

Reliability is said to be difficult to achieve in case study research. This is because a researcher would need to repeat the study and to be confronted with the same events, individuals and groups (Lee 1989). Reliability is elusive given the dynamic and ever changing nature of reality (Neumann 1994). Lincoln and Guba (1985) contend that it is impossible to have internal validity without reliability. They suggest that the term 'reliability' is inadequate in qualitative research, and that other terms should be used. Several techniques for improving reliability in case study research have been put forward. Merriam (1988) tender the concepts of 'triangulation', the 'verification of interpretations' and 'consistency checking' as means of mitigating this issue. Reliability was therefore enhanced for this research via the recording of interviews and the contemporaneous review of these recordings. Other activities included the researcher making notes and reference marks during the interview process. The contemporaneous review process also included making additional notes.

To demonstrate the rigour of the approach used in this research, this study engages the seven principles, developed by Klein and Myers (1999), for conducting and evaluating interpretive field studies within the discipline of IS. These discussions are presented in the final chapter (section 6.1.3).

4.3.2 Inductive and Deductive Research Methods

The two general approaches to reasoning are inductive and deductive (Bonoma 1985; Romano 1989). The inductive approach is a theory building process that starts with observations and seeks to establish some generalisations about the phenomenon under inquiry. Deductive reasoning seeks to test theory; it starts with an established theory and seeks to see if it applies to certain situations. The deductive approach is said to represent the positivist school of thought whilst the inductive approach symbolises the paradigm of phenomenology, which itself can be divided into three categories of critical theory, constructivism and realism (Bonoma 1985; Romano 1989).

There is some controversy regarding the role that prior theory can play, particularly within case research and theory building. Pure inductive theory building can assume theoretical constructs are developed through the collection of primary data, and therefore prior theory is considered to have no role in the research. Pure induction, also termed as grounded theory, emphasises theory building solely from primary data (Glaser & Strauss 1967). Pure induction is also known as logico-deductive theory, which has a focus aimed at testing existing theory (Yin 1993). This prior theory can have a pivotal function in the design of the case study and analysis of its data (Yin 1993).

Mintzberg (1979) contends that deductive methods are important; however, the process of inductive discovery is more interesting and challenging in that deduction is pre-occupied with confirming what we already know. Pure induction might prevent the researcher from benefiting from existing theory, just as pure deduction might prevent the development of new and useful theory (Perry 1998). Both extremes are untenable and unnecessary and the process of ongoing theory advancement requires a continuous interplay between the two. Therefore, research may also lie between pure induction and deduction approaches (Perry 1998).

Research problem situations for case study research projects are said to be more descriptive than prescriptive. For example, no positivist experiments or cause-and-effect paths are required to solve the research problem. That is, the research problem is usually

a 'how do?' problem rather than a 'how should?' problem (Perry 1998). This 'how do' rather than 'how should' problem captures how the positive versus normative dichotomy for case study research is concerned with describing the real world phenomena rather than developing normative decision models (Perry 1998). Therefore, prior theory can be seen as having a place in case study research (Miles & Huberman 1994).

Taking the above into consideration, this research therefore takes a deductive approach. This is evidenced by the creation of the frameworks for inquiry and intervention. These frameworks were developed using the SSM theory (Checkland 1981). Having operationalised these two frameworks (the theory), the researcher then makes suggestions for their improvement and also suggests future directions for this theory. This aspect is further discussed in the implications and future directions for research in the final chapter (section 6.4).

4.3.3 Quantitative and Qualitative Research Methods

Qualitative researchers use the term 'empirical materials' as opposed to the term 'data' because most qualitative data is non-numeric. These qualitative methods search beyond mere snapshots of events, people, or behaviours (Bonoma 1985). A qualitative study seeks to identify underlying concepts and the relationships between them (Frankfort-Nachmias & Nachmias 1996). Qualitative methods seek to explain rather than to reach generalisations for a population under study. Qualitative studies must provide conclusions which account for the particulars of every case which allows the researcher to study an issue in depth. Data collection is not limited to predetermined categories. The data for qualitative studies usually includes transcripts of in-depth interviews, observations or documents (Patton 1991).

Qualitative research methods can produce a wealth of detailed data on a small number of individuals (Patton 1991). The basis for generalisations in qualitative studies is analytical generalisation (Yin 1994); the goal is to expand and generalise theories, not to establish the frequency with which a phenomenon is likely to occur in a population (Yin 1994).

Because it is traditionally based on an inductive approach to reasoning, the results of a qualitative inquiry most often remain untested. The introduction of formal deductive procedures into qualitative research can represent an important step towards assuring conviction in qualitative research findings (Yin 1994).

Qualitative inquiry often takes the form of a case study (Hyde 2000). A case study is an in-depth study of a particular phenomenon and it is the preferred approach to address how and why questions of processes (Yin 1994). Case studies are useful to investigate a real world phenomenon within its real-life context, particularly when boundaries between phenomenon and context are not clearly evident and when multiple sources of evidence are being used (Yin 1994).

By contrast, quantitative methodologies seek, as their *modus operandi*, to describe the general characteristics of a population, and to ignore the details of each particular element studied. The basis for generalisation in quantitative studies is statistical generalisation in that a researcher gathers a sample of elements by a probability selection method, resulting in a sample that allows estimation of the properties of the population of interest with a known degree of accuracy (Kinnear & Taylor 1996). Quantitative research draws a large representative sample from the population of interest, measures the behaviour and characteristics of that sample and then attempts to construct generalisations regarding the population as a whole. A number of individual elements of the population might not match the behaviours and character of this aggregated population. It may even be the case that no one single element matches the generalised character of the population. The problems associated with this procedure have been identified as the nomothetic/idiographic disjunction (Guba & Lincoln 1984).

Having selected the case study research method it is important to realise that the goal of research using case studies is to expand or build theory rather than make statistical generalisations (Burns 1999). Many social scientists would now agree that qualitative and quantitative methods can both lead to valid research findings in and of their own right, and that neither should rely on the other as its source of respectability (Burns 1999). This research uses both qualitative and quantitative data; however, the prominent data

collected is qualitative. The incorporation of several ratio scales in the field questionnaire is the only quantitative element used in this research. These scales are not used to generate statistical analysis. However, the introduction of these scales does mean that both approaches are used. The use of these scales is limited to provision of summarised conclusions from the participant's perspective. These are used as additional evidence to support the notion that demonstrable improvement occurred from the subject's perspective.

Walsham (1995) notes that the creation of generalisations from qualitative field trials may be challenging. Similar to case studies the results are typically unique and not repeatable in the experimental sense; the trials are relatively few and are typically not used for statistical generalisations over a population (Walsham 1995). Walsham's (1995) four categories for making generalisations are presented in section 6.3.1.

4.3.4 Field Studies and Laboratory Experiments

There are many types of laboratory experiments available to IS researchers. Dickson et al. (1977) put forward four types of laboratory experiments that can be used within the discipline of IS; small group, man-machine, prototype experiments and simulation. Within the discipline of IS much work has been conducted in the past using these laboratory techniques. As a consequence, Fitzgerald (1997) suggests that there has been a tendency to avoid field-based research within the IS discipline. Galliers (1987) also highlights problems associated with laboratory experiments within IS research. These authors argue that controlling and monitoring of variables in a controlled environment, such as a laboratory experiment, is problematical since only a certain number of variables can be studied in an artificial setting; some variables are extremely difficult to measure and value; the experiment controller may introduce problems associated with the scientific principle of observation outlined in chapter two; and interpretation problems since the controller's values may impact upon the results. A general criticism of the laboratory approach comes from Mintzberg (1979), who contends that laboratory experiments have only made limited contributions from a statistical sense.

By contrast, field studies are said to offer an opportunity to create interesting and insightful theories (Daft 1983). Field research is essentially conducted within organisations. There are a number of authors who articulate the fundamentals of conducting field-based research (Denzin 1989; Miles & Huberman 1994; Yin 1989). One of the most fundamental issues to conducting field research is the ability to gain access to the field, that is, the ability to get into organisations (Bogdan & Taylor 1975; Buchanan et al. 1988; Hammersley & Atkinson 1983). Field research is also considered to be fundamentally different to the conventional social science methods because they seek to intervene not just observe (Zimmerman 1987).

Field work or field experiments may also be described in four ways (Dickson et al. 1977). The first approach involves 'Field Studies', which is inquiry in a natural setting with no manipulation of variables and no experimental controls applied. Some dependent variables can be systematically measured. The second approach relates to conducting 'Field Tests' which involves the manipulation of variables. Subjects are the stakeholders and viewed as dependent variables. Other variables such as independent variables may be controlled for testing. The third approach is conducted using 'Adaptive Experiments', which utilises a control group. Data is collected prior to and during the process of group activities as part of the experimentation process. The fourth approach utilises 'Group Feedback' as a process, which enables the collection of both objective and subjective data from a participant group. This data is then used as feedback from their responses to be analysed before final results are determined. This research can therefore be seen as conducting a 'Field study' (a contextual inquiry in its natural setting) and an 'Adaptive Experiment' (the use of two different groups). It is important to realise that this second aspect was only incorporated to support the identification of demonstrable improvement in the group that attended the developmental workshops (group A). Given this second aspect this research may be considered to be more of a field study than an adaptive experiment.

4.3.5 Exploratory, Descriptive and Explanatory Methods

Yin (1994) and Neuman (1997) describe ‘Exploratory’ research as one that is aimed at formulating more structured questions over time and questions that future research may better address. This approach predominantly utilises the inductive method of inquiry and uses qualitative research methods. Conversely, the ‘Descriptive’ research approach predominantly aims at analysis that involves specific details of a situation and its organisational setting. The aim of this approach is to take a well-defined subject and describe its structure and function as accurately as possible for theory building as opposed to theory testing, which incorporates the testing of hypotheses. ‘Explanatory’ research predominantly aims for a high level of control so that a theory may be tested. A deductive method of inquiry is employed. Quantitative methods are the predominant approach used in explanatory research.

Exploratory research rarely provides conclusive answers to problems or issues. It does however provide guidance as to the future direction of research (Hussey & Hussey 1997). Fitzgerald (1997) believes that the dichotomy between exploratory and confirmatory draws parallels with the understanding versus prediction dichotomy. This research therefore takes an exploratory approach, since the researcher tests several frameworks in the field. This limited test then raises problems with the situation explored and the frameworks used that future research may address. The research may also be considered explanatory in that it seeks to both conduct an inquiry and intervene. The intervention process incorporates the use of two groups (A & B) to establish the effectiveness of the frameworks used. Therefore, this research uses a mix of exploratory and explanatory research methods.

4.3.6 Longitudinal and Cross-sectional Methods

Research may be conducted in two modes of operation. The first is longitudinal whilst the second is cross-sectional. Cross-sectional studies collect data at a single point in time, which only makes the data analysis relevant to this period. In longitudinal studies, data

may be collected a different times or from different interviewees. Longitudinal studies are often used when the researcher seeks to study changes in a research setting. Easterby-Smith et al. (1991) contend that it is difficult to eliminate the effect of external factors that affect longitudinal studies. The longitudinal mode is required within this study to investigate the effect of the intervention process on each participating SME. The mode is also supported by the multi-staged data collection and data analysis technique being developed and tested by this research which necessitates a longitudinal approach. The multi-staged data collection and analysis process is discussed in section 4.4.

4.4 DATA COLLECTION AND DATA ANALYSIS METHODS

The purpose of this section is to outline the data collection and the data analysis methods used in this study. The section commences by describing the questionnaire development process and outlines the relationship of the questionnaire to the conceptual model which is used for both field inquiries (Q1 & Q2). The next section (section 4.4.2) describes the techniques and protocols for the field-based interviews which were guided by the content of the conceptual model. The section following then explains how the field data is analysed using the principles of hermeneutics.

The two conceptual frameworks developed and presented in chapter three are used by the researcher as a theoretical frame of reference, which supports and maintains their activities and focus. The first conceptual model is used in this study to examine the eight SME case study situations. It forms the theoretical point of reference that supports the data collection, analysis and ultimately the achievement of the research aims and objectives, which were mentioned in chapter 1. How the researcher views each SME case study situation is shown in figure 4.4.

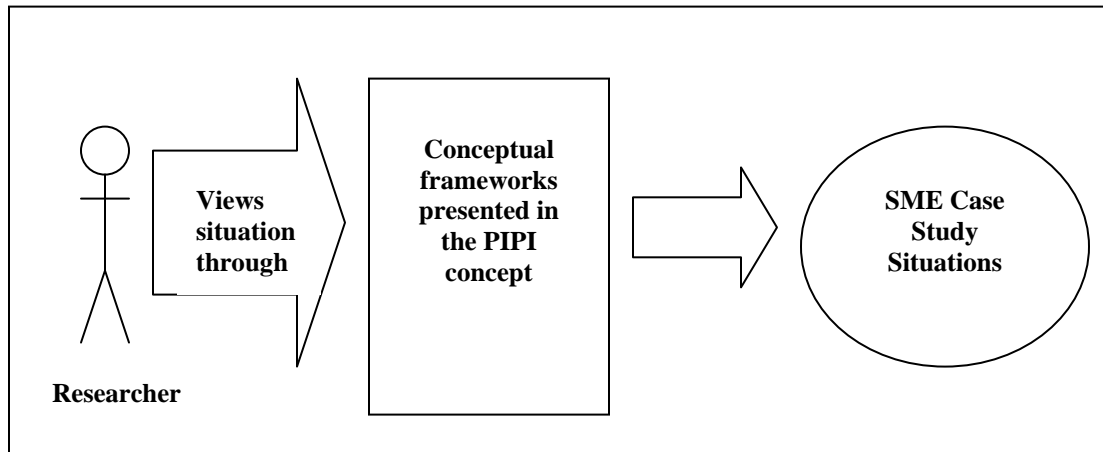


FIGURE 4.4 HOW THE RESEARCHER VIEWS CASE STUDY SITUATIONS

Having developed the conceptual framework for inquiry in chapter three, it became apparent that this was not totally suited to being operationalised in the SME case study situations. The researcher therefore sought ways to convert the conceptual framework into something that was more tangible and therefore useful to this study. This aspect is discussed in the following section.

4.4.1 Questionnaire Development Process

The purpose of this section is to outline how the field questionnaire was derived from the theoretical framework for inquiry and then implemented in the field to collect empirical data. The second framework used for intervention has no bearing on the questionnaire development process because it only focuses on the AR developmental workshop process. The section also indicates the protocol for the questionnaire in that several discussions are presented which indicate how and when the questionnaire was implemented within the SME case study situations.

The second conceptual framework developed in chapter three was designed for the workshop intervention and it was initially constructed to support the researcher during the developmental workshop stage. This framework was not operationalised within the SME case study situations; its role was to indicate the processes necessary for this intervention

activity and to support discourse on the manner in which it was conducted. The main purpose of this framework therefore is not to generate findings and insights. The role of this model was limited to the reporting process and the critical reflective learning activities conducted in the final chapter.

The framework for the inquiry is the more important of the two because it is the framework that starts the intervention process (Q1). The relevance here is that this theoretical frame of reference was used to provide the theoretical foundation for the inquiry and maintain the researcher's focus. The theoretical frame of reference was expressed in chapter three as a model of an 'IT innovation information system'. This conceptual representation was developed using the SSM methodology, which incorporates the notion of a Holon. The Holons presented in the conceptual model are intended to represent the human activity relevant to such a system. Given the problem outlined in the previous section this section reveals how these Holons then became components of a field questionnaire.

Each of the Holons presented in both models are a representation of some suggested human activity. Because the activity is human action, the researcher sought ways to convert these Holons into research questions. The development of these questions centred on two aspects. The first is that each Holon or component needed to be explored. The solution chosen by the researcher was to use an interrogative sub-framework which explored the 'who, what, where, when, why and how' elements of each component. In other words, the researcher sought to inquire about the human activity through the model and this sub framework. For example, the first Holon in the framework for inquiry relates to the gathering of relevant IT innovation information from appropriate communication channels. Given this representation, the researcher developed questions that discovered 'who' conducted this activity, 'what' information channels are appropriate, 'when' was this activity performed, 'why' was it performed the way it was, 'where' was this activity conducted, 'when' was it conducted, and finally, 'how' was it conducted. It is important to realise that these are not the questions presented in the questionnaire; however, they do reflect the style that was used to create the questionnaire.

This interrogative sub-framework was applied to all the Holons portrayed within the model as shown in figure 4.5.

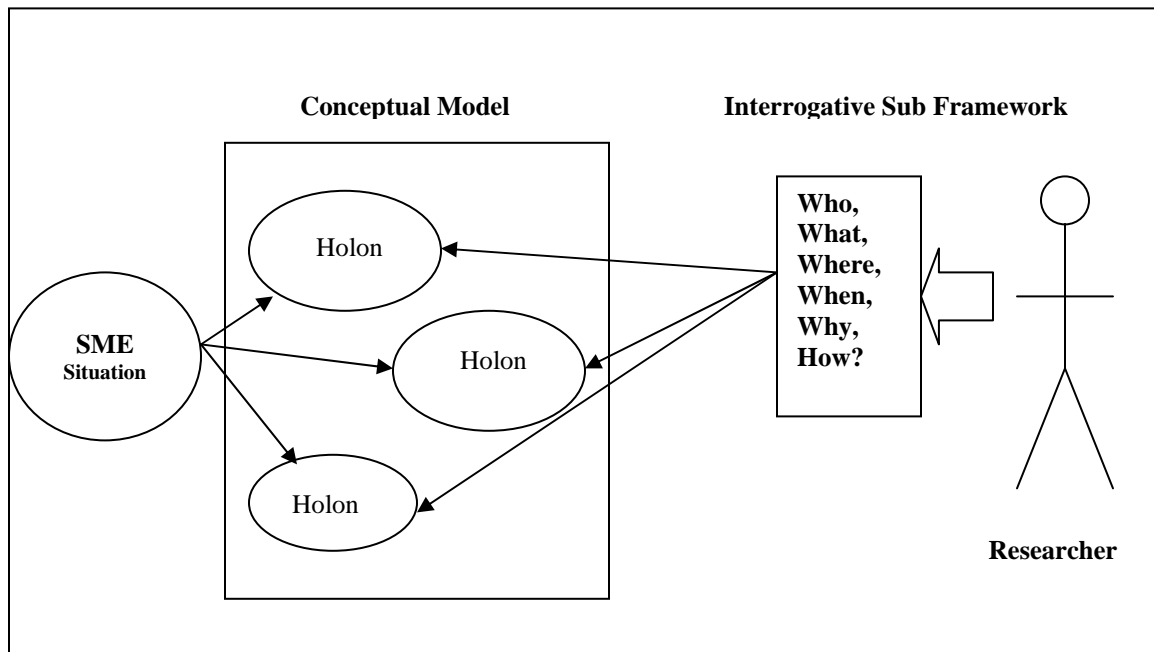


FIGURE 4.5 QUESTIONNAIRE DEVELOPMENT PROCESS

The researcher is therefore inquiring into the SME situation via an examination of each of the Holons presented in the conceptual model of inquiry. Each Holon is then examined via the use of this interrogative sub-framework. The output of this new approach to questionnaire development is a broader picture of Who, What, Where, When, Why and How this human activity is performed within each SME examined. The model looks at human activity and so it is deemed that this sub-framework is relevant to the questionnaire formulation process, since it allows for a more detailed inquiry into the human activity involved in such a process.

Having developed the conceptual model the researcher then refines the model through the aforementioned process to derive the questionnaire that is operationalised in the field during the face-to-face interviews which are discussed in the next section. The compartmentalised questions are purposefully designed to explore the who, what, where, when, why and how of each individual Holon (the parts) represented in the model. They

are then combined to form the overall questionnaire (the whole). It is important to realise that this sub-framework may not uncover all necessary activity; therefore this questionnaire, inclusive of its sub-framework, is intended to be used as a guide for the researcher. For example, each Holon that is explored during the interview process is explored using this interrogative approach. During the interview process other questions that stem from the sub-framework are asked, to the point where the researcher felt they have gathered a rich enough understanding about each Holon. This compartmentalised understanding is then reassembled as a whole, which enables an understanding of the whole SME situation under focus.

Another aspect relevant to this discussion relates to the use of quantitative methods that are incorporated into the questionnaire development. Due to the compartmentalised nature and overall size of the situation being explored the researcher needed to consider the following: Yin (1994) asserts that an interview protocol should include 'Likert' scaled questions summarising the overall perceptions of an interviewee towards the issue addressed in each question. The author contends that these 'Likert' scales can help to summarise discursive type responses. Therefore, another consideration in the questionnaire development process is the inclusion of a method that allows these summarised opinions to be incorporated. Although this study does not focus on using quantitative methods, the researcher deemed that the use of several quantitative Ratio Scales would facilitate the summarising of responses from the participants. This approach would also aid in the simple identification of any demonstrable improvement based on the participant's response to these scales before and after the workshop intervention process (Q1 – Q2). The questionnaire development incorporated several Ratio Scales, which were designed to gather summarised responses from the participants. Having outlined the questionnaire development process the discussion now turns to how the questionnaire is used within the SME case study situations.

4.4.2 The Field-based Interviews

The purpose of this section is to outline and describe the field-based interviews. There are many prominent techniques that can be used for the interview process. Open interview technique (Kvale 1997) is an example of a qualitative method that is used to develop a deeper understanding of behaviour, actions, motives and personality. The purpose is to collect descriptions of the interviewee's worldview so that the researcher can better interpret the described phenomenon. The strength of this technique is its ability to offer discovery. Another alternative is the semi-structured interview technique (Andersen 1998). This is similar to the open interview technique the main difference is its ability to incorporate the already known elements. There are usually some areas that the researcher already understands; however, there may be some areas that the researcher wants to pursue. When using these semi-structured techniques, a guide can be used to prompt the interview process (Andersen 1998). Kirk & Miller (1986) also recommend that a researcher develops a system of notation that will enable them to quickly construct informative notes in the field.

The informer interview technique (Halvorsen 1992) is particularly useful for qualitative interviews where the researcher is interested in a phenomenon that has already occurred or, alternatively, when they do not have the opportunity to study a phenomenon. This is particularly useful at the beginning, when the researcher is unclear which question to ask. Another variation is the unstructured technique (Dick 1990). The starting point with this technique should be almost content free; this will ensure that the answers came from the respondent and did not arise simply because the questions created a self-fulfilling prophecy. Such questions capture interviewee's perceptions as opposed to the researchers (Dick 1990). Another possibility is the use of probing questions. The probing question forms the major part of the prepared interview protocol (Yin 1994). The probing method can also be used to provide a valuable and reliable framework for cross-case analysis (Perry 1998). These probing questions should be crafted with care and they mostly start with 'how?' type questions that can definitely not be answered with yes or no responses.

Baxter and Chua (1998) recommend that the field researcher commences the interview with innocuous questions that permit the interviewee to speak with ease. They cite questions that explore position and duties that help develop an initial sense of rapport. After this more focused questions can be used. Given these considerations the researcher adopted a semi-structured approach, which divided the field questionnaire into several parts. The first, part A was designed with innocuous questions that related to their name, position and roles. Part B then contained the essence of the inquiry whilst the third section (part C) was designed to capture any historical or reflective perspectives (refer appendix A). Another suggestion, provided by Baxter and Chua (1998), relates to sending a copy of the questions to the participants prior to the interview so that they may familiarise themselves with the content. The researcher therefore sent a copy of the questionnaire to each SME, which indicated to the participants the types of questions most likely to be asked during the interviews. This activity took place several weeks prior to the interview. This allowed them time to reflect and minimise any stress they may have encountered. This was also incorporated because of the size of the questionnaire and the time taken to implement it. Overall, the approach used for the interview process was a blend of the probing and informer technique. This is because the questionnaire had a number of pre-existing elements to pursue; yet, other elements needed to be explored such as the researcher's clarification of participant responses that were not catered for in the questionnaire's structure. These techniques were also used because hermeneutics was the method used to analyse the responses

Demonstrations of trustworthiness and integrity, and the need to maintain confidentiality are paramount in research (Baxter and Chua 1998). The researcher stored the content of all interview transcripts and accompanying notes in accordance to these ideals. Although discussed in the ethical concerns section of this chapter, the researcher also had an obligation to comply with the ethical standards of research from their home institution. Audiotape was also used to check notes after the interview. This is, according to Perry (1998), a desirable method of triangulation. Others, such as Dick (1990) and Lincoln & Guba (1985), suggest that there is some controversy about the advisability of using a tape recorder during field interviews. Perry (1998) notes that the use of a tape recorder is

restricted in some areas, particularly in many Asian countries. As a result, each participating SME were asked if they had any objections to the use of recording devices. There were no stated objections.

In order to address the research aims and objectives the first data collection stage was via the use of a questionnaire (Q1). This was used in all the field interviews conducted within each SME. The questionnaire was administered in a one-to-one, face-to-face protocol to all participants. In accordance with Q1, the interviews were conducted in the field with all relevant organisational stakeholders involved in the sense making of new IT innovations and/ or the management of IT innovation information. Each interview went for just over one hour and was recorded with a tape recorder. The contents of these recordings were then transcribed contemporaneously and stored on floppy disk. Each transcript was then scanned along with any field notes taken at the time. The analysis of this data was conducted using the principles of hermeneutics, which are discussed in section 4.4.4. Upon completion of the interviews (stage 1- Q1) the researcher then had acquired information regarding each SME's overall situation. This information then formed the basis for the second intervention, which was the workshop intervention process.

The second stage of the intervention process involved collecting observations and data during and after the workshops from the four SMEs that participated in the developmental workshops. This was also recorded for analysis and discussion. The third stage of intervention reapplied the original questionnaire (Q1) to all SMEs case studies. This third stage of intervention uses the same questionnaire used in Q1 and this intervention is termed Q2. The second inquiry (Q2) provided a vehicle to conduct numerous comparisons. These comparison activities were introduced to provide the necessary evidence to support any demonstrable improvement, which may have occurred within those SMEs that participated in the intervention workshops. The temporal difference between stage 1 (Q1) and stage 3 (Q2) was approximately three months. This time lag allowed for both improvement to emerge and interviewees to forget their initial responses (Q1), which may have introduced some problems with their secondary responses in stage three (Q2).

4.4.3 Data Collection Method

The purpose of this section is to outline and discuss the data collection methods that this research uses and the methods used to interpret and analyse the data. The section will show that all data are collected from the field and analysed using the hermeneutic method of data analysis discussed in the next section.

Other prominent data collection methods considered included the survey method. Jenkins (1985) describes the survey as a method of gathering opinions of a subject matter at a particular point in time that describes some real-world context. Surveys may take on various forms, such as email, phone and mail outs. However, there is no guarantee that the intended recipient actually responds to the survey. For example, surveys sent to upper management may be allocated to lower-level people to respond. Other problems relate to the number of responses to the number that is sent out. The survey content may also be interpreted differently to the purpose intended by the researcher. This was an aspect that was noted throughout the interview process. For example, several managers were asked questions that contained text that had a different interpretation to that intended by the researcher. For example, the text 'evaluate' used in the field questionnaire was interpreted in context by each interviewee. The researcher's understanding of the text 'evaluate' included many theoretical values learned from the literature review process; hence the researcher's understanding or interpretation of the text 'evaluate' was markedly different and richer than the respondents.

Other problems with the survey method relate to the research requirement for an in-depth understanding. The opportunities to clarify, refine, and re-iterate the subject matter of the questionnaire was invaluable to this process. Had the survey method been engaged then several iterations may have been needed to obtain the in-depth understanding needed. The interpretivist position adopted by the researcher imparted another aspect that needed to be considered. This aspect is related to the posture of the researcher and must be orientated toward learning (Smircich 1983).

The interviewees were all informed about the research aims and objectives and the purpose of the interview. Participants were initially given a brief of the research which outlined the purpose of the research and the ethical treatment of research participants. They were then invited to consent to being research participants via the documentation provided by the researcher's tertiary institution. This ethical aspect is further discussed in section 4.5. Data was collected using the questionnaire and interrogative sub-framework to guide the interview process. All interviews were conducted face-to-face with each individual participant. The interviews times spanned a period of between 60 and 90 minutes. The interview was guided by the questionnaire and the sub-framework to support and maintain the focus. The interview procedure related to the structure of questionnaire (refer appendix A), which commenced with innocuous questions about their position and duties. This warm-up stage then progressed to the more in-depth questions, which are presented in the second section of the questionnaire. The order of the questions in the questionnaire related to the order of the components represented in the framework for the inquiry.

The two main methods used to collect data for this research were field-based interviews and observations. The data collected contained mostly qualitative aspects; however, as mentioned in the previous section, the data collected for this study also included several interval scales. These were incorporated to assist the researcher in understanding the situation at a summary level and to support the research requirement of identifying demonstrable improvement. By incorporating such scales the researcher was also able to gather data that reflected, albeit summarily, any improvement from the respondent's perspective. The observation activities may also be conducted either as a participant or non-participant. The purpose of the non-participant approach is to obtain observations without the researcher being involved with the participants either aware of the process or not. A non-participant approach was not suitable given the research requirement for intervention. Observations were conducted in this research with the understanding of all participants. There were no covert observations in this research.

Primary data collection was via the implementation of the field questionnaire outlined in section 4.4.1. This data took the form of both qualitative and quantitative insights.

Secondary data collection occurred during the workshop intervention process. This process utilised other artefacts deemed suitable for this process. For example, several participants came to the workshop with artefacts that provided additional insights about the situations initially explored. These included notes made in the past and copies of reports relevant to particular technologies that were implemented by the business. Other artefacts related to marketing information supplied by vendors such as colour brochures that articulated various business benefits and promises of new IT innovations. This secondary data provided the researcher with an additional opportunity to gather a deeper understanding about each situation explored.

A practical challenge for qualitative data analysis methods is that there are no clear and accepted conventions for analysis activities (Robson 1993). Interpretive researchers must also attempt the difficult task of assessing other people's interpretations and filtering them through their own conceptual apparatus, and then feeding a version of events back to others, including in some cases both interviewees and other audiences. In carrying out this work, it is important that interpretive researchers have a view of their own role in this complex human process (Walsham 1995). The researcher therefore sought a data collection method that would permit the participant's interpretations of their situation to be assessed and reported in accordance with the previously mentioned interpretivist beliefs. The next section outlines the method that was engaged to analyse the primary and secondary data collected for this research.

Overall, the questionnaire developed for this research can now be seen as one that is derived from the Holons represented within the first conceptual model of the research situation. The development process uses the semi-structured technique given the existence of several pre-existing questions (refer appendices A). The questionnaire may also be considered to use a probing type of question given the use of the interrogative sub-framework Who, What, Where, When, Why and How. The questionnaire therefore adopts a semi-structured technique, which incorporates the probing and informer style of questioning. The questionnaire is implemented in the field in a one-to-one interview with all relevant stakeholders within each SME situation and is discussed in the next section.

4.4.4 Data Analysis Method

The purpose of this section is to outline the hermeneutic method used for the data analysis process. The method used to analyse the field data utilises the principles of hermeneutics. The section also models and describes the sequence of events in the data analysis process.

This research attempts to make sense of the eight SME situations (A). The aim of the data analysis method is to support this process. The hermeneutic method is used and requires analysis of the whole situation and the human activity in relation to each constructs represented in the inquiry model. The idea of the hermeneutic circle refers to the dialectic between the understanding of the text as a whole (the situation represented in the model) and the interpretation of its components (the parts) and then back to the whole. Hermeneutics can be used as both a philosophy and a specific mode of analysis (Bleicher 1980). As a method of analysis it is a way of understanding textual data and it is concerned with the meaning of a text or text analogue. A text-analogue is an organisation, which the researcher comes to understand through oral or written text (Bleicher 1980).

The methodology chosen for this study is action research. This is underpinned by phenomenology and the principles of hermeneutics. According to Mueller-Vollmer (1986), the notion of hermeneutics originates from Greek mythology and their concept of Hermes. Hermes was the messenger of the gods. His role was to receive messages from the gods and communicate them to mortals. He sometimes experienced difficulty trying to understand what the gods were saying. He also experienced trouble when the mortals tried to interpret the true meaning of the message. In other words he needed to explain messages in such a way that mortals could make sense of these as the gods intended. The hermeneutic philosophy attempts to foster this understanding in this way as opposed to just describing what was said (Mueller-Vollmer 1986).

Hermeneutics can simply be defined as the theory or philosophy of the interpretation of meaning (Bleicher 1980). Gadamer (1975) believes that all understanding stems from the

act of interpretation, and that all interpretation takes place in the medium of language. Several others feel that this language can also be expressed as a text. Heidegger (1976) and Ricoeur (1981) state that social situations can be understood as a text. This they contend introduces the relevance of hermeneutics as a vehicle to explain and describe social phenomenon. People in everyday life practice the activity of interpretation (Heidegger 1976; Ricoeur 1981). Interpretation of social phenomena is never straight forward, since ambiguity and conflict will emerge through the interpretation process. Precise interpretation in the sense of reconstructing the exact experiences and/or state of mind of another is an impossible undertaking. This could be explained by the complexity associated with people's life experiences. Tradition as well as life experiences influence a social actor's attitude (Gadamer 1975). What we are is shaped by all of our previous experiences (Leonard 1994). Gadamer (1975) introduces the notion of historical consciousness, which he articulates as being the acknowledgement of the effects that history and events have on our life experiences, and this in turn influences our interpretations. These conflicts in interpretation can only be resolved through a discursive-dialectic process (Gadamer 1975). The term dialectic originates from the Greek expression for the art of conversation (Gadamer 1975).

The fundamental tenet of hermeneutics is that understanding has a circular structure. Gadamer (1975) illustrates this point by suggesting that the 'whole' of a phenomenon is comprised of its 'parts'. This is the circle of understanding. A study of the whole begins with an examination of its parts. Operating from a holistic perspective sees each part interpreted and its meaning and relationship to the whole consolidated into an emergent understanding of the phenomenon in question. In cycling through the circle of understanding, each part will be consolidated, and in doing so different perspectives will emerge. Gadamer (1988) maintains that the movement of understanding always runs from the whole to the parts and back to the whole again. Ricoeur (1981) argues that understanding of social phenomena can only be achieved by a dialectic process of narrowing the scope of a concept and then identifying the hierarchy of primary and subordinate topics which constitutes its parts. He notes that the second part of this movement from explanation to understanding is dialectical in nature.

Gadamer (1976) states that “hermeneutic analysis of a situation is somewhat similar to a hermeneutic circle where the understanding of the text is in circular relationship taken from the expectation of meaning from the previous context and is constantly changing from the whole to the part and back to the whole where the parts that are determined by the whole also determine the whole” (p.117). It follows from this idea of the hermeneutic circle there is an expectation of meaning from the context of what has gone before (Myers 1995). The idea of the hermeneutic circle, according to Myers (1995), can be applied to the way in which an organisation is understood as a text-analogue; the more interviews that are conducted then the more information is gathered, and the more that we understand the organisation as a whole along with its constituent parts can be understood. Stowell (1995) explains that with his client-led design a participant’s understanding of the situation increases; this may in turn affect a previous or following phase, necessitating a return and a review of past decisions. In this sense he argues that the hermeneutic circle can be seen as a never-ending cycle of learning (Stowell 1995).

The principles of hermeneutics have been applied in several IS studies (Myers 1994 & 1995; Lee 1991). Within the IS discipline Boland (1985) was one of the pioneers of using hermeneutics whilst Myers (1995), Westrup (1994), Kanungo (1993) and Visala (1991) have also advocated and recommended the use of hermeneutics within the discipline. Hermeneutic analysis of data allows contradictory terms and views of many stakeholders regarding various issues to be brought together for sense making in a holistic way (Myers 1994; Lee 1991). Because of this nature there are many different forms and perspectives relating to hermeneutics that all treat social settings textually; however, not all include a reflective critique of the meaning of interpretations derived from textual analysis (Myers 1995). Within the discipline of IS there has been a tendency to use the phenomenological hermeneutic perspective, which is said to be heavily influenced by the work of Heidegger and Gadamer (Lee 1991; Butler & Fitzgerald 1997; Myers 1995).

The perspectives available for contemporary hermeneutics, according to Coyne (1995), are as follows:

- Conservative

- Constructivist (Pragmatic)
- Critical
- Radical

Coyne (1995) explains that the 'Conservative' perspective seeks to uncover the original meaning of a text as intended by its author. It adopts an objective posture and is historical and contextual in nature. The 'Constructivist' perspective involves entering into the interpretive norms of a community, meaning that it operates and is found within the historical contexts of the interpreter and the interpreted information. The 'Critical' perspective is that interpretation should be emancipatory. Conventional wisdoms are challenged in order to address potential power asymmetries. The 'Radical' perspective treats text and social interaction as an endless play of signs that reveal and conceal knowledge. Walsham (1993) supports the notion that these constitutive process theories provide a new research approach for investigating social phenomenon. These process theories stress both the importance of subjective meaning for the individual actor and the social structures that condition and enable such meanings.

One such constitutive process theory is critical hermeneutics. Critical hermeneutics is a 'Meta' theory, since it provides the principles to guide the interpretation process itself and a framework that supports the integration of multiple perspectives (Walsham 1993). Critical or dialectical hermeneutics is, according to Orlikowski and Baroudi (1991), an attempt to dissolve the boundaries between interpretivist and critical research traditions that have historically been quite distinct. The main advantage of using critical hermeneutics is that it enables a researcher to portray a richer picture of the complexities in an organisation, particularly the social, political and cultural systems (Myers 1995). Myers (1995) adds that in critical hermeneutics the interpreter constructs the context as another form of text which can then, of itself, be critically analysed so that the meaning construction can be understood as an interpretive act.

This research project intends to use the principles of hermeneutics in the critical mode of operation. The most suited perspective for this study is the constructivist perspective because this study involves participants that interpret their own meanings in context.

Therefore, this research seeks to use a combined perspective of constructivist and critical hermeneutics. Principally the interpretivist, subjective and sense making nature of this research motivate this. In short, the research concentrates upon context-based meaning, and Myers (1995) notes that this meaning is an activity that is performed socially by the actors concerned. In other words, meaning is a socially constructed and socially performed activity within the chosen SME case study situations.

Other prominent methods for data analysis available to interpretive IS researchers include ethnographic approaches. Ethnography is becoming accepted increasingly within the discipline of IS (Davies & Myers 1994). This approach seeks to understand and make sense of cultural settings from within the organisation by the researcher participating over prolonged periods of time as an organisational member (actor). This participatory form of inquiry and observation forms the basis for fact gathering and learning about the subject organisation. Ethnography, according to Spradley (1979), is the practice of learning from participants as opposed to just studying them. Zuboff (1988) maintains that ethnography is not just about studying people within their own cultural setting, since it should include learning from them. Ethnographic research has been used by several IS researchers such as Zuboff (1988), Myers (1997) and Orlikowski and Baroudi (1991). One problem with this approach is that ethnography has no method for intervention or the provision for implementing any form of improvement. The researcher plays the role of participant as opposed to the facilitator or vehicle for change. Overall, this ethnographic approach was deemed unsuitable to this research given this drawback.

The main objective in analysing the data gathered in a qualitative case study, as with all methods of qualitative analysis, is not quantification of facts but an in-depth presentation of the relevant elements of a real life situation. There is no universally accepted method for analysing qualitative data generated from case studies (Polit & Hungler 1993). Asserting that a method of data analysis was helpful is not, however, sufficient to demonstrate that findings so generated are trustworthy; it is crucial to show that the method employed was rigorous (Rose & Webb 1998). Establishing the credibility of the research findings and insights requires that details of how these results were obtained are

described. Walsham (1995) provides IS researchers with a framework that supports this activity. Walsham (1995) raises the following points as factors for consideration.

1. Details of the research sites chosen
2. The reasons for choosing the unit/s of analysis
3. The number of people interviewed
4. What hierarchical positions the interviewees occupied
5. What other data sources were used
6. With respect to data analysis whether the reporting includes how the field interviews were recorded and analysed and how the iterative process between field data and theory took place and evolved over time.

These six points, or factors of consideration, are addressed individually within the following chapters and sections of this thesis.

1. Details of each SME research site are presented in the overview in chapter five and at the start of the findings section for Q1 (section 5.2)
2. Reasons for selecting the SME situation are presented in chapter one (section 1.2 & 1.7) and chapter four (Case Study method).
3. The number of interviews conducted is outlined in chapter five (section 5.1)
4. The positional aspects of each participant are presented in chapter five (section 5.1)
5. All data sources, such as primary and secondary are presented in chapter four (section 4.4.3)
6. These data analysis aspects are also discussed in chapter four (section 4.4.4)

Having outlined the data analysis method the next few paragraphs outline how this method is applied and used in this study. The recorded interview dialogues that were gathered during the first and second inquiry (Q1 & Q2) were transcribed and analysed manually by the researcher. The researcher first read each transcript in order to single out useful text-based responses that support an understanding of the human activity in relation to each component expressed in the model for the inquiry. In line with systems

thinking, these individual components were analysed first and then the situation was analysed as a whole. The researcher then iteratively modified, refined or abandoned these text responses as the analysis process progressed. The researcher then identified the most relevant aspects from each individual case study situation. These were distilled into findings and insights relevant to each component of the model first, and then the whole model was used to generate findings and insights about the situation as a whole. The individual case study analysis process is shown in figure 4.6

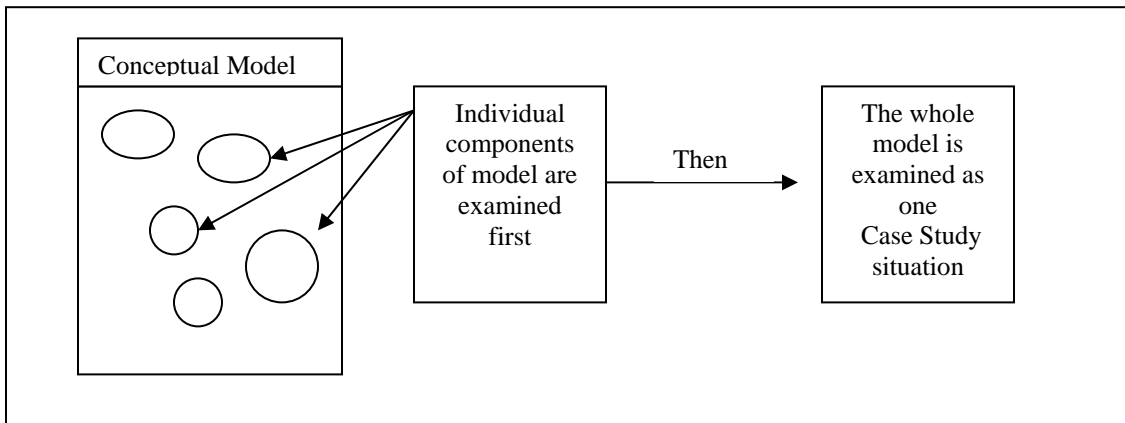


FIGURE 4.6 THE HERMENEUTIC ANALYSIS PROCESS FOR INDIVIDUAL SMEs

The hermeneutic technique used for the cross-case analysis process is now shown in figure 4.7

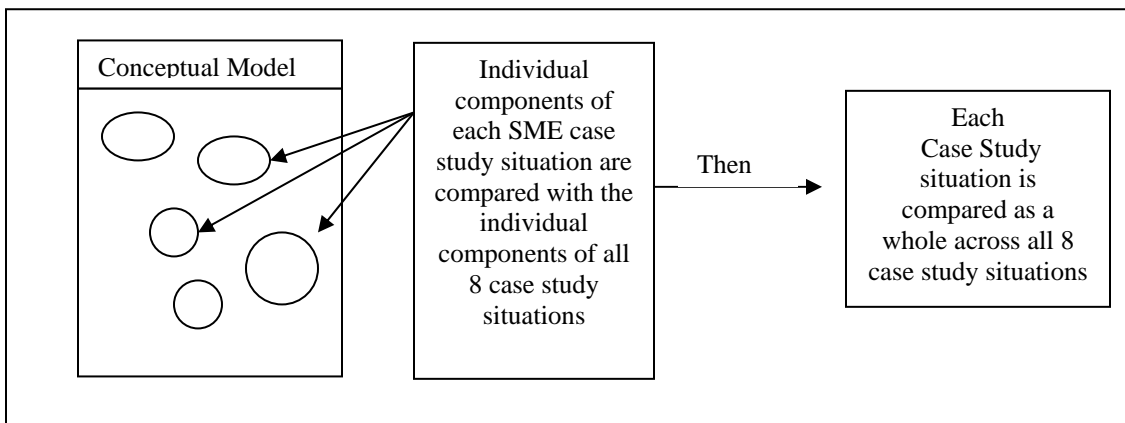


FIGURE 4.7 THE HERMENEUTIC PROCESS FOR CROSS-CASE ANALYSIS

4.5 ETHICAL CONSIDERATIONS

There are many ethical considerations to consider in this research. These concerns relate to being open with the interviewees and the appropriate treatment of confidential information (Emory & Cooper 1992; Lincoln & Guba 1995; Miles & Huberman 1994; Patton 1990). Other factors relate to the covert or overt posture of the researcher (Baxter & Chua 1998) and obtaining legitimate access to an organisation, which is said to provide the researcher with a clear conscience (Baxter & Chua 1998). Ultimately, poor ethical standards can have an unfavourable effect on the participants of the research as well as on the research outcomes (Patton 1990).

Other factors of consideration for IS researchers relate to ethical treatment of those that participate in the research process. For example, IS research should not be concerned with just technology itself, but also with the planning, design, development, implementation, management and use of IT (Piccoli & Wagner 2003). The authors claim that IS academics have not done a good job at making their work accessible to practitioners. They contend that the notion of rigour has stifled the scope of IS research which then reduces the utility of academic research. As a consequence they argue that research should be evaluated at a holistic level in that some benefit to practice must also exist with academic research. Their argument centres on the notion that academics should provide guidance to management in the use of existing and future IT. IS researchers should not be concerned with just optimising IT; rather, they should be focus on optimising all information systems components, which include technology, people, organisational structures and business processes (Piccoli & Wagner 2003). This researcher considers this to be an ethical imperative, since the participants should obtain some form of benefit that they can use to either improve their understanding or their situation. Overall, the research conducted and presented in this thesis follows the guidelines outlined by the Ethical Research Standards provided by the University of the Sunshine Coast. This research was deemed by this committee as being conducted to an ethical standard. This is evidenced by the granting of an ethical clearance number S/02/29 issued by the 'Human Research Ethics Committee'.

4.6 SUMMARY OF RESEARCH DESIGN

This chapter has discussed and outlined several aspects that have influenced the overall design of this research. Other aspects discussed in this chapter related to the axiological choices chosen by the researcher. These decisions have all influenced the chosen design and posture of the researcher. A summary of the epistemological, ontological and methodological positions adopted by the researcher is as follows:

- Epistemological posture deemed most suited is that of an ‘Interpretivist’
- Ontological posture chosen was that of a ‘Relativist’
- Methodology chosen is ‘Action Research’
- Conceptual modelling process utilises Checkland’s (1981) Soft Systems Methodology (SSM) as an applied methodology.
- The Framework, Methodology and Area of interest (FMA) is also used as an applied methodology. The research Frameworks (F) and Methods (M) are critically reviewed using Checkland and Holwell’s (1998) FMA framework

A summary of the methods, tools and techniques used within this research are as follows:

- Case study method used which incorporates the use of multiple SME case study situations to assist with building theory
- Theoretical instrument used to gather data is the field questionnaire which was developed from the conceptual model of IT innovation information system and operationalised in each SME situation during the field-based interviews
- The researcher is operating in ‘Field Study’ mode with a mix of ‘Exploratory’ and ‘Explanatory’ methods
- Research uses ‘Deductive’ theory building methods
- Research conducts a ‘Longitudinal’ study as opposed to a cross-sectional snapshot in time
- Data collected is predominantly Qualitative with some Quantitative elements such as Ratio Scales

- Data Analysis is conducted with a mixed ‘Constructivist’ (Pragmatic) and ‘Critical’ version of Hermeneutics
- Research conclusions and findings are supported by using Walsham’s (1995) framework for making generalisations from interpretive field studies
- Research outcomes are evaluated using the seven principles for conducting and evaluating interpretive field studies as supplied by Klein and Myers (1999)

Overall, this section has presented a discussion regarding the research design principles considered for this research. The research approach can now be seen to fit within the class of social science research approaches described as interpretive (Klein & Myers 1999). The research can also be seen as one that uses an interpretivist systems thinking approach with the methodology of AR and Checkland’s (1981) SSM and Checkland and Holwell’s (1998) FMA framework as applied methodologies.

CHAPTER 5: FINDINGS

5.0 OVERVIEW

The main purpose of this chapter is to present the findings and insights gathered from the two field-based inquiries. The basic reason for conducting a second inquiry was to provide the necessary evidence to substantiate that demonstrable improvement occurred as a result of the AR workshop intervention. The workshop intervention occurred after the first inquiry (Q1) and before the second (Q2). This chapter presents the findings and insights that were generated as a result of both inquiries and it includes discussions about the developmental workshop process.

The chapter commences with a general description of each of the participating SMEs that were used as case study situations (section 5.1). Section 5.2 then proceeds by presenting the preliminary findings that emerged from the first stage of researcher intervention, which was the field-based inquiry (Q1). The section presents the findings from the eight SME case study situations along with a brief cross-case comparison. The cross-case analysis process for the first inquiry (Q1) is incorporated along with the cross-case analysis from the second inquiry (Q2) and both are presented in section 5.5. Section 5.3 describes the second stage of the intervention process, which included a series of developmental workshops. The next section (5.4) presents the second group of findings and insights that emerged from the third intervention process, which was the second field-based inquiry (Q2). The requirement for having this second inquiry arose from the researcher's goal of introducing practical change that resulted in demonstrable improvement in several IT-related areas. The second inquiry was originally incorporated to identify this demonstrable improvement. Having finalised the three stages of researcher intervention, the next section (section 5.5) presents a cross-case comparison of the results obtained from the two field-based inquiries (Q1 and Q2). These discussions also highlight the influence that the developmental workshop process had on the group that attended the workshops. The section conducts a series of comparisons that highlights

the situation before and after the workshop intervention process. Section 5.6 then presents the key findings generated by this study. Section 5.7 follows which identifies and outlines the demonstrable improvement that occurred as a result of the workshop intervention. The next section (5.8) compares the findings that resulted from applying the PIPI concept with the literature reviewed in chapter two. The chapter is then concluded with section 5.9, which presents a summary of the key findings and insights that were generated by applying the PIPI concept in the eight participating SME case study situations (section 5.6).

5.1 OVERVIEW OF SME CASE STUDY SITUATIONS

The purpose of this section is to briefly describe the chosen SME case study situations. The section outlines the broad details of these businesses and the participants that were interviewed within each case study situation. These case studies were selected using the purposeful sampling principles (Patton 1990). A total of eight SME cases were used and the two rounds of inquiry (Q1 and Q2) resulted in a total of 73 field-based interviews being conducted. This provided sufficient levels of meaningful insight about the situation explored (Eisenhardt 1989) and enough case study situations to allow sufficient understanding of the phenomena under investigation and to draw reliable conclusions (Eisenhardt 1989; Gummesson 2000).

The eight participating SMEs were divided into two groups. The first four SMEs were labelled case study 1, 2, 3 and 4 and formed group A. The remaining SMEs were labelled 5, 6, 7 and 8 and formed group B. The reason for using two groups related to the purposeful nature of the workshop intervention process, which aimed to introduce practical change in the form of demonstrable improvement in several nominated areas. Only group A attended the developmental workshops, whilst group B were precluded from attending. The process enabled the researcher to identify the effect that attending the workshop had on group A. This process was also used to substantiate that demonstrable improvement occurred as a result of attending the developmental workshops.

All SME case study situations fall into the category of regional enterprises. This is due to both their location and the nature of their operations, which are solely located and conducted within the Sunshine Coast Region, Queensland, Australia. The region is located approximately 100 kilometres north of the Brisbane City, the capital of Queensland. The region is not typified or dominated by any particular industry; however, the tourism and construction industries have been the most prominent to date. The decision by the researcher to focus on this particular region related to his residency in the area and ease of access to the research participants. Each business was not selected to be representative of any industry group; rather, these SMEs met the case study requirements previously mentioned in chapter four. These SMEs also expressed a desire to improve their IT-related capabilities. In order to preserve their anonymity the details of each SME are presented in a format that achieves this outcome. A summary of the SMEs is presented in table 5.1.

| Case Study | Group | Industry | No. interviewed | Position |
|------------|-------|---------------|-----------------|--------------------|
| 1 | A | Construction | 2 | Directors |
| | | | 6 | Administration |
| 2 | A | Hardware | 2 | Directors |
| | | | 6 | Sales Staff |
| 3 | A | Real Estate | 2 | Directors |
| | | | 2 | Administration |
| | | | 8 | Sales Staff |
| 4 | A | Dental Health | 1 | Director |
| | | | 4 | Dentists |
| | | | 4 | Dental Assistants |
| | | | 4 | Administration |
| 5 | B | Engineering | 2 | Directors |
| | | | 4 | Civil Engineers |
| | | | 2 | Enviro. Scientists |
| | | | 6 | Administration |
| | | | 2 | Project Mgrs |
| 6 | B | Construction | 1 | Director |
| | | | 2 | Administration |
| | | | 2 | Construction Mgrs |
| 7 | B | Construction | 1 | Director |
| | | | 3 | Administration |
| | | | 1 | Construction Mgr |
| 8 | B | Real Estate | 3 | Directors |
| | | | 2 | Administration |
| | | | 3 | Sales Staff |

TABLE 5.1 GENERAL OVERVIEW OF SME CASE STUDY PARTICIPANTS

5.2 FINDINGS FROM FIRST INQUIRY - Q1

The purpose of this section is to present the preliminary findings that emerged from the first purposeful inquiry (Q1). The first stage of this process will present both findings and insights which emerged from the qualitative data that was generated in the field. This data was generated via the implementation of the field questionnaire. All eight SME case study situations were examined in this first inquiry as separate case study situations prior to the cross-case comparison being performed. In order to assist in communicating and interpreting the findings from each of these situations the model of an 'IT Innovation Information System' presented in figure 3.8 is again presented in figure 5.1 this time using a different format. The main alteration made is the introduction of several labels designed to support the communication of these findings. The activities represented in the model are now expressed as 'constructs of the system' rather than 'activities of the system' as expressed in figure 3.8. Each of the constructs is given a new label ranging from 'A' through to 'I'. The constructs are then used at the end of this chapter to highlight where and how the findings and insights were generated. For example, the first activity relates to the gathering of IT innovation intelligence, and is labelled 'A'. Each individual case study section commences by using this component designator 'A' to help identify and discuss the activities associated with this first construct of the inquiry model.

All the information presented in the following case study situations was gathered via interviews, which were guided by the field questionnaire. The information is represented along with the question that was first asked followed by its response. These are shown as text responses that have both meaning and relevance to the inquiry. The text responses are presented in italics and double quotation marks. These represent the most informative aspects that emerged from the interview process in relation to each construct. The structure of each section is similar to the questionnaire presented in appendix A. The first part of the questionnaire is **Part A**. The output of this section was presented in table 5.1 and it contains the warm-up and rapport building questions such as position, title and responsibilities. The second component, **Part B**, contains the bulk of the questionnaire, which includes the questions designed to help address the two research questions and three propositions. **Part C** includes reflective questions that gave the interviewees the

opportunity to reflect on the process as a whole. **Part C** also contains the two Ratio Scales.

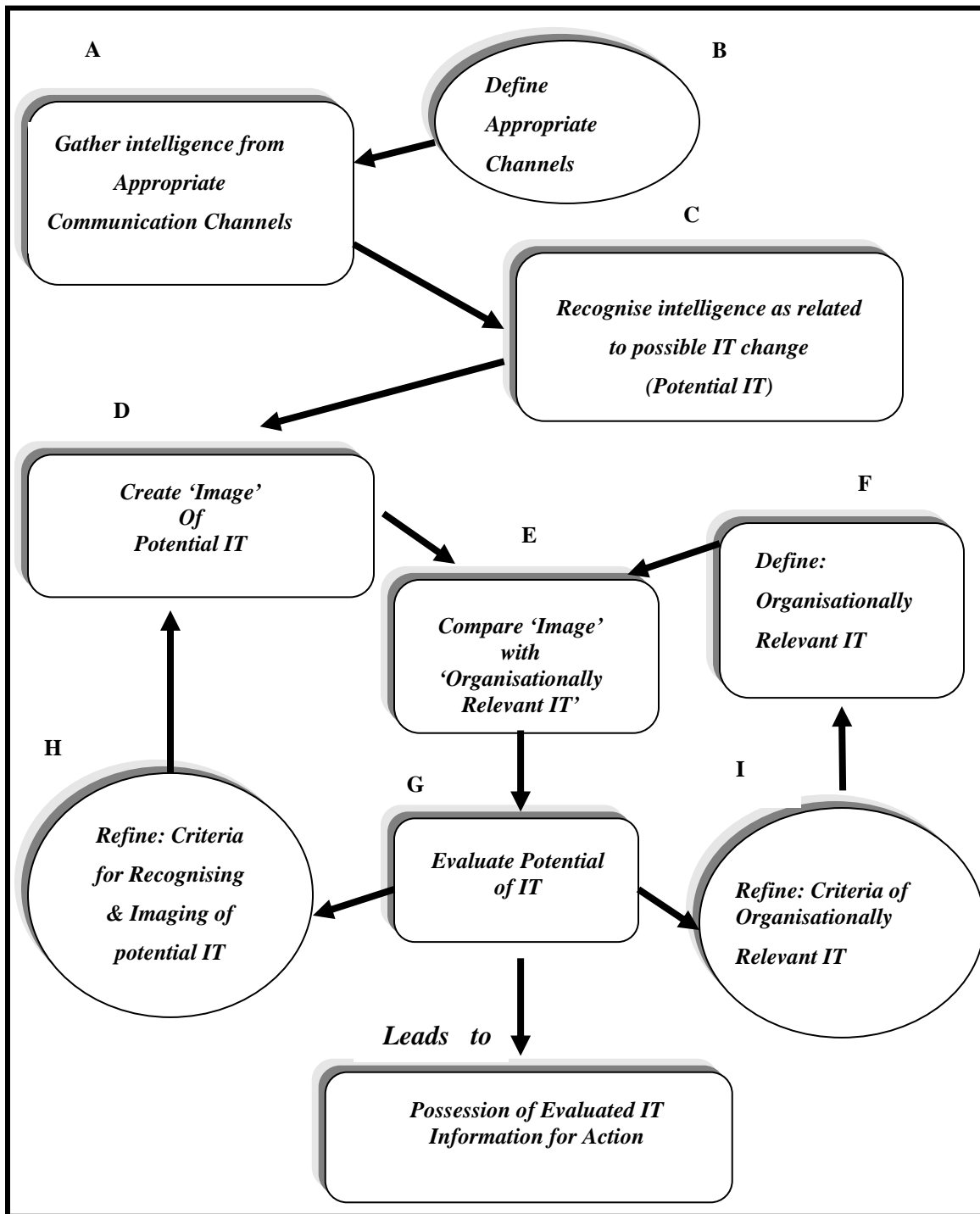


FIGURE 5.1 MODIFIED MODEL OF AN 'IT INNOVATION INFORMATION SYSTEM'

5.2.1 Case Study 1 – Construction Firm

The first SME (Case Study 1) operates within the construction industry. The business specialises in both plumbing and electrical services contracting for themselves and several larger organisations within the sunshine coast region. The business is owned and operated by two directors. These directors have employed six full-time support staff that operates the administration of the business. The business also employs several licensed contractors on a permanent casual basis; these casuals were not interviewed because they were not involved in the sense making of IT innovations and the management of IT innovation information. The business has been operating on the coast for approximately 15 years. The questionnaire was administered to the two directors and the six administrative personnel in a face-to-face interview. For ease of communication and to provide anonymity all SMEs are allocated a letter starting with 1 through to 8. This case study is referred to as case study 1.

Construct A – Gather IT intelligence

The last IT innovation considered and subsequently adopted within this business was the replacement of three computers and the provision of several software applications during February 2005. Within this enterprise the persons responsible for gathering IT intelligence are the managing directors. Both directors admitted that they were the only internal providers of information concerning new IT innovations. When asked if other members of their organisation were capable of providing this type of information one stated “*I couldn’t really tell you*” whilst the other stated “*control of our business is important to its success and I really don’t think the staff could help*”. Responses from the administrative staff confirmed this position. Typical responses included the following: “*X1 does that*” and “*can’t really remember being asked about any new technology*”.

When asked why they were the only persons involved, both directors replied with similar responses; these responses related to them being the owners of the business and it was their job to introduce new IT innovations. It appears that most of the activity relating to construct A is performed by the directors and one other person external to the business.

Construct B – Appropriate Communication Channels

Questions were then asked to explore where the directors gathered their information from. Their responses were similar in that one of the directors knew a person with an IT background that had previously worked within a large computer firm in Sydney. This person was identified as the only provider of IT intelligence for this business. When asked if this person was the best person, meaning an appropriate channel, one director replied “*I have known XI for many years and I know he is honest and he wouldn’t rip us off*”. Questions that explored other possible sources of information, which they might use, prompted the following responses. “*I suppose so*” and “*I’m sure there are but we’re happy with XI*”. When asked if they ever used any other source of information “*...we may have in the past I can’t really remember*”. It appears that this business considers their single source as being appropriate because of friendship, trust and the previous IT experience of that person.

Construct C – Recognise Potential IT

How did you first recognise the potential of this innovation? Responses from the directors included, “*We usually do what XI tells us to do*” and “*We don’t really call a meeting to discuss IT we just get it and move on*”. When asked if they go and investigate or find out more about it they replied “*No, not really*” and “*If I’ve heard about something similar or seen it on TV I’ll go and find out about it*”. When the directors were asked how often they go and find extra information they replied “*It’s not something I do all the time*” and “*This stuff is changing all the time so I try to leave it to the experts*”. It appears that someone outside the business predominantly conducts the role of recognising the potential of a new IT innovation with the occasional recognition by one of the directors.

Construct D – Create Image of IT

When informed of a new IT innovation do you (the directors) tell other staff members that you are going to buy it? “*Depends on what it is really*”. “*Sometimes, usually XI brings it in and he tells the staff what it does*”.

Construct E – Compare Image of IT with Definition of Organisationally Relevant IT

When asked how new IT was deemed suitable to the business and its operations the directors replied “*X1 doesn’t waste his or our time*”. Has X1 ever introduced IT to you that you had to sit down and think about how and where you were going to use it? “*I suppose so*” and “*sure, he brings it in and makes suggestions and if we agree we do as he says if we don’t like it we think about it, I’m paying for it remember*”.

Construct F – Definition of Organisationally Relevant IT

How do you know what IT is relevant to your business? “*I know what others are doing*” and “*I guess it’s a combination of things...like what it is and how it’s going to help the business*”. Clarification of ‘others’ revealed other similar businesses and other plumbing and electrical businesses that they were aware of. Do you have any guidelines or policy that lets the staff members know what is a relevant IT to your business. Both directors replied “*No*”.

Construct G – Evaluate Potential of IT

When asked who normally evaluates the potential of a new IT innovation the directors replied “*we don’t really have a meeting about it if that’s what your asking*” and “*we ask X1 what it’s meant to do*”. How do you know if it does what it’s meant to do? “*We just know*” and “*we don’t really do that...do we?*”. Do you ever involve the staff when evaluating a new technology? “*We did ask X2 if she wanted a new computer because she kept complaining that it was slowing her work down*”.

Construct H and I – Criteria Refinement

Questions pertaining to these two activities revealed little; this could be due to this activity not being performed at any recognisable level.

Part C - Reflections

Has the new computer system provided the benefits that you thought it might? “*Yes, there were some early problems but we fixed them*” What sort of problems? “*Some things didn’t work the way we wanted*” and “*staff needed more training than we first expected*”. Overall, were there any things that you would have liked to have done or would do

differently? “Yes, would have liked more information about how we use them...training needs etc”.

Ratio Scale Responses

The Ratio Scales were presented to each respondent with the following descriptor.

On a scale of 1 to 10 with 1 being ‘Extremely Poor’, five being ‘Average’ and ten being ‘Expert’, rate your ability in the following two areas.

1. Overall, how do you think the business evaluated this new IT innovation?

(Director A – 6 out of 10) - (Director B = 6 out of 10)

2. Overall, how do you think the business manages information about new IT innovations? (Director A = 6 out of 10) - (Director B = 6 out of 10)

5.2.2 Case Study 2 – Hardware Store

The second SME (Case Study 2) operates as a general hardware store. The business supplies hardware goods and some services to the local market. The business is owned and operated by three company directors, and is structured as a family-oriented business. All three directors are from the same family. The enterprise employs 10 staff members, of which 6 are full-time and four are casuals. The casuals were not interviewed due to availability constraints. The business has been trading on the coast for approximately 21 years. It is not part of any hardware chain or franchise. The questionnaire was administered to the two directors (one is considered a silent partner and is a permanent resident of New Zealand) and the full-time staff members.

Construct A – Gather IT Intelligence

The last IT innovation considered by this business and subsequently adopted was a new product identification and scanning system (electronic barcodes) during November, 2004. Within this enterprise the primary persons responsible for gathering IT intelligence are the two managing directors. Questions that explored this first construct resulted in the

following insights “*we both play a role here*” and “*it’s our responsibility, we know the business*”. The business gathers its IT innovation information from several sources. “*We receive newsletters and magazines from several of our suppliers*” and “*my son is really into IT and we ask him if something crops up*”.

Construct B – Appropriate Communications Channels

How do you know if these sources of information are appropriate to your business? “*Been using these avenues for several years*” and “*haven’t really had any problems that I’m aware of*”. When asked if they considered other sources “*sometimes use different ones*” Can you give me an example “*we were approached by a sales company from Maroochydore to buy a new system that was tailored to our needs...we asked around and found problems with this business so we stopped using this person*”. What do you mean problems? “*My brother works at XX and they used this guy and they weren’t happy...had a lot of problems...think they threw it out*”. Why do you only use these sources? “*Years of experience*” and “*although he doesn’t know everything I know he wouldn’t do the wrong thing by me*” (reference to director’s son).

Construct C – Recognise Potential IT

How do you know that a new technology is going to work for this business? “*We don’t buy just anything these days before we discuss it together*”. Who is normally involved in thinking about new IT? “*That’s something we do either at work or at home, it depends*”. Only the two directors are involved in this process.

Construct D – Create Image of IT

Both directors are responsible for generating an image of new IT. When informed about a new IT do other staff members get involved? “*Had problems with this before so we try to let those that will use it know what’s happening*”. What do you mean by problems in the past? “*Lost a valuable staff member because we changed too many things and they didn’t like it and left*” Changed what? “*We introduced a new point of sale system and they didn’t want to use it*”.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How did you know this new system would work for your business? *“After talking with a few people we decided it would be the right move”* and *“thought it would speed things up... it gets busy here sometimes”*. When did you know it was the right type of IT for your business? *“it’s a pretty simple system...didn’t think too much could go wrong”* and *“other hardware stores use it so we thought we would too”*. Did you involve the staff members that would use this system? *“Yes, we had several meetings about it”*. Did they provide any help to your decision making? *“Learnt a few things, nothing that we didn’t really expect”*.

Construct F – Definition of Organisationally Relevant IT

Do you have any policy or guidelines that let the staff know what IT is relevant to your business? *“No”* and *“if someone wants to talk about any ideas we do encourage them to speak their minds”*. The business conducts regular weekly staff meetings to air any concerns the staff might have.

Construct G – Evaluate Potential of IT

Both directors perform this function. Who normally evaluates new IT? *“We do normally but we have had some suggestions in the past from staff”*. Do you think the staff could help you with this? *“Possibly”* and *“No, it’s usually up to us to make the big decisions”*. When do you evaluate the potential of a new technology? *“When we come across it I guess”* and *“we do take technology seriously here so we try to evaluate things as best we can”*. What do you do? *“The main thing we look at is costs and benefits to the business”* and *“we know of other technologies that would make life easier but some are very expensive”*.

Construct H – Criteria Refinement

Questions pertaining to this activity revealed little. This could be due to this activity not being performed at any recognisable level.

Construct I – Criteria Refinement

As mentioned previously, this activity is partly conducted via the mediation process that exists within the regular staff meetings. *“We have in the past discussed and had knocked*

back our ideas that used IT” and “sometimes things are presented that result in staff rumblings”. What do you mean by rumblings? “Not happy Jan, pulling faces that sort of thing”.

Part C: Reflections

Has the new barcode system provided the benefits that you thought it might? *“No, we thought that it would be easy to introduce it turned out to be a real nightmare”.* What do you mean by nightmare? *“The existing system had to be used longer than we first thought because the new system took so long to sort out” and “we almost gave it away...if it didn’t cost so much we would have”.* In hindsight is there anything you would have done differently? *“Yes, we would have had XX fix all our problems before we paid them” and “It was not as easy as we were told it would be”.*

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 4 out of 10) - (Director B = 5 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 3 out of 10) - (Director B = 3 out of 10)

5.2.3 Case Study 3 – Real Estate Firm

The third SME (Case Study 3) operates as a real estate firm which specialises in waterfront properties for both interstate and international investors. The business is owned and operated by two directors. The firm also employs 2 full-time administrative staff and 8 full-time persons in the sales section, together with 1 part-time general maintenance person. The business has been operating on the coast for approximately three years. The questionnaire was administered to the full-time members and the company directors. The part-time maintenance person was not included because he was too busy with other forms of employment.

Construct A – Gather IT Intelligence

The last new IT considered by this business was the replacement and the provision of new mobile telephones for management, the directors and the sales staff during January, 2005. How did you find out about these new phones? *“We were approached by a sales rep”*. Where do you normally gather IT information from? *“Nobody really”* and *“We don’t have any regular channel for IT intelligence”*. Who normally gathers information about new IT? *“If there was a person it would be XXX”* (one of the directors). Is there a reason that XXX performs this role? *“Would you trust any of these jokers”*. By jokers the director was referring to his staff.

Construct B – Appropriate Communications Channels

How do you know what information channels are best for your business? *“It’s not something we concentrate on”* and *“You can’t con a con-man”*. When asked to clarify this statement the director informed the interviewer that they relied on gut instinct to evaluate the credibility of information sources.

Construct C – Recognise Potential IT

When you receive information about a new IT innovation do you immediately recognise its potential? *“Not every time no”* and *“We kinda know if it’s useful or not, there’s a lot of selling going on...as salesmen we know a good deal when we see it”*. What do you mean by good deal or not? *“Whether it’s cost effective or it’s going to make things better...more money that sort of thing”*. Who normally does this activity? *“Look, we are open to suggestions but it’s usually done by the senior staff”*. What do you mean by open to suggestions? *“Staff have always had a say as to what IT they can use...these new phones were not really needed but after we had a sales meeting the sales team began to get excited about it”* and *“we try to make them happy...if they’re happy they make sales, if they make sales we make dollars”*.

Construct D – Create Image of IT

When you realise that you have a new technology you want to introduce to the team how do you let them know about it? *“Usually at our sales meetings, or the sales manager lets*

them know". How often do you have these meetings? *"At least twice a week, depends on who's around and how busy we are"*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

When you develop an image of a new technology how do you know that it's right for your business? *"Try to ask questions and we try to see how it's going to change things before we do anything"*. When did you decide to adopt these new phones? *"The deal we were offered made a lot of sense so after the first meeting with the staff we pretty much decided it was worth the money"*. How do you normally work out if a new IT is right for the business? *"Like I said there is a lot of marketing going on and a lot of good deals, some are desperate to sell stuff...we can see through most of this crap"*. What do you mean by crap? *"There's a lot of selling out there that doesn't need to happen"* and *"One of the good things about this industry is that it teaches you how to recognise people that lie"*.

Construct F – Definition of Organisationally Relevant IT

Does the business have any policy or guidelines that lets the staff know what types of IT is right for your business? *"No, but like I said we try to encourage people to make suggestions that will improve their lot"*.

Construct G – Evaluate Potential of IT

Who evaluated these mobile phones on behalf of the business? *"I guess we both did"* and *"We are the ones that paid for these phones so yeah we both did"*. Who normally evaluates the potential of new IT innovations? *"We both thought about this and we worked out that most of the work is done by us...with some staff involvement"*. How are these staff involved? *"Sales meetings and we normally talk about things all the time"*. How did you evaluate these mobile phones? *"The sales rep was full of good ideas on how we could improve our communications"* and *"It made sense to us because it's important to stay in touch"*. *"Some of the changes in mobile phones have really changed the way we do business"*. In what way? *"Our sales team has received sales inquiries through the SMS (Short Messaging Service) network"* and *"We have actually sold several properties using nothing but SMS"* and *"Now we see our team taking and sending photos directly to*

customers...this used to take a week in the old days". When do you evaluate new IT? *"We kind of just do it"* and *"Only when we have to"*.

Construct H – Criteria Refinement

Questions pertaining to this activity revealed little. This could be due to this activity not being performed at any recognisable level.

Construct I – Criteria Refinement

As mentioned previously this activity is conducted partially through the mediation process that exists within the regular staff meetings and through general discussions within the office.

Part C - Reflections

Has the introduction of these new mobile phones provided the benefits the business thought they would? *"I say yes"* and *"Yes, the team has really run with these phones and come up with ideas that we never thought"*. Can you give me an example? *"I didn't realise they did so many things...I just use mine to receive and make calls; some of these guys live on their phones"* and *"we should have done this a while ago...they have already paid for themselves"*. How do you know that? *"Like I said, some of the sales we made just last month were basically made over the phone"*. In hindsight is there anything you would have done differently? *"Yeah, got them sooner"* and *"I saw a show on Sunday that explained these new 3G phones; maybe we should have got these ones...they look great"*.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 6 out of 10) - (Director B = 7 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 6 out of 10) - (Director B = 6 out of 10)

5.2.4 Case Study 4 – Dental Practice

The fourth SME (Case Study 4) is a dental practice that specialises in many advanced dental procedures and services. The business has 1 company director 4 full-time and two casual dentists. The casual dentists were not incorporated into the case study due to availability constraints. The full-time dentists each have their own assistant and in some instances the assistants were in training to be a dentist. The business also employed 4 full-time administrative personnel and engaged the services of a temporary staff service located in the small town that they operated in. All employees except those supplied by the temp service and the casuals were interviewed. The business has an excellent reputation and is considered to be a role model within the industry. It has been in operation for approximately 12 years at the same location. The questionnaire was administered to the director, the full-time dentists and admin personnel.

Construct A – Gather IT Intelligence

The last IT innovation considered and subsequently adopted by this business was a number of Web-based cameras during November, 2004. Where did the information about this IT come from? The sole director replied *“I supplied the information...it came from my own research and awareness”*. The director was the only person who gathered this IT intelligence. What sources of IT intelligence are available to you and your business? *“I would regard myself as being a technocrat...I read a number of IT journals which keeps me up to date with the latest technology”*. What do you mean when you say technocrat? *“I don’t know if that’s the right description but a few people have made reference to me as being an IT guru or nerd...I guess I’m into technology”*. How many different sources do you have? *“There is a few, I mainly use the Internet and these computer magazines”*. Does anyone else furnish you with IT intelligence? *“No not really, this is a small town and there is not a lot of what I would call professional advisors”*. What do you mean by professional advisors? *“As a business we are constantly approached by sales and service providers...most that I have encountered don’t really understand what they are selling...you know what I mean...I guess I feel that I’m in a better position than they are”*.

Construct B – Appropriate Communications Channels

Do you trust the sources of information that you use? *“I would have to say yes”* and *“I have been into technology for many years...sometimes I wonder if I should start another business that specialises in providing businesses with proper advice”* and *“I have friends in business and they sometimes inform me of problems they encounter...it makes me laugh”*. Why do you say that it makes you laugh? *“Without being condescending some of these people just have no idea what to do...their approach to IT is just like everyone else’s”*. What do you mean by everyone else’s? *“I have even discussed these things with my patients... I guess its my own opinion that they are all doing it wrong...you would have to see that in papers and journals”*.

Construct C – Recognise Potential IT

How did you first recognise the potential of these Web cameras? *“My wife just had our second baby so we installed several cameras at home...I had them linked to the net so I could see what’s going on when I was here”*. How did you know that they would be useful in your business? *“Same principle in reverse I suppose...I’m trying to spend more time at home...wanted to keep an eye on activities at work...so I didn’t have to phone in every few hours and annoy my staff”*. How do you normally recognise that some IT are useful for your business? *“Experience comes into play...I really see the value of IT relatively quickly”*. Was anyone else involved in suggesting these were a good idea? *“No just myself”* and *“I couldn’t say if there was anyone that was aware of these devices...they were installed for over a week before anyone noticed what they were”*. How did they find out what the cameras were? *“XXX approached me and simply asked the question”* and *“I’m certain that XXX informed other people because it just became common knowledge”*.

Construct D – Create Image of IT

You said that these cameras were first used at your private residence; can I ask how you perceived these cameras as a dad? *“I experienced a situation that I solved using these cameras...nervous dad emotions...they do serve other functions...my wife uses them to communicate on a regular basis”*. Did your perception of these cameras change when you began to think about their application here? *“Only mildly...different emotions same*

outcome or purpose I suppose". The perception you had, was it communicated to any staff members? *"I did talk to XXX (another dentist) who thought it was a good idea"*. Do you know if this person uses these cameras from home? *"No. My wife and I are the only persons that know the on-line details that are needed to access them"*. Can I ask why others don't have this information? *"Security is my concern...we have several temporary staff members who work for other businesses...I suppose I don't want everyone looking in on what we do here...patients need privacy"*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that these cameras would be suitable for the business? *"I did chat with my wife and XXX...I have made these types of decisions before and to date we haven't encountered any problems"*. How do you normally decide if an IT innovation is right for your business? *"I try to lead the thinking on most things...in my nature"*. Have you ever involved anyone else that works here? *"No, it's not a trust issue if that is what your asking"*.

Construct F – Definition of Organisationally Relevant IT

Do you have any policy or guidelines for your staff to inform them of what IT is relevant to this business? *"I did think about this and the answer would be no because they leave it up to me"*.

Construct G – Evaluate Potential of IT

How did you evaluate the potential that these cameras would have? *"Having used them at home I one day realised that they could be used in reverse...it was as simple as that"*. Did you perceived any benefit to the business as a whole? *"Good question, I suppose the answer would be yes"* and *"...a number of people have commented on the technology they see around the building...I do recall when we first met that you even mentioned that we have the latest and greatest of everything"*. Who normally evaluates the potential of new IT? *"When we purchased the new computers last year I did involve the girls at the front desk...normally the IT decisions are managed by me...some consultation with my wife...I think that it's more psychological reassurance than anything else...bounce ideas around from time-to-time"*.

Construct H – Criteria Refinement

Questions pertaining to this activity again revealed little. This could be due to this activity not being performed at any recognisable level. The director did comment “*I thought about this morning and I don’t really do this...not quite sure what you were after here*”.

Construct I – Criteria Refinement

How do you continually refine what is a relevant IT for your business? “*I’m always looking out for new ideas...receive a lot of information from journals, newspapers and I’m always looking for ideas on what other dentist practices are using...lots of homework really*”.

Part C – Reflections

In hindsight has the introduction of these cameras provided the benefits that you thought they would? “*Yes, more than happy about it*”. Have there been any problems? “*No*”.

Is there anything that you would do differently if you had to repeat this process? “*Yes, I would have spent a little more money on slightly better cameras*”. What do you mean by slightly better cameras? “*I purchased them on-line...the technical specs read O.K. but I’m now aware that other cameras provide better quality pictures...they have dropped in price significantly*”.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director = 8 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director = 9 out of 10)

These first four SMEs (Cases 1, 2, 3 & 4) were the members of group A who attended the workshops discussed in section 5.3. The remaining cases (5, 6, 7 & 8) form group B. The first member of group B is presented in the next section.

5.2.5 Case Study 5 – Civil Engineering Firm

The fifth SME (Case Study 5) is a civil engineering business owned and operated by two directors, who are also brothers. One brother also owns the next SME (case study 6) which is discussed in the next section. Case study 5 employs 4 full-time civil engineers and 2 full-time environmental scientists. The business has 6 full-time administrative personnel and 2 full-time project managers. The business provides several services to the civil construction industry on the coast. Clients include both the general construction community and several state and federal government departments. The business has been operating on the coast for approximately 10 years. The questionnaire was administered to the directors and the full-time staff.

Construct A – Gather IT Intelligence

The last IT innovation considered and adopted by this business was a photocopying machine during January, 2005. Where did the information about this IT innovation come from? *“A colour brochure that was delivered here before Christmas”*. How did you this come about? *“The old photocopier wasn’t compatible with the computer network we have”* and *“we needed to improve the quality of the presentations we make”* (for their tendering process). Where do you normally gather information about new IT innovations from? *“We’re always getting brochures from X1 and X2”* (stationary and business supplies firm on the coast and local IT supplier). Do you have any other sources of IT intelligence? *“One of our staff is doing an IT degree and she sometimes comes up with interesting ideas”*. How do you normally gather IT intelligence? *“No one person is responsible for this, it just happens when we need it to”*. Who was responsible for gathering the information about the new photocopier? *“The brochure came with our monthly account”* and *“the other director of the business read the brochure and he already knew we needed a new machine so he was the person responsible”*.

Construct B – Appropriate Communications channels

How did you know that the business giving you this brochure was providing you with the right information? *“We have purchased several items from them in the past...they provide good after sales service...problems get fixed quickly”*. What other sources of IT

information do you have? *“We get the XX magazine sent to us does that count?”*. What types of IT innovation does this magazine inform you of? *“Engineering firms around the world provide articles so we can see what others are using and how they use it”* and *“we are always open to suggestions so I would say all sorts of sources”*. How do you know that these sources are appropriate to the business? *“The Engineering magazines specialise in giving us information that other engineers get so that’s one way of saying that the information is reliable and appropriate”* and *“we don’t really check out the information we get”*.

Construct C – Recognise Potential IT

How did you first recognise the potential of this IT innovation? *“XX read the brochure and he seemed to be impressed”* and *“We don’t spend thousands of dollars without talking to each other... this machine cost us \$22,000”* and *“As the owners of the business we regularly get together to discuss these things”*. Who was involved in identifying a business need for this machine? *“We had a problem with the old photocopier and we also needed to improve our tender documents”* and *“Some of the tenders we have from other engineering firms have a more professional appearance than ours so I’m thinking it was both of us really”* (both company directors).

Construct D – Create Image of IT

How did you first perceive the photocopier? *“The brochure contained a lot of information and it seemed to be just what we needed”* and *“I saw it as something we really needed to purchase”*. Did this perception change over time? *“Didn’t really give it much thought after we decided to get it”*. Did you communicate this perception to other staff members? *“Yes, I spoke to the girls and a couple of our engineers and they thought it was a good idea...the girls were told about it”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that this innovation would be suitable to the business? *“We decided after talking with a few people that it was what we needed”*. Who was involved in this decision making process? *“Us, we spoke about it and we already knew we needed a new photocopier”*. How do you normally decide that an IT innovation is suitable to your

business? *“Depends on how much it costs...if it’s only something small we let whoever wants it get what they need”*. Is there any monetary limit that stops staff members from making these decisions? *“We have an ordering system for X1 and X2 and if the amount is too high or out of the ordinary one of the girls usually lets us know...they don’t sign off unless they’re happy”*. *“X from X1 has called me in the past when there has been an expensive item requested...just to make sure”*.

Construct F – Definition of Organisationally Relevant IT

How was it determined that this photocopier was relevant to the business? *“As I said, we needed it and it seemed to solve our problems”*. How do you normally decide if an IT innovation is relevant to your business? *“As directors we have a rough idea what will suit the business”* and *“I’m not really into this stuff so we ask around”*. Who do you ask? *“Depends again, sometimes I will ring X from X1 and he will let me know what its like or if it’s any good”* and *“I can’t remember when it happened but I have spoken to other businesses and even some clients about some IT”*. Does the business have any policy or guidelines that inform the staff as to what IT is relevant to the business? *“No”* and *“Not that I’m aware off it usually happens on a case by case basis”*.

Construct G – Evaluate Potential of IT

Who was responsible for evaluating the new photocopier? *“It was a joint decision really...had several discussions...no one person”*. How was it evaluated? *“X1 recognised its potential and the people we spoke to said that they wanted it”* and *“the brochure contained a lot of information about what it did and it seemed to be able to do the job we wanted...wasn’t that hard an exercise”*. Who normally evaluates new IT innovations? *“Again it’s done on a case by case basis”* and *“no one person does it...as a business we have needs that require us to spend money on IT...if it’s going to work we usually get it”*.

Construct H – Criteria Refinement

Does the business have any policy or guidelines regarding how it recognises or perceives new IT innovations? *“No, not really”* and *“I suppose we do at some level”*. What do you mean when you say at some level? *“We tend to talk about a lot of things and that can*

happen anytime, so if something's not right either X1 or myself will let them know...does that count as a guideline".

Construct I – Criteria Refinement

Does the business have any policy or guidelines relating to how the staff recognises a new IT innovation as being relevant to the business? “No” and “*I’m sticking with my last answer*”.

Part C - Reflections

In hindsight has the introduction of this new photocopier provided the benefits that you thought it would? “*Yes, I’m happy with it*” and “*A couple of our engineers have complained that you need a degree to operate it that’s the only problem I’m aware of at present*”. Have there been any other problems? “No” and “*There was at the start, nobody was interested in taking it out for a spin, but once the girls showed us how it worked most of us figured it out*”. Is there anything that you would do differently if you had to repeat this process? “*Probably find a cheaper copier*” and “*I suppose we would have liked some sort of training so we could all see how it works from the start...it wasn’t used like it is now*”.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 7 out of 10) - (Director B = 6 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 6 out of 10) - (Director B = 6 out of 10)

5.2.6 Case Study 6 – Construction Firm

The sixth SME (Case Study 6) is a civil construction firm that is owned and operated by one company director. This director is also involved with case study 5. The business provides construction services and equipment to the civil building industry on the coast. The firm employs 2 full-time administrative personnel and 2 full-time construction managers. The business also employs many part-time and casual staff members. The number of these fluctuates markedly as and when work is generated and provided. These members were not involved with this study. All four full-time members and the company director were interviewed. The questionnaire was administered to the directors and the full-time staff. Part-time and casual employees were precluded due to availability constraints.

Construct A – Gather IT Intelligence

The last IT innovation that this business considered and subsequently adopted was an off the shelf software package that was then tailored to suit the business. The software performs several calculation and take-off functions, such as resources and materials needed, and it was implemented in February 2005. Where did the information about this new software package come from? *“We were approached by X1 (local web and software development firm) in the middle of last year”*. Who collected the information about this package? *“I did”*. Who normally gathers information about new IT innovations? *“No one does it as a job”*. What sources of IT information do you normally use? *“Don’t have any regular contacts”*. Who is normally involved when you choose to gather information about a new IT innovation? *“If I find I want to know more about something that’s interesting either myself or I will get one of my admin girls to get it”*.

Construct B – Appropriate Communications Channels

How did you know that X1 was an appropriate source of IT information? *“Didn’t really consider it as a problem”* and *“They approached me at a golf day last year and have been ringing me ever since”*. *“They sponsored a couple of holes for the day and each team was asked to drop a business card in a barrel...didn’t know it was going to end up like this”*.

Construct C – Recognise Potential IT

How did you first recognise this software package as having some potential for your company? *“They pretty much sold me on the idea that they could change the system we used now into one that would do a lot more”*. Who was involved in identifying a business need for this software? *“Just me”*. How does the business normally recognise any potential new IT innovations? *“It falls on me...I’m the boss...we’re not a high user of IT in this business”*.

Construct D – Create Image of IT

How did you first perceive this software package? *“I was a little worried about the costs involved with this project...saw it as something that would make us money...create a better system that produced better results”*. Did you communicate or share this perception with your staff? *“X2 who answered the phone calls knew about it...she knew that they were pressuring me to buy it”*. Did your original perception of the software change over time? *“You bet it did...it was an absolute disaster...towards then end I just wanted to throttle the bloke who sold it to us”*.

Construct E – Compare Image with definition of Organisationally Relevant IT

How was it decided that this software package would be suitable to your business? *“I think we get to that but I was basically sold”* and *“We did have problems with the old system but they were nothing to the problems we had from this”*. How do you normally decide what IT innovations are right for the business? *“It’s not a science...just get what we need”*. Who is usually involved in evaluating new IT? *“Me mostly but I have bought stuff in the past that other people wanted”*. What do you mean other people wanted? *“My construction manager wanted one of those new mobile laptop computers so I asked him to find out how much it cost and I paid for it”*. Was cost the only thing that worried you? *“Yes, the thing cost \$4500...that’s a lot of money...I don’t think he is working harder either, it’s more of a bragging tool on site”*. What do you mean by bragging tool? *“He’s a bit of a show-off with it out in the field...I don’t think he really does much with it...tries to look important”*.

Construct F – Definition of Organisationally Relevant IT

Does your business have any policy or guidelines that inform your staff of what IT innovations are relevant to this business? “No”.

Construct G – Evaluate Potential of IT

Who evaluated the business potential or function that this software package would do? “X from XI spoke to the girls a few times when he came in and they seemed to think that it would make life easier for me and them...me and the office girls really”. How did you and the office staff evaluate its potential? “It was going to replace the old system...it was meant to improve our take-off accuracy...I suppose we did think it was pretty good for while”. Who normally evaluates new IT innovations? “Me”.

Construct H – Criteria Refinement

Does the business have any guidelines as to how it recognises or perceives new IT innovations? “No, not a guideline”.

Construct I – Criteria Refinement

No identifiable activities were discovered.

Part C - Reflections

In hindsight has the introduction of this software package provided the benefits that you thought it would? “Yes, I suppose it does...but there has been lots of drama along the way”. Have there been any other problems? “Yes” and “There were a lot of promises made that they never delivered on”. What do you mean by that? “The girls tell me that the downstairs computer does not want to talk to the upstairs computer so they have to save the data they need downstairs...or print it up and then bring it upstairs to put into this one”. Is there anything that you would do differently if you had to repeat this process? “No more golf days...only kidding...never use that mob again...I see that they have moved office don’t know where they have gone to” and “I would get someone in that really knew what they were doing...a professional...can you help?”.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director = 7 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director = 6 out of 10)

5.2.7 Case Study 7 – Construction Firm

The seventh SME (Case Study 7) is a general house building firm. The business designs and builds residential properties only. It is owned by two directors, who are husband and wife. The husband operates the business with his wife performing a supportive role only. The firm employs 3 full-time administrative personnel, 1 full-time construction manager and 3 full-time tradesmen (1 carpenter, 1 electrician and 1 plumber); the three tradesmen were not involved due to management's request. The business also employs many casual tradesman and apprentices on an as needed basis. These casuals were not included in the case study due to availability constraints. All full-time members and only one director were interviewed. One director was not interviewed because she felt that she was not in a position to offer valuable commentary. The business has been successfully operating on the coast for over twenty years.

Construct A – Gather IT Intelligence

The last IT innovation considered and subsequently adopted within this business was an off the shelf accounting software package during October, 2004. Where did the information about this new accounting software come from? *“My wife (the other director) was complaining about the old spreadsheet package we use to do our accounts so she started this”*. Do you know where she got the information about it from? *“I do, we both watched the same show...it came from them”*. What show are you referring to? *“The small business show on Sunday mornings”* (Channel 9 airs a weekly show that specialises in SME issues, events, ideas and general business management). *“When we ordered it the*

box it came in had heaps of information about what it does and how to use it". Has this business show ever given you any other ideas about new IT innovations? "We both like to watch it...I record it just in case I miss it...sometimes it has good stories that we can understand...I suppose some of things we have seen we used". Can you give me an example? "I can't remember any IT things but it has helped us with a lot of things". How does the business normally gather information about new IT? "We usually just get it from who ever are selling it". Where do you get your IT information from? "Don't have any businesses giving that to us...all over the place". Who normally gathers the information you need about new IT? "Usually me or my wife unless one of the others suggests something". Has any other staff member given you information about a new IT? "Don't remember...I'd say that it has happened".

Construct B – Appropriate Communications Channels

These sources of IT information that use you how did you know that they were right for your business? *"Never really thought about it like that...don't know". Do you trust the information you gathered from the business show? "If it's on TV you have to believe its right...yeah sometimes...they try to sell products...some of the sponsors of the show push their products...we only use what we want".*

Construct C – Recognise Potential IT

How did you first recognise that this software package had potential? *"I know some other people that use it...I try to do as I'm told...It's been around for ages". What do you mean by doing as you're told? "Have you ever been married...she helps me a lot so when I think I can help I try to make her happy". You said you knew others that use XXX did that help you to recognise that this had potential for your business? "No...Yes...I try not to re-invent the wheel...I suppose when you know that your mates are using it does help...yes". What do you mean by re-invent the wheel? "We're not exactly pace setters here...we get together with other builders all the time...know what they are doing...unless it's a secret".*

Construct D – Create Image of IT

How was this accounting software first perceived? *“It suited what we needed...Bill Gates owns the company... he knows what to do...it’s just a computer program”*. Did this perception change over time? *“No”*. How does the business normally recognise the potential of new IT innovations? *“In the press media...we also get a lot of stuff from the Housing Industry Association (HIA) and the Master Builders sends us things too”*. These are peak industry bodies for the construction industry. How do these help you recognise any potential IT? *“It’s about the construction industry...several stories in each magazine that talks about new technology all the time”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that this software would be suitable for the business? *“It did all the things that the old program used to do...had other things that made life a bit better”*. Who was involved in this activity? *“Just the two of us”*. How does the business normally decide if a new IT innovation is suitable to the business? *“We don’t really use a lot of IT...if anyone does it I say it was me”*.

Construct F – Definition of Organisationally Relevant IT

Do you have any policy or guidelines that outline what types of IT are relevant to your business? *“No, not really”*.

Construct G – Evaluate Potential of IT

Who determined how this new package would be used? *“It’s something we have to do for our accountant...told him what was going on and he said it was a good idea”*. Did your accountant make any suggestions? *“He did chuck a wobbly at first but then he came into the office and he thinks it’s O.K”*. What do you mean by chuck a wobbly? *“He thought we were trying to replace him...told us that he couldn’t accept what came out of the program unless we changed a few things”*. Changed what things? *“He needed the figures printed out because he didn’t want us to send him things a disk”*. Do you know why he couldn’t accept your information on a disk? *“He said it was because of viruses or something like that”*. Who normally evaluates new IT? *“It’s not anyone’s job...don’t really think we do that?”*

Constructs H and I – Criteria Refinement

Questions pertaining to these two activities revealed little. This could be due to them not being performed at any recognisable level within this business.

Part C - Reflections

In hindsight has the introduction of this accounting software package provided the benefits that you thought it would? *“Yes, apart from XXX (Accountant) problems I mentioned earlier”*. Have there been any other problems? *“No”*. Is there anything that you would do differently if you had to repeat this whole process? *“No”*.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director = 6 out of 10)
2. Overall, how do you think the business manages its information about new IT innovations? (Director = 5 out of 10)

5.2.8 Case Study 8 – Real Estate Firm

The eighth and final SME (Case Study 8) is a real estate agency. It is owned and operated by three company directors. Two are married to each other whilst the third is the eldest son of these two directors. The business is part of a national franchise and it specialises in both residential and commercial properties in their immediate area. The enterprise employs 2 full-time administrative personnel and 5 full-time sales staff. The business also employs several casuals to perform a range of duties such as maintenance of properties and the construction and placement of advertisement signs on properties offered for sale by the firm. These casuals were not interviewed. All full-time staff members were interviewed, with the exception of two members of the sales team who were a married couple away on extended leave overseas.

Construct A – Gather IT Intelligence

The last IT innovation that this business considered and subsequently adopted were two Sony DV video cameras during November 2004. Where did the information about these new cameras come from? *“XXX went into Myers and he picked a catalogue...they were in there”*. Who normally gathers IT intelligence for your business? *“Nobody in particular...depends on what is happening”*. What do you mean by depends on what is happening? *“As each new idea pops up someone gathers the information that we need to make a decision”*. Were you aware of any other sources of information about these cameras? *“I’d have to say yes...always seeing ads on TV and in the papers”*. Did you gather any additional information from any of these sources? *“No, but we were aware of it”*. Where do you normally gather information about new IT innovations? *“Lots of places...bombarded with all sorts of marketing campaigns”*.

Construct B – Appropriate Communications Channels

Did you think that Myers catalogue was an appropriate source of IT innovation information? *“For this purchase yes”* and *“I think so”* and *“They have an established presence and Sony is a reputable brand so I would agree”*. What channels of IT intelligence do you find are appropriate for the business? *“The intelligence that we use has always been reliable”* and *“I’d have to say that we only use reliable sources...don’t rely on just anyone or any particular company”*.

Construct C – Recognise Potential IT

How did you first recognise the potential of these new cameras? *“XXX in sales suggested that we purchase company video cameras so that they could film properties and send prospective clients a copy”* and *“The sales team and the three of us recognised the potential these cameras had”*. Who is normally involved in recognising the potential of any new IT innovation? *“Nobody”* and *“As the owners we try to keep an eye on what’s happening out there...anything interesting or worthwhile we can have a look at it”*. *“I have told XXX (administration staff member) to find out certain things...make phone calls and the like”*.

Construct D – Create Image of IT

How did you first perceive these cameras? *“As cameras that would help make things more professional and it was a thing that we needed”*. *“Always looking for ways to improve how we conduct ourselves”*. Did your perception of these cameras change over time? *“I suppose we came to appreciate how many different types of cameras there are”*, *“No”* and *“I didn’t realise how advanced some of these new toys are...amazing and simple technology...in the old days we couldn’t do this without getting someone in to help us or send a home made video which was usually the only one we had”*. How was your perception of these cameras conveyed to your staff? *“They knew more about them than I did”* and *“We discussed them with XXX (salesman who originated the request) and at our Monday meeting”* and *“There was quite a bit of excitement and expectation”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that these cameras would be suitable to your business? *“I know of other real estate firms that use cameras like these”* and *“we recognised their potential”* and *“It wasn’t something that we thought would be a problem if they used them for work only”*. What do you mean use them for work only? *“Like most people things get taken home and well used for other purposes”*. Was that a concern for you? *“We didn’t want anyone making certain home movies...we use a TV in the boardroom to review footage each Monday...saves time on stock runs...didn’t want embarrassing footage...yes it was a consideration but not a big one”*. How do you normally decide that a new IT innovation is right for the business? *“XX (the eldest son and director) has his masters degree so he is in charge of the complex issues and the business management”* and *“It would be judged as each new IT came into focus”* and *“we don’t spend too much time chasing IT...it’s everywhere”*.

Construct F – Definition of Organisationally Relevant IT

How did you determine if these cameras were relevant to the business? *“Others were using them and I know that XX (another real estate agency) uses his with a balloon”*. What do you mean with a balloon? *“The camera is sent up with a balloon so it can take aerial shots”*. Can your camera do this if you had a balloon? *“No”* and *“No, I don’t think*

so his, is a special camera”. What do you mean by special? *“It rotates around in a circle and he controls it from the car”*. Do you think that this type of camera would be better for your business? *“Yeah for sure, but how much did he spend...we only spent \$2500”*. Who normally determines that a new IT innovation is relevant to the business? *“We do at some level”* and *“XX (the son) that’s your role isn’t it”*.

Construct G – Evaluate Potential of IT

Who evaluated how these cameras would be used in the business? *“When they arrived we spent the morning going over the information that was provided...we all discussed how and under what circumstances they should be used”* and *“Made sure that whoever booked them out that they use them appropriately...any misuse would result in punishment...scared them a little”*. Who normally evaluates how new IT is used? *“XX (the son) he usually does that”* and *“We generally like to share ideas and concepts...discuss things with the staff and amongst ourselves”*.

Construct H – Criteria Refinement

Does the business have any policy or guidelines to how it recognises or perceives new IT innovations? *“Nothing that formal”* and *“No”*.

Construct I – Criteria Refinement

Does the business have any policy or guidelines to what new IT is relevant to the business? *“Again, nothing that would be in writing”* and *“No”*.

Part C - Reflections

In hindsight, has the introduction of these new cameras provided the benefits that you thought it would? *“Yes”* and *“I’d agree”* and *“They don’t go out as much as they used to...novelty has worn off”*. What do you mean when you say the novelty has worn off? *“You couldn’t get either of them for weeks...staff had them booked out constantly...now they only get used when a potential client wants footage of a property”*. Do you think this is a good thing? *“Doesn’t worry me”* and *“We made several sales interstate that we attributed to these cameras...paid for themselves already”*. Have there been any other

problems? “No” and “Nothing I can think of...yes there is they don’t go well with balloons”. Is there anything that you would do differently if you had to repeat this whole process? “I would, I would have liked one of the new cameras that burns directly onto DVD”. Why is that? “We have to connect cables to the cameras and then store the footage on the PC and then we have to create a file for each property...with direct recording we could have by-passed all that nonsense” and “I would say that we only needed the one...perhaps if we rented a few at the start and bought just the one”.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 7 out of 10) - (Director B = 7 out 10) - (Director C = 6 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 7 out of 10) - (Director B = 7 out of 10) - (Director C = 6 out of 10)

Because this research conducts the same inquiry twice (Q1 & Q2) using the same questionnaire and the same interview techniques the findings generated from this first inquiry are combined with the results from the second inquiry in section 5.5. This includes the content of the cross-case comparison tables presented in the following section.

5.2.9 Cross Case Comparison (Q1)

Having first presented the findings from the individual case studies the section now presents a summarised description of the cross-case comparison results. The information is presented in summarised tables 5.2 and 5.3. A more detailed cross-case comparison is conducted in section 5.5 which highlights the situation before and after the workshop intervention.

| Case | Innovation | Info Sources used | Other Sources available | Used | Who recognised Potential |
|------|----------------------------|---------------------|--------------------------------|----------|--------------------------|
| 1 | Office PCs | Friend | None | No | M.D. |
| 2 | Electronic Scanning System | IT vendor | Newsletters Directors son | No No | M.D. M.D. |
| 3 | Mobile Phones | Sales Rep | Vendor Brochures | No | M.D. |
| 4 | Web-based Cameras | Director | IT magazines Internet | Yes | M.D. |
| 5 | Photocopy Machine | Vendor Brochures | Business Supplies Firm | No | M.D. |
| 6 | Software Program | Local Software Firm | None | No | M.D. |
| 7 | Accounting Software | TV business Show | Several IT vendors & suppliers | No | M.D. |
| 8 | Sony DV Video Camera | Myers Catalogue | TV Newspapers Marketing Firm | No | M.D. |

TABLE 5.2 CROSS-CASE COMPARISONS PART A

| Case Study | Construct D | Who normally involved | Existing Policy | Construct G | How Performed | Construct I | Construct H |
|------------|-------------|-----------------------|-----------------|-------------|-------------------|-------------|-------------|
| 1 | M.D. | M.D. | No | M.D. | No Formal Process | No | No |
| 2 | M.D. | M.D. | No | M.D. | No Formal Process | No | No |
| 3 | M.D. | M.D. | No | M.D. | No Formal Process | No | No |
| 4 | M.D. | M.D. | No | M.D. | No Formal Process | Limited | Limited |
| 5 | M.D. | M.D. | No | M.D. | No Formal Process | No | No |
| 6 | M.D. | M.D. | No | M.D. | No Formal Process | No | No |
| 7 | M.D. | M.D. | No | M.D. | No Formal Process | No | No |
| 8 | M.D. | M.D. | No | M.D. | No Formal Process | No | No |

TABLE 5.3 CROSS-CASE COMPARISON PART B

A review of these two tables indicates the situation across all eight case studies before the workshop intervention discussed in the next section. The content of these two tables are discussed along with the outcomes from the second cross-case comparison activity and these discussions are presented in section 5.5.

5.3 THE DEVELOPMENTAL WORKSHOP INTERVENTION

Having finalised the first field-based inquiry (Q1), this section discusses the second stage of the intervention processes namely the AR workshops. Only the members of group A (cases 1-4) attended these developmental workshops. The purpose of this section is to outline and discuss the developmental workshop process. The primary purpose of these developmental workshops was not to generate more findings or insights; it was instead to introduce practical change that gave those SMEs that attended the workshops the opportunity to improve how they make sense of new IT innovations and how they manage their IT innovation information environment in practice. The purpose of these workshops was embedded in the first construct of the second conceptual model to reflect this purposeful intent.

All of these workshops were conducted within the SME business setting. Each workshop was operated within the trading offices of those SMEs in group A. The time and day of each workshop varied across each case. The allocation of time was an aspect that was negotiated by the researcher with the participating SMEs. Ultimately, the time and days chosen for these workshops were those that best suited the business and the researcher. All of the workshop sessions for cases 2, 3, and 4 were conducted during normal trading hours. The workshops for Case study 1 were all conducted outside of normal trading hours on Saturday afternoons. Each workshop was run to suit each individual business. The following table (5.4) indicates the number of participants and the number of workshops attended by those SMEs that participated.

| Case Study | Participants | Number of Workshops Attended |
|-------------------|--|-------------------------------------|
| 1 | 2 Directors & 1 Admin Staff | 2 X 2 hour sessions |
| 2 | 2 Directors | 1 X 2 hour sessions |
| 3 | 2 Directors | 2 X 2 hour sessions |
| 4 | 1 Director & 2 Dentists | 2 X 2 hour sessions |

TABLE 5.4. GROUP A WORKSHOP PARTICIPATION & SESSION DETAILS

The researcher originally anticipated that all staff members should attend these workshops and that each would require approximately three 2 hour sessions. However, after consultation with the business owners and after the researcher better understood each situation it was deemed appropriate that the business owners and management attend these sessions. This decision is supported by the conceptual model (figure 5.2), in particular the references made to the monitoring and management activities. Of note here is that case study 2 only required one 2 hour session. This could be attributed to their ability to understand the Specifically Relevant Information (SRI) and the activities conducted in the workshop; however, this aspect was not investigated or challenged by the researcher. The term SRI relates to the information that is both relevant and specific to each of the constructs represented in the model of inquiry and each of the participating case studies.

The findings and insights generated from the first inquiry (Q1) are used and presented in the workshops as SRI. Examples of SRI for the first construct (A) include the situational findings and insights that were obtained during the first inquiry. These informative elements were then combined with the theory reviewed by the researcher in relation to the first construct. The theory in this instance related to the theories of information

seeking and use and the gathering of IT intelligence from appropriate communication channels. The formula for the SRI for the remaining constructs was a repeat of this process. The SRI can be seen as comprising the contextual findings and insights from each separate SME and the theory reviewed by the researcher that was deemed relevant to addressing the area of concern (A).

The SRI forms the basis of the information that was introduced by the researcher into the SME situation during these developmental workshops. The second model of AR workshop intervention, as shown in figure 5.2, mentions this SRI aspect in several constructs. The SRI in this instance is a blend of the outputs generated via the implementation of the field questionnaire (Q1) and the researcher's understanding. Having first analysed each SME situation in the first inquiry the focus then turns to using this output as SRI that enables the researcher to generate practical change within group A.

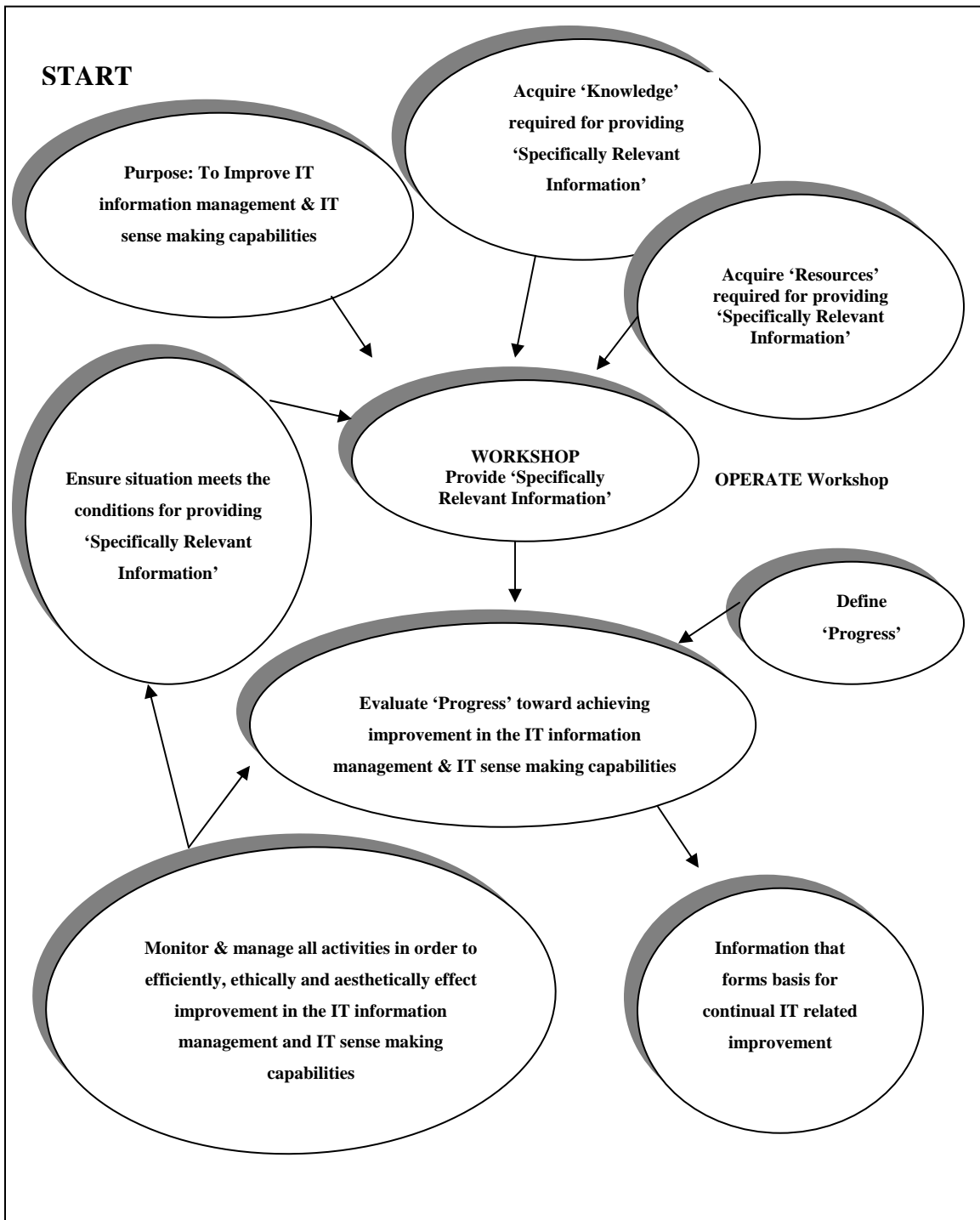


FIGURE 5.2 A MODEL OF 'ACTION RESEARCH WORKSHOP INTERVENTION'

Each workshop was purposefully designed to utilise these SRI inputs. The SRI inputs include the theoretical understanding of the researcher, which was gathered during the literature review process, and the situational understanding of each individual SME case study that emerged after the first inquiry. The researcher's theoretical understanding remained somewhat constant across all case studies; however, the SRI presented in the workshops was different for each SME because the results gathered from the first inquiry were different for each SME. This means that the SRI supplied in the workshop was unique to each case study.

The use of this SRI also gave the researcher an opportunity to provide others with a detailed description of the information-related activities performed by the researcher within these workshops. This was introduced to limit any possible issues surrounding the researcher conducting consultancy activities. In other words, the researcher sought to use the output from each case study situation and use this as the basis for generating practical change that then provided demonstrable improvement. This is in contrast to the use of an expert that simply instructs clients how to improve their IT-related activities. The SRI provided to each SME was slightly different because each SME had its own unique responses in the first inquiry and differing situational requirements and characteristics.

Although the model shown in figure 5.2 has a start and finish construct, these were only introduced to indicate the nature of the workshop process. It is important to understand that the participants were not given a copy of this model. The model served no real use to their situation; however, if the researcher sought to conduct either an ethnographic or extended version of the workshop process then its usefulness would increase. That is to say that this model also has several dynamic cycles of use. The first sees the model used as a tool by the researcher to support the workshop intervention process, whilst in the second it is used by either the business management or an academic supervisor to judge the performance of the researcher in regard to achieving the goal of the system. The third is the dynamic and continual process of generating continuous change. In other words, the model could be implemented to such an extent that its life continues whilst its

purpose remains current. The opportunity for continuous use and improvement is an aspect that is further discussed in the final chapter.

Overall, the developmental workshops proved to be the most difficult and interesting of the three interventions. Although discussed in detail in the next chapter, the main learning that occurred for the researcher was that it was not as easy to improve their situation as first anticipated. All of the participants and the researcher enjoyed the experience. The participants had several opportunities to further understand how they made sense of IT innovations, through the constructs represented in the first model. They also passed several comments that reflected this activity as being worthwhile and useful. This aspect is discussed in detail in the demonstrable improvement section in section 5.7.

The stated purpose of the workshop interventions was to introduce practical change for those SMEs in group A. The focus of this research now turns to the identification of demonstrable improvement. The identification process is primarily supported by the second Inquiry (Q2) because it examined the situation after the workshop interventions. The main outputs for the participants from this second stage of intervention process were an increased understanding of their own unique situation and an awareness of the theory in relation to the constructs portrayed in the first model.

5.4 FINDINGS FROM SECOND INQUIRY - Q2

The purpose of this section is to present the findings generated from the second and final field-based inquiry (Q2). The first stage of this process provided both findings and insights that emerged from analysing the data gathered during the first field-based inquiry (Q1). The findings and insights generated from this third stage of researcher intervention are again supplied via the implementation of the questionnaire in a series of interviews during the second field-based inquiry (Q2). Similar to the first inquiry, all eight SME case study situations (groups A & B) are discussed individually and in line with the constructs represented in the first conceptual model used to support the inquiry process. They are also presented as separate case study situations labelled 1 through 8. The individual case study findings and insights that were generated by both Q1 and Q2 are then used to support a cross-case analysis of all case study situations before and after the workshop intervention process. The combined results of this cross-case analysis process are presented in section 5.5. Similar to the format of the first stage, this section also presents the interviewees' text-based responses that emerged from the second round of interviews. These are presented again as informative text-based responses that have meaning to these discussions and the inquiry.

This second inquiry (Q2) took place approximately three months after the first round of inquiry (Q1) and approximately two months after the AR developmental workshop process was completed. This time lag was thought to be sufficient in duration to allow the developmental workshop to take effect and for the interviewees to forget their original responses in the first stage of questioning. The main reason for the time delay being introduced was to allow for the identification of improvements. A short timeframe would not have allowed the changes in activities to occur and a longer timeframe would have diminished the effect of the intervention through staff changes and the memories of IT innovations fading. There is no scientific basis for the amount of time allowed. This aspect needs further investigation; however, given the circumstances surrounding this research situation it did appear to be sufficient since it allowed for the identification of

demonstrable improvement. This demonstrable improvement aspect is discussed in the next chapter.

The format of the information presented here is the same as the format used in the first inquiry (section 5.2).

5.4.1 Case Study 1 – Construction Firm

Construct A – Gather IT Intelligence

The last IT innovation that was considered by this business was a software package which was designed to support the management of their Web based information (a Content Management System or CMS). The consideration process then lead to the package being implemented into the business during June, 2005. Where did the information about this CMS software come from? *“We contacted X1 (local IT firm) to help...came from them”* and *“After talking with X1 we also contacted X2 (a friend with IT experience) and he thought it was a good idea”*. Was X2 able to give you any additional information about this CMS software? *“He did say he was aware of other content management programs but that’s about it”* and *“Not that helpful really”*. Who was involved in gathering this information? *“Bit of a team effort with this one”* and *“Both of us and X3 and X4 (both are admin staff) did help”*. Were you aware of any additional information channels that might have been useful? *“Yes...got more advice than we needed”* and *“Could have done more but we were confident this would do the job”*. What channels of IT information do you use? *“We’ve made a few changes”* and *“The Internet, magazines and we now use X1 (local IT firm)”*.

Construct B – Appropriate Communications Channels

How did you recognise that these channels of IT information were appropriate? *“More information the better...we were recommended to use X1”* and *“Found out things before we decided to buy it”*. What sort of things did you find out? *“Asked a lot of questions...did a lot of research”* and *“This program will give us a real advantage with our clients...big investment...just needed to know more I guess”*.

Construct C – Recognise Potential IT

How did you first recognise the potential of this CMS program? *“We needed to start using the Internet more...government work only available on the Internet”* and *“After we spoke to XI we realised that we needed this software”*.

Construct D – Create Image of IT

How did you first perceive this CMS? *“I was excited about it...had a web site for a couple of years...wasn’t really doing much”* and *“We can do more business using this program...I was excited to”*. Did your image of this new program change over time? *“Yes”* and *“Definitely changed how I see IT”*. What do you mean changed how you see IT? *“I wouldn’t say that I’m a geek but the potential for the business to grow has lit a fire in my belly”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How did you know this CMS was suitable for the business? *“Changes to the government tendering meant we had to change”* and *“We did our research and didn’t have any problems”*. Who was involved? *“Us”* and *“We both were...important change...big jump...didn’t want to stuff this one”*. What do you mean by stuff this one? *“This CMS cost a few bucks and we didn’t want any surprises down the track”*. How do you normally decide what IT innovations are right for your business? *“Well that depends on what it is”* and *“I think we do more homework when it’s more important”*. Who is involved? *“We both decided that we should ask around more...anyone that we need to involve”*.

Construct F – Definition of Organisationally Relevant IT

How did you know this CMS was relevant to the business? *“The more I found out about it the more we realised that it was what we needed to move up”*. What do you mean by move up? *“Business has slowed on the coast...needed to look at new ways...government work only on Internet”*. Do you have any policy or guidelines that inform staff members what IT innovations are relevant to the business? *“Yep, got one of those”* and *“It wasn’t easy but we came up with a few ideas...had a chat with our staff”*. Do you have a copy that I can read? *“It’s not something we printed up...just let everyone know we changed”*.

How did you let them know? *“After your last visit we did talk to everyone and ask them for ideas and stuff”* and *“Yeah, we had a good chat”*. Has anyone suggested any new IT? *“One of the girls asked us for a new phone (a mobile phone)”*. Did you get it? *“No”* and *“I did ask her a couple of questions...didn’t do this one”*. Can I ask why? *“Dollars are hard to come by...she went and got a new phone the day after she asked me anyway”*.

Construct G – Evaluate Potential of IT

Who evaluated how this CMS system would be used? *“XI showed us what it could do...impressed...didn’t know this kind of stuff was around”* and *“It was another team effort”*. What do you mean by team effort? *“It wasn’t just me and XI we spoke to other people this time”*.

Construct H – Criteria Refinement

Does the business have any policy or guidelines as to how it recognises new IT? *“Nothing in writing...just let them know its O.K. to make suggestions”* and *“Were trying a little harder”*. Did you reflect on how you recognised this CMS program? *“Did that too...sat down and had a chat”* and *“I reckon we were pretty good this time...AAA plus student material”*.

Construct I – Criteria Refinement

Does the business reflect or refine on the guidelines you spoke to your staff about what IT is relevant to the business? *“That’s something we didn’t do”* and *“Had to can that one”*. What do you mean by can that one? *“Couldn’t work it out...haven’t spoken about it since we first did”* and *“I told you we should have written it down somewhere”*.

Part C – Reflective Responses

In hindsight, has the CMS software provided the benefits that you thought it would? *“I’d have to say yes”* and *“Yes, I’m pretty happy about this one”*. Have you had any problems with it? *“Just the payments”* and *“I don’t have to use it but I haven’t heard any complaints”*. What did you mean by payments? *“Its not cheap that’s all...guy comes in each fortnight (from vendor of CMS) for the first few months to see if we have any problems that sort of thing isn’t cheap”*.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 7 out of 10) - (Director B = 7 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 8 out of 10) - (Director B = 7 out of 10)

5.4.2 Case Study 2 – Hardware Store

Construct A – Gather IT Intelligence

The last IT innovation considered by this business was the replacement of the existing cash registers with new touch screen computerised cash register system. The business did not adopt this IT innovation. Where did the information about these new touch screen registers come from? *“The same people who sold us the stock identification system”*. Where you aware of any other information sources about these registers? *“We contacted my son who went found a site on the Internet and we asked him to check it out”*. Can I ask what he found? *“He printed a lot of pages that he found...we read them and decided that they were too costly”*. What channels of IT intelligence do you have access to? *“Since your last visit we now subscribe to several magazines and newsletters”* and *“Our son hasn’t paid any board since he moved in with us so now we get him to find information”*. Who gathers your IT intelligence? *“Our son does that for us...he was happy to do it for us”*.

Construct B – Appropriate Communication Channels

What sources of IT intelligence do you consider as appropriate for this business? *“We no longer rely on any one source...tend to find out as much as we can”*. Why did you use your son as an appropriate source of IT intelligence? *“Without stating the obvious he’s someone who we can rely on”* and *“I couldn’t see him giving us the wrong information”*.

Construct C – Recognise Potential IT

How did you first recognise the potential that these registers could offer your business? “XX from XXX (IT firm) gave us a demonstration of the registers...they looked like what we needed” and “We have to try and keep competitive with some things and I did think that these touch screens were useful because we do get a little dirty here”. How does the business normally identify a need for new IT? “We’re lucky that we don’t really need to evaluate IT all the time” and “I’m trying to work out a way to do this...given this to my son”.

Construct D – Create Image of IT

How did you first perceive these new registers? “They complemented the system we purchased from XXX (IT firm)...originally were quite impressed” and “Yes, they did look impressive”. Did your perception change over time? “Yes” and “Yes it did really, after we found out about them we decided to put it off for a while”. What do you mean by put it off for a while? “They are very expensive and I really don’t think we have a business need for them...sold on the idea of getting them at first...later we realised that we weren’t ready to do it”. Did you communicate these perceptions to your staff? “I did speak to XX (staff member) about it”. Did she say anything interesting to you? “She thought they were a good idea but she did ask why we needed them...I remember her saying that they looked like the ones in McDonalds”.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How did you work out that they might not be relevant your business? “Cost for me” and “After a while we sort of cooled off on the whole idea” and “I could see how they would improve things but we mainly decided they were a little too much”. Do you think that you will reconsider them in the future? “Yeah, I see the price of IT dropping all the time...told the young fellow that when they drop in price to come back and see us” and “If we really need them I suppose so”. Apart from the price, how did you determine that they were relevant for the business? “They suit the stock scanning system we purchased last time you were here...XX did think they would do other things that I thought might help us”.

Construct F – Definition of Organisationally Relevant IT

Does the business have any policy or guidelines that inform the staff about what IT is relevant for this business? *“We asked our son to do up something on his computer...didn’t get around to it”* and *“Sort of guidelines”*. What do you mean by sort of? *“After our class with you we did talk to everyone about IT that sort of thing”*.

Construct G – Evaluate Potential of IT

Who evaluated how these registers would be used? *“A joint effort with my son and XX from XXX (IT firm)”* and *“XX was here on and off for a while...kinda felt guilty that we didn’t buy them”*. Was any of your staff involved? *“No not really”* and *“I do recall we spoke about involving the staff but nobody really new anything about them...no we didn’t”*. How were the registers evaluated? *“Cost was the main issue in the end”* and *“I’d agree the money we needed to spend just didn’t warrant it”* and *“We did understand how they would improve things...complement the scanning system software because it was made by the same people”*.

Construct H – Criteria Refinement

Does the business have any guidelines or policy that informs other staff as to how it recognises new IT innovation? *“Blame XX (the son) for that one too...we haven’t failed have we?”* and *“That was hard even for our son”*.

Construct I – Criteria Refinement

Does the business have any guidelines or policy that informs other staff what new IT innovations are relevant to your business? *“Again, we didn’t paint it on the wall but we did talk about it”* and *“After we spoke to everyone I felt that they were prepared to chip in with ideas if they had any”*.

Part C – Reflective Responses

In hindsight, do you think that it was a good idea not to get these touch screen registers? *“I’d say yes”* and *“Yes, I think we made a good business decision”*. If you could do all this again what would you do different? *“Nothing comes to mind”* and *“Yes, I agree with you”*.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 6 out of 10) - (Director B = 7 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 6 out of 10) - (Director B 6 out of 10)

The non-adoption of the IT innovation considered by this business may have occurred because of their involvement in the developmental workshop process which could have improved their IT sense making and IT innovation information management processes. Alternatively, it may have occurred because of purely financial aspects. Either way, this business has recognised the benefits of simply considering an IT innovation. This was evidenced through the procedures and processes that changed by comparison to their first IT sense making and consideration process discussed in the first stage of data collection and analysis. In short, the characteristics and dynamics of this process have changed; this may be attributed to the developmental workshop process which they attended.

5.4.3 Case Study 3 – Real Estate Firm

Construct A – Gather IT Intelligence

The last IT innovation that this business considered and subsequently adopted was the purchase of two Toshiba satellite laptop computers. Where did the information about these two laptops come from? *“I gathered the information from a salesperson at Harvey Normans (National Retailer of IT goods) when I was there”*. Who else was involved in gathering information about these laptops? *“The sales manager”*. Why was he involved? *“One of the laptops was for him and the other was for XX (one of the directors). Were you aware of any other sources of information about these laptops? “I collected just about every pamphlet they had in the store and we both sat down and read them...yes”*. Did you access any other information source apart from Harvey Normans? *“No, I did think at the time that we had enough”*. Were you aware of any other source that explained different

laptops? *“I know you said to check the Internet but, no I didn’t”*. What sources of IT intelligence does the business have? *“One of the girls found a few sites on the Internet that she saved as favourites so we can use these”* and *“I also got the admin staff to buy a few magazines from XI”* (local newspaper and stationary shop). Have you found anything interesting in these magazines or the web sites she saved for you? *“Yes mate, were looking at a couple of ideas”* and *“Yes”*.

Construct B – Appropriate Communications Channels

Why did you think that Harvey Norman was an appropriate source of IT intelligence? *“I know they get bonus dollars for pushing some products ahead of others...after I got the pamphlets I was happy that the information was appropriate”*. Can I ask why you thought that? *“These pamphlets were provided by each of the manufacturers I guess...we could compare each of them”*. What do you mean by compare each of them? *“They had all the specs and what they could do”*. What sources of information do you consider to be appropriate for this business? *“The ones we’ve got now”* and *“we know we have more now than before you arrived”*.

Construct C – Recognise potential IT

How did you first recognise that these laptops had potential for your business? *“I know its sounds like a spur of the moment thing but we thought they suited us”*. What do you mean by suited us? *“You know they look flash and we do use them...I know I use mine”*. Who was involved in identifying a business need for these laptops? *“Both of us”* and *“XX (a director) and the salesman at Harvey Norman showed us how we could you them”*.

Construct D – Create Image of IT

How did you first perceive these laptops? *“Hey, they look great and they work”* and *“Professional is the word he’s looking for”*. Did this perception change over time? *“Yes, the more I found out about them the more we wanted one”*. Did you communicate these perceptions to other staff? *“No not really”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that these laptops were suitable to your business? *“We thought about them for about two weeks before we bought them”*. Can I ask what functions or how you use them? *“I use mine for keeping documents and sending emails that sort of thing...the sales manager needs to have quick access to information all the time...I think he uses it for emails too”*.

Construct F – Definition of Organisationally Relevant IT

Do you have any policy or guidelines that inform staff as to what IT innovations are appropriate to your business? *“Yes”* and *“We do now”*. Could I have a look? *“We can print you a copy or email you a copy which do you want”*. Who was involved in creating this? *“We all got together at our sales meeting...took a while...had a bit of fun...XX (admin staff) took notes and voila, here it is”*.

Construct G – Evaluate Potential of IT

Who evaluated or worked out how these laptops would be used? *“Me and XXX (sales manager) sat down together”*. What sort of things did you talk about? *“How they could make us money and how they could be used...the sales manager already had a laptop so he came up with a few ideas”*. Can I ask for an example? *“He just showed me what he did and I copied him for a while...until I knew what else it did”*. How does the business normally evaluate new IT innovations? *“Still on a case by case basis”* and *“Whatever we need really...it’s all different”*.

Construct H – Criteria Refinement

Did you have any policy or guidelines that inform staff as to recognise potential IT innovations? *“Sort of do”* and *“Yeah, we did talk about that at the meeting...didn’t we”*. Have you a copy I can read? *“No didn’t really go that far”* and *“No”*.

Construct I – Criteria Refinement

Did you have any ideas about how you can refine your guidelines about relevant IT innovations for the business? *“No haven’t got around to that”* and *“No, should we change the one we’ve got?”*.

Part C – Reflective Responses

In hindsight, have these new laptops provided the benefits that you thought it would? *“Yep, I’d say they have”* and *“Yes, I’m pretty happy with mine”*. Have you had any problems with it? *“Can you include dropping it off the roof of my car”*. Do you know if the sales manager had any problems? *“He hasn’t said anything”* and *“I don’t think he dropped his yet”*.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 7 out 10) - (Director B = 7 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 7 out of 10) - (Director B = 7 out of 10)

5.4.4 Case Study 4 – Dental Practice

Construct A – Gather IT Intelligence

The last IT innovation that was considered and subsequently adopted into this business was a Short Messaging Service (SMS) linked to the client scheduling system which is located on the administration computer system. The system sends confirmation of appointment requests to clients. Where did the information about this new SMS system come from? *“Me (the sole director)”*. Can I ask the source? *“I read about the capability of this system on-line”*. Were you aware of any other source about this system? *“There could have been but this site is very current with its discussions on technology”*. Who was involved in gathering this intelligence? *“Again, just myself”*. What sources of IT intelligence does the business have? *“Journals, magazines and the Internet”*. Who is normally involved in gathering intelligence about new IT innovations? *“It’s still me...did ask my senior staff for any worthwhile contributions”*. What do you mean by worthwhile contributions? *“The things that they find which are relevant to what they do”*.

Construct B – Appropriate Communication Channels

Why was the site you accessed deemed to be appropriate? *“I enjoy its content...IT and professional people all around the world make contributions...very reliable and unbiased opinions”*. What do you mean by unbiased opinions? *“I’d value some of these contributions over someone that walked in trying to sell such a system”*.

Construct C – Recognise Potential IT

How did you first recognise that this SMS system had potential for your business? *“I use SMS myself and when I noticed that it could be used with our patient booking system I started to explore it”*. How does the business normally recognise the potential of new IT innovations? *“I have learnt to value my own judgement in these types of situations...that’s a role I perform”*.

Construct D – Create Image of IT

How did you first perceive this new SMS system? *“I recognised the potential after thinking about it...envisaged time savings...useful to our operations”*. Did this perception change over time? *“No”*. Did the intended purpose of this innovation change over time? *“I would say yes because I’m now looking at integrating the SMS service into other areas”*. Can I ask where? *“I haven’t assessed it fully as of yet but we’re considering its use as a general method of communication within the office and with other services”*. Who is involved in this activity? *“I have asked a couple of the dentists to prepare notes on these ideas...have not received them yet...work in progress”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that this innovation would be suitable to the business? *“It was straight forward in its application...over the weekend I came in and made the necessary changes”*. Did you discuss these changes with anyone? *“I did speak to XX and XXX (admin staff who use the system) and informed them of the changes...they don’t require any new skills...system operates itself”*. Did you discuss these changes with any of your patients? *“No...not had any problems”*. Are you aware that some patients may not be able to receive SMS because they do not have mobile phone coverage? *“No I didn’t think of*

that". Are you aware that some mobile phone users do not like or prefer not to use SMS?
"No".

Construct F – Definition of Organisationally Relevant IT

How was it determined that this SMS system was relevant for this business? *"It performs a function that would improve several processes"*. Can I ask for an example? *"It saves time...girls at front desk will not need to make as many phone calls...less obtrusive to our patients"*. Does the business have any policy or guidelines that inform staff as to what IT innovations are relevant for this business? *"I do recall we discussed this in the workshop but it was decided that the status quo remain"*.

Construct G – Evaluate Potential of IT

Who evaluated how this SMS system would be used? *"I did"*. Who normally evaluates new IT innovations? *"I do...sometimes confer with my staff"*. Do you recall the last time you sought opinions from others about a new IT innovation? *"Last week I had several discussions with staff concerning this system and how best to use it"*.

Construct H – Criteria Refinement

Do you reflect or refine on how you perceive new IT innovations? *"I do a lot of thinking about technology and I'm always trying to improve my abilities...yes"*.

Construct I – Criteria Refinement

Do you reflect or refine on what types of IT innovations are relevant for your business? *"That's another process that's always ongoing...consider myself lucky that I have a keen interest in IT...made a difference to my business"*.

Part C – Reflective Responses

In hindsight, has the new SMS system provided the benefits that you thought it would? *"Yes"*. Have you had any problems with it? *"No...well none that I'm aware of"*. If you had to do this all over again is there anything that you would do differently? *"I did make a note about your comments regarding mobile phone coverage...perhaps I should have included that aspect"*.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director = 8 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director = 8 out of 10)

5.4.5 Case Study 5 – Engineering Firm

Construct A – Gather IT Intelligence

The last IT innovation considered and subsequently adopted by this business was the provision of several new laptop computers. Where did the information about these new laptops come from? *“We did approach a couple of suppliers to find out what was available”* and *“I sent XXX (admin staff member) to Office Works (National Retailer stationary and IT goods) and she came back with all this”* (a number of brochures). Was anybody else involved in gathering this information? *“Yes, I rang around to find out prices and details from a couple of other suppliers”* Can you give me an example? *“Harvey Norman and Future Computers”* (a local IT retailer). Can I ask why these sources were used? *“Didn’t want to over pay...and we needed the these computers loaded with the right software”* What do you mean by right software? *“I didn’t want to pay good money on these laptops and then have to pay more for the software that we need”*. What sources of IT innovation information do you have? *“It mostly comes from our own sources”* and *“we are aware of a number of different sources for information about technology”*.

Construct B – Appropriate Communications Channels

Why did you use the sources that you did? *“They are known to us I guess”* and *“These companies have buying power because of their turnover etc”*. What sources of IT information do you normally consider to be appropriate? *“I suppose those sources that*

give us reliable information” and “I wouldn’t buy from a small business...looking for back-up service if we need it”. What do you mean by reliable information? “Stuff we can trust and stuff that we now isn’t going to let us down” and “it’s reliable because it comes from a business we know and have used in the past”.

Construct C – Recognise Potential IT

How did you first recognise the potential of these laptops? *“We needed to replace the laptops we have now with new ones” and “I’d agree, we needed to update the old ones because they are too old”.* Do the old laptops still do the things you want them to do? *“I suppose so” and “I thought that they looked a little tatty”.* What do you mean by tatty? *“Scratches, chips and a couple of the batteries needed to be replaced anyway”.* How does the business normally identify a need for new IT innovations? *“As each new idea pops up we tend to gather information to help us make a decision” and “Constantly sent information about new ideas” and “if we think it could make a difference we will look at anything really”.*

Construct D – Create Image of IT

How did you first perceive these new laptops? *“As something we needed I guess” and “They would help us to do business”.* What do you mean by help us to do business? *“Well, we use laptops in the field all the time so I guess we needed to replace them”.* Did your image of these laptops change over time? Both Directors replied *“No”* and *“No”*. Did the original purpose you had for these laptops change over time? *“No; after we decided to buy them we gave them out and used them”.*

Construct E – Compare Image with Definition of Organisationally Relevant IT

How did you decide that these laptops would be suitable for your business? *“We have used them in the past” and “just knew that we needed to replace the old ones”.* Who was involved in this? *“Me and XX (other director)” and “yeah, both of us I guess”.* Who is normally involved? *“Usually it’s us...can’t remember letting anyone else decide on buying expensive items of any kind”.*

Construct F – Definition of Organisationally Relevant IT

How was it determined that these laptops were appropriate for the business? *“After we found out how many laptops there were we decided to buy the best value ones that did the things we wanted”* and *“We didn’t spend too much time thinking about this we just did it”*. Does the business have any policy or guidelines that inform staff as to what IT innovations are appropriate? Both directors replied with *“No”* and *“Not really, no”*.

Construct G – Evaluate Potential of IT

Who evaluated or determined how these laptops would be used? *“They are used the same way they always been used”* and *“Didn’t really need to do this because we have had these ones for a few years now”* and *“The guys that use them were given new ones...had no problems with using them”*. How does the business usually evaluate new IT innovations? *“XX (director) and I usually decide how things are done around here...I guess it would be us”*. Is anybody else involved with this? *“Not really”* and *“We’re the bunnies who sign the cheques...us”*. What do you mean by not really? *“I suppose we have asked the people that are going to use it a few questions”*.

Construct H – Criteria Refinement

Does the business have any guidelines or policy regarding how it recognises or perceives new IT? *“No”* and *“No”*.

Construct I – Criteria Refinement

Does the business ever review what IT innovations are relevant to the business? *“No”*.

Part C – Reflective Responses

In hindsight, have these new laptops provided the benefits that you thought they would? *“Yes”* and *“I’m still happy...they haven’t let me down at all”*. Have you had any problems with these laptops? *“No”* and *“XXX (an engineer) dropped his off the back of the car and broke the screen...had it replaced under warranty”*. If you had to do this all over again is there anything that you would do different? *“Nothing I can think of”* and *“Probably would have liked to get a bigger discount”*.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 7 out of 10) - (Director B 7 out 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 6 out of 10) - (Director B = 7 out of 10)

5.4.6 Case Study 6 – Construction Firm

Construct A – Gather IT Intelligence

The last IT innovations considered and subsequently adopted by this business were several Bluetooth Hands Free units that were installed in company vehicles. Where did the information about these hands free units come from? *“One of my construction managers got a ticket from the police after he was caught talking on the phone...thought I would do the right thing and buy a few hands free units...I went to Office Works and spoke to a salesperson”*. Why did you use this source of information? *“It wasn’t a big purchase and they were really helpful”*. What do you mean by helpful? *“She showed me all the different options and what they cost...I do remember that I thought she was pretty honest”*. What sources of IT innovation information do you have? *“No one really, we just get the information we need from wherever”*. Who is normally involved with collecting information about new IT innovations? *“I suppose it’s me...sometimes I’ll ask one of the girls to make a few calls or to pick up some information when they’re out”*.

Construct B – Appropriate Communications Channels

What sources of information does the business normally consider to be appropriate? *“It depends on the business...wouldn’t get information from just anybody”*. Why did you consider Office Works an appropriate source of information? *“They’re pretty big...I know that they won’t disappear overnight”*.

Construct C – Recognise potential IT

How did you first recognise the potential that these new hands free units would have for the business? *“After XXX got a ticket I thought that these guys use company vehicles...as the boss I thought I should do something about it”*. Was anybody else involved? *“I did talk to XXX as I he thought it was a good idea”*. How does the business normally recognise potential new IT innovations? *“Its not something that we do...as each IT idea crops up”*.

Construct D – Create Image of IT

How were the hands free units first perceived by the business? *“As something that we should get...needed to make sure they were doing the right thing...didn’t want them to break the law in one of my cars”*. Did the perception of these units change over time? *“No not really”*. Did you communicate this perception or image to other staff members? *“Only my construction managers...the only ones with company cars”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that these units were suitable to the business? *“I spoke to the woman at Office Works and she told me that this Bluetooth technology was the latest and best for our situation”*. Who else was involved with this? *“No one”*.

Construct F – Definition of Organisationally Relevant IT

How did you know that these units were appropriate for the business? *“They’re just hands free units...did the job I wanted them to do”*. Does the business have any policy or guidelines that inform staff as to what new IT innovations are relevant to the business? *“No”*.

Construct G – Evaluate Potential of IT

How did the business evaluate how these units would be used? *“I suppose that I did...and XXX”* (construction manager). Who is normally involved with evaluating new IT innovations? *“Whoever is going to use them...I usually do it”*.

Construct H – Criteria Refinement

Does the business have any guidelines or policy regarding how it recognises or perceives new IT? “No”.

Construct I – Criteria Refinement

Does the business ever review what IT innovations are relevant to the business? “No”.

Part C – Reflective Responses

In hindsight, have these new hands free units provided the benefits that you thought they would? “Yes, we haven’t had any more tickets”. Have you had any problems with these units? “I have but the boys haven’t”. What problems have you had? “It doesn’t really want to work with my mobile sometimes”. Have you tried to find out why? “No, I think mine is older than the others”. If you had to do this all over again is there anything that you would do different? “I would have checked to see if they work with all mobiles”. Is there anything else? “No”.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director = 6 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director = 6 out of 10)

5.4.7 Case Study 7 – Construction Firm

Unfortunately this business did not consider any new IT innovations during the time between the first and second field interviews (Q1 & Q2). The ratio scales were given to the director for his response. The results are as follows:

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director = 6 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director = 6 out of 10)

5.4.8 Case Study 8 – Real Estate Firm

Construct A – Gather IT Intelligence

The last IT innovation considered and subsequently adopted by this business was the replacement of their existing web site with a new web site. Where did the information about this new web site come from? *“We were recommended to XX (local web development firm)...came from them”*. Who recommended this company? *“We all went to a conference at Twin Waters...we spoke to a few other principles...impressed by service and professional web sites...after conference it just kept coming up so we decided to get them in”*. Why did you think that these other people were an appropriate source of IT intelligence? *“I have known XXX (one other director) for years and I value his comments and experience in this industry”* and *“We know how well these others are doing”*. *“After talking with a few people I worked out that this mob helped a few other real estate companies”*. What sources of IT innovation information does the business have? *“No regular sources”* and *“We’re the ones that usually do that anyway”*. Who normally gathers IT information for the business? *“I would say that it’s usually us”* (the directors).

Construct B – Appropriate Communications Channels

Does the business have any guidelines regarding what information sources are appropriate? *“No”* and *“Not really”*. Why did you think that the sources you gathered this information were appropriate? *“Known them for years”* and *“Value their advice...their name just kept coming up in conversation”*.

Construct C – Recognise Potential IT

How did you first recognise the potential that this new web site would have? *“I spoke to a few people and I realised that their sites were doing things ours just didn’t do...they were making money from theirs”* and *“Old site was built a few years ago...haven’t made any changes to it”* and *“Always looking for new ways to make things more professional”*. Who was involved? *“We were all involved with this one...XXX came to us a couple of times...had heaps of meetings”* and *“Another team effort”*. How does the business normally recognise any new IT innovation as having potential within your business? *“As the owner of the business I am always looking out for new IT that might help us”*.

Construct D – Create Image of IT

How was the new web site first perceived by the business? *“We have kinda known for a while that our web site wasn’t making any real contribution”* and *“I did think that it was something we should have done a while ago”* and *“Needed to keep up with what others are doing in the industry”*. Did that perception or image change over time? *“No”* and *“It did for me...more I found out what it could do the more impressed I became”* and *“I’d agree, the more we came to know about what technology could do for our business I started to see this new web site as something that could really add value to our business”*. Did you communicate these perceptions to the staff? *“Yes...did discuss it at our sales meetings...team was very interested in it”* and *“You could say they were aware of what was happening”*.

Construct E – Compare Image with Definition of Organisationally Relevant IT

How was it decided that this new web site was suitable or relevant to your business? *“It was pretty easy in the end...needed to make a few changes”* and *“It was replacing the old one so there wasn’t much to consider...new site was much better than the one it replaced”*. Who was involved with deciding it was relevant to the business? *“Us”* and *“We were...sales team thought it was a great idea”*. How is it normally decided that a new IT innovation is suitable to the business? *“I’m not into control but I’d have to see that its something we do as the owner operators”* and *“Bigger decisions are discussed as*

a family...its normally the three of us...unless we notice we need some other advice". What do you mean by notice we need other advice? *"I have a good relationship with our accountant and if we need to talk to someone about what we should be doing I will ring XXX"* (their accountant).

Construct F – Definition of Organisationally Relevant IT

How did you realise this web site was appropriate? *"Wasn't much to think about...replacing the old site"* and *"After talking about it we noticed that it was something we should do"*. Who was involved in this activity? *"The three us do most of the decision making about the strategic changes we make"* and *"Us"*. Does the business have any policy or guidelines that inform other staff members what IT innovations are relevant to the business? *"No"* and *"Not that I can say"* and *"No"*.

Construct G – Evaluate Potential of IT

Who evaluated and determined how the web site would be used? *"We did ask at the sales meeting for ideas"* and *"Did have a brain storming session...come up with some interesting ideas"*. How was it evaluated? *"We kinda knew from talking to XXX (consultant from web development company) that it would do a number of things that our old site didn't"* and *"Well we did rely on the ideas that XXX mentioned...also included some of the suggestions made by sales staff"*. Could I ask what type of suggestions they made? *"A couple of them asked if we could find out if they could use the site from home...who controlled the content...what they could do with it"* and *"They were more interested in finding out what they could do with the new one"*. Who normally evaluates new IT innovations? *"I'd say that role is yours XX"* (one of the directors) and *"We normally make decisions about what IT we purchase and what IT will do for us"*.

Construct H – Criteria Refinement

Does the business have any guidelines or policy as to how it recognises or perceives new IT? *"No"* and *"No"* and *"We don't have any policy"*.

Construct I – Criteria Refinement

Does the business ever review what IT innovations are relevant to the business? “No” and “*It’s something that just happens I think*”. What do you mean by just happens? “*Well I suppose what I’m trying to say is that things are never the same and always changing...IT is always changing...more and more IT that we need to think about to keep up with our competitors*”.

Part C – Reflective Responses

In hindsight, has the new web site provided the benefits that you thought it would? “Yes” and “*It’s probably too early but I’d say yes*” and “Yes”. Have you had any problems with the site? “*It’s still being sorted but no major problems*” and “*No, nothing out of the ordinary*”. What problems have you had? “*Getting the files into the server from the old site has taken longer than we thought*”. Have you tried to find out why this is happening? “No”. If you had to do *this all over again is there anything that you would do different*? “*Probably do it sooner*” and “No”.

Ratio Scale Responses

1. Overall, how do you think the business evaluated this new IT innovation?
(Director A = 6 out of 10) - (Director B = 7 out of 10) - (Director C = 6 out of 10)
2. Overall, how do you think the business manages information about new IT innovations? (Director A = 7 out of 10) - (Director B = 6 out of 10) - (Director C = 6 out of 10)

5.4.9 Cross-Case Examination

The purpose of this section is to generate further findings and insights. Comparing and contrasting each individual SME case study situation before and after the workshop intervention achieve this. The underlying activity within this section is to analyse and compare the SME case study situations in group A with those in group B. It is performed at this stage because individual case study analysis should always precede cross-case analysis (Perry 1998; Miles & Huberman 1994; Patton 1990). Having first analysed the SME situations as individual cases, this section now conducts a more holistic case study analysis in order to establish and refine the understanding and insights about the research situation as a whole.

The findings and insights were generated through the implementation of the questionnaire during the two field-based interviews labelled Q1 and Q2 respectively. The section presents and discusses the content of several tables. These tables are formatted to match the constructs in the conceptual model of an IT Innovation Information System presented in figure 5.1. The output of this initial process is then used at the end of this section to support the cross-case analysis process. This cross-case analysis is used to further refine the findings and insights, which are used in the next chapter to address the two research questions.

Summaries of the types of IT innovations that were considered by each SME case study situation are presented in table 5.5.

| Case Study | IT innovation – Stage 1 (Q1) | IT innovation – Stage 2 (Q2) |
|------------|------------------------------|-------------------------------------|
| 1 | Office Computers | Web Content Management System (CMS) |
| 2 | Electronic Scanning System | Touch Screen Computer System |
| 3 | Mobile Phones | Satellite Laptop Computers |
| 4 | Web-based Cameras | Short Messaging Service System |
| 5 | Photocopying Machine | New Laptop Computers |
| 6 | Software Program | Bluetooth Hands Free Devices |
| 7 | Accounting Software | Nil |
| 8 | Sony DV Video Camera | Upgraded Web-site |

TABLE 5.5 IT INNOVATIONS OF EACH CASE STUDY SITUATION

Case study 7 was the only case situation that did not consider any new IT innovations during the time lag between Q1 and Q2, which was approximately 3 months.

Constructs A and B – Gather IT Intelligence and Appropriate Channels

The sources of IT intelligence that were used to help each SME make sense of these particular IT innovations during stage one (Q1) are presented in table 5.6. The table includes other sources of IT intelligence that were available to each of these adoption and consideration situations. It also indicates whether these additional sources were utilised during their IT innovation sense making process.

| Case Study | Information Source used | Other Sources of IT intelligence | Used |
|------------|-------------------------|-----------------------------------|------|
| 1* | Friend | None | No |
| 2* | IT vendor | Newsletters, Directors son | No |
| 3* | Sales Representative | Vendors Brochures | No |
| 4* | Director's own Research | IT Magazines, Internet | Yes |
| 5** | Vendor Brochure | Business Supplies Firm, Brochures | No |
| 6** | Local Software Firm | No regular sources | No |
| 7** | TV Business Show | Several IT vendors and Supplier | No |
| 8** | Myers Catalogue | TV, Newspapers, Marketing info | No |

* Group A; ** Group B

TABLE 5.6 SOURCES OF IT INTELLIGENCE (USED & NOT USED DURING Q1)

A review of this table indicates that nearly all of the SMEs, with the exception of case 4, had access to additional sources of IT intelligence to help and support their IT sense making processes which were not utilised; this suggests that they made sense of each IT innovation using 'lean' IT intelligence. Further examination reveals that only case study 4 utilised the Internet as a source of IT intelligence. Given the large amounts of accessible IT intelligence it appears that SME cases 1, 2, 3, 5, 6, 7 and 8 operated in a lean information environment, which suggests that they have poor management of their IT intelligence environment since the Internet is a rich source of IT intelligence.

The sources of IT intelligence that were used to help each SME make sense of these IT innovations during stage two (Q2) are now presented in table 5.7 which uses the same format as table 5.6.

| Case Study | Information Source used | Other Sources of IT intelligence | Used |
|----------------------|-------------------------|----------------------------------|------|
| 1* | Local IT Firm | Internet, IT Magazines | Yes |
| 2* | IT vendor | IT Magazines & Newsletters | Yes |
| 3* | Harvey Norman's | Internet, IT Magazines | Yes |
| 4* | Internet Research | IT and Industry Magazines | Yes |
| 5** | Office Works (retailer) | Harvey Norman, IT Vendors | Yes |
| 6** | Office Works | IT Vendors | No |
| 7** | Nil | Nil | N/A |
| 8** | Local Web Developer | Other Real Estate Businesses | Yes |
| *Group A; ** Group B | | | |

TABLE 5.7 SOURCES OF IT INTELLIGENCE (USED AND NOT USED DURING Q2)

An examination of these tables indicates that each SME used information sources that they deemed suitable for their IT sense making processes. Some of these sources can also be considered as being informal, such as friends and other similar business operators. A comparison of the first and second table also shows that the SMEs in group 'A' utilised additional sources of IT intelligence in more situations than those in group 'B'. Several of these case studies indicated that they were aware of other sources; however, they each had their own reason why they chose to not gather additional information. It appears that after the workshop process those SMEs in group A used more sources of IT innovation information than those in group B.

Construct C – Recognise Potential IT

The persons involved in recognising the potential of new IT innovations are presented in table 5.8. The table also indicates who was responsible in each case study situation for recognising new IT innovations with business application potential.

| Case Study | Who Recognised Potential IT innovation | | Who is normally involved |
|------------|--|---------------------------------|--|
| | 1 st Inquiry - Q1 | 2 nd Inquiry – Q2 | |
| 1 | Directors | Directors | Directors |
| 2 | Directors | Directors | Directors |
| 3 | Directors | Directors | Directors, Some Staff |
| 4 | Director | Director | Director, Senior Staff |
| 5 | Directors | Directors | Directors |
| 6 | Director | Director | Director |
| 7 | Director | Director | Director |
| 8 | Directors | Directors/Senior Sales Staff | Directors, Some Staff when required |

TABLE 5.8 PARTICIPATION INVOLVEMENT DURING RECOGNITION ACTIVITIES

A review of this table indicates that the process and associated activity of recognising potential IT innovations as related to possible IT change is performed in all eight case study situations by the managing directors. Only four case studies utilised other staff members; these were case studies 8 at Q1 and 3, 4 and 8 at Q2. 8 at Q1. Case study 4 revealed that staff involvement was limited to senior staff only. There were no notable changes in either group as a result of the workshop.

Constructs D and E – Create Image of IT and Comparison Activity

The next table (5.9) provides a similar picture of who is responsible for developing an image or perception of new IT innovations. The table also represents the persons involved in comparing this image with what is defined as being an organisationally relevant IT innovation during Q1 and Q2.

| Case Study | Who Creates Image | Who is normally involved | Who conducts Comparison |
|------------|-------------------|--------------------------|-------------------------|
| 1* | M.D. | M.D. | M.D. |
| 2* | M.D. | M.D. | M.D. |
| 3* | M.D. | M.D. | M.D. |
| 4* | M.D. | M.D. | M.D. |
| 5** | M.D. | M.D. | M.D. |
| 6** | M.D. | M.D. | M.D. |
| 7** | M.D. | M.D. | M.D. |
| 8** | M.D. | M.D. | M.D. |

TABLE 5.9 INVOLVEMENT IN IMAGE GENERATION & COMPARISON ACTIVITIES

A review of this table again highlights the highly centralised nature of these activities in all eight case study situations. There were no notable changes after the workshop intervention. Given the information in this and the previous table it appears that staff inclusion remains minimal even after the workshop intervention. This aspect requires further investigation since each of the SMEs in group A were provided with SRI that suggested staff participation would improve their capabilities in these IT processes.

Construct F – Definitions of Organisationally Relevant IT

All eight SMEs were asked if they had any formal policy or guidelines that inform all staff which IT innovations are relevant to their respective businesses. The next table presents this situation before and after the developmental workshop intervention. The table shows that this intervention process altered group A’s responses in the second field inquiry (Q2).

| Case Study | Group | Existing Policy or Guidelines that inform of Relevant IT | |
|------------|-------|--|------------------------------|
| | | 1 st Inquiry Q1 | 2 nd Inquiry - Q2 |
| 1 | A | No | Yes |
| 2 | A | No | Some elements |
| 3 | A | No | Yes |
| 4 | A | No | No |
| 5 | B | No | No |
| 6 | B | No | No |
| 7 | B | No | No |
| 8 | B | No | No |

TABLE 5.10 GUIDELINES OR POLICY TO INFORM ABOUT ORGANISATIONALLY RELEVANT IT

The table indicates that all eight case studies examined during the first field questionnaire had no formal or informal policy or guidelines that informed staff members what IT innovations were relevant to the business. The developmental workshop intervention process can be seen to have affected several cases in group 'A'. There were notable changes in three case studies (1, 2, 3). There were no reported changes in case study 4. The non-existence of any formal or informal policy that informs staff which new IT innovations are relevant to the business is limiting. This is because it minimises staff involvement, since they simply not aware of the types of new IT innovations that they should be seeking. A review of this table highlights this activity as being dominated by the managing directors during Q1; however, after the developmental workshops cases 1 and 3 developed a policy or guideline that informed staff which IT innovations are organisationally relevant. Case study 2 attempted to formalise this aspect however, they only introduced informal direction via discussions about what IT innovations are organisationally relevant. The other case study in group A was the only example that remained the same. These changes are attributed to the workshop intervention and are in contrast to the SMEs in group B who made no changes in this area. This aspect is attributed to them not attending the workshop.

Construct G – Evaluate Potential of IT

The next table (5.11) presents the information gathered concerning the evaluation of new IT innovations within each of the eight case study situations.

| Case Study | Who performed activity | | Who is normally involved | How is it performed |
|--------------------------|------------------------|----------------------|--------------------------|---------------------|
| | 1 st (Q1) | 2 nd (Q2) | | |
| 1* | M.D. | M.D. | M.D. Some other staff | No Formal Processes |
| 2* | M.D. | M.D. | M.D. | No Formal Processes |
| 3* | M.D. | M.D. | M.D. Some other staff | No Formal Processes |
| 4* | M.D. | M.D. | M.D. | No Formal Processes |
| 5** | M.D. | M.D. | M.D. | No Formal Processes |
| 6** | M.D. | M.D. | M.D. | No Formal Processes |
| 7** | M.D. | M.D. | M.D. | No Formal Processes |
| 8** | M.D. | M.D. | M.D. Some other staff | No Formal Processes |
| *Group A ** Group B | | | | |

TABLE 5.11 IT INNOVATION EVALUATION INVOLVEMENT AND ASSOCIATED ACTIVITIES

A review of this table shows that the activity of evaluating new IT innovations is again performed at the upper echelon of each of the eight case study situations. There were some reported instances where other staff were involved; however, this involvement was limited to confirmation activities or because they were the person responsible for generating a request for that particular IT innovation. The workshop process presented specifically relevant information that informed participants of the problems associated with these ad-hoc processes. This aspect was reported in the literature; however, it appears that none of the members within group ‘A’ made any attempt to formalise or put any structure to the IT innovation evaluation process. This aspect will also be discussed in the demonstrable improvement section in chapter six.

Constructs H and I – Refinement of Criteria

The next table (5.12) presents the information that was gathered concerning the activities of refining both guidelines regarding what IT innovations are organisationally relevant (construct I) and the activities associated with refining the criteria for imaging or recognising potential IT innovations (construct H).

| Case Study | Group | Construct ‘I’ Performed | | Construct ‘H’ performed | |
|------------|-------|-------------------------|----------------------|-------------------------|----------------------|
| | | 1 st (Q1) | 2 nd (Q2) | 1 st (Q1) | 2 nd (Q2) |
| 1 | A | No | Limited | No | Limited/informally |
| 2 | A | No | Attempted | No | Limited/informally |
| 3 | A | No | Attempted | No | No |
| 4 | A | Limited | Limited | Limited | Limited |
| 5 | B | No | No | No | No |
| 6 | B | No | No | No | No |
| 7 | B | No | No | No | No |
| 8 | B | No | No | No | No |

TABLE 5.12 CONSTRUCT ‘H’ AND ‘I’ ACTIVITY BEFORE AND AFTER WORKSHOP INTERVENTION

The notation of ‘limited’ is intended to indicate that some elements of this activity are performed. ‘Informally’ means that the activity has been conducted but not formalised into policy or guidelines. In several instances these informal activities simply included discussions about this posture with staff members. In group A all case studies attempted or at the least had limited activities in both areas after the workshop. This is in contrast to the members of group B who made no changes in these activities.

5.5 KEY FINDINGS

The purpose of this section is to outline the key findings generated by this research. Comparing these key findings with the literature presented in chapter two concludes this section. The key findings and insights that were generated by this research include the following points.

- All case study situations were seen to conduct the activity of IT innovation sense making within a rich information environment. This statement is supported by each case study having access to several IT innovation information sources/channels. All of the businesses examined also had access to the Internet, which, as a source of IT intelligence, is an information rich environment. All eight case study situations performed the activity of IT innovation sense making using lean information sources or IT intelligence. This is evidenced by two key facts; first, all SMEs were operating in an information rich environment; and second, that during the sense making process examined by the researcher those persons conducting these activities were aware of other information sources and IT intelligence information but did not use them. The key observation here is those that made sense of each IT innovation did so using lean information and IT intelligence channels.
- Informal and formal sources of IT intelligence were both used. These informal sources included family, friends, television shows and other business people, met through social gatherings, who operated in the same industry sector.
- The process of gathering this IT intelligence and the sense making of IT innovations was also found to be predominantly conducted by the owners of the business. In all case study situations, the managing directors were identified as those persons that performed the IT sense making and gathering of IT intelligence. This indicates the highly centralised nature of the IT sense making process, and confirms the findings of the literature review chapter. In several studies, the nature of this activity was autocratic, given the posture that was adopted by the managing directors. These directors considered their abilities and

understanding of IT to be unmatched within their respective organisations. They did not see a need or any justifiable reasons to include others in this sense making process.

- The information that was gathered in most case studies was provided by IT vendors. Other sources of IT intelligence included industry newsletters and publications and IT magazines and television programs. This indicates the prominence of industry peak bodies and IT vendors in providing this IT intelligence.
- The processes associated with making sense of new IT innovations were also identified as being reactionary in nature and performed in an ad-hoc fashion. The reactionary nature was evidenced by the IT consideration process only being performed after the decision was made to purchase the innovation in question. The ad-hoc processes were evidenced by the informal nature of the evaluation process. None of the case study businesses had any recognisable framework for adjudicating or evaluating the IT innovations examined. The ad-hoc nature of SME decision making was also noted in the literature.
- Staff participation in the sense making of new IT innovations was noted in all situations to be non-existent. The only presence of staff inclusion in this sense making activity was for the confirmation of management decisions. Some other situations were seen to include only those staff members that either requested the new IT innovation or were the idea instigators; these were the persons responsible for the business having to consider a new IT innovation.
- Staff participation was seen to be limited since all of the SMEs in the first round of questionnaires did not have any recognisable or formal policy or guidelines that enabled or supported staff members in identifying organisationally relevant IT innovations. This lack of awareness and inclusion removed the ability of staff to contribute ideas about new IT innovations. Interventions prior to the second round of questioning witnessed the introduction of policies or guidelines that could be considered vehicles of inclusions. These inclusions allowed other staff members to assess what IT innovations were relevant to their respective businesses, which then enabled them to participate in the identification of

organisationally relevant IT innovations. These policies or guidelines were also seen to be developed both formally and informally; formally, in the sense that policy or guidelines were prepared, presented and made available to all staff members and informally, which includes the notion of discussions about what new IT innovations are relevant to the business.

- Of interest to the researcher was the self-nominated improvement that was witnessed in case study 5. The questionnaire incorporated several 'Ratio Scales' that enabled the owner managers of all SMEs to assess their own ability to make sense of new IT innovations and manage their respective IT innovation information environment. Without being involved in the developmental workshop process one particular SME still improved on these aspects. This observation indicates the situation whereby without researcher intervention this business was, according to one director, able to improve in both areas. This may be attributed to the director's consideration of a photocopying machine that they, as a company director, might not use. This is in contrast to the level of interest during the consideration of a new laptop that would only be used by them. This level of personal interest and/or enthusiasm for a particular IT innovation requires further investigation.
- The management of IT innovation information was again performed at a highly centralised level. The preclusion of relevant or capable staff members is testament to this posture. With the exception of case study D all other SMEs indicated that their ability to manage their respective IT innovation information environment was either under average (Case 2), average (Cases 1, 3, 5, 6 and 7) or slightly above average (Case 8). Case study 4 interpreted their ability to manage their information environment as at almost the Expert level. This opinion was supported by the business owner's own awareness of IT in general.
- The management of IT information within the IT consideration processes had considerable room for improvement. In all the cases examined, each of the IT adoption or IT consideration processes ended without the possession of all the necessary and evaluated information. This was discovered during the final stages of questioning, where all participants were asked to reflect on the overall

process. In all situations they acknowledged the need for additional information, which in hindsight may or may not have changed their decisions or consideration processes.

These key findings have been derived from operationalising the PIPI concept. These key outcomes are compared in section 5.8 with other theoretical frameworks that were discussed in the literature review chapter.

5.6 DEMONSTRABLE IMPROVEMENT

Prior to addressing the research propositions in the next chapter, this section will highlight the outcomes of the workshop interventions introduced to the SMEs in group A. This discussion will indicate that demonstrable improvement occurred within this group. The main purpose of this section is to establish whether demonstrable improvement occurred in group A as a result of their participation within the developmental workshop process. An important note here is that group A were the only SMEs to attend the developmental workshop process. It was during this particular intervention that the researcher sought to introduce practical change that would form the basis for improvement in two nominated areas: IT sense making activities and IT information management capabilities.

A review of the tables presented throughout this chapter indicated several changes occurred between the first inquiry (Q1) and the second inquiry (Q2). Although these cannot be directly attributed to the developmental workshop intervention process, this section will highlight the possibility that these improvements were generated as a result, either directly or indirectly, of the workshop intervention process. The identification of demonstrable improvement utilises the information presented in the tables in this chapter. The most observable or notable changes to each of the participants in group 'A' and 'B' are presented as follows:

- In the first IT sense making event (first inquiry - Q1) cases 1, 2, and 3 from group A did not utilise other sources of IT intelligence. By comparison, during the second sense making event (second inquiry - Q2) these three SMEs were seen to utilise additional sources of IT intelligence to support their IT innovation sense making processes and improve their IT innovation information management.
- Those SMEs in group B that matched this development include cases 5 and 8 only.
- In the first IT sense making event (Q1) no SMEs had any policy or guidelines to inform other staff members which IT innovations were organisationally relevant. In the second IT sense making event (Q2) only those businesses in group A had either formal or informal policy or guidelines to reflect which IT innovations were organisationally relevant.
- The number of IT sources or channels of IT innovation intelligence also increased in group A. All members of this group were noted to utilise additional and richer sources of IT intelligence. The most notable was the inclusion of IT innovation information, which is available through the Internet. None of the SMEs in group B made this alteration.

Whilst there were several other elements that suggested improvement or changes, the items in this list were the most observable and therefore reportable. The notion of demonstrable improvement within these case study situations is also supported by the inclusion of the participant's own views concerning their ability to manage their respective IT innovation information environment and make sense of new IT innovations in practice.

The questionnaire development process incorporated several Ratio Scales. The reason for implementing these scales was discussed in section 4.4.2; this was to indicate, from the participant's perspective, how they rated their own ability to make sense of new IT innovations in practice and their overall performance with respect to how they managed their IT innovation information environment. The purpose of this was to record how they viewed their own overall capability, and to provide additional evidence to support the

notion that demonstrable improvement occurred as a result of the developmental workshops. The scales were presented along with the following descriptor:

‘On a scale of 1 to 10 with 1 being ‘Extremely Poor’, five being ‘Average’ and ten being ‘Expert’, rate your ability in the following two areas.

Based on this descriptor, each of the participants was presented with the following questions. They were then instructed to provide a grading value of between 1 and 10.

Ratio Scale Question 1. Overall, how do you think the business evaluated this new IT innovation?

Ratio Scale Question 2. Overall, how do you think the business manages information about new IT innovations?

The results from the two Ratio Scales that were incorporated within the field questionnaire have resulted in the following information that was provided by the managing directors of all eight SME case study situations. This output is presented in the following table (table 5.13), which presents the responses in the first round of interviews followed by the second round, which occurred after the workshop intervention. The labels D1, D2 and D3 denote the responses from multiple directors. Q1 in this table is the Ratio Scale question 1 and Q2 is the second question. The * and ** denotes those in groups A and B respectively.

| Case Study | 1 st Response | | | 2 nd Response | | | |
|------------|--------------------------|----|----|--------------------------|----|----|----|
| | | D1 | D2 | D3 | D1 | D2 | D3 |
| A* | Q1 | 6 | 6 | | 7 | 7 | |
| | Q2 | 6 | 6 | | 8 | 7 | |
| B* | Q1 | 4 | 5 | | 6 | 7 | |
| | Q2 | 3 | 3 | | 6 | 6 | |
| C* | Q1 | 6 | 7 | | 7 | 7 | |
| | Q2 | 6 | 6 | | 7 | 7 | |
| D* | Q1 | 8 | | | 8 | | |
| | Q2 | 9 | | | 8 | | |
| E** | Q1 | 7 | 6 | | 7 | 7 | |
| | Q2 | 6 | 6 | | 6 | 7 | |
| F** | Q1 | 7 | | | 6 | | |
| | Q2 | 6 | | | 6 | | |
| G** | Q1 | 6 | | | 6 | | |
| | Q2 | 5 | | | 6 | | |
| H** | Q1 | 7 | 7 | 6 | 6 | 7 | 6 |
| | Q2 | 7 | 7 | 6 | 7 | 6 | 6 |

TABLE 5.13 RATIO SCALE RESPONSES AND COMPARISON BETWEEN GROUP A & B

A simple indicative analysis of the table also shows that improvement occurred in group A whilst group B remained static. Analysis of the first round of responses revealed an average for group A of 5.79%. For group B the average in the first round of responses was 6.36%. After the developmental workshop intervention the second round of responses revealed an average for group A of 7.0%. This represents an increase in the average of 1.21%. The average for group B during the second round of responses revealed an average of 6.36%. This represents no change. It appears that group B remained static whilst group A experienced an overall increase of 1.21%. This increase is only used to express positive movement along the Ratio Scale away from very poor and

average and towards the level of Expert. Given the small number of samples used within this research the analysis conducted is only tendered as additional support to the improvements demonstrated previously. This comparison indicates the differences between group A and B.

This table also reveals the increase in ranking for questions 1 and 2 in all members of group 'A'. The only outlier is the reduction in rank for question 2 in the second round for case study 4. In case study situation 2 the participants, by their own admissions, doubled their score for question 2 and markedly improved in question 1. Cases 1 and 3 only increased by a small margin; however, they did state an increase in their abilities relative to Ratio Scale questions 1 and 2.

Within group 'B', case studies 5 and 7 were the only SMEs to nominate any notable improvement in their situation, with case study 7 only noting improvement in the Ratio Scale for question 2. Case study 6 remained the same for question 2 but went back one point for question 1. Case 8 remained largely the same, with only subtle changes in both questions by one director for each question. Overall, it appears that the SMEs in group 'A' made several advances along the Ratio Scale to positions that indicate improvement. This improvement can be characterised by their gradual progression from an 'Average' ranking towards an 'Expert' ranking through an average increase of 1.21%. With the exception of case study 4, none of the participants in either group labelled themselves as expert.

The discussions presented in this section highlighted further changes as a result of the developmental workshop process, since demonstrable improvement occurred. The members of group A were observed to improve in more areas and in more ways than those in group B. Simple numerical analysis indicated a 1.21% improvement in group A after the workshop intervention. This is in contrast to group B who remained static. The developmental workshop intervention conducted by the researcher has therefore generated demonstrable improvement in several nominated areas for those SMEs in group A.

5.7 COMPARISON OF PIPI CONCEPT WITH EXISTING THEORIES

The purpose of this section is to compare and contrast the ideas in the PIPI concept with the theoretical concepts discussed in the literature review chapter. The PIPI is now compared with the theoretical frameworks presented in the literature review chapter. The chapter predominantly focused on the technology adoption, acceptance and diffusion literature. The approach used in this study is substantially different to the approach taken in the frameworks for technology acceptance, adoption and diffusion are substantially different to that taken in this research.

The first component of the PIPI concept is the purposeful inquiry aspect. This proved useful in enabling the researcher to learn about the chosen research situations and generate findings and insights. The purposeful inquiry component of the PIPI concept is now compared with the ideas presented in chapter two. The purposeful intervention aspect of the PIPI is reviewed in chapter six.

The theoretical ideas relating to IT acceptance, adoption and diffusion have traditionally been applied to the implementation and post-implementation stages of IT (Cragg & King 1993; DeLone 1983; Gable 1991; Lees 1987; Montazemi 1988; Raymond 1985; 1990; Thong et al. 1994; 1996). The PIPI concept was capable of being applied to a number of activities that existed prior to the implementation of technologies such as information gathering and IT innovation sense making processes. The PIPI was also able to identify and highlight several activities in the implementation and post-implementation stages. The PIPI concept may be also used as support for these theoretical ideas because it focuses on the activities that are performed prior to the IT acceptance, adoption and diffusion stages.

The TAM (Davis et al. 1989) was seen to have many drawbacks such as its limitations in different contexts, in particular the professional context (Chau and Hu 2001). The TAM was noted to exclude social aspects such as the role social influences plays in IT situations (Mathieson 1991). The TAM was also noted to be difficult to apply and

unsuitable for some technologies such as the Internet (Cheung et al. 2000). The PIPI concept was relatively easy to apply by comparison to the TAM and did not need to be altered to fit differing technologies. The concept was shown to be capable of focusing on a wide range of technologies and these were shown in figure 5.5.

The Theory of Planned Behaviour (TPB) developed by Ajzen (1991) and Mathieson (1991) was shown to have many similarities to the TAM. The TPB also excluded social aspects that were shown to have a negative effect on its use (Orlikowski & Baroudi 1991). The TPB contends that the IT adoption process is affected by decisions based on attitude, individual characteristics and business size, sector and status. The PIPI concept was capable of identifying and considering the individual characteristics of those in the research situations and accommodating the differing sizes, industry sectors and the overall status of each business (section 5.1). The different industry sectors that the PIPI explored in this research project are noted in this table.

The Decomposed Theory of Planned Behaviour (Taylor & Todd 1995) was also noted as not incorporating social elements. This concept was shown to suffer from the process of decomposition, which again introduced problems relating to the notion of reductionism. By comparison, the PIPI concept takes a more holistic approach and as a result was capable of examining and considering a wider range of issues and other important factors of consideration.

The Integrated model of IS Adoption (Thong 1999) was used to identify the primary determinates of the IT adoption process such as the decision maker and environmental characteristics. The concept was shown to be capable of identifying contextual variables such as external pressures to adopt, perceived benefits, financial readiness and the organisational, technical and external contexts. The PIPI concept was also capable of identifying these contextual aspects because it examined each SME case study situation in context that enabled these contextual factors to be incorporated. The integrated model also required customising for each individual IT innovation under focus (Chau & Tam 1997). As discussed previously, the PIPI concept was shown to be capable of examining

the influences from the external environment and a wide range of technologies. It was also capable of being applied across eight differing SME situations.

The DTI Adoption Ladder was shown to be problematical for many reasons. The linear model had no inbuilt flexibility (Martin & Matlay 2001) and was also shown to neglect the diversity that exists across individual business situations (Brock 2000). The DTI adoption ladder was not able to incorporate different industries, sectors and gender aspects. Its application is also strictly limited to the notion of electronic commerce and the internet, and it therefore cannot be used to examine other IT innovations. Brock (2000) noted that this adoption model oversimplified a situation that is very complex. By comparison, the PIPI was shown to be capable of considering a range of complexities such as the differing IT innovations, industries and sectors.

The Innovation Diffusion Theory (Rogers 1983:1995; Brancheau & Wetherbe 1990; Agarwal & Prasad 1997) was noted to suffer from measurement problems (Moore & Benbasat 1991) and its constructs were poorly explicated and measured (Tornatzky & Klein 1982). The results obtained from its application have produced mixed outcomes (Fichman 1992) and the definition of its variables can only be described as very exploratory (Wynekoop 1991). A major concern with this theory relates to the IT adoption or non-adoption dichotomy. By comparison the PIPI was capable of introducing an IT consideration process that resulted in neither IT adoption nor IT non-adoption. The PIPI introduces a third state, which is the IT consideration process.

The Innovation Decision Process Theory (Rogers 1995) was noted as being problematical because of its linear and fixed stages of learning about IT innovations. The theory was noted as not including important aspects such as IT vendor characteristics (Tam & Hui 2001). The theory also failed to elaborate on a number of information related aspects such as appropriate information, information sources and information channels. By comparison, the PIPI was able to contribute to this theory by taking into consideration these information related aspects. The PIPI included many vendor related considerations such as the role they play in providing IT innovation information to SMEs.

The notion of measuring IT productivity and performance was seen to be problematical in many areas (Piccili & Wagner 2003). IT value was also noted as being different to IT investment (Wiseman 1992). Taking a purely economic approach to IT investments was seen as being problematical by Farbey et al. (1993) and Wilcocks (1994). The IT evaluation process was noted as being ad-hoc (Griffith 1991) which was also recognised within this study during the first field-based inquiry (Q1). The activity of identifying productivity gains from IT investments was also noted as being difficult (Merrill 1993). Similar problems associated with identifying gains from IT investments were also identified in this study.

Overall, most of the frameworks presented in the review chapter were shown to suffer from or to be overly concerned with the scientific research methods, in particular the principle of observation, which sees that absence of an intervention to improve the participant's situation. This aspect means that the research participants were given no identifiable instruction, training or support to help them improve in these research areas. The scientific approach was problematical in the sense that it restricted the ability of these frameworks to fully appreciate the social situations they explored and provide practical benefit to those that participated in the research. A major theoretical issue was the absence of a framework that supports the two differing research objectives of this research, which are purposeful inquiry and purposeful intervention. By contrast, this research presents an approach that enables such a dual role to be performed. The second component of the PIPI concept was the purposeful intervention aspect. The existing theories in relation to this component of the PIPI were discussed in chapter three. The literature from chapter three is compared with the PIPI concept in the next chapter.

5.8 CHAPTER SUMMARY

The main feature of this chapter was the presentation of the findings that were obtained from the operationalisation of the field questionnaire which was derived from the conceptual model of an 'IT Innovation Information System'. This questionnaire was originally developed to support and address the two research questions outlined in chapter one. Overall, the two inquiries provided an opportunity for the researcher to gather an initial understanding of how each SME made sense of IT innovations in practice and the information they used to support this activity. This was then used as a foundation for introducing change within the developmental workshops. The workshop process also included the use of two separate groups. The primary goal of this two-group process was to provide the necessary evidence to support the introduction of demonstrable improvements in both the IT sense making and IT innovation information management abilities of those SMEs which participated in the developmental workshops (group A).

The group that was precluded from the workshop process (group B) were found to be severely disadvantaged by this omission. Having identified this as an ethical concern, the researcher sought ways to overcome or mitigate this aspect. The solution implemented by the researcher was to furnish these SMEs with a summarised version of the workshop events, activities and to provide a detailed discussion of the main points that were raised and addressed during the workshop process. This aspect was not incorporated into this research because it closely resembles the consultancy approach that was identified in the literature as a concern, particularly when using the action research methodology. Other considerations concerning this omission stems from the fact that the researcher had no real structure to work with by comparison to the structure and activities that were conducted in the workshops. In short, they only received this information as a matter of courtesy and as an ethical consideration. The information presented to them was also presented in a format that may or may not have been interpreted correctly or in a manner that enabled them to improve.

Overall, this chapter has outlined and described the eight SMEs that participated in this research. The chapter then presented and discussed the findings from two separate field-based inquiries. The data collected from both Q1 and Q2 was analysed using the principles of hermeneutics, as outlined in the research design chapter (section 4.4.4). As a result of analysing these two different inquiries the researcher was able to generate both findings and insights about the eight SME case study situations explored before and after the workshops. These findings proved valuable and enabled the research questions and propositions to be addressed. The next chapter uses the key findings and insights generated in this chapter to address and discuss the research questions and research propositions.

CHAPTER 6: REFLECTIONS AND CONCLUSION

6.0 OVERVIEW

The purpose of this sixth and final chapter is to bring to a close this research. The first section (6.1) reviews the aims and objectives of this study. The section then addresses the two research questions using a summary of the key findings presented in the previous chapter before moving on to address the three research propositions. The section is concluded using the seven principles for evaluating interpretive field studies (Klein & Myers 1999). Section 6.2 then conducts a series of reflective learning activities focusing on the methodological elements of the research design. Section 6.3 then outlines and discusses the implications for theory and practice that emerged as a result of the development and testing of the new PIPI concept presented in chapter three. The next section (6.4) outlines how the PIPI concept can be built upon by providing several future directions for research. The last section (6.5) presents a summary of this final chapter and concludes the research.

6.1 RESEARCH AIMS AND OBJECTIVES

The purpose of this section is to review the overall aims and objectives of this research realised via the addressing of the two research questions and three research propositions. This section addresses the research questions and propositions. The section is concluded with an evaluation of the research project as a whole using Klein and Myers's (1999) seven principles for evaluating interpretive field studies. The aims and objectives of this research were outlined in chapter one (section 1.4) and presented as follows:

- To explore and understand the information environment that SMEs are dependant upon to make sense of new IT innovations.

- To explore and understand how SMEs make sense of new IT innovations in practice.
- To discover ways to improve the capabilities of SMEs in this area.
- To develop and test a framework of inquiry that incorporates an intervention process that is both relevant and capable of demonstrably improving the IT-related capabilities of participating SMEs.

These stated research aims and objectives were further refined by the researcher through the development of two research questions and three research propositions, which are discussed in the following sections.

6.1.1 Research Questions Addressed

The research questions that were developed to help support achieving the aforementioned research aims and objectives were presented as follows:

R.Q.1. How do SMEs make sense of new IT innovations in practice?

R.Q.2. What information are they reliant upon to support the sense making of new IT innovations in practice?

Chapter five presented the findings and insights generated by this study. The chapter also outlined the key findings that this research has made in section 5.6. These insights and key findings helped to address the two research questions. A summarised version of those key findings is presented as follows:

- The activity of IT innovation sense making was conducted within a rich and global information environment.
- Prior to the workshop intervention, all SMEs made sense of new IT innovations using lean information. Those persons that performed the sense making process were also aware of other IT intelligence; however, they opted

to use lean IT intelligence. After the intervention, several businesses utilised richer forms of IT intelligence.

- SMEs also used informal sources of IT intelligence such as family, friends and other business people who they met at social gatherings.
- The process of gathering IT intelligence and making sense of IT innovations was conducted by the managing directors. This indicates the highly centralised nature of IT sense making process.
- IT intelligence was provided by IT vendors and manufacturers. Other sources of IT intelligence included newsletters and various magazines. This indicates the external influence that the IT industry and IT vendors have on the sense making process and the gathering of IT intelligence.
- The processes of making sense of new IT innovations were reactionary in nature and performed in an ad-hoc fashion.
- Staff participation in the sense making of new IT innovations was almost non-existent and limited to the confirmation of management's decisions.
- The management of IT innovation information was performed at a high level.
- The management of IT information to support the sense making process was limited. Most sense making situations ended without gathering all necessary information.

Having addressed the research questions the focus now turns to the research propositions.

6.1.2 Research Propositions Addressed

This section now addresses the research propositions. The process uses the findings and insights gathered from the eight SME case study situations and the reflective learning outcomes and theoretical contributions generated in this chapter to address the three research propositions. The propositions are presented as follows:

P.1. That a model of 'Inquiry', which is underpinned by 'Systems Thinking' concepts, provides a suitable foundation for conceptualising the research

situation as an 'IT Innovation Information System' which is both useful and appropriate for conducting a purposeful inquiry that identifies the sense making processes and the information SMEs are dependant upon to support and help them make sense of new IT innovations in practice.

P.2. That a model of action researcher 'Intervention', which is underpinned by 'Systems Thinking' concepts, provides a suitable foundation for conceptualising and conducting purposeful researcher intervention activities that demonstrably improve both the IT information management and IT sense making capabilities of SMEs.

P.3. That the 'Inquiry' and 'Intervention' concepts combine to provide a useful and appropriate way of identifying, addressing and demonstrably improving the IT information management and IT sense making capabilities of SMEs.

These three propositions were primarily developed as a consequence of applying several modern systems thinking concepts to support achieving the research aims and objectives. These systems concepts were used by the researcher to develop the conceptual models of the chosen research situation using the Soft Systems Methodology (SSM). The models were supported by the Action Research (AR) methodology to help support the developmental workshop intervention. The FMA was also used to guide the research and the reflective learning processes. The three propositions will now be addressed.

Proposition 1: That a model of 'Inquiry', which is underpinned by 'Systems Thinking' concepts, provides a suitable foundation for conceptualising the research situation as an 'IT Innovation Information System' which is both useful and appropriate for conducting a purposeful inquiry that identifies the sense making processes and the information SMEs are dependant upon to support and help them make sense of new IT innovations in practice.

The SSM (Checkland 1981: 2000 & Checkland & Scholes 1990; 1999) was used by the researcher to develop the conceptual model of an IT Innovation Information System. The

selection of SSM allowed the researcher to conduct an inquiry into the chosen research situation. The model depicted the research situation as an information system that contained a series of interrelated components or parts which, when assembled, formed a whole system. The usefulness of this systems approach was also evidenced by the levels of understanding and findings that were gathered by the researcher as a result of conducting the two field-based inquiries labelled 'Q1 and Q2' respectively.

The SSM proved to be a useful and appropriate means of conceptualising the research situation. The conceptual model's usefulness also extended into the questionnaire development process, which saw the Holons or constructs portrayed in the model being utilised to construct the field-based questionnaire. This questionnaire also proved to be both relevant and useful given the insights that were gathered via its operationalisation. The field questionnaire was used in two separate inquiries. The first gathered a preliminary understanding about how SMEs made sense of new IT innovations in practice. Therefore, the first proposition is addressed in the affirmative. Upon completion of this exercise the researcher then used another systems thinking concept to analyse and interpret the field data gathered from all eight SME case study situations. The output of this initial process was then fed back into the research situation via the second intervention activity, which was termed the AR workshop intervention. This aspect is further discussed below because it relates to the second proposition.

Proposition 2: That a model of action researcher 'Intervention', which is underpinned by 'Systems Thinking' concepts, provides a suitable foundation for conceptualising and conducting purposeful researcher intervention activities that demonstrably improves both the IT information management and IT sense making capabilities of SMEs.

The SSM was again utilised to construct a conceptual model of this AR workshop process. The second model was also portrayed as a set of interrelated components or parts that, when assembled, formed a system. The researcher activities and physical and resources requirements were also embedded into the model. The notion of Specifically

Relevant Information (SRI) was also noted in this representation. The usefulness and relevance of this second model was noted as being high. The researcher was able to follow the model's processes before conducting the developmental workshops. The goal here was to support the identification of the necessary requirements of such a developmental activity. The SSM derived model also enabled the identification of the inputs and outputs relevant to this second system. Another major contribution that this model provided was a vehicle to report the manner in which the workshop intervention was conducted. This model also gave the researcher the opportunity to identify and discuss the inputs they provided (the SRI). This was tendered to mitigate some of the issues relating to the conducting of 'consultancy' type workshops.

The main outcome from this second model was the opportunity to introduce practical change that then formed the basis for demonstrable improvement. The demonstrable improvement was highlighted and discussed in chapter five (section 5.7.). As a result of identifying that demonstrable improvement occurred in group A, the second proposition may also be addressed in the affirmative. This is because the developmental workshops provided demonstrable improvement in the area of IT innovation sense making and IT information management practices for those SMEs that attended the workshop intervention.

Proposition 3: That the 'Inquiry' and 'Intervention' concepts combine to provide a useful and appropriate way of identifying, addressing and demonstrably improving the IT information management and IT sense making capabilities of SMEs.

Having discussed the Inquiry and Intervention models the focus now turns to amalgamating them to form the 'Purposeful Inquiry and Purposeful Intervention' concept. This new concept was outlined in chapter three (framework of ideas) and it is discussed further in section 6.4 of this chapter. It is also important to note that the term intervention was used here as a label to aid communication. The first and second inquiries were also considered to be interventions in their own right. Given the

discussions outlined for the first and second propositions, this third proposition becomes a priori. Combining these two concepts has produced a framework for inquiry and intervention. Although the combination of two separate concepts may not always be suitable, the aims and objectives of this study were achieved by combining these two concepts. Ultimately, the Inquiry concept has proved to be highly relevant and useful for the two field-based inquiries. The Intervention concept has also proved to be relevant and useful because it enabled the researcher to introduce practical change in the form of demonstrable improvement in several IT-related areas. The combined framework has proven to be effective, suitable and appropriate for conducting a purposeful inquiry and purposeful intervention. The third proposition may therefore be addressed in the affirmative. Having addressed the three propositions, the framework for the 'Inquiry and Intervention' is now re-labelled to represent the underlying purposeful nature of these frameworks. The framework for inquiry and intervention therefore needs to be considered as a framework for Purposeful Inquiry and Purposeful Intervention (PIPI).

The application of systems thinking concepts and the holistic approach adopted by the researcher has resulted in many contributions that allow all three propositions to be addressed in the affirmative. The most notable contributions for theory and practice that have arisen due to the selection and use of systems thinking concepts are presented in section 6.3. The introduction of the research propositions was also considered important and necessary, since a series of new intellectual frameworks were developed and tested across eight SME case study situations. The opportunity to develop these propositions also stems from the selection of the AR methodology and the use of other modern systems thinking concepts such as the FMA and SSM. Overall, the research aims and objectives were achieved by addressing the two research questions and were supported by addressing the three research propositions. In short, the research questions and research propositions were addressed by engaging several modern systems thinking concepts and the action research methodology.

6.1.3 Evaluating the Research

The purpose of this section is to evaluate the two conceptual models developed and used in this research and to assess this interpretive field study. The section both evaluates and discusses how well these two models represented the real world situations they explored. These activities and the theoretical grounding of this interpretive field research are further supported by using Klein and Myers's (1999) seven principles for evaluating interpretive field studies. These seven principles are used at the end of this section to evaluate the main research outcomes.

The underlying aspect in this section relates to how the conceptual model of an IT Innovation Information System, the framework for inquiry (F) compared with or represented the real world situation that it was used to examine (A). The reason for this focus arises from the use of the modern systems thinking concepts used to develop the models. Within the classical version of SSM the conceptualisation process is conducted in a conceptual or logical thinking world. This conceptual representation (F) is then compared to the real world situation (A). The comparison activity is expressed within the classical form of SSM as the fifth phase (Checkland 1981). The comparison activity essentially compares the conceptual ideas or logical representation with reality. Areas that could be examined here include how well the conceptual model represented or mapped the real world situation. This act of comparison is said to differentiate the systems thinking approach from other hard systems approaches (Checkland 1981).

Surveys of SSM users have found that many did not make use of the modelling and comparison phases (Ledington & Donaldson 1997) due to difficulties with their application. The relevance here is that the core idea of SSM is to generate logical systems models that are relevant to a problem situation and then compare the model and the situation in order to structure debate about change (Ledington & Ledington 1999). The authors note that this comparison phase is problematic in both theory and practice. The comparison phase was not directly adopted by the researcher given the limited application of the methodology. However, the model, via its derived questionnaire, was

the artefact that was compared with the situation. In other words, the researcher was not focused on comparing the logical model with the situation explored explicitly. The researcher instead used the logical systems model as a framework of ideas to structure the questionnaire development process, which in turn guided the two field-based inquiries.

Once the first inquiry was completed (Q1), the researcher then sought to intervene into the situation via the developmental workshop process. This workshop elicited dialogue about the SME situation under examination. This process can also be considered to be the comparison activity, since the output of the inquiry formed the Specifically Relevant Information (SRI) presented during the workshop. Examples and discussions concerning SRI were presented in section 5.3. Overall, the goal of the researcher was not to compare the first logical model with the situation; rather, this model was used to start the inquiry process. The output gained from this first inquiry (Q1) was therefore used to structure debate during the workshops, which were oriented towards achieving the practical change. This dialogue aspect does incorporate the sixth and seventh phases of the classical SSM framework shown previously in figure 3.7; however, the researcher used the AR methodology and the second conceptual model of the workshop intervention to achieve these outcomes since AR is more oriented towards training than SSM. This training aspect was noted as one of the cornerstones of the AR methodology presented in section 4.1. Although this is only a subtle alteration, it does indicate the influence that the AR concept had in the SSM development process. This is an aspect that the author acknowledges in the creation of SSM, since it was based on several systems thinking concepts and the AR methodology (Checkland 1981).

The results of the comparison of the logical models and the real world situation can be assessed via the findings and insights that were generated via the implementation of the questionnaire. The development of the questionnaire was discussed in section 4.4.2; it was heavily influenced by the content of the first conceptual model. Any comments or judgments about the comparison process must therefore consider that the findings and insights were gained via the questionnaire and not the model itself. Therefore, the logical model was not compared with the chosen research situation. Its use was instead limited to structuring and maintaining the focus for the questionnaire development process. Overall,

the usefulness of the conceptual models for inquiry and intervention as tools to support and guide the field-based inquiry and intervention is evidenced by the key findings and demonstrable improvement that were gathered and generated by this research.

Field research within the discipline of IS can be classified as critical if the main task is one of social critique where the restrictive and alienating conditions of the status quo are brought to light and people can consciously act to change their social condition (Klein & Myers 1999). IS research can also be classified as interpretive if it is assumed knowledge of reality is gained through social constructs such as language, shared meaning and other artefacts. It does not predefine dependent and independent variables, but focuses on the complexity of human sense making. It attempts to understand phenomena through meanings that people assign (Boland 1985), and interpretive field studies are idiographic in nature (Klein & Myers 1999). Klein and Myers (1999) claim that researchers no longer need to justify their work by the use of inappropriate positivist criteria.

Establishing rigour in qualitative research is essential (Rose & Webb 1998). Klein and Myers (1999) provide a set of seven principles that are designed to improve the plausibility and cogency of interpretive field studies. They derived these principles from two primary sources. The first is anthropology, and the second is their understanding about phenomenology and hermeneutics. These seven principles are particularly useful for conducting and evaluating interpretive field studies that use hermeneutics. The authors do recognise that such a set of principles violates the emergent nature of interpretive research, which philosophically cannot be pre-determined or mechanistic in nature. However, they contend that interpretive research must have some form of standards by which it can be judged. These seven principles are also helpful because they summarise important insights in interpretivism that are not yet embedded in the practice of interpretive field research (Klein & Myers 1999).

The seven principles, according to Klein and Myers (1999), are as follows:

1. **The Fundamental Principle of the Hermeneutic Circle.** This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form.
2. **The Principle of Contextualisation.** This requires critical reflection of the social and historical background of the research setting so intended audience can see how the situation under investigation emerged.
3. **The Principle of Interaction between the Researchers and the Subjects.** This requires critical reflection on how the research data was socially constructed thorough interaction between the researcher and participants.
4. **The Principle of Abstraction and Generalisation.** This relates the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.
5. **The Principle of Dialogical Reasoning.** This requires sensitivity to possible contradictions between theoretical preconceptions guiding the research design and actual findings, with subsequent cycles of revision.
6. **The Principle of Multiple Interpretations.** This requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. This is similar to multiple witness accounts.
7. **The Principle of Suspicion.** This requires sensitivity to possible biases and systematic distortions in the narratives collected from the participants.

During repeated cycles of the hermeneutic circle, all of the above principles can be applied iteratively, forming a complex web of interpretations (Klein & Myers 1999). The first principle overarches the remaining six principles. The second principle requires the subject matter to be set in its social and historical context. Interpretivists argue that organisations are not static and the relationship between people, organisations, and technology are not fixed but constantly changing (Klein & Myers 1999). With regards to the third principle, they contend that interpretive research seeks to understand a moving target. Interpretive researchers must also recognise that participants, just as much as the

researcher, can be seen as both interpreters and analysts. Klein and Myers (1999) claim that the fourth principle of abstraction supports Walsham's (1995) argument that the validity of the inferences drawn from one or more cases does not depend on the representativeness of cases in a statistical sense, but instead on the plausibility and cogency of the logical reasoning used in describing the results from cases and drawing conclusions from them. Walsham (1995) put forward four types of generalisations that can be made to generate theory from case studies. Walsham's (1995) guidance on theoretical generalisations from case studies is presented and discussed in relation to this study in section 6.3.1. Theory also plays an important role in interpretive research because it is used differently to that of positivist research. Interpretive researchers are not interested in falsifying theories, they instead use theory as a sensitising device with which to view the world in a certain way (Klein & Myers 1999).

The fifth principle of dialogical reasoning requires the researcher to identify what type of interpretivism is used and then relate the particular strengths and weaknesses of the philosophy to the purpose of the research. The intellectual basis of the research design provides the lenses through which field data are construed, documented and organised. The sixth principle relates to multiple interpretations and the need to examine the influences that a social context has upon the actions under study by seeking out and documenting multiple viewpoints. The analysis of reasons may include seeking to understand conflicts that are related to power, economics or values. The principle is of heuristic value because it leads to probing and it is further strengthened with the seventh principle of suspicion.

The above principles all encourage various forms of critical thinking. Critical Systems Thinking (CST) has pursued this idea more vigorously than interpretivism. Interpretive field studies that use this principle tend to be influenced by critical theorists such as Flood and Jackson (1991) and Ulrich (1983; 1987). Questioning the surface meaning of what is being said in a systematic way enables a researcher to read the social world behind the words of the actors; this is characterised by power structures, vested interests and limited resources to meet goals of various actors who construct and enact it. The

seventh principle of suspicion is the least developed within the IS literature and Klein and Myers (1999) leave open the possibility that some interpretive researchers may choose not to follow this principle in their research. Having considered each principle separately the first principle requires consideration of the whole that these principles create. The whole story resulting from the application of individual principles is greater than the sum of its parts (Klein & Myers 1999).

The results from applying Klein and Myers's (1999) seven principles to this study are as follows:

1. The principle of the hermeneutic circle is explained in section 4.4.4 and applied in this study to support the data analysis processes.
2. The principle of contextualisation is provided in the background section (1.1) and further outlined in the Area of concern (A) chosen for this research (section 1.4). An overview of all SME participants was presented in section 5.1.
3. The principle of interaction was applied by engaging the participatory AR method, in which the researcher and subject work as co-researchers in a collaborative and iterative way.
4. The principle of abstraction and generalisation was applied by engaging the critical form of hermeneutic analysis and using the SSM derived models to support a focused inquiry and intervention. The generalisation process was supported by Walsham's (1995) generalisations from interpretive field studies, and this is presented in section 6.3.1.
5. The principle of dialogical reasoning was not explicitly discussed however; the intellectual and philosophical positions adopted for this research were presented in chapter three and four.
6. The principle of multiple interpretations was predominantly applied by focusing on business owners and senior management. Some viewpoints of other stakeholders were also presented in chapter five.
7. The principle of suspicion was applied at the methodological level in chapter two by both criticising and revealing several theoretical and methodological issues.

The research then provided solutions to these drawbacks by examining the viewpoints and actions of different stakeholders within each SME case study by adopting a collaborative and pragmatic approach to examining the chosen area of concern (A).

Other methods for evaluating the qualitative nature of the field data that was gathered from the eight SME case study situations are presented in section 6.3.1. This section uses Walsham's (1995) four theoretical generalisations from case studies.

6.2 REFLECTION ON RESEARCH

The purpose of this section is to reflect on the use and application of the chosen action research methodology. This section also includes a discussion concerning the use of the two applied methodologies, which were Checkland and Holwell's (1998) FMA framework and Checkland's (1981; 2000) SSM. The reflective learning activities presented in this chapter are guided by Checkland and Holwell's (1998) FMA framework presented in figure 6.1.

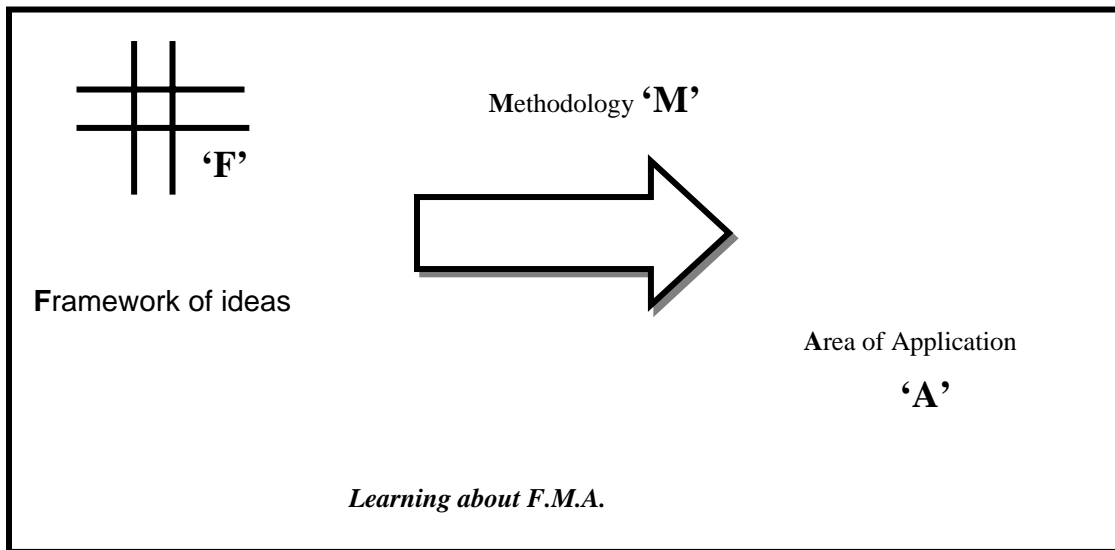


FIGURE 6.1 THE FMA FRAMEWORK (ADAPTED FROM CHECKLAND & HOLWELL 1998)

The use of this FMA can also be used to support and guide a number of research related activities. The framework can be used to guide the researcher through a process of critical inquiry and reflection (Stowell 1997). The desire to conduct such a critical reflection process emerged from the chosen philosophical posture of the researcher and the exploratory nature of this research. The systems thinking nature of this philosophical posture also imparted a need for the use of this FMA framework as an applied methodology. Therefore, the FMA framework will now be used to conduct several iterative learning activities; these will result in a refined appreciation about the framework of ideas (F) which was used by the researcher to both inquire and intervene within the chosen area of concern (A) using the action research methodology (M).

The third chapter of this thesis developed and presented two conceptual models which, when combined, were presented as an intellectual framework of ideas (F). The third chapter also articulated these two frameworks as being the basis for the 'Purposeful Inquiry and Purposeful Intervention' (PIPI) concept. The two models were noted as having differing uses and different and separate purposes. The first conceptual model (figure 6.2) was used to guide the purposeful inquiry, whilst the second (figure 6.3) supported the researcher's activities during the purposeful intervention. These two figures (6.2 & 6.3) are shown after the next section. The remainder of this section commences by reviewing the AR methodology before moving on to the two applied methodologies.

6.2.1 Action Research Methodology

The selection of the action research methodology emerged from the researcher's desire to intervene within the chosen research situation and provide the research participants with training that would then promote or improve their self-help capabilities. This was noted as being a factor of consideration, particularly with IS researchers Susman and Evered (1978), who believe that social inquiry should see the participants benefit from a collaborative learning experience. Susman and Evered (1978) also described the AR methodology as an approach towards social research that combined the generation of

theory with changing the social system through the researcher acting on or in the social system. This activity is therefore a means of both changing the system under focus and generating knowledge about it. Galliers (1987) supports this notion of adding to the collective knowledge of participants through intervention and interaction. He argues that groups should learn about themselves or their organisation through training and discussion.

Having conducted two field-based inquiries (Q1 & Q2), the findings and insights that were generated from the first inquiry (Q1) were then fed back into the research situation via the developmental workshop intervention process. This process included the participants learning about and appreciating their own situation via the constructs expressed in the first conceptual model, which is discussed in the next section. The process also provided them with the opportunity to exit these workshops armed with information that helped them change their own situation. They were also given several frameworks to allow them to improve this aspect over time after the researcher had left the situations. The main framework presented to these participants was a copy of the model of an IT innovation Information System. How each SME contextualised and used this model was discussed in the cross-case analysis section in chapter five (section 5.5)

Ultimately, the justification for the selection of the AR methodology is supported by the key findings and insights that were generated from these complex social situations. Another important aspect relates to the opportunity to conduct purposeful training activities. This training process helped to provide and support the notion of demonstrable improvement (see section 5.7) and the promotion of the self-help abilities of those SMEs that participated in the workshops (group A). This self-help aspect was reinforced by the researcher, who facilitated the workshops that generated collaborative discussions and democratic debate about change within their respective situations. Both SME groups (A & B) were also given a copy of the model of the IT Innovation Information System that they could refer to and utilise to help them achieve continuous change and/or improvement after the study was completed. This particular contribution to practice is further discussed in section 6.3.2.

6.2.2 SSM as an Applied Methodology

The selection and use of SSM as an applied methodology was supported by its theoretical suitability for developing the two conceptual models that underpinned and guided most of this research, in particular the framework for the Purposeful Inquiry and Purposeful Intervention (PIPI) concept. The application of SSM was not in the classical seven phase sense espoused by Checkland (1981:2000) and further developed by Checkland and Scholes (1990:1999). Instead, the researcher only used the methodology as an applied modelling tool that complemented their stated philosophical posture and use of the AR methodology.

The first conceptual model is of an 'IT Innovation Information System' shown in figure 6.2, whilst the second is of the 'Action Research Workshop Intervention' process shown in figure 6.3. Both models were created using the applied methodology. The SSM was outlined and discussed in detail in chapter three (section 3.5). The use of SSM was also noted in this section as being a limited application of the methodology. The researcher only used two phases of the classical seven-phased approach. The two SSM phases used were root definition and logical modelling.

The conceptual model shown in figure 6.2 was not operationalised in the case study situations as the theoretical lens to guide the inquiry; its use was limited to guiding the structure and development of the questionnaire. The questionnaire was the theoretical lens that was operationalised within all the SME case study situations. The field questionnaire was developed from the Holons presented in the model. The SSM-oriented term Holon was altered to the word construct to both support the communication process and simplify the questionnaire development process. Each of the Holons, or constructs, was then further refined by the researcher using a sub-framework. This sub-framework consisted of several elements, such as the Who, What, Where, When, Why and How. These elements were incorporated because they enabled the researcher to encapsulate a more complex and broad range of questions that could then be used to gather a more holistic understanding of the human activity performed. The human activity of interest

here was studied in relation to each of the constructs portrayed in the model. Since the SSM-based model focuses on human activity the use of this sub-framework provided the opportunity to conduct the two field-based inquiries at a broader and wider level.

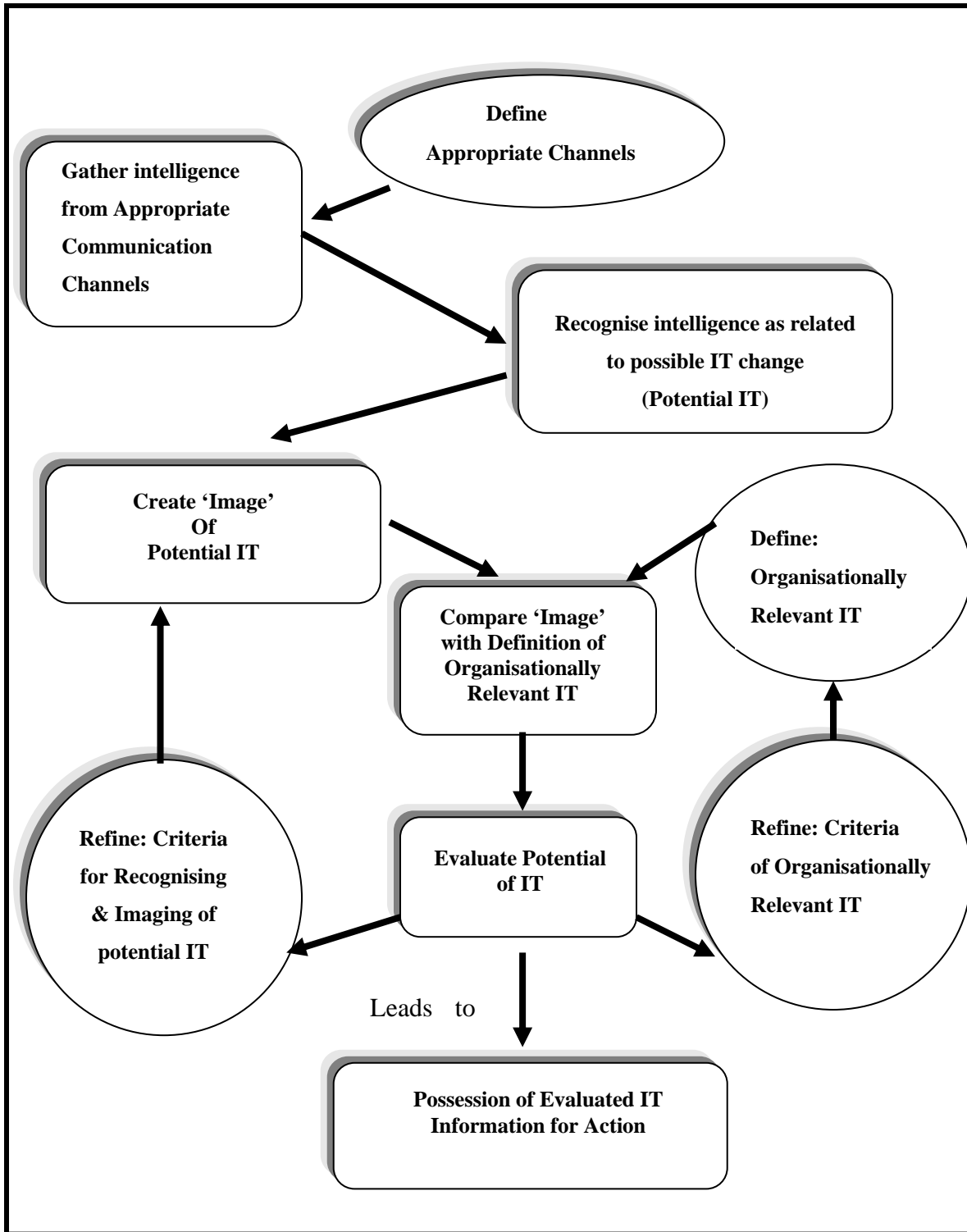


FIGURE 6.2 THE CONCEPTUAL MODEL OF AN 'IT INNOVATION INFORMATION SYSTEM'

The use of SSM was also useful because of its focus on humans taking purposeful activity. Another benefit relates to the field-based inquiry, since the researcher sought to understand how these SMEs conducted the activities under focus. The use of the sub-framework in combination with SSM also improved the questionnaire development process.

In addition to its usefulness as an inquiring tool, the methodology of SSM also offers “a process through which an organisation can continually reflect upon its aspirations and tasks, thus continually reviewing its information strategy” (Checkland & Scholes 1990, p. 313). This reflection concept blends well with the notion of handling the continuously changing flux of IT ideas and events that SMEs face within the modern economy discussed in chapter one. The multiple cycles, or stages of use, within SSM models provide good support for this dynamic area. The conceptual model shown in figure 6.2 also has three inter-related cycles of purposeful human activity (Ledington & Glen 2001). For example, in the first cycle, IT communication channels are scanned to identify information about potential IT innovations. The image of a targeted IT innovation is generated and then compared and engaged with the image of organisationally relevant IT. The cycle continues by further ‘refining’ the underlying thinking, or criteria, regarding what is generally meant by an organisationally relevant IT innovation. The cycle also includes ‘refining’ the criteria for recognising and imaging IT innovations.

The second cycle of activity continually ‘refines’ an organisationally relevant IT innovation. These two dynamic cycles can be brought together in a comparison to enable the organisation to continuously revise both its evaluation of new IT innovations and definition of organisationally relevant IT. Finally, there is also an outcome in which the ‘picture-in-situation’ generated by the system itself is enacted, thus essentially creating a third dynamic cycle of practical change that feeds into the other two cycles. The overall process is considered to be a purposefully managed IT innovation information system that supports an SME in their sense making of new IT innovations and management of their IT innovation information environment (Ledington & Glen 2001).

The overall usefulness of this first model relates to its ability to support the initial direction of the research and maintain the focus and structure of the questionnaire development activities. The creation of logical or conceptualised models of the chosen research situations proved invaluable, particularly to the questionnaire development process. The SSM expression of compartmentalised human activity, combined with the use of the interrogative sub-framework used in this study enabled the development of a series of questions that provided many situational findings and insights about the area of concern (A).

The second conceptual model of the AR workshop intervention was developed and used by the researcher to both support and conduct the developmental workshop intervention. This second model presented in figure 6.3 was also developed using the same two SSM phases that were presented in the previous section. The researcher first generated a root definition of the intended situation, which then guided the development of the conceptual model shown in figure 6.3. The use of this model was primarily for the workshop process. The model was also created to provide guidance for the researcher and allow the reporting of the manner in which the workshop intervention was conducted. A detailed description of constructs portrayed in this model was presented in section 3.7.

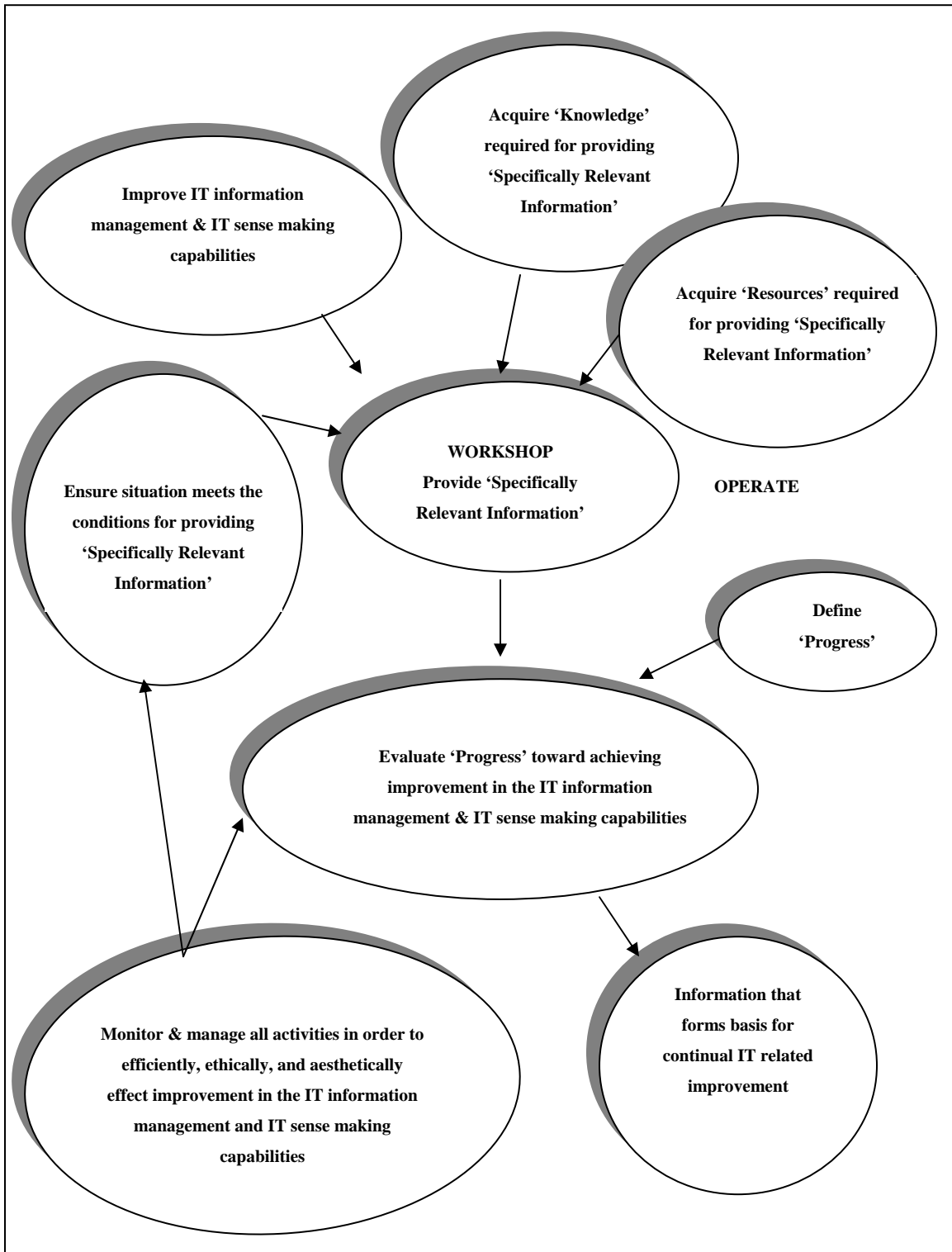


FIGURE 6.3 A MODEL OF 'ACTION RESEARCH WORKSHOP INTERVENTION'

This second conceptual model was not operationalised or used to support the questionnaire development process. The researcher used this second model to identify the types of activities that must be performed to achieve the purpose of the workshop intervention. The purposeful intent of this system related to the introduction of practical change in the form of demonstrable improvement in several IT-related areas. Like the first model, this contains a series of constructs that represent purposeful human activity. The model was also assembled and presented as a whole system that comprised several interrelated components or parts. When combined, these components formed the overall workshop intervention system. This modelling process was also noted as being philosophically suitable given the holistic nature of the inquirer and the research approach in general. The primary goal of this second system was to improve several IT-related capabilities of those SMEs that participated within the workshop process.

Having engaged the SSM in a new way other discussions that relate this research to the theory of SSM are presented in section 6.3.1. The focus now turns to the next systems thinking concept that was used in this study as an applied methodology.

6.2.3 FMA as an Applied Methodology

The use of the Checkland and Holwell's (1998) FMA enabled reflective learning processes to occur within this study. It was also applied to the research at a higher level, since its use was extended to provide guidance to the overall research process and the composition of this thesis. The selection of the FMA and its use as an applied methodology is supported by the critical reflection outcomes presented in this chapter. The main learning that emerged from these reflective activities is outlined at the end of this chapter. The main benefit from the process of critical reflection included the further refinement of the PIPI concept. The reflective activities allowed the researcher to make further contributions to theory after the study ceased such as identifying possible changes and future directions for the PIPI concept. The main contribution of this reflection activity was the model presented in figure 6.5, which highlights how 'Theory' informs

‘Practice’. This has implications for many areas, which are discussed in section 6.3. Overall, this aspect would not have transpired without the selection and use of this FMA concept.

Unfortunately, the FMA concept offers little structural support for discussing the manner in which a study was conducted (Champion & Stowell 2002). In order to make judgements about the credibility of this study the researcher needed to determine if the manner in which it was conducted was both credible and valid. The two conceptual models in the PIPI concept, in conjunction with the FMA, allowed the researcher to outline and describe the manner in which the inquiry and the intervention were conducted. These discussions were presented in chapter three along with the conceptual models that enabled and supported this process. Given the reflective learning obtained throughout this chapter, the relevance and usefulness of Checkland and Holwell’s (1998) FMA concept has therefore been justified.

6.3 IMPLICATIONS FOR THEORY AND PRACTICE

The purpose of this section is to highlight and discuss the implications and contributions that the research has made to both theory and practice. The first and second parts of this section outline the contributions to theory and practice respectively. These implications and contributions have emerged as a result of developing and testing several new and existing frameworks (F) across eight SME case study situations (A) and through the operationalisation of the ‘Purposeful Inquiry and Purposeful Intervention’ concept (F) via the use of the action research methodology (M).

6.3.1 Implications for Theory

Central to this research and research in general, is the idea of theory development and testing. These contributions to theory may be plotted along a continuum from development to testing (Bagozzi 1981; Yin 1989). This was achieved via the

development and testing of the ‘Purposeful Inquiry and Purposeful Intervention’ (PIPI) concept. The research conducted and presented in this thesis therefore contributes to inductive theory development and testing. Inductive theory building is an interpretivist ideal whilst deductive theory building is the positivist version (Bonoma 1985; Romano 1989). Perry (1998) and Eisenhardt (1989) also provide guidance for building theory from multiple case study situations and these ideas were used and discussed in section 4.2. To strengthen the rigour of this study, the researcher engaged Klein and Myers’s (1999) seven principles for evaluating interpretive field studies in section 6.1.3. In support of this evaluation process, this section commences by further evaluating the qualitative nature of this interpretive field study to support the studies theoretical generalisations. Walsham (1995) suggests four categories of generalisations that may be made in interpretive field studies, which are as follows:

1. Development of concepts
2. Generation of theory
3. Drawing specific implications and
4. Contributions of rich insights

As outlined in chapter three, this research develops several new concepts and as a result it contributes to these four categories. The main concept developed is the PIPI concept. This also contains two purposefully designed conceptual models, which were used to support and guide the inquiry and assist the researcher during the AR workshop intervention process. A methodological contribution here is the creation and testing of a new ‘Purposeful Inquiry and Purposeful Intervention’ concept that may be used by both academics and practitioners to improve the IT information management and IT sense making capabilities of SMEs, or simply to ‘Purposefully Inquire’ or ‘Purposefully Intervene’ in research situations that are either problematical or non-problematical. Another contribution of this study was the provision of knowledge regarding how SMEs make sense of IT innovations in practice and the management of IT innovation information. The study also evaluated the IT innovation information environment in which these regional SMEs operate. The generation of theory occurred through the application of these concepts in multiple SME case study situations (Perry 1998;

Eisenhardt 1989). The use of these concepts also generated specific implications for theory, the research area of concern (A) and for the IS discipline. These implications are outlined and discussed in this section. The nature of the data collected from the eight SME case studies situations was rich enough to address the two research questions (see section 6.1.1) and provide valuable insights and key research findings, which were presented in chapter five (section 5.6). Walsham (1995) also notes that it is possible to have all four types of generalisations from the one field study. This research therefore contributes to all four of Walsham's categories.

One of the main research issues identified in the literature review chapter related to the problems associated with taking a purely scientific approach, particularly the observation methods. The scientific method of observation was shown to remove the opportunity to conduct an explicit form of intervention. The selection of AR as the methodology for this study was justified because it embodies such a strategy for studying and introducing change, and allows analysis of the ensuing modifications or changes (Baskerville & Pries-Heje 1999). As previously discussed in section 6.2.1 the cyclical nature of the methodology allowed the outputs of the first intervention, the first field-based inquiry, to flow into the second, which was the AR workshops; the outputs from the workshop intervention then flowed back to the third intervention, which was the second field-based inquiry, thereby completing one complete cycle of the AR process.

The researcher also operated the AR methodology in the appreciative and participatory mode of operation. The Appreciative mode (Cooperrider & Srivastua 1987) was chosen because the first model was not directly focused on a problem situation. The PIPi concept provides a new research conceptualisation and modelling process for situations that are either problematical or non-problematical. This gave the researcher and the participants the opportunity to explore more positive possibilities than simply addressing a problem situation. One of the fundamental aspects of the Participatory mode (Park 2001; Cronholm & Goldkuhl 2004) relates to a collaborative form of AR where the researcher and research participants act as co-researchers. This democratic activity was conducted during the AR workshops, and was guided by the second conceptual model designed for

the workshop interventions. The use of AR operated in the Participatory mode was noted as being problematical since the researcher loses control of the research area of concern (A). This lack of control relates to the ability of the researcher to pick and choose what problem or situation to focus their attention on (Baskerville 1999). The PIPI concept changes this problematical situation, enabling the researcher to inductively lead the way and select the frameworks (F), the area of concern (A) and overall research design (M). This 'researcher-led approach is a major theoretical contribution to the Participatory mode of AR.

The next theoretical contribution relates to the applied use of the Soft Systems Methodology (SSM) developed by Checkland (1981:2000) and further developed by Checkland and Scholes (1990:1999). The SSM was operated in mode 1, which is an application of the methodology to guide action (Checkland & Scholes 1990). This study used two SSM-derived models to guide and inform the researcher of relevant actions. The research also engaged the methodology in mode 2, which witnessed the use and implementation of the first conceptual model within several SME case study situations. The first model, which was used for the inquiry, was also given to participants to use or implement into their respective situation. Therefore, the PIPI concept uses the SSM in modes 1 and 2. The next implication for SSM theory relates to the advocates and users of the SSM. The application of only two phases of the classical seven phased approach is testament to its overall usefulness. The SSM was useful as a tool for modelling and guiding the researcher's field-based inquiries and the AR workshops. This partial use of SSM is a new application or another possible mode of operation that to date has not been noted within the SSM literature.

The traditional use of SSM has also been historically focused on developing representations of problem situations. This problem-oriented stance is evidenced in the classical seven phases of the SSM. The first few phases of this SSM focus on developing a rich picture, root definitions and a conceptual model of problem situations. Given the social and interpretive nature of this research, the researcher sought to portray the chosen research area of concern (A) as a situation, rather than as a problem situation, which then

needed to be explored; hence the act of inquiry. Several SME issues were raised in the first chapter, which could be considered to be problematical; however, the researcher sought to develop a more positive approach to the model development process, so these issues were not presented as a problem situation but rather as a research situation that needed to be explored. This positive focus may also be considered a new application of SSM.

The linking of SSM-derived models with the AR methodology has also resulted in an opportunity to implement practical change through the conducting of AR workshop training sessions. The classical version of SSM does not specifically articulate how these types of training activities are performed and achieved. Although only a subtle difference, the application of all phases in the traditional SSM approach has received some criticism since it was noted as being hard to operationalise, and the required comparison activities are also reported to be difficult (Ledington & Ledington 1999). Collectively, these implications for SSM contribute to the growing body of SSM related literature.

The next implication for theory relates to the development and testing of a new questionnaire development process, which is anchored to the SSM conceptual model developed for the inquiry. The questionnaire development and use process developed here continues the use of holistic or soft systems thinking, since it deliberately incorporates many holistic elements or factors of consideration. These elements could be assessed as being to the left and to the right of the main focal point of the research. In other words, instead of focusing on the conceptual model, the questionnaire development process expanded the ability of the inquiry process by incorporating another framework that broadened the focus of the inquiry. The intent here was to establish a richer and deeper investigation of the main element under focus. Along with the model for the inquiry, the questionnaire development process also engaged an interrogative sub-framework, which was the Who, What, Where, When, Who and How framework. It is important to note that this sub-framework was not used to support the development of the field questionnaire. Its role was to enable the researcher to broaden the questionnaires overall focus. The opportunity to employ such a framework also emerged from the

selection of the system thinking approach. Of note here was the inclusion in the field questionnaire of both qualitative and quantitative data gathering tools. The questionnaire was designed to gather predominantly qualitative data; however, several ratio scales were incorporated to demonstrate the usefulness of this study and substantiate the claim of demonstrable improvement from a participant's perspective. The new questionnaire development process may also be extended to the SSM literature because its primary source of direction was the conceptual model. The conceptual model process is something that most SSM users employ. The ability to generate questionnaires or questions based upon these conceptual models can therefore be considered another contribution to the SSM literature.

An important implication for the theory examined in the literature review chapter is the discontinuation of the IT adoption or non-adoption dichotomy. The model of an IT Innovation Information System shown in figure 6.2 gives SMEs and enterprises in general the opportunity to simply consider a new IT innovation via an evaluation process. The main output from the use of this first model is the generation of evaluated IT innovation information, which can be used to guide further action such as IT adoption or non-adoption. In other words, this model provides a framework that gives a business the opportunity to consider an IT innovation until organisational constraints such as information or technology-related requirements are met or circumvented. Examples of other constraints include the consideration of a particular IT innovation that may not be relevant to the business until other IT developments occur. For example, the definition of relevant IT innovations may change as knowledge worker skills change or internal or external aspects change. The PIPi concept can also reduce many of the barriers to IT adoption, in particular the many information related aspects such as understanding and knowledge about new technologies.

The next implication for theory stems from the use of systems thinking concepts within the discipline of IS. The traditional focus within the IS discipline has previously been on data and technologies (Cecez-Kecmanovic 2002). The discipline has evolved from this preoccupation to more contextual, organisational, behavioural and social elements

(Cecez-Kecmanovic 2002). Given the direction of the IS discipline towards the social interaction with IT and information systems in general, systems thinking concepts that enable social forms of inquiry and purposeful intervention may be seen as highly desirable. The reason for this relates back to discussions in section 3.2 concerning the historical developments of the tools and techniques used within the discipline to conduct research. The notion of reductionism was also a problematical aspect identified in a number of frameworks and ideas discussed in chapter two, and can be mitigated using systems thinking concepts. Also, none of the frameworks examined in chapter two had any inbuilt self-help capabilities. By contrast the PIPI concept enables both research (inquiry) and intervention. The use of systems thinking concepts has proven to be useful both for this particular study and the development of the PIPI concept. The PIPI can be seen as contributing to the frameworks available to study social aspects within the IS discipline.

The sense making approach used in this study encouraged an analytical focus upon the processes through which individuals create and use symbols. It focuses attention upon the study of the symbolic through which reality is created and sustained. Individuals are not seen as living in and acting out their lives in relation to a wider reality so much as creating and sustaining images of a wider reality, in part to rationalise what they are doing. They realise their reality by reading into their situation patterns of significant meaning (Morgan et al. 1983). Images rationalise what people are doing and derive from rationalisations of action. People create and sustain images of a wider reality. Weick (2001) states “Managers need to be just as attentive to meaning as they are money. As organisations move more and more vigorously into electronic information processing they will increasingly bump up against the limits of human processing capacity and the key to overcoming these limits is meaning, because it increases processing capacity. Unless these qualitatively different kinds of logic are developed, disseminated and valued by the organisation, people will find themselves increasingly unable to make sense of the products of Information Technology (IT)” (pg 456).

Weick (1979) suggests that many individual people play a role in scanning, interpreting and processing data, but the point at which information converges and is interpreted is assumed to be at the top management level. This study suggests that this holds true within the SME situations examined. Managers and business owners were identified as those people that perform these information interpretation or sense making activities. Managers are also said to perceive information differently depends on information sources (Anderson et al. 1994; O'Reilly 1982; Reimers & Fennema 1999). The PIPI concept further refines the relationship between scanning, interpreting and learning by providing structure that guides these sensemaking activities. Information accuracy and reliability were also noted as being dimensions of information quality (Zmud 1978). The PIPI concept also improves these aspects by focusing on contextual elements resulting in IT innovation information that was interpreted by the firm. Managers were noted as being more likely to use information they trust and is of high quality (Mooreman et al. 1993). Managers that are in situations where they are unaware of information are placed at a competitive disadvantage (Daghfous & White 1991). PIPI takes a more structured and pro-active stance to help reduce this missing of valuable information. The model also provides assistance for the organisation and individuals to make sense of new IT innovations in practice.

Organisations must also develop information processes capable of detecting trends, events, competitors, markets and technological developments relevant to their survival (Weick 1979). The first conceptual model has been shown to be capable of performing such a role. The PIPI concept also confirms and builds on the sense making approach used by Cheuk (1998) in that it was able to incorporate several other sense making dimensions relevant to information seeking and use. For example, the first conceptual model contains the contextual definitions and use of appropriate communication channels, appropriate information sources and other information evaluation aspects such as the organisation's criteria for recognising and imaging of potential IT innovations. Therefore, the ideas represented within the PIPI concept may also be extended to support and build upon Cheuk's notion of 'Information Seeking and Use' (Cheuk 1998).

The data analysis method used in this study was critical hermeneutics (section 4.4.4). The use of this particular method enabled the researcher to understand and analyse the chosen research situations as a text-analogue. Each SME situation was analysed using the hermeneutic principle of circular understanding. The hermeneutic process of data analysis (Gadamer 1976) is a circle of understanding of an organisation as text, which is itself in a circular relationship. This circular data analysis method initially focused on examining the constantly changing whole, and then to the parts and back to the whole again where the parts that are determined by the whole also determine the whole. Stowell (1995) notes that this circle of understanding can also be a never-ending cycle of learning. According to Myers (1995) the main advantage with using this critical or dialect hermeneutic approach is the chance to portray a richer picture of the complexities in organisations, in particular the social, political and cultural systems. The more interviews the more information is processed and the more information gathered the more understanding of the organisation as a whole and its constituent parts (Myers 1995). The selection of this approach to data analysis proved valuable given the key findings and insights that were gathered in this study. These contributions add further weight to the selection and use of this data analysis method and further the theory of hermeneutics.

The next implication for theory arose after the study had ceased and adds further weight to the testament of critical reflections. During the write up stage of this thesis the researcher noticed, during the critical reflection activities which were guided by the use of Checkland and Holwell's (1998) FMA, that the relationship between the two separate models presented in the PIPI concept may be expressed and therefore interpreted in a different way using the same ideas from the discipline of informing science. The goal of informing science is to solve a critical issue that is present within the discipline of IS. Critical research within the IS discipline has emerged with an issue, theory and practice are not 'informing' each other (McGrath 2005). The discipline of IS has in effect, not yet reached a position where the theory and practice of doing critical research are informing each other (McGrath 2005).

The PIPI concept has within it the explicit presence of two separate information systems each purposefully designed and used to achieve differing research related aims and objectives. The relationship between the two separate systems was described in chapter three using theory from the discipline of Informing Science (section 3.8.2.). These two systems are again described in this section as system 'A' and system 'B'. System A is the first information system which was used by the researcher to support and guide the 'Purposeful Inquiry' process, whilst system B is the second information system which was used to support and guide the 'Purposeful Intervention' process. The output of the first inquiry (Q1) then informed system B, which was the AR workshop intervention system. System B then informed system A through the deliberate process of a second Purposeful Inquiry (Q2), thereby completing one complete cycle as shown in figure 6.4. Informing was noted as being the result of engagement with data (Boland 1987).

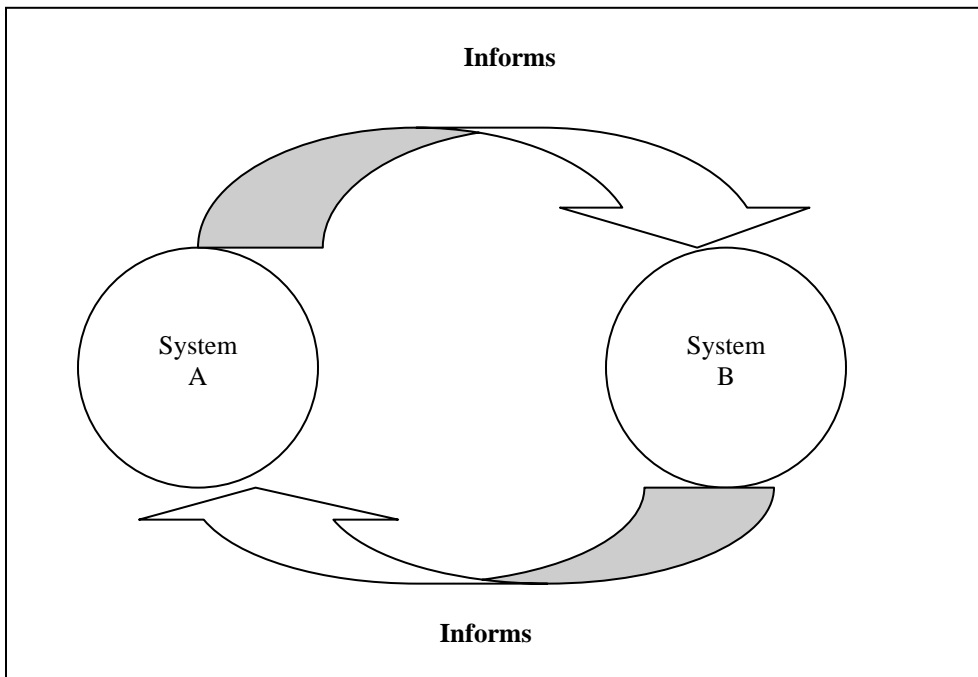


FIGURE 6.4 SYSTEM 'A' AND SYSTEM 'B' RELATIONSHIP (ADAPTED FOR THIS RESEARCH)

Another interpretation of this circular relationship is as follows. System A and B were both developed using theory; however, the actual content of system B contained no real

theory but instead only ways of going about the workshop interventions. The researcher introduced theory to the participants within the confines of the AR workshops. If the second system is considered a venue for practice to become informed about the theory from system A a new way of interpreting system B exists. If system B is considered to be practice then a new relationship between the two systems exists, as shown in figure 6.5.

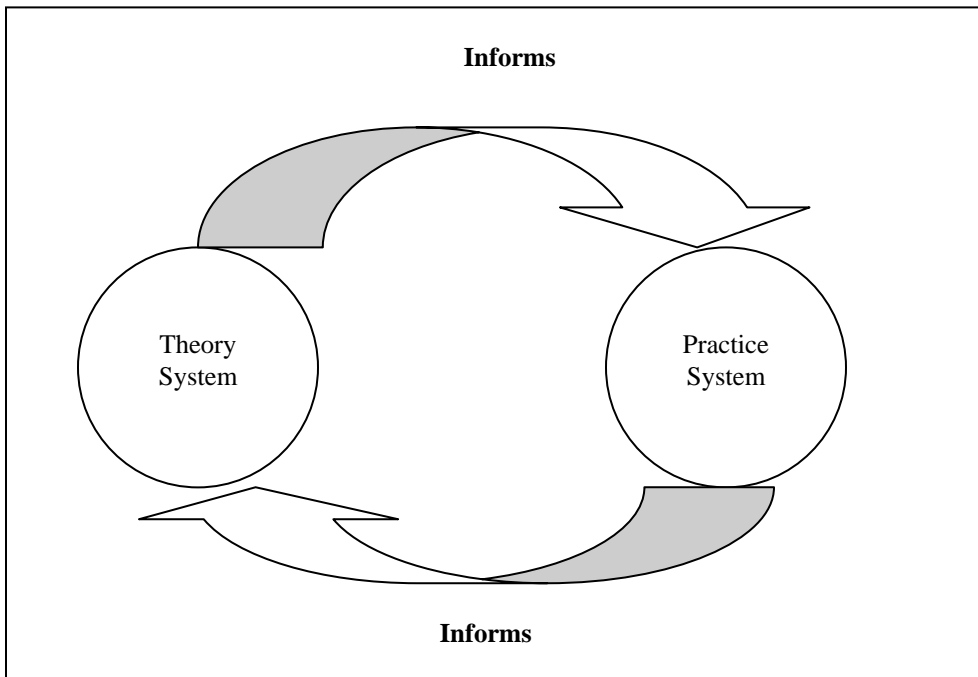


FIGURE 6.5 THEORY INFORMING PRACTICE (ADAPTED FOR THIS RESEARCH)

Apart from being derived using theory, the first system contains many theories. These are related to each of the constructs portrayed within the first system. For example, the first construct focused on gathering intelligence from appropriate communication channels. The researcher then reviewed several theories relevant to this particular construct. This approach was then carried forward to each of the remaining constructs. Such a situation sees the theory relevant to each construct being introduced to the second system by the researcher. These inputs to the second system were conceptualised in this study as Specifically Relevant Information (SRI). Descriptions and examples of the SRI introduced in this study are discussed in section 3.7. Of particular interest here is the

temporal aspect of this relationship. During this study, the time taken between theories informing practice was only a period of several months. This study therefore introduces an approach that minimises the time taken to inform practice of developments of a theoretical nature. This temporal aspect may prove to be beneficial in an era that is typified by constant and dynamic change such as that noted in the modern economy discussed in section 1.1, which is continually active. The time that it takes for academic and theoretical contributions to be developed and implemented in practice renders this situation problematical. This claim is further supported by the complexities that were noted to exist in the modern economy concept discussed in the first chapter. Overall, this final contribution has important implications for both theory and practice. It is also a major contribution and an exciting area for future research.

6.3.2 Implications for Practice

The research conducted and presented in this thesis provided several contributions to theory and academics. It also provided many benefits to those SMEs that participated in this study. These may be extended to include other SMEs, such as those in other geographical locations and industry sectors. The following summarises the main benefits for those that practice in this area or for those practitioners that utilise the methodology of action research or conduct training seminars:

- An evaluation of the strengths and weaknesses of the SME information environment and IT innovation sense making processes
- An indication of the IT adoption or consideration process; this is highly relevant to IT marketing firms, marketing in general, IT vendors and IT practitioners that seek to improve organisational evaluation and decision making investigating new IT innovations
- The provision of a new conceptualisation process that gives practitioners the opportunity to focus on both problematical and non-problematical situations
- The provision of a newly developed and tested questionnaire development and use process that may be used to understand situations as a text-analogue

- The framework for the workshop intervention may also be used to structure, organise and facilitate the workshop and/or to facilitate continual improvement processes

Of note here is the provision of several useful and adopted models that also provided many benefits; in particular, some structural and directional support to the SMEs that participated in this research. These eight SMEs offered their services, resources and time, so in return the researcher felt a moral and ethical obligation to provide them with frameworks that improved their capabilities to continually improve their respective IT-related situations. This may be considered a direct contribution to these participants.

The modern economy concept discussed in the first chapter (section 1.1) showed how Australian business owners and managers need to keep abreast of the global IT state-of-affairs. A challenging aspect for any business that then seeks to scan, gather and interpret all the globally transmitted IT innovation information is that this can be a difficult and monumental task. This aspect requires some form of bounded rationality in that it would be tremendously difficult and therefore unreasonable for these businesses to manage all of this globally generated IT information. Therefore, the creation of a system that guides and supports this is particularly useful for those performing and managing such an activity. The use of a defined structure and formally modelled system to improve the IT sense making process and the management of the IT innovation information environment can be seen to be a highly desirable contribution in such circumstances. Therefore, both models that are presented in the PIPI concept have real world relevance, usefulness and implications, both for the owners and managers of Australian SMEs and also for those that practice in these IT-related areas. A model such as the IT Innovation Information System also has currency for businesses around the world that operate in the modern economy.

The key findings and useful learning points that emerged from this study may also be published in a range of industry journals and disseminated by those peak industry bodies and agencies that deal with SMEs. This information may be used to assist SMEs in their

transition to the modern economy, which was an aspect discussed in section 1.1. These findings and useful learning points may also be disseminated by numerous government agencies that represent Australian SMEs or have an interest in their technology-based capability. The two models developed and used in this study may also be considered to be the equivalent of how a larger organisation makes a formal business case for IT. Developing a business case for a proposed information system or technology is a part of the strategic evaluation process in large organisations (Beynon-Davies 2002). The strategic evaluation process involves assessing or appraising an investment in terms of its potential for delivering benefit against estimated costs. As part of a business case an organisation would also need to conduct an assessment of risk. Projects that do not meet appropriate levels of benefit and satisfactory levels of risk are rejected and those that substantiate the business case may then be subjected to some form of feasibility study, which involves analysis of the ability of the organisation to resource and complete the project (Beynon-Davies 2002). The PIPI may be used as an SME version of this process because the first model generates evaluated IT innovation information that can then be used as the basis for future action. One possible action may be the generation of business cases for IT within SMEs.

The researcher-led activities conducted in this study were guided and supported by both models. Others may also use these models without the presence of the researcher. The usefulness of the models developed in this study may also be extended to include practitioners and those SMEs wishing to improve their IT innovation sense making capabilities and management of IT innovation information. Both models have enough structure to permit these activities to be performed without the researcher being involved. The workshop model shows how to set up and prepare for the workshop process. It outlines what type of resources and capabilities are required for those who are conducting this activity. The only prerequisite would be the development of a standardised workshop process that may take the form of a series of informative seminars or workshops. Those persons that have sufficient capability to perform such a task may conduct these. This aspect was also discussed and modelled within the framework for the AR workshop intervention. Several constructs of this second model related to the researcher's capability

to perform these activities. For example, the model outlines the need to acquire knowledge for providing SRI, to ensure that the situation meets conditions for providing SRI and the acquisition of the necessary resources needed to perform these workshops such as a suitable venue. The usefulness of this second model may be extended to include these training and information dissemination aspects. Of note here was the existence in this model of a construct that pertains to the monitoring and controlling of these activities. Various stakeholders, practitioners, management or business owners may manage this part of the process.

Markus (1997) argues that one of the directions the IS field should now take is the appreciation of practicality in IS research. This should not replace research that builds or tests theory, but rather should complement it with rigorous studies that describe and evaluate what is happening in practice. Other authors calling for more real world relevance and practical outcomes include Lee (1999), Lyytinen (1999) and Hirschheim and Klein (2000). Hirschheim and Klein (2000) refer to the vicious cycle of academic research as the reason why researchers have valued rigour over relevance to keep their jobs. Given these considerations and the overall direction of the IS discipline, this research was oriented towards providing practical and structured frameworks that supported learning for both the participants of the research project and those that practice in these IT and IS areas.

Piccoli and Wagner (2003) claim that academics have not generally performed well at making their work accessible to practitioners and communicating the value of their findings to practicing managers. However, there are signs of change as an increasing number of researchers are working to build relationships with managers (Piccoli & Wagner 2003). Academics may be considered to have a moral obligation to help educate future generations of industry leaders, who may otherwise decline to participate in research studies because of a general lack of immediate applicability of results. The expansion of university-based research centres that focus on the specific needs of various enterprises are becoming increasingly attuned to practitioners' needs (Piccoli & Wagner

2003). Given these considerations, the research was conducted in a manner that aimed to bridge the gap between academia and practice.

The final implication relates universities partnering with industry in order to add theory to practice. The PIPI can be used on a continual basis by those best suited to using these systems. The opportunity here relates to the role that universities play within their broader community. The use of this concept may be extended to perform these types of activities on a regular basis in order to achieve some benefit. This situation would see the university system providing theory to practice, which could provide relevant and demonstrable improvement over an extended period of time. This aspect is an opportunity for universities to change how they inform local or regional businesses about relevant theory that may assist these businesses. This aspect was noted as being a concern for universities in general by Piccoli and Wagner (2003).

6.4 FUTURE RESEARCH DIRECTIONS

The purpose of this section is to highlight future directions for this research and suggest how the new PIPI concept may be extended and built upon. These have emerged as a result of successfully developing and testing the PIPI concept that was presented in chapter three.

The literature and the bodies of knowledge that were examined during the literature review process contained a range of historical developments and theoretical ideas. The theories and frameworks that were developed in this study have provided a new way of understanding how SMEs make sense of new IT innovations and how they manage their IT innovation information environment. The previous research into IT and organisations spans many different bodies of knowledge and a range of disciplines, such as IS, marketing, accounting, computer science and the behavioural and social sciences. The research presented here acknowledges these various contributions; however, given the

dynamic and rapidly changing nature of the global economy, theoretical change is needed that accommodates and supports this dynamic activity in a global business environment. The PIPI has relevance to many other research situations that seek to take a new approach to examining SME-IT relationships.

The PIPI concept presented in this thesis also represents another gradual shift towards the use of modern and traditional systems thinking concepts and more social forms of inquiry and intervention. The support for this shift was evidenced by the overall direction of the IS discipline. The research presented here has also indicated the diversity of factors that are present in each unique business setting. From the outset, this study deliberately targeted its area of concern, which was amalgamated to form the chosen research situation. The design approach used in the PIPI concept provided an opportunity to broaden the field of inquiry and thus broaden the field of understanding. The option for the researcher to lead the way in selecting the methods and tools for this inquiry was also noted as being a contribution to those that use the AR methodology in particular the participatory mode. This researcher-led method may also be extended to include other situations that need to be either researched or changed.

The focus for the frameworks (F) used and presented here can now be directed towards other notable areas of concern (A) or research interest. They may also be applied outside the discipline of IS. The frameworks, tools and methods employed here enabled the achievement of the stated aims and objectives. The two models used in the PIPI concept also have currency in many other research situations including those outside the discipline of IS. They may also be extended to include other disciplines that seek to conduct a more systemic approach to their research, or alternatively those that wish to broaden their scope of inquiry or simply intervene in situations with some predetermined objective. For example, marketers that wish to improve their client's awareness of different marketing aspects or strategies might conduct a purposeful inquiry. They then might want to conduct a purposeful intervention program. These two aspects of inquiry and intervention may be used independently of each other or combined to form the inquiry and intervention concept.

The PIPI concept itself may also be extended and further tested in the field. This would refine the concept and improve its overall capability over time. In other words the PIPI concept may be extended to include other research situations. The PIPI concept used for this study has two separate models. The modelling process may involve other differing objectives. This process would require other conceptual models to be developed. These conceptual models may be applied and used in the same way as in this study or modified to suit the new area of concern (A) or methods (M). To further extend its usefulness the first model could then be changed to reflect a new root definition developed using SSM. The new subject matter of this model may then be further refined, by using the questionnaire development technique used in this study and the FMA framework. The second model in the PIPI concept was designed for the intervention workshop process. This model can therefore be considered as a generic model for the conducting of AR workshops. The explicit purpose of the second model would also need to reflect the new purpose or goals of the first model. Therefore, the second intervention model only requires minor alterations to reflect the new purpose or goal of the first model.

The data collection process used in this study is another potential area for future research. Other data collection approaches, such as the survey method, may also be tested as a reliable source of gathering situational findings and insights from businesses in locations that are not easily accessible to researchers. The use of both qualitative and quantitative methods also needs to be further explored by other researchers with a differing philosophical perspective. This research used compartmentalised sets of questions that sought more qualitative responses than quantitative. Using more quantitative methods of data collection and analysis methods may further test the questionnaire development process outlined in section 4.4.1. These options were not selected because of the researcher's philosophical posture. There are a number of the concepts developed in this research that may be applied using other philosophical postures and methods. This possible range of philosophical options also warrants further exploration and testing.

The explicit presence of two separate systems in PIPI may also be extended as an interpretive form of systemic intervention. This systemic intervention method is by comparison to critical systems approach discussed in chapter three, section 3.4. This aspect required further attention. Overall, given the number of newly created and tested elements within this research, the opportunities to expand, test and expand the PIPI concept further are numerous and exciting.

6.5 LIMITATIONS

The purpose of this section is to identify the key limitations of this research. Methodological limitations and the strategies used to minimise the impact of these limitations for this research were addressed and justified in detail in Chapters 3 and Chapter 4 and will be briefly outlined next.

A key limitation is the lack of generalisability of the findings resulting from the qualitative nature of the data gathered, the relatively small sample size (eight SME cases with a total of 73 individual people being interviewed) and the use of non-probability purposeful sampling in choosing both the cases and the respondents within the cases. However, as the purpose of this research was theory building, that is, the development of the PIPI concept, rather than theory testing, this limitation was expected.

In addition to the key limitation outlined above four further minor limitations should be noted as outlined next. These limitations result from the small number of respondents, the variability in IT knowledge of respondents, the replicability of the methodology and finally the delimitations of scope of the research.

Firstly, the number of respondents (73, refer table 5.1) may be considered low. However, given that the businesses were SMEs this still allowed for an average of 9 respondents per case allowing for considerable within case triangulation of results. In addition, 14 of these respondents were interviewed twice in a six-month period to test the effectiveness of the intervention component of the PIPI. It was important to interview the same contact

used in Q1 for Q2. This was needed because the researcher sought to intervene in the research situation and perform a basic before and after analysis of the scenario. Again this limitation is acceptable within qualitative research given the purpose of theory building rather than theory testing.

Another limitation of this research relates to the variability in the levels of IT competence of the respondents within each case. Each SME involved had differing levels of IT knowledge, IT capability and IT competence. This variability meant that some participants were able to answer more fully than others. However this limitation was not critical to the overall research findings given the diversity of cases and the duplication of the inquiry process. Furthermore this limitation is acceptable within case research (Yin 1994) and the overall research findings are still appropriate for analytical generalisation.

Thirdly, from the outset, this study deliberately targeted several IT related areas of concern, which were amalgamated to form the overall chosen research situation. The design approach used within the PIPI concept provided the option for the researcher to lead the way in selecting the methods and tools outlined in chapter 4. This was noted as being a contribution to those that use the AR methodology in particular when they operate in the Participatory Mode. However, this researcher-led method may be unsuitable for some action researchers, in particular, those that are unable to utilise and implement this mode of AR.

Finally, further minor limitations in relation to generalisability result from the delimitations of scope of this research in that the research focused on SMEs only and geographically these companies were chosen from one regional area.

6.6 CONCLUSION

This final chapter commenced by reviewing the research aims and objectives before addressing the two research questions using a summary of key findings and insights generated by this study. The chapter also addressed the three research propositions in the

affirmative. The chapter then evaluated this research using the seven principles espoused by Klein and Myers (1999). The next section performed a series of critical reflections regarding the action research methodology and the two applied methodologies (SSM & FMA) used in this study. The chapter then outlined and discussed the implications of this research to theory and practice. These activities were supported by Walsham's (1995) four categories of generalisations from interpretive field studies. The section also outlined the most useful learning points and key outcomes that contributed to theory and the discipline of IS.

Several discussions outlined the many contributions that this research has made to both theory and practice. These contributions emerged from developing and testing the new 'Purposeful Inquiry and Purposeful Intervention' (PIPI) concept across eight SME case study situations in two field-based inquiries. The outcomes of applying PIPI as an inquiring concept included many key findings and valuable insights into how SMEs make sense of IT innovations and manage their IT innovation information environment in practice. The new PIPI concept was also applied as an intervention tool in a series of action research developmental workshops. This workshop process allowed the researcher to introduce practical change within the SME case study situations. This change took the form of demonstrable improvement in their IT innovation sense making and management of IT innovation information capabilities and was presented in section 5.7. Other discussions presented in this chapter related to the future direction of research and how this study and the new PIPI concept may be extended in the future to include other areas of concern and other disciplines. Having addressed both research questions and the three research propositions and having also demonstrated that the stated research aims and objectives were achieved, this final chapter brings the research to a close.

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APPENDIX A

Interview Questions

Part A – Personal details

Q.1. Name?

Q.2. Position/Title/Daily Responsibilities?

Part B – Recent IT innovation considered

Q.3. What was the latest IT innovation that your business considered?

Q.4. Was this IT innovation adopted and implemented into the business?

Q.5. Why was this IT innovation chosen?

Q.6. What was its original purpose or use?

Q.7. When was the decision made to adopt this innovation?

Q.8. How was this decision made?

Q.9. Who was involved in the decision making process?

Construct ‘A’

Q.10. Where did the information about this particular IT innovation come from?

Q.11. Why did you use this particular source of information?

Q.12. Were you aware of any other sources of information and did you use any of these?

Q.13. Who collected the information about this innovation?

Q.14. Where does the business normally collect information about IT innovations?

Q.15. Who is normally involved in these activities?

Q.16. What sources of IT information do you have access to?

Q.17. Do you have access to the Internet at work?

Q.18. Do you have access to the Internet at home?

Q.19. Do you use the Internet to gather information about IT?

Q.20. Do you sometimes bring information about IT innovations to work that you found on the Internet?

Q.21. Do you sometimes bring information about IT innovations to work that you found elsewhere?

Construct 'B'

Q.22. Why was the chosen source of information deemed suitable for this activity?

Q.23. What sources of IT innovation information are normally considered appropriate for this business?

Q.24. Does the business have any guideline which outlines what information sources are appropriate and what are not appropriate for this business?

Q.25. If yes, does the business ever review or update these guidelines?

Construct 'C'

Q.26. How did you first recognise the potential of this IT innovation for the business?

Q.27. Who was involved in identifying a business need for this IT innovation?

Q.28. How does the business normally identify a need for an IT innovation?

Q.29. How did you recognise that the information about this innovation was relevant to your particular business situation?

Construct 'D'

Q.30. How was the IT innovation first perceived or imaged?

Q.31. Did that perception change over time, if yes why?

Q.32. Did the original purpose of this IT innovation change at all as time went by?

Q.33. How was the perception of this IT communicated to other staff members?

Construct 'E'

Q.34. How was it decided that this innovation would be suitable to this business?

Q.35. Who was involved in this activity?

Q.36. How is it normally decided that an IT innovation is suitable to the business?

Construct 'F'

Q.37. How was it determined that this IT innovation was appropriate for this business?

Q.38. Who was involved in these activities?

Q.39. Does the business have any guidelines or policy that outlines what is an appropriate IT innovation for this business?

Construct ‘G’

Q.40. Who evaluated or determined the role that this particular innovation would play?

Q.41. How was the potential of this IT innovation evaluated?

Q.42. How does the business normally evaluate the potential of IT innovations?

Q.43. Who is normally involved in these activities?

Q.44. Were the capabilities and training of end users considered for this IT?

Q.45. Do you normally consider any of these aspects?

Construct ‘H’

Q.46. Does the business have any guidelines or policy as to how it recognises or identifies new IT innovations?

Q.47. Does the business reflect or refine the activities relating to how the business recognises or identifies new IT innovations?

Q.48. Who is involved in these activities?

Construct ‘I’

Q.49. Does the business provide any guidelines or policy that outlines to others what is a relevant IT for this business?

Q.50. Does the business reflect and refine on these guidelines or policy at all?

Q.51. If yes, how often?

Part C – Holistic Reflections

Q.52. Has this particular IT innovation provided the benefits that you thought it would?

Q.53. Has the introduction of this IT innovation produced any problems at all?

Q.54. Overall, how do you think the business weighed up the pros and cons of this IT innovation?

Q.55. Overall, how do you think the business managed the ‘information’ regarding this particular IT innovation?

Q.56. Overall, how do you think the business normally manages 'information' about IT innovations?

Q.57. In hindsight, do you think that the decision to adopt this IT innovation was a good one?

Q.58. Are there any activities or processes that you would change if you did this in the future?