2002

Diffusion of electronic business: adoption patterns in manufacturing small and medium sized enterprises

Robyn Lorraine Lawson

University of Wollongong

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DIFFUSION OF ELECTRONIC BUSINESS:
Adoption Patterns in Manufacturing
Small and Medium sized Enterprises

A thesis submitted in fulfilment of the
requirements for the award of the degree

Doctor of Philosophy

from

The University of Wollongong

by

Robyn Lorraine Lawson
B.A., M.Computing (University of Western Sydney)

School of Information Technology and Computer Science
2002
Declaration

This thesis is submitted in accordance with the regulations of the University of Wollongong in fulfilment of the requirements for the award of a Doctor of Philosophy. It does not incorporate any material previously published or written by another person except where due reference is made in the text. The work described in this thesis is original work and has not been previously submitted for a degree or diploma in any university.

Robyn Lorraine Lawson
August 2002
Abstract

Using the Internet for electronic business has become an area of action for the Australian Government. Programs have focused on raising the awareness of small and medium sized enterprises (SMEs) to the opportunities offered by doing business on-line. Research into electronic business has reported adoption rates within particular industry sectors, but has not provided a theoretical framework for studying the process of diffusion of this dynamic interactive innovation, particularly in relation to explaining the levels of adoption and factors that affect the rate of adoption.

The goal of this dissertation was to address this limitation by proposing a framework, and testing it with a series of integrated empirical studies into the diffusion of electronic business in Australian manufacturing SMEs. Specifically, it answered the following question: *Is the model of innovation adoption relevant to doing business on-line?* Rogers’ (1995) diffusion of innovation theory has been applied to attempt to account for the multiple pathways to adoption and the various multi-way communication channels. The role of the Model of Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998b) was also explored within the total diffusion process.

A series of integrated studies was undertaken, using a triangular research methodology consisting of survey and case study interviews, to gather empirical data to apply to a theoretical study to test the research question. Business-to-business (B2B) dealings in
the manufacturing industry in Australia was the focus of the studies. The manufacturing industry has experienced productivity improvements in recent years, and the outlook is strong. SMEs was the unit of study as these organisations are ideally placed to gain a competitive advantage in global trade, and therefore make valuable use of electronic business. In addition, SMEs were less likely to have dedicated information technology (IT) staff, which allowed the research to concentrate on the SMEs and their experiences in the diffusion process.

The initial and replication studies used the survey method and case study interviews with participating organisations in two equivalent manufacturing regions. A comparative study was undertaken to determine similarities and differences between the regions, and between small and medium organisations. Interviews were used to examine the role of national and regional industry associations as change agents in the diffusion process. Qualitative analysis of government initiatives provided a complete picture of what is available for manufacturing SMEs as a group in Australia. The findings from these studies was applied to the theoretical study, which tested the viability of existing models as evaluation tools for research into the dynamic interactive innovation of electronic business.

The results of the empirical studies indicated that while most manufacturing SMEs in regional Australia use computers, with a majority using email, only a small percentage utilise the Internet for transaction processing. Major barriers to becoming involved in
electronic business were identified as concern about security and privacy of transactions, cost of consultants, and lack of IT expertise of staff. Examination of planned staff IT training methods revealed that employing people with appropriate knowledge has been added to current methods such as on-the-job training. Results from the comparative study found that the regions are consistent and equivalent in their use of e-business strategies. Some differences were found between small and medium organisations indicating a number of issues that need to be addressed. This forms part of the recommendations outlined for industry associations, government and the education sector in relation to their role in the diffusion process.

Results from the theoretical analysis, that applied the data from the empirical studies to Rogers’ (1995) framework, demonstrated that extension and modification to the diffusion model is necessary to explain a dynamic interactive innovation within a global environment. Level of adoption is more appropriately measured with MICA (Burgess & Cooper, 1998b). Factors that affect adoption are more suitably defined by including additional elements such as barriers than inhibit involvement, and the management and coordination role necessary for the relevant change agents.

The research encompassed in this dissertation strongly suggests that diffusion of a dynamic interactive innovation, such as electronic business, can be explained using this modified diffusion model. The limitation of this research is that the results cannot be generalised beyond members of the Australian Industry Group, the national industry
association that was used as the population-sampling frame. However, future research, using this modified model, can test these findings in other industry sectors. The outcomes of the empirical studies have provided a profile of manufacturing SMEs, which can be used in the future for either comparative or longitudinal studies.
Publications from this Thesis


Other Publications by this Author


Acknowledgements

Many people have provided support and advice to me in the production of this dissertation. I am indebted to Professor Joan Cooper and Dr Carole Alcock for their supervision and guidance throughout the years of my candidature. I thank them both for their support and for providing me with role models for undertaking academic research.

Thanks are also extended to Ross Pearce, Sandra George and Mark Fogarty from the industry associations for their time and support and their willingness to share their experiences in dealing with the small and medium sized organisations in the manufacturing industry.

To the case study organisations in south west Sydney and south east Melbourne go my heartfelt appreciation for their time in participating in this research. Their enthusiasm for what they do on a daily basis, and their willingness to share this information provided a wealth of quality data which makes the research relevant to the Australian manufacturing industry.

Assistance with the validation of the survey instrument was provided by a number of organisations in the manufacturing industry. Special thanks for valuable support and help goes to Carlos Broen, Christopher Manion and Don Hale, who freely spent time with me on a range of issues, and gave valuable advice and an industry perspective to this research.

Finally, I would like to express my thanks to my husband, John, and my sons, John and Mark, for their unfailing support in my academic endeavours over many years.
DIFFUSION OF ELECTRONIC BUSINESS:
ADOPTION PATTERNS IN MANUFACTURING
SMALL AND MEDIUM ENTERPRISES

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<td>Australian Bureau of Statistics</td>
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<td>AIG</td>
<td>Australian Industry Group</td>
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<td>AUSe.NET</td>
<td>Australian Electronic Business Network</td>
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<td>B2B</td>
<td>business-to-business</td>
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<tr>
<td>B2C</td>
<td>business-to-consumer</td>
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<td>Campbelltown City Council</td>
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<td>City of Greater Dandenong</td>
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<td>DFAT</td>
<td>Department of Foreign Affairs and Trade</td>
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<td>DIST</td>
<td>Department of Industry, Science and Tourism</td>
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<td>DOCITA</td>
<td>Department of Communications, Information Technology and the Arts</td>
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<td>e-business</td>
<td>electronic business</td>
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<td>electronic commerce</td>
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<td>EDI</td>
<td>electronic data interchange</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>ITN</td>
<td>Innovative Technology Network</td>
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<td>ITU</td>
<td>International Telecommunications Union</td>
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<td>MICA</td>
<td>Model of Internet Commerce Adoption (Burgess &amp; Cooper, 1998b)</td>
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<td>NOIE</td>
<td>National Office for the Information Economy</td>
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OECD  Organisation for Economic Cooperation and Development
OIT  Office of Information Technology
PWC  Price Waterhouse Cooper
SBIP  Small Business Incubator Program
SE  South East (Melbourne)
SEN  South East Networks
SME  Small and medium enterprises
SW  South West (Sydney)
UN  United Nations
US  United States
CHAPTER ONE

INTRODUCTION

The overall goal of this dissertation is to further understanding of the research process into the diffusion of the innovation of electronic business. Rogers' (1995) Diffusion of Innovation Theory is used as the theoretical framework for a series of integrated studies of Australian manufacturing small and medium sized enterprises (SMEs) and their adoption of electronic business strategies for business-to-business (B2B) dealings. This approach brings into focus diffusion research into e-business beyond reporting how many have adopted the innovation. In addition, it introduces a framework for studying dynamic and interactive innovations such as using the Internet for business activities.

The significance of this research can be described as satisfying a need for research into electronic business which is a more encompassing and comprehensive view of the diffusion process than is currently evident, and therefore moves beyond snapshot views to a more analytical assessment of web based business activities.

In this chapter, the stage is set for the research that broadly outlines the scope and methodology utilised. The following chapters review the literature and provide
the detail for the series of studies and their outcomes, and then the overall outcome of the research. Limitations and further research within this area are discussed in the concluding chapters.

1.1 BACKGROUND

The evolution of the Internet as a commercial tool for conducting business has led to an increase in the use of on-line services by organisations. Electronic business has emerged as a whole of business strategy offering a range of services and opportunities for electronic trading in the global marketplace. The use of information and communication technologies enables organisations to improve business processes and communication within the organisation and with trading partners.

The way business is conducted is experiencing change worldwide, and is clearly evident in Australia. Globally, e-business revenue is estimated to reach US$6.8 trillion by 2004 representing 8.6% of the world-wide sale of goods and services (Hobley, 2001). The use of information technology, the Internet and the move to e-business have generated considerable interest in recent years. Consequently, the Australian government asserts that e-business will provide many new opportunities to expand exports and create thousands of new jobs, and so enhance economic growth (DFAT, 1997). Certainly, the media have portrayed the image that business will predominantly be conducted on-line in the future, and organisations that do not embrace the
new technologies will be left behind. As pointed out by Rosenberg (1976) diffusion of new technology can take decades, and involves more than simply reproducing and distributing the technology. Indeed, making full use of the new technologies will rely on a number of factors including knowledge and IT skills of staff within organisations.

Technology has attracted attention from researchers for decades (Green and Guinery, 1994; Noble, 1984; Burke, 1979; Mumford, 1934) and has been viewed as a means of controlling the workforce and early developments were in automating the manufacturing processes. Technological determinism was used to describe technology as a force that irreversibly affects the way we work, particularly computers and telecommunications (Noble, 1984; Burris, 1993). Later research that refuted this notion relied on the socio-technical approach (Taylor and Felten, 1993). Justification for the use of technology was focussed on economic grounds and the replacement of labour (Jones, 1990; Noble, 1984). Suspicion about technology that is evident today can be traced to these early developments, and from instances were technology has replaced human labour.

In contrast, the controlling factor asserted by Noble (1984), and the interpretation of scientists such as Reintjes (1991) saw technology in terms of solving a problem, and the resultant lowering of costs and reduced time associated with the use of technology as positive. Economists, March and Simon (1958) argued that there would always be a propensity for gradual
change in organisations, and this would be assisted by technology. Lawrence and Lorsch (1967) found that organisations adopted an innovation in response to uncertainty in their environments and then moved towards the integration of the innovation to solve a problem.

While the notion of controlling the workforce by the use of e-business activities could be argued, today’s Internet-based technologies are more multifaceted and need a more contemporary path to their exploration. Certainly, describing any technology, including e-business activities, as a force that changes the way business is conducted is valid. Organisations that embrace new ways of doing business will succeed into the future, while old ways will be destroyed (McKeown and Watson, 1996), and historical trends have proved this to be correct. However, e-business is not one single technology, it is a collection of technologies that can be embraced over a period of time. In this sense explaining adoption levels fits within the Diffusion of Innovations (Rogers, 1995) theory, rather than within historical theories used to explain less complex innovations.

Diffusion of technology research shows that large organisations adopted more quickly than small organisations, and where labour costs were high the adoption rate was rapid (Nabseth and Ray, 1974; Rogers, 1995). Later studies also found that government incentives contributed to the diffusion rate, and that the introduction of a new technology often equated with changes in structure and administrative practices (Rogers, 1995; Ettlie, 2000). Likewise,
the strength of connections between unrelated groups has been used to predict diffusion rates (Granovetter, 1973; Rogers, 1995). While large organisations can justify the set-up and ongoing maintenance costs of e-business activities, smaller organisations may be unable to take full advantage, particularly if they do not have dedicated IT staff. Change agents of industry associations and governments can assist in the diffusion process for SMEs.

The nature of work has changed remarkably during the 1990s since the advent of the Internet. The resulting effect on organisations of moving business on-line, known as electronic business, has witnessed a variety of combinations of technologies, from only using email to full scale enterprise wide electronic commerce initiatives. This extreme move is the result of the convergence of two technologies: computers and telecommunications. It is estimated that Internet traffic doubles every 100 days (Ettlie, 2000). The express train known as e-business appears to be unstoppable.

Innovations and organisations can vary greatly in their level of success. Examining the research process of the diffusion of electronic business in Australian manufacturing SMEs is the focus of this dissertation. Review of the literature is contained in Chapters 2, 3 and 4. Chapter 2 reviews current diffusion thinking, outlines the process and summarises criticisms of the theory. Chapter 3 outlines the research specific to e-business, and Chapter 3 examines the manufacturing industry.
1.2 ELECTRONIC BUSINESS IN PERSPECTIVE

Electronic business is a technological innovation, which engages the use of the Internet for a range of business activities from email for communication to online ordering and transaction processing. To fully appreciate a definition of electronic business, the meanings of terms such as ‘technology’, ‘invention’ and ‘innovation’ need to be addressed. This thesis utilises the following definitions:

*Technology* is the knowledge and skills that are used to develop products and services, including production and logistics (Burgelman et al., 1996; McLuhan, 1964). Technology can be software, hardware and people skills utilised in the processes within the organisation. Management of technology is a multi-disciplinary approach to planning, developing and implementing the technology to achieve organisational strategic and operational objectives (NRCR, 1987).

*Invention* is the creation of a new idea, with innovation having a broader meaning that includes the process of development and implementation of the new idea (Van de Van and Angle, 1989). *Innovation* is characterised as invention plus exploitation (Roberts, 1988). *Diffusion* is the process that the innovation takes over time on its way to adoption within a particular social system (Rogers, 1995; Ettlie, 2000).
Electronic business is the process of conducting all forms of business activity using electronic methods, which can include electronic mail, electronic catalogues, electronic banking, and processing transactions (Lawrence et al, 2001; Schneider and Perry, 2001; Greenstein and Feinman, 2000; Adams et al, 1999; Kalakota and Whinston, 1997). The use of these paperless methods of exchanging business information recognises that paper based systems increase cost without adding value. The argument that organisations can conduct electronic business to make better use of information and computer technology, and to leverage these technologies to improve business processes and the exchange of information is strong, particularly when confronted with the need to reduce production costs and lead times (Burgess & Cooper, 1998a). Electronic business has moved from being a technology issue alone, to a broader core business issue, both in Australia and internationally (Alston, 1999).

Electronic business is an innovation, which encompasses a set of technologies (including knowledge and skills) that form the basis for doing business online. This research focuses on the broad activity of the diffusion of electronic business. The term electronic commerce is used for the transaction processing part of the electronic business. While not all SMEs are suited to electronic commerce, due to nature of the product (goods or services) or the industry, most organisations can benefit from some form of electronic business. A majority of SMEs have Internet access in Europe and United Kingdom (70%), in the United States (80%) (Hobley, 2001), and in Australia (83%)
(ABS, 2001). Internet access does not, however, equate with electronic business practices, but is the first step along the path to adoption.

1.3 THE RESEARCH PROBLEM

In introducing the research detailed in this dissertation, the need for a framework to position studies into diffusion of a dynamic interactive innovation such as electronic business was evident. Models explaining the level of adoption and factors affecting adoption are tested during this research.

The journey along the road to electronic business has already commenced, but to a lesser extent than the media would have us believe. Adoption by large organisations, particularly in IT-aware industries, is apparent. In contrast, SMEs have been slower to adopt than larger companies (DFAT, 1977).

What are the experiences of SMEs in the diffusion of electronic business? What is the current level of adoption? What is the planned level of adoption? What are the barriers for SMEs to become involved in electronic business? Are there differences between small and medium organisations? What are current staff IT training methods, and are they adequate for conducting business on-line?
These questions are the focus of this research. Some of these questions have been addressed by other studies, however, development of a research theoretical framework in which to place these studies has not been apparent in the literature. This dissertation provides this framework, and tests it with a series of integrated studies focussing on the diffusion of electronic business in Australian manufacturing SMEs. A feature of the framework is a mechanism to explain level of adoption and factors that affect the rate of adoption within the diffusion process. Replication studies in other industries will be possible, and will feature as part of the author’s future research agenda.

1.3.1 Research Question and Hypotheses

The following research question is addressed:

*Is the model of innovation adoption relevant to doing business on-line?*

The Null Hypothesis and then the Alternative Hypothesis are tested:

*H1: The model of innovation adoption is relevant to doing business on-line.*

*H2: The model of innovation adoption is not relevant to doing business on-line.*

Further to the alternative hypothesis, an outcome of this research is to propose a framework for explaining the diffusion of a dynamic interactive innovation such as electronic business.
1.3.2 Units of Analysis

Units of analysis to study the research question are:

- the manufacturing industry, as an example of a non-IT industry;
- small and medium enterprises (SMEs);
- business-to-business dealings;
- two equivalent manufacturing regions.

1.3.3 Contributions to Knowledge

This dissertation contributes to knowledge on electronic business by:

(a) providing a theoretical framework for researching diffusion of electronic business in SMEs;
(b) establishing a profile of diffusion of electronic business by Australian manufacturing SMEs in two regions;
(c) identifying issues important to manufacturing SMEs in their adoption of electronic business;
(d) identifying problems to be addressed by industry associations, government and the education sector in the diffusion process of electronic business.

The significance of this contribution is partly confirmed by a number of publications on aspects of this research that have been accepted at international conferences (see p.vii in the front section of this thesis).
1.4 CONSIDERING A THEORETICAL FRAMEWORK

Diffusion of Innovations Theory as defined by Rogers (1995) forms the theoretical framework for this research. In addition, the Model of Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998b) is applied to measure the actual and planned level of adoption of electronic business and the stage of maturity of the SMEs under examination. Data is then mapped to the Rogers' (1995) overall model of diffusion, which encompasses level of adoption as one aspect in the diffusion process. Factors affecting the rate of adoption are examined, firstly within the regional studies, and then within the theoretical study which determines their relevance to the diffusion process. Communication channels within the social system (Australian manufacturing) are examined, as well as the point where critical mass is reached. Justification for the selection of Diffusion of Innovations theory is detailed in Chapter 2, along with discussion of other theories considered.

Figure 1.1 shows that the Diffusion of Innovation Model, the Model of Internet Commerce Adoption and the regional studies of SMEs provide input into the development of a proposed Model for the Diffusion of Dynamic Interactive Innovations such as electronic business. The new model explains the level of adoption and factors affecting adoption. Chapter 10 details this theoretical study.
1.5 AIMS AND RATIONALE

The overall aim of this research was to develop a theoretical framework for studying the diffusion of electronic business as a dynamic interactive innovation. The research question is answered by testing the null hypothesis. The Research Plan is detailed in Chapter 5, Methodology.

This dissertation examines Australian manufacturing SMEs to test the framework. Outcomes from a series of studies were designed to provide primary data that was be used to modify and extend the Diffusion of Innovation Theory (Rogers, 1995) in explaining level of adoption and factors that affect the rate of adoption. The role of MICA (Burgess & Cooper, 1998b) was also evaluated as a model to explain level of adoption. The rationale was to provide a means for positioning research into the diffusion process of dynamic interactive innovations.
1.6 RESEARCH OBJECTIVES

From the overall aim of the research, the following progressive objectives were established:

1.6.1 To conduct an initial study in south west Sydney to:

- provide information on the use of IT for business;
- identify specific and planned use of the Internet for e-business;
- identify barriers to using the Internet for business;
- determine actual and planned staff IT training methods; and
- provide data on the reliability of the survey instrument.

Preliminary findings from this study provided initial recommendations for industry associations, government and the educational sector for their participation in the diffusion process.

1.6.2 To conduct a replication study in south east Melbourne to:

- provide information on the use of IT for business;
- identify specific and planned use of the Internet for e-business;
- identify barriers to using the Internet for business; and
- determine actual and planned staff IT training methods;

Findings from this study provided data that supported the recommendations from the initial study, and provided data for comparison between the regions.
1.6.3 To conduct a comparative study of the two regions to:

- identify similarities and differences between regions; and

- identify similarities and differences between small and medium organisations.

Findings from this study provided data for the theoretical study established to test the relevance of adoption models.

1.6.4 To conduct a qualitative study of change agents to:

- document functions of the industry associations;

- compare industry associations’ actual function and the perceptions of SMEs from the regional studies;

- document government e-business programs; and

- compare government programs and perceptions of SMEs from the regional studies.

Findings from this study provided data for the theoretical study established to test the relevance of adoption models.

1.6.5. To conduct a theoretical study to answer the research question by:

- applying relevant data to the Model of Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998b) and suggesting modification for manufacturing SMEs;
- identifying factors for manufacturing SMEs when planning to move beyond Stage 1 of MICA;
- applying relevant data to the Diffusion Model (Rogers, 1995) and suggesting modification for manufacturing SMEs; and
- providing an answer to the research question.

1.7 OVERVIEW

This dissertation consists of a series of integrated studies on electronic business with the following chapter structure:

1.7.1 Chapter 1: Introduction

Chapter 1 outlines the conceptual background for the research. Overall aim of the dissertation is discussed, along with the research problem, theoretical framework, aims and rationale for the studies, and research objectives.

1.7.2. Chapter 2: The Road to Diffusion of Electronic Business Innovation

Chapter 2 reviews the literature appropriate for the theoretical foundation of the research. The review starts with a background on technological progress, which provides themes that are relevant to the current issues in adoption of electronic business, and moves on to diffusion of innovation theory and its characteristics. Alternative
theories, which were considered, are discussed and justification provided for not including these in this research.

1.7.3 Chapter 3: Pathways to adoption of Electronic Business Innovation

Chapter 3 reviews the literature related specifically to electronic business, and sets the agenda for the empirical studies in manufacturing SMEs. Definitions are provided for electronic business and for SMEs as applied to this research. The evolution of electronic business is presented, models of analysis of adoption and research into the use of the Internet by SMEs, and barriers to involvement are discussed.

1.7.4 Chapter 4: Narrowing the focus to the Manufacturing Industry

Chapter 4 overviews the Australian manufacturing industry in Australia, and the regions under examination (south west Sydney and south east Melbourne). The operations of the national and regional industry associations relevant to this research are outlined. Chapters 2, 3 and 4 set the framework for the empirical studies into the diffusion of electronic business for manufacturing SMEs in two regional areas of Australia.
1.7.5 Chapter 5: Methodology

Chapter 5 details the overall research plan and objectives for the series of studies. Data collection methods are detailed, including the design of the survey instrument, definition of the population and sample for the studies, and the participants are explained. Data analysis and statistical procedures used are outlined for the studies and the application of the models.

1.7.6 Chapter 6: Diffusion in South West Sydney

Chapter 6 details the initial empirical study into diffusion of electronic business in south west Sydney. Results into business use of IT, actual and planned use of the Internet, barriers to Internet use, and level of staff IT skills and training are presented. Some preliminary outcomes are drawn for this region.

1.7.7 Chapter 7: Diffusion in South East Melbourne

Chapter 7 details the replicated empirical study into diffusion of electronic business in south east Melbourne. Results into business use of IT, actual and planned use of the Internet, barriers to Internet use, and level of staff IT skills and training are presented. The outcomes from this study support outcomes of the initial study in south west Sydney.
1.7.8 Chapter 8: Comparison of two Australian regions

Chapter 8 details the comparative empirical study of the two regions detailed in Chapter 6 and Chapter 7. This study collates outcomes from the regional studies. Analysis of similarities and differences between regions proved to be consistent and confirm that the regions are equivalent. This adds reliability to the outcomes of the two regional studies. Analysis of similarities and differences between small and medium organisations reveal some differences and points to the need to address some issues separately for these groups.

1.7.9 Chapter 9: Change Agents in Manufacturing

Chapter 9 reports on an empirical study of the change agents within the manufacturing industry, namely industry associations and government programs, and compare actual operation with perceptions of the SMEs in the regional studies. Case study interviews highlight some differences in the operation of regional industry associations, and some problems meeting the needs of SMEs in their quest to be involved in electronic business. Issues raised by organisations participating within the regions were highlighted and brought to the attention of industry associations. Government initiatives in the area of electronic business and whether these are targeted to SMEs are examined. Content analysis of federal and state government web sites, as well as dissemination methods of information revealed some
differences. Findings are compared with perception of performance of government highlighted during case study interviews with SMEs in the initial and replication studies.

1.7.10 Chapter 10: Towards a diffusion model for manufacturing SMEs

Chapter 10 details the theoretical analysis that pulls the empirical studies together and applies the diffusion and adoption models to the findings, and provides an answer to the research question. Further, a flexible theoretical framework in which to position and explain studies into adoption of the dynamic interactive innovation of electronic business is presented.

1.7.11 Chapter 11: Summary and Conclusions

Chapter 11 summarises the research and key findings from the empirical and theoretical studies. It also provides recommendations for industry associations, government, and the education sector for their participation in the diffusion process of electronic business for the Australian manufacturing SMEs that participated in this research. Limitations to this research, and directions for future research are noted. Finally, the overall importance of this research is discussed.

In summary, Chapter 1 has provided an outline of the research contained in this dissertation on diffusion of electronic business, including the research problem,
theoretical framework, aims and rationale and research objectives. The next chapter, Chapter 2 embarks on the road to diffusion of electronic business innovation by providing a review of the academic and professional literature, which together with Chapters 3 and 4 sets the context for the empirical studies.
CHAPTER TWO

THE ROAD TO DIFFUSION OF
TECHNOLOGICAL INNOVATION

Electronic business is a dynamic interactive innovation that has many aspects that impinge on the multiple pathways of the diffusion process. This research examines this process, identifies the aspects and provides a framework for studying dynamic interactive innovations associated with doing business on the Internet. The gap in the literature, which is addressed by this dissertation, is the lack of a theoretical framework in which to position studies into adoption of electronic business, and to explain level of adoption and factors affecting adoption within the diffusion process.

In the previous chapter, an outline of the research contained in this dissertation was defined. In this chapter the road to diffusion of an interactive innovation such as electronic business is travelled by providing a review of the academic and professional literature that will set the context for the empirical studies in Chapters 6 to 9, and the theoretical study in Chapter 10. The literature review starts with background material on technological progress which provides themes which are relevant to current issues into adoption of electronic business, and moves on the
diffusion theory and its characteristics which provide the theoretical framework for this research. Alternative theories, which were considered, are discussed in the context of this research. Figure 2.1 shows a schema of reviewed literature. In Chapter 3 the road narrows to an examination of literature in the use of electronic business in Australia and overseas. This chapter, Chapter 3 and Chapter 4, which overviews the manufacturing industry, set the platform on which the empirical studies were carried out.

![Diagram](image)

**Figure 2.1: Schema of Reviewed Literature**

### 2.1 INTRODUCTION

The road to diffusion of electronic business innovation has its roots in technology innovation and is associated with change. Technology-driven change in organisations is always present and is everywhere (Ettlie, 2000). It
affects how the organisation does business, how successful it is in relation to its competitors, and how effective its staff is in managing the process. The change that an innovation brings about can result from internal pressures (dissatisfaction with existing practices), or external pressures (introduction of the Internet and a new way of doing business) (March and Simon, 1958).

Technology has been responsible for changes in society, and the evolution of the Internet and e-business will shape the future of organisations and result in a major redefinition of the way business is conducted. However, this redefinition needs decisions to be made now. Drucker (1970) asserted that decisions regarding the future need to ask the question “What do we have to do today to be ready for the future?” and not what we should do tomorrow.

In the context of e-business in today’s world, the question is firstly, when to begin on the path to e-business, and secondly, when to start the progression along the path to full e-commerce. A number of factors will affect these decisions, particularly knowledge and expertise of the innovation, and the nature of the industry sector. E-business will change the way business is conducted, however, the impact on various industry sectors may be different.

The impact will also be different for various organisations, particularly small and medium organisations. Whatever the future outcome, the diffusion of e-business as an innovation will vary across organisations and industry sectors.
2.2 BACKGROUND TO CURRENT DIFFUSION THINKING

During the 1800s Karl Marx wrote about interactions between economic growth and innovations (Brewer, 1984). Marx's approach was descriptive and a process view of innovation. The Russian economist, Kondratiev (1925) described the cycles of economic development, which were characterised by pessimistic forecasts for future levels of unemployment, followed by more optimistic predictions.

The 20th century witnessed optimistic levels of opinion prior to World War I and during the 1950s and 1960s. Conversely, pessimism prevailed during the 1930s and 1980s. Kondratiev's cycles were made fashionable by Joseph Schumpeter, who extended the theory by accentuating the role that new technologies play in the cycles of economic development (Freeman, 1985). These cycles of economic development became known as Long Wave theory and Schumpeter developed the notion that linked the movement in the long wave to diffusion of new technologies. He pointed out that the process of diffusion took decades to take place, and not years or months. Marx described this process of diffusion as an influence that was partially responsible for creating economic instability (Brewer, 1984).
Technical progress has been defined by Rosenberg (1982) as knowledge that enables a higher volume of output, or a higher quality of output from a designated number of resources. Emphasis on reducing the cost of producing the same quality product has allowed an economic quantitative approach, without the qualitative improvements and product innovation needed to enhance technical progress.

Schumpeter (1942) stated that product innovation was closely aligned to the replacement of old industries and old products with new industries and new products, which emphasises a discontinuous outlook of technical progress. He defined innovation as a variation in the process of production, which may include a new organisational structure, a new source of materials or perhaps a new market. A new way of doing business with new processes, with the old being replaced by the new. In contrast to Schumpeter's theory, Strassman (1959) states that old and new technologies can coexist even for decades.

Development of any new technology does require a degree of innovation (Deideren et al, 1990), and the impact of technological progress can be partly measured in the cost of the new technology. There may be a long rehearsal in the development process, with many modifications, before the cost can be justified. Also, productivity effects will depend on how widely the technological innovation is adopted (Rosenberg, 1982), or whether a need for the innovation is perceived (Cook & Morrison, 1961). Overall, the
significance of the new technology innovation will be assessed by whether it actually reduces costs, and by how much.

Technical progress can be affected by the rate of adoption of the new technology innovation. In 1968 Mansfield drew attention to the wide variance in adoption for different technology, and pointed to the overall slowness (Mansfield, 1968). More recently, in Australia, Lindley has attributed the slowness of adoption of smart cards to social and organisational implications not being addressed (Lindley, 1997).

Innovation is associated with a product, and diffusion can also be associated with a product. However, diffusion can also encompass the process that the innovation takes on its way to accepted use within society. This research takes a process focus, which is more descriptive, and assumes that the product has been developed. This approach relies on the assumption that diffusion of an innovation is essentially an economic activity (Rosseger, 1980), which states that there is either an advantage to the organisation to take up the innovation, or an immediate disadvantage in not taking up the innovation. Also, success for the organisation adopting the innovation will depend on the rate of adoption (Porter, 1990), which lies outside the organisation and will be controlled by other forces. Another factor that is outside the organisation is the role of government in development of public policy (Sharp & Holmes, 1989), which affects the rate of adoption, and influences acceptance of the innovation.
2.3 DIFFUSION OF INNOVATION

The diffusion process for a new technological innovation involves more than creating and distributing the technology (Rosenberg, 1976). It affects processes, systems, sub-systems and the technology itself. The introduction of computer technology has created economic as well as social change and has created new industries and new types of goods and materials. New work skills, management awareness, new systems including design and development, new educational systems and new legislation are aspects that need to be taken into consideration (Schumpeter, 1939).

Freeman (1985) argues that decades can pass before there is acceptance and integration of a new technological innovation. He further argues that economic growth from a new technology is not from the technological innovation itself, but from the change associated with it. Expectations about the future direction of the technological innovation are significant when considering how quickly the technology can be accepted and integrated (Rosenberg, 1982). The rate of adoption will depend on the progress of awareness and understanding of the innovation, of which the technology is only a part, rather than on discrete breakthroughs in technology.

Innovation consists of both the technology and the system in which the technology exists. Rogers (1995) developed his theory of diffusion in the 1960s, and many researchers have used his approach in a number of
disciplines. In the fourth edition of his book, Rogers presents a convergence model of diffusion that presents the communication channel as two-way, rather than a linear one-way channel, and introduces the notion of interactivity associated with the Internet. Previous research, which has made use of this theory, has concentrated on the adoption of the technology alone (Drury & Farhoomand, 1996; Premkumar et al, 1994; Pfeiffer, 1992). The diffusion of innovation theory, which is used for this research, is outlined in the following sections.

2.3.1 Basics of the Diffusion Process

Diffusion is a progressive communication of messages among members of a social system over time. These messages are focused on a new idea, such as an innovation like e-business. The process of communication of messages is to create and share information to reach an understanding about the innovation. Most past diffusion studies have been based on a linear model of communication, which views the process as a one-way path with messages being transferred from source to receiver. An example of this one-way communication of messages would be if an organisation seeks information from a consultant about the innovation. A convergence model of diffusion more accurately describes how participants create and share information with one another (Rogers, 1995).
Due to the newness of the innovation some degree of uncertainty is involved in the diffusion process. Uncertainty is the degree to which a number of alternatives are perceived in an event and the relative probabilities of these alternatives. Uncertainty motivates an individual to seek information. One type of uncertainty is generated by innovation. An innovation presents an individual or an organisation with new alternatives and new ways of solving problems. The motivation to seek information about the innovation is to cope with the uncertainty that the innovation creates, and so reduce the uncertainty.

The four characteristics to the diffusion of an innovation are the innovation, communication, time and the members of the social system. The innovation is the new idea (such as electronic business), communication is the sharing of information between individuals to reach an understanding, time is involved in the process where an individual moves from first knowledge of the innovation through to adoption or rejection, and members of the social system (such as members of an industry sector who are engaged in a common goal). The diffusion process involves the units of the innovation, communication, time and the members of the social system.
The diffusion process identifies adopter categories, namely innovators, early adopters, early majority, late majority and late adopters. The rate of adoption of the innovation is affected by whether the innovation is perceived as an advantage when adopted, or perceived as a disadvantage when not adopted. Rogers (1995) states that the same innovation may be advantageous to an adopter in one situation, but disadvantageous to another potential adopter in another situation. For example, electronic commerce may be beneficial to one industry and not to another industry, or to large organisations and not
to small organisations, or to a particular type of product and not another type of product.

If the innovation involves technology it is important to define the boundaries of the innovation. For example, electronic commerce is viewed as a separate innovation to computers and the Internet. However, the diffusion process cannot be separated as easily. Certainly experience with related technologies will affect the individual’s perception of the next innovation and therefore affect the diffusion process.

*The characteristics of an innovation* as described by Rogers (1995, p.15-16) assist in explaining different rates of adoption of an innovation and include:

(a) *relative advantage* over what is being replaced, either economic or social;

(b) *compatibility* with existing practices, both technological and social;

(c) *complexity* where more difficult innovations are adopted more slowly;

(d) *trialability* where innovations that can be sampled before adoption;

(e) *observability* where innovations are visible and used by others of the social system.
Innovations that are more visible, are able to be trailed, are less complex, are compatible with existing practices and have a relative advantage will be adopted more quickly (Rogers, 1995; Ryan & Gross, 1943). Innovations can sometimes be re-invented or changed by the adopter in the process of adoption and implementation.

**Communication channels** involved in the diffusion process can include:

(a) other individuals with knowledge of the innovation or experience using it;
(b) other individuals with no experience with the innovation;
(c) a group that can connect with the individual and others (such as an industry association);
(d) mass media can inform potential adopters of an innovation (such as information segments by government).

Interpersonal communication, mainly face-to-face, is more effective in influencing potential adopters of an innovation, particularly if the individuals are similar in socio-economical status, education and other important ways (Rogers, 1995). In terms of electronic commerce for business, this type of communication can be achieved through activities of industry associations. Most early adopters depend on subjective evaluation of an innovation by others, rather than on scientific studies.
Time taken to arrive at a decision regarding the innovation (Rogers, 1995) involves the individual moving through:

(a) gaining knowledge of existence and gains understanding;

(b) being influenced to a positive or negative attitude to the innovation;

(c) arriving at a decision to adopt (or reject at this point in time);

(d) implementing the innovation (can include adapting the innovation to suit the individual); and

(e) confirming the decision by gaining reinforcement (can reverse decision at a later time).

Time will also affect the rate of adoption when individuals start using the innovation and the diffusion curve starts to rise as more individuals adopt, reaches a point where the adoption levels and fewer individuals remain who have not yet adopted. Most innovations follow the same rate of adoption which is S-shaped, but there can be variations in the slope of the S, where the steeper the curve the more rapid the diffusion (see Figure 2.2). The rate of adoption is measured in time required to reach a certain percentage of members of the social system to adopt an innovation (Rogers, 1995).

The social system can also influence the rate of adoption by members. The members of a social system can be individuals, groups or...
organisations. All members cooperate in a common goal that binds the system together (such as in a particular industry group). The social system can act as a boundary within which the innovation diffuses (such as the use of electronic commerce within a particular section of an industry group). The social and communication structure can help or hinder the diffusion of an innovation within the system.

**Norms** are established ways of doing things within the social system, and serve as a guide or standard on what is expected (such as face-to-face business dealings). Norms can also be an obstruction to change (Rogers, 1995). Opinion leadership is the degree that an individual or unit can influence attitudes of others within the social system (for example, influence exerted by industry associations). A change agent is an individual who can also influence attitudes of others in a direction that is desirable for the change agent (such as influence from a consultant). Government has been viewed as a change agent in the process of diffusion, and has been described as a regulator (Sharp & Holmes, 1989).

**Members of a social system** (Rogers, 1995) can make decisions that are:

(a) independent of decisions of other members to adopt or reject an innovation;

(b) a consensus of choices among members of the system;
(c) made by a few individuals with power, status or technical expertise; or

(d) a combination of two or more of the above (Rogers, 1995).

The final way that a social system influences diffusion of an innovation is by way of consequences as a result of adoption or rejection of an innovation (such as an organisation being left behind if the innovation is adopted).

2.3.2 Following the development process of Innovation

Rogers (1995, p.5) describes an improved understanding that can be achieved by conceptualizing certain kinds of diffusion in the convergence model.

During the 1940s and 1950s, the mass media (newspapers and radio) were viewed as having a dominant influence on behaviour change within society (Katz and Lazarsfeld, 1955) including the adoption of new technologies. Research during the 1960s showed that behaviour change in individuals is more influenced by face-to-face interaction than by the mass media (Lazarsfeld and Menzel, 1963). This involves a two-step approach to influencing the diffusion of an innovation, namely, communication flow from the mass media to opinion leaders within the social system, and then interpersonal influence from the opinion leaders to the members of the social system. This does not
preclude an individual gaining awareness from the mass media, and then engaging in communication with an opinion leader or peers within the social system.

2.3.3 The process of Innovation-Decision

Information about an innovation is often sought from peers, who are local, particularly information on their evaluation. Interpersonal networks enhance this information exchange about the innovation using the convergence model. To put this in a business context, this convergence might be achieved via national industry associations in conjunction with government, then dispersion through local industry associations to opinion leaders and then members of the industry sector.

Different forms of communication operate at different stages in the innovation-decision process of an individual. The two-step process did not fully recognise the role of different communication sources at various stages in the innovation-decision process. This process involves passing through knowledge (of the innovation), persuasion (from various communication sources), to a decision (to adopt or reject), and then to implementation and confirmation of the decision (Rogers, 1995).
Mass media is known for creating knowledge and awareness, and interpersonal networks for persuasion to adopt or reject. This persuasion phase to the diffusion process can involve communication between individuals who belong to the same social system (such as an industry sector) and are therefore similar in certain attributes (beliefs, education, etc) (Tarde, 1903; Lazarsfeld and Merton, 1964). “Social relations...are much closer between individuals who resemble each other in occupation and education” (Rogers, 1995). Communication is comfortable and more effective when the individuals share common beliefs and understandings.

In contrast to the communication between similar individuals during the persuasion phase, is communication between individuals who are different during this phase. Effective communication with individuals who are different requires more effort, and can cause the individual to be exposed to communication, which is inconsistent with existing beliefs. Communication can then become frustrating between individuals with different technical competence, beliefs and language, and lead to important messages becoming distorted and lost (Rogers, 1995).

The potential for communication between different individuals is important in information terms particularly when related to diffusion of an innovation. It can occur between two divergent individuals, or
two divergent groups and is explained as the strength of weak ties (Granovetter, 1973). This type of communication while less frequent has an impact on diffusion, and can form part of the persuasion phase along with the more frequent communication between similar individuals. The strength of the persuasion can overcome the invisible barrier created by the communication with similar individuals.

Innovations can enter the social system (such as an industry sector) through mass media, opinion leaders and more innovative members, and can therefore lead to a horizontal spread of ideas (among the leaders) that does not reach vertically to all members (Rogers, 1995). An example of this point comes from Van den Ban (1963) who found that large farms purchased expensive equipment, which was not feasible for small farms, although some did follow the lead of the large farms, when in fact, it would have been more beneficial to communicate and interact with small farms. Overall, individuals tend to seek information and advice from opinion leaders who are perceived more technically competent (Rogers, 1995).

2.3.4 Critical mass in adoption of interactive innovation  
In diffusion process, a stage known as critical mass is reached when enough individuals have adopted the innovation that it becomes successful. The adoption of an interactive innovation (such as electronic commerce) generates interdependence among the other
adopters within the social system, which is essential for the operation of the interactive innovation. Doing business on-line will not be successful if there are no other adopters to interact with. As new adopters embrace the innovation there is increased interactivity with other adopters. The rate of adoption will be slow until a critical mass is reached early in the diffusion process (Rogers, 1995). Early adopters of an interactive innovation can influence late adopters, and later adopters can influence early adopters in a reciprocal interdependence process (Markus, 1990). In a non-interactive innovation process, the interdependence is more sequential where early adopters influence late adopters in a linear process.

![Graph](image)

**Figure 2.3 Critical Mass for an innovation, and for an interactive innovation as defined by Rogers (1995, p314)**
An example of an interactive innovation is the rise of the Internet as a communication channel. The Internet's precursor, BITNET, began the interconnection of universities in 1981 in the US as a joint venture between the University of New York and Yale University. In 1982 the University of California at Berkeley joined BITNET and opening up the network to other west coast universities, and shortly after the critical mass was reached (Gurbaxani, 1990). When BITNET joined the Internet, the total number of users increased dramatically due to reciprocal interdependence.

Rogers (1995) argues that until the critical mass is reached, there is little advantage in an interactive innovation, and even disadvantage for individual adopters. If we apply this to electronic commerce, then early adopters are faced with the need to run parallel systems, one for other early adopters, and another for those without the innovation. When the critical mass is reached, the innovation has crossed the social threshold, which in turn encourages further adoption by individuals.

The late adopters, and even non-adopters can affect early adopters of an interactive innovation. Therefore the rate of adoption (or non-adoption) can affect previous early adopters as benefits decrease and
costs increase, which in turn stimulates further defection (Markus, 1987). Even if one person discontinues using the innovation (such as email) others can conclude that the innovation is no longer effective and also discontinue use. This will create a critical mass of discontinuers, and then to rejection of the interactive innovation (Rogers, 1995).

All early adopters are not equal, as those with more influence (such as opinion leaders) who adopt can represent a smaller number for the purposes of reaching the critical mass than a large number of less influential individuals (Rogers, 1995).

The diffusion of innovation is a social process where information is communicated, and is a type of social change. When an innovation is invented, diffused, accepted or rejected which leads to certain outcomes, social change occurs.

2.3.5 Characteristics affecting the pace of adoption

Rogers (1995) outlined strategies for reaching the critical mass. These strategies included targeting significant people within an organisation for early adoption of the interactive innovation. For example, if the managing director adopts email as a form of communication, others within the organisation would need to also adopt the new technology. Reaching the critical mass in this example is provided by
organisational pressure, and supply of the necessary resources. In the world of electronic commerce, large organisations that are early adopters can exert pressure on other organisations within their supply chain to also adopt the technology. While organisational pressure is involved, the other organisation is responsible for the necessary resources, which in turn may slow the pace of adoption.

Adapting perception of the interactive innovation to the notion that adoption is inevitable can affect the pace of adoption. It is certainly the case with the media portraying the image that business will be conducted on-line in the future, and those who do not adopt will be left behind. A number of advertisements have implied that critical mass has already occurred, and give the impression that the technology is easy to adopt. This direct communication channel to the individual can create situations where an individual can become an early adopter, only to discover that the picture is much bigger, more complex and involves more than simply installing the appropriate technology.

Targeting particular groups whose members are likely to adopt in a very short timeframe is another strategy that can affect the pace of adoption. The IT industry could easily be targeted in the move to electronic business, as this industry already has the necessary technological expertise to embrace the new way of doing business.
This strategy can give the impression of a critical mass, despite the reality that the critical mass is positioned vertically in one industry, and is not across the range of industry or organisations. This in turn can be in impetus for the media to give the skewed proposition that organisations that do not embrace the innovation will be left behind.

Providing incentives for adoption of the interactive innovation until the critical mass is reached is another strategy that can affect the pace of adoption. Governments in Australia have been targeting small and medium enterprises in Australia to encourage them to move to doing business on-line. In addition to this targeting of SMEs, incentive schemes aimed at industry segments that are slow to adopt may encourage more involvement. Rohlfs (1974) stated that giving the service free to a selected group for a limited time was the most direct approach to reaching critical mass. Free internet connection to SMEs which are interested in becoming involved in conducting their business on-line, would lead to full adoption if the trial period was successful.

As pointed out by Rosenberg (1976) diffusion can take decades, and involves more than reproducing and distributing the technology. An illustration is the diffusion of the fax machine, which was originally invented in 1843 but due to a number of problems (slow transmission,
cost) took 150 years to reach critical mass (Holmlov and Warneryd, 1990). Media newsrooms were the early adopters in the 1960s.

The pace of adoption of the interactive innovation of electronic business can be affected by:

- pressure from other organisations within the supply chain;
- media advertising;
- adoption by others within the industry segment; and
- incentives to adopt.

As well as adoption of the innovation, these factors can also influence the rejection of the innovation.

2.3.6 The Innovation and rate of adoption

The rate of adoption is an indicator of the steepness of the adoption curve for the innovation. When exploring the diffusion of an interactive innovation, the innovation itself needs examination for particular characteristics that can affect the rate of adoption. These characteristics of the innovation are significant in predicting individuals’ reaction to the innovation. Some innovations diffuse very quickly (mobile phones), while others (home PCs) take much longer. Rogers (1995) has identified five characteristics of an innovation, which can predict the rate of adoption depending on the individual's perception of the characteristics.
1. **Relative Advantage** relates to the notion that the innovation provides a better way than the previous way. Electronic business, at least initially, will not replace the existing practice, but will lead to parallel business activity. To increase awareness individuals seek information about relative advantage that includes benefits and costs associated with adoption. Rogers (1995) states that relative advantage is one of the best predictors of adoption. Relative advantage is increased by incentives, which in turn increase the rate of adoption.

2. **Compatibility** with existing values, needs and past experiences provides less uncertainty about the innovation. Compatibility with values and beliefs can increase the rate of adoption, or incompatibility can slow the rate of adoption. For example, electronic mail may be incompatible with face-to-face dealings for business in an industry sector. Compatibility with previously introduced successful ideas can pave the way for an innovation. For example, an organisation uses email and has a web site, so moving to doing business on-line is compatible with existing practices. In this instance it can be seen as an extension of current practices rather than a whole new way of doing business. If an organisation has a need to do business on-line with other organisations in the supply chain, then an innovation, such as the Internet, that meets that need, can be viewed as compatible.
Compatibility of an innovation is positively related to rate of adoption but has less importance than relative advantage (Rogers, 1995).

A point to note here is the notion of technology clusters which are an interrelated group of ideas where the adoption of one can activate adoption of a number of others. The individual innovations are closely related and the boundaries may appear blurred. For example, electronic business is a cluster of innovations (email, Internet and web, transaction processing). In this case, adoption may be incremental with an organisation embracing email, then a promotional web site, and then move to electronic commerce (or transaction processing).

3. **Complexity** of the innovation relates to how difficult it is perceived to understand and use. An innovation will be placed on a continuum from complex to easy. In this sense, complexity is negatively related to rate of adoption (Rogers, 1995). If an individual perceives an innovation as complex then they will not likely be an early adopter.

4. **Trialability** relates to experimenting with the innovation on a limited basis. Being able to trial the innovation is positively related to rate of adoption (Rogers, 1995). Early adopters rate
trialability as more important than late adopters (Gross, 1942; Ryan, 1948). These early adopters will act as models for the late adopters. Based on this the late adopters will move to full-scale use more quickly than early adopters.

5. **Observability** of the innovation is positively related to rate of adoption (Rogers, 1995). Some innovations are more difficult to describe than others. There are two dimensions to technological innovations, a hardware component and a software component. The software component is less visible to observation (than hardware) and usually the rate of adoption is slower. As electronic business is software focussed, then other characteristics would be more important to diffusion.

In addition to these characteristics of an innovation, Rogers (1995, p.206-208) also identified variables that determine the rate of adoption and includes the perceived characteristics of the innovation.

1. **Perceived Attributes of the Innovation** are relative advantage, compatibility, complexity, trialability and observability as detailed in the previous section.

2. **Type of Innovation-Decision** relates to the number of individuals involved in making the decision. A slower rate of adoption will
ensue with more individuals involved in the decision making process. As a smaller number of individuals are involved in the decision process in SMEs, then the decision to adopt or reject should be reached more quickly than in large organisations.

3. *Communication Channels* raise awareness and knowledge and can be interpersonal or mass media. Mass media is more effective for less complex innovations. If an inappropriate channel is used then this can result in a slower rate of adoption, for example, using television for the complex innovation of electronic business.

4. *Nature of the Social System* relates to the norms of the system and the extent of interconnection of the communications channels. For example, the manufacturing industry traditionally conducts business face-to-face, and the extent of interconnection is low.

5. *Extent of Change Agents' Promotion Efforts* can affect adoption if it is direct and linear with activity occurring at specific stages of the diffusion process. Change agents can include government and industry associations, as well as opinion leaders.

Figure 2.4 shows the factors that affect adoption of an innovation as defined by Rogers (1995). Are there additional factors that affect adoption when considering a dynamic interactive innovation such as electronic business?
2.3.7 Adopter Categories

Adopters of an innovation adopt over a span of time. Adopter categories are explained in terms of when they adopt along the time span. Rogers (1995) diffusion progression indicates some change in behaviour of the adopter categories, which is based on the S-shaped curve of adoption (see Figure 2.2).

Distribution of the S-shaped adoption curve rises slowly from the point where there are a few adopters, accelerates to the point where there are half of the individuals in the system adopted, and then slows
as the remaining few adopt the innovation, resulting in a normal distribution. Rogers (1995) explains this normal distribution as a learning process of acquiring awareness, knowledge and skill in a particular innovation, and applies to individuals and to group adoption. Two-way communication networks at the individual and group level assist the point where the diffusion accelerates. The significant point in the diffusion process is between the 20 to 30% adoption.

The argument that diffusion of an innovation follows a normal distribution is supported by researchers and a variety of innovations (Ryan, 1948; Dimit, 1954; Rogers, 1958; Beal and Rogers, 1960; Bose, 1964; and Hambelin et al (1973). This support is beneficial when categorising adopters, as set out in Figure 2.5 (Fig 7.2, p 262).

![Figure 2.5 Adopter categories on the basis of innovativeness as defined by Rogers (1995, p262)](image)
The S-shape curve displaying this normal distribution does however, only describe the number of adopters of a particular innovation, not what motivates the adoption.

Rogers (1995) explains the adopter categories as “ideal types” which does not include innovations that are not completely adopted, as could be the case with electronic commerce in particular industry groups. The Innovators group must be able to deal with risk and uncertainty about the innovation at the time of adoption, and their communication channels usually leads them outside the social system. Risk taking by individuals decreases until about 35 years of age, takes off until about 50 years of age, and then decreases again (Vroom & Pahl, 1971). The time between 35 and 50 has been identified as the most productive time of an individual’s career (Ettlie, 2000). The Early Adopters group are more integrated in the social system than Innovators, and are usually opinion leaders. Change agents (government, industry associations, and technology developers) usually target this group to accelerate the diffusion process. This group generally do not resist change merely for the sake of resistance. Resistance is usually associated with some form of loss, such as loss of profit for an organisation or loss of pay for an individual (Dent & Goldberg, 1999).

The Early Majority group interact frequently with their peers, and adopt the innovation ahead of the average member of the social
system (Rogers, 1995). This group, which makes up a third of the members in the social system provides interconnectedness in the social system. The Late Majority group adopt after most of the other members have done so, and make up a third of the social system. The motivation for their adoption is usually associated with pressure from peers within the social system. The Laggards group is the last group to adopt an innovation (Rogers, 1995). They generally look inward to the organisation, and refer to the past for decision-making, and are suspicious of innovations and change agents (Ettlie, 2000; Dent & Goldberg, 1999). The innovation-decision making process is long and their awareness-knowledge is also lagging behind other groups.

Early Adopters are more likely to have interpersonal networks outside the social system, and have more contact with change agents, enabling this group to be more informed and have greater awareness and knowledge than late adopters. This, in turn, creates a higher degree of opinion leadership within the social system.

A key difference between the groups is the way in which change agents should approach each adopter category, particularly in relation to language used about the innovation. Rogers (1995) identifies this as audience segmentation and the use of a strategy with each sub-audience for different communication channels. In particular, language that would be effective for early adopters is not suitable for
late adopters or laggards. Early adopters generally have their own networks, and do not rely upon change agents (Rogers, 1995; Ettlie, 2000). In turn, change agents may have a vested interest in accelerating the diffusion process and thus need to target late adopters and laggards. A paradox occurs in the diffusion process where late adopters and laggards may need the innovation most but are the last to adopt it (Dent & Goldberg, 1999). For example, a small manufacturing organisation in a niche market, but without IT expertise may delay adopting e-business technologies, however would benefit by reaching a global market. This paradox can be minimised if change agents concentrate on the sub-audiences who feel the least need to adopt, instead of concentrating their efforts on the early adopters.

2.3.8 Criticisms of Diffusion of Innovations Theory

While Diffusion of Innovations Theory has been used in research to study technology adoption patterns, a number of criticisms have been highlighted, and in recent years new viewpoints and angles have been sought from the theory (Hull and Kaghan, 2000) for research focussing on the Internet.

The dynamic and interactivity nature of the Internet questions the simplicity of the Diffusion of Innovations Theory to explain adoption patterns of complex technologies such as e-business. To date the
criticisms have included: pro-innovation bias, individual-blame bias, recall problem and equity issues.

Pro-innovation bias centres on the belief within the social system the innovation should be adopted (Downs & Mohr, 1976). As e-business is in its infancy in most industries, tailoring research studies to acknowledge this factor is important, such as selecting a non-IT industry segment. Individual-blame bias is the tendency to blame individuals, who have not researched the problem, for non-adoption (Caplan & Nelson, 1973). A way of dealing with this criticism is to make the unit of analysis larger than the individual (Rogers, 1995). As e-business is an organisational strategy, then the organisation becomes the unit of analysis. Recall problem deals with the respondent’s recall of events and actions (Coughenour, 1955). While this needs to be acknowledged and can create error ranges in results, the timing of e-business activities is in the present, rather than in the past. Equity issues relate to the availability of certain factors to the organisations under study. With e-business, if the organisations under study use a certain level of technology, where e-business activities can be viewed as next levels or stages of growth, then equity issues can be minimised.
2.4 FRAMEWORK FOR IT RESEARCH

Diffusion of Innovation theory is the most appropriate for the research detailed in this dissertation on adoption of e-business within manufacturing SMEs in Australia. The criticisms are taken into account and controlled as far as practicable. The overall research plan was to explain the diffusion of e-business within a theoretical framework where the factors can be identified (communication channels, the social system and time). Outcomes of the research explain that the simplicity of the Rogers' (1995) model needs to be extended to encompass a dynamic and interactive innovation such as e-business.

A number of other theories used in the IT disciplines were considered for this research, and deemed to be unsuitable based on a number of factors. These theories (IS Adoption, Socio-Technical and Social Learning) along with comments and justification for excluding them, are outlined in the following sections.

2.5 ALTERNATIVE THEORIES AND JUSTIFICATION

Current issues in the workplace have moved away from issues related to technology and how it can improve business operations, to non-technical issues related to the effect on people. Certainly to understand where technology in the workplace is going, it is necessary to look at the present situation and the application of technology. Determining how information technology will affect organisations encompasses not only the technology
itself, but also the people in the organisations where technology is used (Strassman, 1985). Current thinking recognises the role of users in the diffusion of technological innovation (Von Hippel, 1988), and focuses on how people use information instead of how people use machines (Davenport, 1994).

Approaches such as examining the amount of technology, that is computers, software, communications, applications, printers, etc. dominated the literature up to the mid 1980s. Strassman (1985) asserted that this was necessary to establish technological capabilities and getting the job done. However, this had the effect of targeting computer professionals and not users of the technologies.

### 2.5.1 Information Technology Adoption theory

The stages of growth theory was developed in the 1970s to explain the stages that an organisation moves through when adopting new information technology (Nolan & Gibson, 1974; Nolan, 1979). The six stages are Initiation (initial introduction), Contagion (demand increases), Control (economics of the technology), Integration (system and databases integrated), Data administration (manage and control databases) and Maturity (technology and management processes integrated) (Frenzel, 1992).
Although IT adoption theory is widely used, it has created debate about its validity and ability to withstand scientific scrutiny (Benbasat et al, 1984; King & Kraemer, 1984; Wysocki & Young, 1990). The focus of this approach is the technology, however, not all organisations within an industry group are at the same level, and not all functions within an organisation are at the same stage (Frenzel, 1992).

While the innovation is the focus of both IT adoption and diffusion theories, diffusion offers more factors when studying adoption of an interactive innovation, namely, communication, time and the social system. Therefore, diffusion of innovations theory is more appropriate to this research on electronic business. In contrast, while providing some interesting aspects, IT adoption theory is more suitable to the introduction of computer technology than a phenomenon such as electronic business. The adoption of electronic business is bigger than just the technology, and is influenced by a number of social factors.

2.5.2 Socio-technical theory

Socio-technical theory emerged in the 1960s and is described as a philosophy that revolutionised thinking about technological change (Davis & Cherns, 1975; Trist & Murray, 1993). At the centre of this approach are individuals, work groups and quality of work. Early work did not generally use this approach with the introduction of new
computer technology (Ettlie, 2000). However, research has highlighted that organisations will adopt integrative approaches when installing new computer-based technology (Ettlie & Reza, 1992; Liu et al, 1990).

The 1990s have witnessed an increase in the importance of human factors when probing the impact of IT and when looking to the future. The move from examining the supply of IT, to the demand for IT has meant the addition of the socio-technical perspective is needed when researching the impact of information technology.

Relationships between social structures, technology and organisational needs form the basis of the socio-technical theory (MacKenzie & Wajcman, 1985). While social structures and technology are a focus of both socio-technical and diffusion theories, diffusion considers the role that change agents play in the communication channels of the organisation, that is government, industry associations, etc. For this research diffusion of innovation theory will provide a richer picture as the manufacturing industry is a non-IT industry.

2.5.3 Social learning theory

Research within the framework of diffusion theory could also consider aspects of social learning theory as explained by Bandura
(1977). Central to this theory is that the individual can learn from observation of other individuals' behaviour. This type of observation adds non-verbal communication to the communication channel, and is an important characteristic of behaviour change. Social modelling can occur in person or through visual mass media channels such as television, and is more effective if the model is rewarded in some way. In social modelling the observer takes the necessary elements of the behaviour in order to carry out similar behaviour, without necessarily reproducing the exact behaviour of the model.

As explanations for changes in behaviours of individuals through communication is the focus of both social learning and diffusion theories, consideration of social learning theory within the framework of diffusion of an interactive innovation is important. However, diffusion theory measures the effects of the communication on the adoption or rejection of the innovation. Social learning theory measures what the individual learns from the communication, such as knowledge, skills needed and resources. However, a focus on the individual, and the social and psychological needs of users, regards the technology as not important (Drucker, 1970), and therefore is not suitable for research examining the full picture of diffusion.
2.5.4 Long Wave theory

As indicated earlier in this chapter, long wave theory was originally introduced to explain technological innovations during the 1800s, and is important in the historical development of present-day theories. However, long wave theory is focussed on external factors of cycles of economic development and levels of unemployment (Kondratiev, 1925). The important aspects to this research are the assertions that diffusion can take decades (Schumpeter, 1942), and that old technologies can coexist with new technologies (Strassman, 1959).

A theory that has some similarities to long wave is evolutionary theory (Nelson & Winter, 1982). While long wave theory takes external factors, evolutionary theory uses internal factors when studying the diffusion process, and focuses on organisational behavioural elements.

Long wave theory has some important aspects to the diffusion process, however when examining the dynamic interactive innovation of electronic business, factors such as communication and the social system need to be included.

In summary, when examining the phenomenon of electronic business, diffusion theory can provide the overall framework that includes factors of the innovation, communication, time and the social system. Of course,
aspects of IT adoption, socio-technical, social learning and long wave theories can present some interesting insights and explanations for aspects of the diffusion process.

2.6 USE OF INFORMATION TECHNOLOGY IN ORGANISATIONS

Advanced IT is providing platforms for new ways of communicating (Siegel et al, 1985) and this trend has accelerated during the 1990s with the introduction of networks and the evolution of the Internet. Certainly, business use of the Internet, particularly email, is becoming widespread. However, this increased use of technology has led to concern about the loss of jobs usually associated with changes in processes in organisations. However, the introduction of the technology without corresponding changes in process has created jobs (Marstrand, 1984).

A study of the use of computers among top administrators found that the diffusion of this innovation was spread through interpersonal networks where individuals within a similar job category and similar characteristics (formal education, experience) communicated on the advantages of adopting computer technology (Kearns, 1992).

Dutton (1999) states that when studying IT in organisations a number of factors need to be addressed. These include the innovation, how the innovation is used, and public policy and regulation in regional and global arenas. Certainly, diffusion of innovations theory cover these aspects, and this
research tests whether this approach is relevant to the dynamic interactive innovation of electronic business.

2.6.1 Use of Information Technology in SMEs

SMEs use IT to support their existing practices. The strategic role of IT has not been planned in advance, and the organisational structure has not been adjusted. This impasse holds back SMEs when considering high-level use of the Internet (Stroken & Coumans, 1998) particularly when moving to electronic commerce activities such as transaction processing.

Major bottlenecks are caused by lack of knowledge of IT, as well as lack of IT expertise of staff, which leads to IT not being fully utilised. This is a trend that can be exacerbated by the use of electronic business. Empirical evidence shows that SMEs use IT to support existing activities without any changes to their processes (Stroken & Coumans, 1998). Factors that can impact on the level of usage of IT by small organisations are the owner’s perceived benefit of IT compared to cost, degree of competition, and external requirements (Henson, 1995).

If the use of IT is viewed as more than the technology, and encompasses the human components of knowledge and expertise
(Dawson, 1986), then SMEs will face the situation of a lack of skill in Internet related technologies.

2.6.2 Information Technology Skills in the Workplace

Strassman (1985) predicted that non-technological concerns such as IT skills would be more important than technological matters. He stated that in the future IT would be examined from demand-side issues rather than from the technology itself. Organisational relationships would be changed by information technology and its effect on individuals.

The changing environment brought about by new IT in the workplace, will be evidenced by staff who are generalist and multi-skilled, and jobs that contribute to value rather than add overheads. The challenge for IT is how to deal with the unpredictability and pace of change (Strassman, 1985). E-mail communication is an illustration of a technology that has created a generalist aspect to many jobs.

Strassman (1985) also highlights that successful adoption of IT requires change agents to be successful. A priority of any introduction of new IT should be training of users, rather than technological decisions. The ability of users to make the IT work efficiently for the organisation need to be addressed along with decisions about whether the IT will be implemented. For an organisation to successfully
implement new IT then the business processes must be able to adjust
to them (Landauer, 1995). How to apply an innovation to human
needs, rather than just solving some technological problem will be the
central concern when dealing with electronic business.

Historically, technological innovation has been viewed as the introduction of
a new way of doing business that can reduce the cost of producing the same
product (Rosenberg, 1982). Over the past couple of decades, IT in the
workplace has supported this view, and the expectation is that the Internet
will continue this trend.

2.7 BUSINESS USE OF THE INTERNET

If we view the use of IT for business as a precursor to an Internet connection,
then the Internet connection can be viewed as a precursor to the steps along
the road to electronic business. Adoption of the Internet does not have a
predictable path, as it involves social factors as well as technological factors.
The simplistic views offered by technological determinists are not relevant
when examining the activities associated with business use of the Internet
(Howcroft & Fitzgerald, 1998).

2.7.1 Australia

In Australia, almost all organisations use computers (ABS, 2000). The
penetration for large organisations is 100%, which means that SMEs
will provide future growth in the use of PCs. About 56% of all
organisations are connected to the Internet (ABS, 2000), and like PCs, penetration in large organisations is higher. The Australian Government believes that future use of the Internet will be strongly influenced by trends in SMEs (DCITA, 2001). Yellow Pages Index (2000) puts Internet connection for small organisations at 61%, and at 89% for medium organisations. From the group that were not connected to the Internet, 41% believed that the business was not suited to Internet use.

The businesses with Internet access, 90% used their connection for email communication, and 27% for marketing. Transaction processing was much lower, with 18% for purchasing, 15% for sales, 5% for making on-line payments, and 7% for receiving on-line payments (DCITA, 2001). While searching for information has been popular, using the Internet for electronic commerce activities has not been attractive for the majority of SMEs.

2.7.2 Overseas

Overseas trends have been similar to Australian trends with 70% of SMEs in Europe and United Kingdom, and 80% in the United States with Internet access (Hobley, 2001). Generally, statistics related to SMEs are not industry specific, so industries cannot be compared on whether they are IT or non-IT industries.
Business use of the Internet by SMEs suggest that these organisations have started on the road to electronic business, and have embraced the precursor innovation of use of computers. Therefore, research into the specific and planned use of electronic business in an industry sector is viable.

2.8 CONCLUSION

Researching a dynamic interactive innovation such as electronic business needs a flexible theoretical framework. Review of the literature of theories used in studying innovation reveal some limitations when attempting to explain electronic business. IT adoption theory, Socio-technical theory, Social learning theory and Long wave theory provide a framework for aspects of the innovation process.

Rogers’ (1995) Diffusion of innovation theory, which includes the innovation, communication, time and social system factors, has the most comprehensive framework for this research. The two-way communication factor does provide a limitation when studying a dynamic interactive innovation, and this research aims to extend and modify the framework.

When specifying an innovation such as electronic business, the use of IT and the beginning of the use of the Internet in organisations are precursors, and are innovations in themselves. Electronic business is connected to these innovations, and is an extension of a technological trend.
In summary, this chapter has reviewed the literature associated with theories for studying innovation, and concentrated on diffusion of innovations theory that is used in this research. Justification for selecting this theory and discarding other related theories is explained. The four characteristics to the diffusion theory when applied to this research are: the innovation (electronic business); communication (within manufacturing industry); time; and members of the social system (including manufacturing SMEs, consultants and industry associations). Use of IT in organisations and business use of the Internet are overviewed to set the stage for the next chapter, which reviews the literature associated with research into the adoption of electronic business.
CHAPTER THREE

PATHWAYS TO ADOPTION OF

ELECTRONIC BUSINESS INNOVATION

Electronic business is a dynamic interactive innovation that has many aspects that impinge on the multiple pathways of the diffusion process. An in-depth examination of the business-to-business dealings of small and medium enterprises in the manufacturing industry was undertaken for this research, by way of an integrated series of studies in two regional areas of Australia. This provided an insight into the diffusion process, and revealed the adoption profile and issues of concern to manufacturing SMEs in Australia. The results of these studies were then used to evaluate the relevance of the diffusion of innovation theory models. An overall aim of the dissertation was to provide a flexible theoretical framework in which to position studies into adoption of electronic business, particularly levels of adoption and factors that affect the rate of adoption. The empirical studies provided the first evidence into the suitability of the framework, which was taken from the literature and extended and modified.
In the previous chapter, the literature associated with theories for studying innovation was reviewed, with a concentration on Rogers' diffusion of innovation theory, which is used for this research. The two-way communication factor does provide a limitation when studying a dynamic interactive innovation such as electronic business, and this research aimed to extend and modify the framework. This chapter reviews the literature related specifically to electronic business (see Figure 3.1), and sets the agenda for the empirical studies in manufacturing SMEs that are detailed in the following chapters. The literature review starts with definitions of electronic business and small and medium enterprises (SMEs) as applied to this research, looks at the evolution of electronic business, the models for analysis of adoption, research into the use of the Internet by SMEs, and barriers to SMEs becoming involved.

Figure 3.1 Schema of Reviewed Literature
3.1 INTRODUCTION

Electronic business is an important innovation to organisations, and its rapid rate of growth has brought with it uncertainty about its implementation. The turning points can be traced to the introduction of personal computers during the 1980s, and networking in the 1990s. The Internet and subsequent moving towards doing business on-line are extensions of a global trend, which will ultimately see boundaries disappear and business conducted seamlessly electronically. While electronic business as an innovation is a collection of related technologies (and is the focus of this dissertation), it could not stand alone without the precursor innovations of personal computers and networks.

The Internet is becoming a universal trading platform, and the predicted growth of electronic business in the next decade will be concentrated in developed countries such as Australia (Hyndes et al, 1999). Australia compares very well internationally on measures of electronic enablement, and significant opportunities are available for organisations that use electronic commerce to expand export markets (Adams, 1999), and break down the geographical isolation of Australia. Certainly, Internet technology can overcome the physical barriers that have prevented long distance trade (Choi & Whinston, 1999), however electronic business is a wider concept than the technology alone. While Slyke (2000) described e-commerce as a cluster of related innovations, adoption
of e-business may involve a series of steps not only of e-business technologies, but also of precursor technologies, such as effective use of IT.

3.2 ELECTRONIC BUSINESS

This section provides the definitions used in this research, namely electronic business, electronic commerce, business-to-business, and small and medium enterprises. The industry sector (manufacturing) is detailed in the next chapter.

3.2.1 Definition of Electronic Business and Electronic Commerce

Electronic business has been defined as the process of conducting all forms of business activity using electronic methods for business processes and communication channels, ie, electronic mail, electronic catalogues, electronic banking, processing transactions (Adam et al, 1999; Lawrence et al, 2000; Farrell et al, 2001). This broad definition is used in this research. The term electronic commerce is used to describe transaction processing, such as on-line ordering and on-line payments, and involves communication channels external to the organisation (Farrell et al, 2001).

The use of these paperless methods of exchanging business information recognises that paper based systems increase cost without adding value.
The argument that businesses can adopt electronic business to make better use of information and computer technology, and to leverage these technologies to improve business processes and the exchange of information is strong, particularly when confronted with the need to reduce production costs and lead times (Burgess & Cooper, 1998b).

3.2.2 Definition of Business-to-Business

Business-to-business (B2B) electronic commerce involves trade between organisations, and not with consumers. This type of trade dominates electronic business activity with about 80% of the total value of transactions (OECD, 1999), and it is believed that this will be the case for the foreseeable future. B2B e-commerce is aligned to conducting business differently, whereas business-to-consumer (B2C) e-commerce is an extension of normal sales channels (Huggins, 2001). Predictions show that e-commerce will continue to be dominated by B2B (Zwass, 2000), and B2B e-commerce will have a rapid penetration over the next few years (Bonaccoris & Ross, 2001).

3.2.3 Definition of Small and Medium Enterprises

The Australian Bureau of Statistics defines small and medium enterprises (SMEs) as organisations with less than 200 employees (ABS, 2000). For this research the broad definition of small and medium organisations is
used to make comparisons more relevant, namely small organisations have less than 20 employees, and medium organisations from 20 to 200 employees.

The use of electronic business lessens the importance of time by reducing turnaround times when messages are exchanged electronically rather than using traditional methods such as mail and telephone. Geographical location is not an issue and transactions can be conducted around the clock (OECD, 1999).

3.3 SMALL AND MEDIUM Sized ENTERPRISES

Small and medium sized enterprises (SMEs) have features that distinguish them from larger organisations, namely, small management team, strong owner influence, lack of specialist staff, informal and inadequate planning and control systems, practical but narrow training methods, reluctance to take risks, and the owner's age (Reynolds et al, 1994; Thong, 1999). These features will influence adoption of any innovation that will affect the way business is conducted. Conversely, SMEs have provided valuable contributions such as providing a place for new industries and possibly enhancing innovation, and acting as suppliers for niche markets. Differences between small and medium organisations are that medium organisations are generally more confident about future prospects, and subsequently profit expectations are higher (Telstra, 2001).
The Internet and the emergence of electronic business have started to change the way business is conducted. SMEs are now faced with the situation of a global market, as well as more open competition and the need to transform their business operations to meet challenges of customers and trading partners (Ginige et al, 2001). The effect of electronic business on SMEs has been the focus of policy makers in many countries (OECD, 1999), as it is recognised that SMEs contribute significantly to the economy, and are facing increased competition due to globalisation. Consequently, SMEs need particular attention to encourage their participation in electronic business.

Electronic business has moved from being a technology issue to a core business issue, both in Australia and internationally (Alston, 1999). A majority of SMEs have Internet access in Europe and United Kingdom (70%), in the United States (80%) (Hobley, 2001) and in Australia (83%) (ABS, 2001). Internet access does not, however, equate with e-business practices, but is the first step along path to being involved in doing business on-line.

This notion of a new way of doing business raises many issues particularly for SMEs in Australia. This new way of doing business requires staff with expertise in the new technologies, ie, Internet Web Page design and electronic business. SMEs will not necessarily have dedicated IT staff to enable them to gain the necessary competitive advantage in the global marketplace. While the
advantages of electronic business to large organisations can be justified, particularly if the organisation has specialised IT staff, SMEs may have difficulties firstly in meeting the initial costs and then the on-going expenses of maintaining the operation (Farmer, 1996).

Government programs focus on raising the awareness of SMEs to the trading opportunities offered by electronic business, however SMEs are not conducting business on-line as quickly as larger companies (Adams et al, 1997). Factors that contribute to SMEs not becoming involved in doing business on-line include: less expertise in IT than larger organisations; fewer resources available to initiate new ways of doing business and, suspicion held by owner/managers about who benefits from new technologies (Clarke, 1996; Poon & Swatman, 1977).

SMEs constitute 97% of commercial organisations in Australia (ABS, 2000) and therefore play a major role in the Australian economy, as well as contributing to private sector employment. Australian Bureau of Statistics defines manufacturing SMEs as organisations with less than 200 employees, and annual turnover less than $20 million. Almost all Australian SMEs are using computers (Gessin, 1996), however, how the computers are used for business and in particular the role of the Internet are emerging issues. However, small organisations will not take up new technologies unless they perceive an advantage to do so, or an immediate disadvantage in not taking them up (Clarke, 1997). Likely benefits to
an organisation using the Internet include saving in communication costs and potential business opportunities (Poon and Swatman, 1997).

Successful implementation of electronic business can offer many opportunities for SMEs including lower costs, wider markets, and strengthening of existing business relationships through on-line services (Adams, 1997). For regional SMEs the location ceases to be an issue. SMEs that have implemented forms of electronic commerce have done so in reaction to demands from a large customer organisation (Behrendorff & Rahman, 1999), and therefore a planned whole-of-business strategy is not necessarily evident.

Australian SMEs as a group have embraced technologies such as telephone and fax, however the adoption of electronic business technologies has been comparatively slow (Behrendorff & Rahman, 1999). Encouragement from government is needed for SMEs to, firstly connect to the Internet, and then to use email for communication. The problem facing SMEs is that adoption of e-business technologies, unlike fax, requires installation and training by specialist IT staff, either internal or external to the organisation.

3.4 EVOLUTION OF ELECTRONIC BUSINESS

E-business has evolved from EDI (electronic data interchange) which was a means for businesses to exchange data electronically and saw its beginning in the
1980s. Throughout the next decade large organisations adopted EDI more readily than small organisations. Factors that contribute to small organisations adopting EDI are external pressures and organisational readiness (Iacovou et al, 1995). During the early 1990s email became popular, and the focus of electronic business was broadened to include email and the Internet (Behrendorff & Rahman, 1999; Zwass, 2000).

Organisations that effectively use IT in their business operations will be ideally placed when considering the move to electronic business activities. High levels of IT usage by staff is an important indicator of IT success (Mahmood et al, 2001), and results in the ability of the organisation to look externally to improve efficiency. While successful implementation of e-business technologies can reduce costs, the key to overall success depends on building and maintaining customer relationships (Archer & Yuan, 2000). This implies an overall e-business operation must include more than implementation of the technology. Global benchmarks for cost savings from on-line service delivery have been predicted at 58-71% for customer service and 100% for operational costs (Cutler, 1999).

Significant productivity gains and higher economic growth are expected from the use of electronic business in Australia (Alston, 2000). These gains will not be consistent across industry sectors, with some sectors fully embracing e-business,
and other only partially. Business will be transformed by the capability of organisations to easily reach a global business community (Farhoomand et al, 2000).

3.4.1 Models of adoption of electronic business

Models of the stages that an organisation moves through when embracing electronic business have been developed (Ho, 1997; Burgess & Cooper, 1998a; APT, 1999). The Model of Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998a, 2000) is used to evaluate the level of maturity of e-commerce for organisations in the empirical studies in this dissertation (see Figure 3.2). This model was developed from existing models to reflect the modular adoption process for the manufacturing industry (Burgess & Cooper, 1998a). The model was tested internationally to evaluate level of maturity of manufacturing organisations with a web presence. In 1998 most organisations began with an uncomplicated web page and added modules for functionality and complexity. MICA is used for this research as the original development was within the manufacturing industry and is therefore appropriate for this series of studies into manufacturing. Also, the flexibility of MICA will suit modification for an industry sector. Certainly, this flexibility is a major strength of this model.
MICA (Burgess & Cooper, 1998) shows where the organisations are in terms of their adoption of e-business, and complements the Diffusion model (Rogers, 1995) that charts the communication channels, which led to the level of adoption. Indeed, to fully study the adoption process more than one model is needed. To this end the diffusion model and MICA are looking at aspects of the same phenomenon. The advantage of MICA is in its simplicity, which can operate at an abstract level and be tailored to suit the industry sector under investigation. A number of the alternative models lack this simplicity and as a consequence cannot operate at the
same effective abstract level. This research aims to extend and modify MICA explicitly for manufacturing SMEs. When studying a dynamic interactive innovation such as electronic business, the models used need the same dynamic flexibility.

A model needs to fit the industry sector and type of organisation under examination, and in this sense there is no right model (Nguyen & Stewart, 2001). Characteristics of models include relationships with suppliers and customers which traditionally were handled by phone and mail with paper based invoicing and payments (Callahan & Pasternack, 1999). These same relationships can move to the digital arena with email and web based business activities comprising the focus of models of electronic business.

### 3.4.2 Australia

In January 1999 the Australian Government released its vision for Australia in the information age, with electronic business as one of the areas for action. Senator Alston, Minister for Communications, Information Technology and the Arts believes that industry will be uncompetitive without electronic business. The Australian Government is partnering with industry to establish a range of initiatives that ensure a balanced and predictable legal and regulatory environment for e-
commerce (Alston, 1999). A priority is to target barriers and to encourage the use of business-to-business electronic commerce. Technical barriers of bandwidth capacity and incompatible IT systems are currently under investigation.

Even though electronic business is in its early stage, a key message from the Australian government is that it would be a mistake for organisations to think that they can delay consideration of the Internet as a tool for conducting business (Hyndes et al, 1999). The government, which has already placed more emphasis on delivering its own information on-line, is combining with business to promote on-line business activities (Adams, 1999).

A number of weaknesses have been identified that affect Australia's participation in electronic business (Cutler, 1999). These include: lack of depth of skills and management; inadequate linkages at government, business and academic levels; and lack of focus on innovation. In addressing the weaknesses it needs to be recognised that technology is the enabler, not the driver of electronic business.
3.4.3 Use of the Internet by Australian SMEs

Large organisations are adopting the use of the Internet at a faster rate than SMEs. The single biggest determinant of how electronic commerce is integrated into the business is size, with SMEs tending to use the Internet for marketing, rather than integrating their systems (Adams, 1999). SMEs have a short-term focus, and need to achieve a return on investments (ROI) in 6 to 18 months (Jentzsch, 1998), yet ROI on web business has not been evidenced within the first 12 months (Diederich, 1998). In addition, SMEs do not generally have the resources and expertise needed to embrace new technologies.

The use of computers by Australian SMEs has been reported at 97%, with 83% with an Internet connection (ABS, 2000). Further, 54% of small and 92% of medium organisations use email (Alston, 2000). At the start of this research in 1998 12% of SMEs had a web page (ABS, 1998), which had grown to 46% in 2000 (ABS, 2000).

The Australian Industry Group reported that 78% of its members had an Internet connection (AIG, 1999). A study conducted in Tasmania revealed that 77% of respondents used computers, with 37% having an Internet connection, and 23% a web page (Chau & Lawrence, 1998). Further, 23% of respondents to the Tasmanian study indicated plans for a
web page within the next year. In Queensland, AIG found that 60.5% of members had an Internet connection (AIG, 1998). US SMEs with Internet access is 80% (Hobley, 2001), however, only 32% of American manufacturers had a web page (Caswell, 2000).

Research has found that SMEs have only superficial knowledge of the emerging global business communications and information infrastructure (DIST, 1996; Lawson et al, 1999; Lawson et al, 2001). The idea of electronic commerce is even less understood, and in general, SMEs do not believe that electronic commerce will substantially assist them with their primary concerns of staying in business, making a profit and getting ahead of competitors. Generally, studies have found that using email and access to information via the World Wide Web are starting points for moving into electronic commerce (DIST, 1996; Gregor & Jones, 1997, 1999; Poon, 1999; Lawson et al, 1999; Lawson et al, 2001). An action research project in agribusiness, which studied the use of electronic communication, found that the group exhibited success in this first stage of electronic business adoption (Gregor & Jones, 1997, 1999).

Lack of interest and the perception that the business would not benefit have been given as reasons for non-adoption of Internet technologies (Akkeren & Cavaye, 1999). Even though uncertainty about the effect on
the organisation and cost of implementing e-business technologies have been expressed, the notion of not being involved and being left behind was a driver for some organisations to become involved (Marshall et al, 1999). In addition, there is a lack of any planned changes to internal business processes to integrate e-business strategies.

A target of the Getting Business On-line Project by the Department of Industry, Science and Tourism is to ensure the Australian business sector is regarded as a front-runner in the adoption of on-line technologies at the global level within five years, and a leader in the ASEAN region (DIST, 1998). Certainly, predictions are that profit margins will reduce due to global competition (Wigand & Benjamin, 1998). How this will impact on the cost of participating is not clear. Organisations will need to think about their relationships with customers and suppliers, as well as issues such as information for potential customers, and after sales support (Applegate et al, 1996).

Considering that electronic commerce is in its beginning phase, Australia is viewed as a world leader in electronic commerce initiatives by the OECD (1999), which rates Australia ahead of most of its 29 member countries. Australia is ranked third in the world (behind Finland and the US) in Internet use. Levels of electronic commerce in Australia have
been estimated at 0.1% of total sales (Alston, 1999). The Australian Electronic Business Network (AeB.N) has been established, as a joint venture of the federal and state governments and the business sector, to promote electronic commerce to SMEs in Australia (Goldsworthy, 1998a). Its objective is to increase the number of SMEs doing business on-line. AeB.N's leadership role includes contributing to policy and regulation decisions, and networking organisations. SMEs can vary greatly between countries and even within the one country, and AeB.N contends that to fully understand primary information requirements of SMEs, regional studies in particular industry sectors are critical.

3.4.4 Use of the Internet by SMEs overseas

Research overseas indicates similar experiences to Australia. A study in the UK (Levy et al, 1998) revealed that as a result of management limitations, the introduction and exploitation of new technologies was a problem for many SMEs. Little interest was generated for new technologies, such as e-commerce, because of the lack of experience and skills necessary, and the comfortable nature of the existing market situation. As a result, investment in new technologies was only evident with individual activities, like basic administration. However, when change agents are involved in the social system, adoption rates are higher,
a success is based on customised training programs (Berranger et al, 2001).

Use of the Internet in Israel is comparatively low, despite its status as a high-tech leader. The adoption of the Internet for business is more evident in large organisations than for SMEs (Schechter et al, 1999). In China the development of e-business is tightly linked to government policy, and there is interest in Internet access from small business that use technology to overcome the barrier of distance (Clark, 1999). Inferior IT infrastructure has been noted as the reason that few purchases are made on the Internet in South Korea. However, Lee (1999) has demonstrated that email advertising can be effective for marketing. After privatisation, the Brazilian government aims to meet demands from SMEs for telecommunications, by supplying a range of data communication services (La Rovere, 1998).

SMEs that have Internet access in Europe have been defined at 70% and 40% with a web site. Communication and information gathering are the main activities, and difficulties are that not enough companies use the Internet (48%) and lack of legal guarantees for on-line transactions (47%). For SMEs without Internet access, main reasons include lack of
time (46%), lack of motivation (29%) and lack of specialised staff (22%) (Hobley, 2001).

Similar figures for the United Kingdom show SMEs with Internet access at 70%, which represents 1.7 million organisations that are on-line, and 80% in the United States (Hobley, 2001). In the US, Internet usage patterns were found to be similar regardless of size of organisation; however, small organisations were generally more focussed on marketing issues (Haynes et al, 1998).

3.5 BARRIERS TO ELECTRONIC BUSINESS ADOPTION

To fully understand the complex nature of a dynamic interactive innovation, issues such as drivers and barriers need to be addressed in addition to the degree of usage of e-business. Drivers in electronic business adoption have been defined as cost reduction, adoption by competitors, and large organisations insisting that all organisations in their supply chain link to their e-business systems (OECD, 1999). This will impact on SMEs, as many large organisations already have these systems, and cost will be a factor. In Australia, the majority of organisations are SMEs that may not trade with large organisations, and therefore will not be persuaded to adopt the new technologies. Indeed, SMEs may not be convinced to adopt electronic business based purely on the reported drivers of the diffusion process. Another aspect is that some individuals view electronic business as web
pages for advertising, rather than as a way of doing business (Power, 1998), and therefore see gaining competitive advantage as more important than productivity and performance (Drinjak et al, 2001).

Barriers to doing business on-line can be categorised as having a technical or a social perspective. Technical barriers include inadequacy of telecommunications infrastructure and security of transactions (Wai-Pun et al, 1997; Warren et al, 1999; ABS, 2000). Social barriers range from believing that the Internet is not suited to their type of business (ABS, 2000); generally not trusting information technology (Corbitt et al, 1997; Crawford, 1998); lack of knowledge about conducting business on-line and lack of IT skill of staff (Clarke, 1996; Crawford, 1998; Marzbani, 1998; ABS, 2000; Farhoomand et al, 2000); through to lack of awareness about possible uses of the Internet (Wai-Pun et al, 1997).

Telstra (1998) conducted a survey of Australian SMEs and found that the major barrier was lack of personal contact between the organisation and the customer. The viewpoint that customers were not ready to do business on-line was also rated highly as a barrier. Interestingly only 5% of respondents felt security was a barrier to implementation. This is in contrast to other studies (Wai-Pun et al, 1997; Warren et al, 1999), and could be a result of the sample biased towards organisations without Internet involvement as illustrated by the major barrier of lack of personal contact, and the assertion that customers were not ready.
Further, the Australian Industry Group's report highlighted reasons for not obtaining an Internet connection as cost of access, and lack of IT skill (AIG, 1999). ABS (2000) statistics indicate that 54% of organisations with no Internet connection believed that using the Internet did not suit their business. This was supported by 41% of unconnected organisations in Yellow Pages (2000) survey. Barriers to European SMEs not becoming involved in using the Internet have been identified as lack of time (46%), lack of information (31%), and lack of training (30%) (Hobley, 2001).

Lack of security has been identified as a major concern for organisations considering moving to electronic business (Wai-Pun et al, 1997; Warren et al, 1999; ABS, 2000). It has been argued that this barrier is not warranted, as technologies such as public key encryption and firewalls are already available (Segev et al, 1995). Some industries are more suited to electronic business are therefore more able to overcome the barriers (McComb, 1999). However, whether these technologies are actually implemented is perhaps the real issue, along with publication that a site is secure. Certainly, when considering barriers to e-business adoption, the industry (that is, nature of the business), type of organisation (large or SME), and location are factors. Change agents such as government and industry associations could then focus on these factors, and not merely address barriers across the country. In fact, barriers can be related to the
ability of the organisation to respond to the challenge, rather than issues specifically related to the technology.

3.6 ROLE OF GOVERNMENT

As the largest single user of goods and services, governments have a vested interest in the adoption of electronic commerce in industry for business-to-business transactions. Of course, this means that governments need to harness the intrinsic worth of electronic commerce themselves, to be able to gain the benefits of trading on-line. To this end, the OECD (1997) has recommended that governments can play a role in the diffusion of electronic business, firstly, by direct promotion of their own administration and provision of services, and secondly, by facilitation of a legal and regulatory environment that encourages the development of electronic business. How governments handle this second recommendation will impact on the diffusion process.

Australia ranks second in the world in terms of computer penetration (OECD, 1997) and therefore the Australian government is ideally placed to promote the use of electronic business. An additional motivation for industry is to break down the geographical barriers that have historically hindered international trade. The Electronic Commerce Act (1998) was developed to facilitate the implementation and conduct of electronic commerce in Australia. The Australian and US governments have agreed to a joint approach in the development of electronic commerce.
commerce and both countries have recognised the important of the Internet to future economic and social development (Howard, 1998). Agreement was reached on key policy principles of self-regulation, minimal government intervention and private sector leadership. The Australian and Singapore governments have a similar agreement to cooperate by combining their skills, expertise and technology to assist organisations in their endeavours with electronic commerce (Bennett, 1999). In addition, joint statements have been released to promote the development of e-commerce issues in Australia and China (1999), Korea (1999), Canada (2000) and Ireland (2001).

The Australian government formulated a set of strategies based on OECD ministerial declarations for the development of electronic business in Australia including protection of privacy, authentication, consumer protection, and taxation issues (Alston, 1999). From this platform state and territory actions were developed to actively facilitate e-business activities. For New South Wales the focus centred on regional and rural telecommunications, with the Business Enterprise Centres conducting awareness training programs. For Victoria the focus centred on awareness of SMEs with an awareness project to foster understanding of the possibilities of e-commerce (Goldsworthy, 1998b). The regional studies in this research were undertaken within these two states.
Developing skills, generating new ideas through research is the key to Australia’s future success and the government is increasing funding for research related to innovation (Howard, 2001). Electronic trading adoption has been mostly concentrated on government related interactions with public companies playing the main part in providing the infrastructure (Damsgaard & Lytytinen, 1998).

Government cannot impose solutions onto the industry sector, and the industry sector alone cannot control the diffusion of electronic business. Governments have an important role in achieving adoption of electronic business activities by industry and the major issues will continue to be security, privacy, intellectual property and finance (Irving, 1998). Tradegate ECA is a non-government, non-profit organisation that promotes e-commerce techniques for the exchange of information between customers and their suppliers. Part of its mission is to provide information, education and training services (Tradegate, 2001).

3.7 INFORMATION TECHNOLOGY SKILLS

Diffusion of a dynamic interactive innovation such as electronic business involves more than the technology. Certainly, interaction between the various groups within the organisation plays a part. Knowledge of the decision maker and IT skills of staff will affect how successful, or otherwise, the adoption of e-business will be for the organisation. Investment in skills and qualifications will
be necessary for the organisation to realise the potential of electronic business (OECD, 1999), as will the need to integrate work practices with the technology (Dutton, 1999). For SMEs this will be mean the knowledge level of the owner/manager and skills of staff who are not dedicated IT staff.

The impact on jobs will be considerable within the IT industry and IT consultants, where other industries will look for assistance with implementation and on-going maintenance tasks. Beyond the IT industry, the impact of jobs in other industries will also be considerable when taking into account SMEs without dedicated IT staff. IT skills of staff will be relied upon, not only for the technological changes to their own work patterns, but also for IT specific tasks associated with electronic business, eg maintaining content of web sites, backing up files.

High skill levels are critical to a technology-based society (OECD, 1999). This demand will mean that governments, industry associations and the education sector must respond by upgrading professional skills of graduates and for those already in industry.

3.8 CONCLUSION

Researching a dynamic interactive innovation such as electronic business needs a flexible theoretical framework, and the diffusion of innovation theory is detailed
in the previous chapter. In addition, a model to explain the adoption pattern is needed to complement the framework. MICA (Burgess & Cooper, 1998) has been selected for this research, as it is not rigid in its application, and can therefore be modified and extended for the industry sector being studied.

SMEs in Australia and overseas are facing similar issues in these early stages of the diffusion of electronic business, and generally, barriers to involvement have a social rather than a technical perspective. Change agents such as governments have a major role to play in successful adoption of e-business technologies within the SME sector, as do industry associations and the education sector in relation to knowledge of e-business and appropriate IT skills.

In summary, this chapter has reviewed the literature related to electronic business specific to this research. The agenda has now been set for the factors governing the empirical studies, namely, what is meant by the terms electronic business and electronic commerce; the focus of the research (business-to-business); the type of organisations to be studied (SMEs); and model to be adopted (MICA) and justification. Justification for the use of the diffusion of innovation theory as the theoretical framework was detailed in Chapter 2. The pathway narrows in the next chapter to examine the industry sector (manufacturing in Australia), and then moves to the empirical studies in the following chapters.
CHAPTER FOUR

NARROWING THE FOCUS TO THE
MANUFACTURING INDUSTRY

Small and medium organisations in two regional areas of the Australian manufacturing industry were the focus of the empirical studies for this research into diffusion of electronic business. These studies provided the information for the overall aim of the dissertation, which was to answer the research question and provide a flexible theoretical framework in which to position studies into adoption of electronic business.

In the previous chapters, the theory of diffusion of innovation, and the evolution of electronic business are discussed. These chapters set the agenda for the factors governing the research, ie adoption of electronic business in manufacturing SMEs that trade business-to-business. This chapter overviews the manufacturing industry in Australia, the industry associations and the regions under examination (south west Sydney and south east Melbourne) in this research. The outcomes of the empirical studies provided a profile of adoption of e-business, which was then related to the model of diffusion of innovation theory. Overall, this research aimed to extend and modify the framework of this theory.
4.1 **INTRODUCTION**
Manufacturing has been undergoing change, from the making of a product by physical labour or machinery, to a global marketplace where geographical distance is no longer an issue. This brings with it pressures for manufacturing organisations to remain competitive in this environment. Electronic business innovation has reached the manufacturing sector, with large organisations embracing the new technologies, while SMEs are feeling the pressure to conform to recent trends. Innovation has been viewed as a key to increasing profits and market share. However, the dynamic interactive innovation of electronic business has caused problems for SMEs that, in general, do not have dedicated IT staff, and at times little knowledge on how to incorporate e-business activities into their organisation.

4.2 **OVERVIEW OF AUSTRALIAN MANUFACTURING INDUSTRY**
Current literature in the area of electronic commerce has produced success stories for SMEs, but not usually within the manufacturing industry. The manufacturing sector in Australia achieved substantial productivity improvements between 1987 and 1997, with output increasing by 21.8%, and an employment increase of 0.5% (DIST, 1997). The empirical studies for the research in this dissertation were conducted in 1999 and 2000.

More recently manufacturing has reported declines in liquidity. However, manufacturing activity strengthened in 2001, providing evidence of recovery, following three consecutive quarters of decline. The percentage of
organisations reporting increased production rose from 33% to 41%, and business confidence has increased with 61% of organisations expecting a rise in production. The improvement, however, was confined to large and medium organisations with 40% of small organisations continuing to report production declines. Increased production rates were 36% for small organisations, 42% for medium and 46% for large organisations. An increase in demand was the main factor driving the improvement. Improved export opportunities have been assisted by the low Australian dollar (AIG, 2001). Exporting was undertaken by 13% of manufacturing organisations and this accounted for almost 13% of the industry’s total turnover (ABS, 2000b).

The manufacturing sector is Australia’s largest industry sector (Alston, 2000), and the outlook has been optimistic in terms of economic growth if current trends continue. An Internet presence for manufacturing organisations would see the geographical distances that historically have isolated Australia from global trade broken down. Productivity improvements in manufacturing over the last decade have resulted in a third more products produced each year with fundamentally the same number of organisations, one in four of these products sold overseas (AIG, 2001). The Innovate Australia initiative contributed to these improvements by encouraging manufacturers to join together to conduct trade internationally via the Internet. The initiative pointed out that the two-year period usually associated with getting into the international market could be reduced to a few months (Bryan, 1997).
In Australia, manufacturing is divided into the following industry segments:

- Food, beverage and tobacco,
- Textile, clothing, footwear and leather,
- Wood and paper product,
- Printing, publishing and recorded media,
- Petroleum, coal, chemical,
- Non-metallic mineral product,
- Metal product,
- Machinery and equipment, and
- Other manufacturing (ABS, 1999).

4.2.1 Manufacturing and Electronic Business

The global evolution of e-business has raised a number of questions for manufacturing SMEs: firstly, questions related to whether to become involved in doing business on-line, and what features to include on an initial web site, and secondly, questions related to the integration of existing systems into a web site. Is manufacturing suited to a full-scale e-commerce facility, or is there merit in conducting business using only some features? A barrier that could be relevant to manufacturing is the belief by the technology is not suited to the nature of the business (ABS, 2000a).

In areas such as machinery and equipment production, and metal products, where most business is conducted in person because of the
specialised nature of the products, the question remains about whether some features of e-commerce may not be suitable. Some buying organisations like to see the product and employ quality standards, and also like to negotiate different individual deals with the selling organisation. This type of negotiation adds another dimension to e-business, and in these instances falls outside the spectrum of some e-commerce activities. On the other hand, some manufacturers are using e-commerce primarily to reduce processing costs to assist with lower inventory levels, which results in less warehouse space and quicker delivery schedules (DOCITA, 2000; PWC, 2001). This type of activity suits larger organisations, or organisations that do not make products to order.

Delivery of physical products over long distances (even within Australia) still remains a problem for manufacturing in the metal and machinery areas. Reduced costs and more efficient processes are factors that could be attributed to implementing e-business strategies for SMEs (DOCITA, 2000). While the majority of Australian manufacturers report cost reduction as an overall strategy, most tend to focus on more traditional areas of quality management, and view e-business as a way to attract new customers and improve customer service (PWC, 2001), rather than as a way to reduce costs.
The Australian government reports than manufacturing could be strengthened significantly by participating in Internet-based supply chains with USA, Asia and Europe (Adams, 1999). This would see Australian manufacturers participating by supplying products to developing countries. This involvement would assist SMEs to create a global image, but would necessitate an e-business strategy.

The percentage of Australian businesses that are Internet active has been reported at 46%, with manufacturing organisations at 23% in 2000 with most activity more prevalent in large organisations (ABS, 2000a). There has been a slight increase in e-business intensity in 2001, with email the main activity (AIG, 2001). In contrast, Australian businesses engaging in e-commerce is reported at 6% in 2000 with activity dominated by B2B transactions (ABS, 2000a).

Manufacturing SMEs are in a position to be responsive in the current climate to utilise the most up-to-date IT and the web to be successful (Nicholls, 2001). However, successful utilisation of IT and, indeed e-business technologies, requires a highly skilled workforce, and SMEs generally do not have these skills in-house.

4.2.2 Manufacturing region in NSW: South West Sydney

The south west Sydney region has a population of 154,000 residents, and is located about 53 kilometres from Sydney (CCC, 1999). This
region has a significant manufacturing base of 1,249 organisations, with machinery and equipment and metal products as its main sectors (ABS, 1999). South west Sydney is the location for the first study in this research that was conducted in 1999.

4.2.3 Manufacturing region in Victoria: South East Melbourne

The south east Melbourne region has a population of 133,000 residents, and is located about 30 kilometres from Melbourne (CGD, 2000). This region has a significant manufacturing base of 1,368 organisations, with textiles and clothing, machinery and equipment and metal products as its main sectors (ABS, 2000c). South east Melbourne was identified as an equivalent region to south west Sydney by industry associations (Nicholas, 1999), and was the location for the second study in this research that was conducted in 2000.

4.3 NATIONAL AND REGIONAL INDUSTRY ASSOCIATIONS

The most prominent national industry association for manufacturing in Australia is the Australian Industry Group. The leading regional industry associations, the Innovative Technology Network (in south west Sydney) and South East Networks (in south east Melbourne) are discussed in the following sections.
4.3.1 Australian Industry Group

The merger of the Metal Trades Industry Association of Australia (MTIA) and the Australian Chamber of Manufacturers (ACM) created the Australian Industry Group (AIG). It is an independent body created to help Australian industry become more competitive within Australia and globally. AIG is the largest industry association in Australia with over 11,000 organisations in all states of Australia (AIG, 2000).

The goal of AIG is to be an effective advocate for Australian industry. Their policies reflect the need to enhance the success of Australian industry in local and global markets. Issues that are addressed include: the economy and related investment; taxation and regulation; trade; industrial relations policy and practice; workplace safety and environment; research and development; and education and training. A telephone advisory service is available to members on a range of enquiries.

Head Office is located in Sydney, with offices in Canberra, Melbourne and Brisbane, and international offices in Jakarta and Osaka. Affiliate associations are located in Adelaide and Perth. AIG is a registered training provider, with programs that cover a range of courses for management and technical education and training. The Training
Centre is located in Richmond, Victoria, with other locations in regional areas of NSW and Victoria.

The Australian Industry Group claims to be the new voice of Australian industry representing large, medium and small organisations in engineering, construction, printing, information technology, food processing, packaging, automotive, rubber, aviation, chemicals, telecommunications, energy and other related industries.

4.3.2 The Innovative Technology Network

The Innovative Technology Network is a regional association in south west Sydney that concentrates on providing a focus for organisations to further develop their competitiveness and productivity through technology. Meetings of the association are held monthly and include seminars, workshops and site visits. Benefits to members include opportunities to share experiences, work with local colleagues on the introduction of new technologies and workplace renewal, updates on government industry policy, introductions to strategic partnerships, and reports on current research into hard and soft technologies (ITN, 1999).

The association is located at the University of Western Sydney in Campbelltown (which is centrally located in south west Sydney) and provides a meeting point for local organisations to share their
experiences in implementing both hard and soft technologies and to consolidate their understanding of technological innovation through interacting with visiting experts, researchers, consultants and government representatives. The site-visits to local industries where practical aspects of new technologies can be viewed and openly discussed have proved very popular with participants.

The Innovative Technology Network is industry-driven and technology-oriented, with an emphasis on business operational improvement. Originally part of the AusIndustry-NSW User Group, funding for the associations comes from Federal and State government initiatives.

4.3.4 South East Networks

South East Networks is a regional industry association in south east Melbourne that focuses on practical and active support for business through networking. The program is unique in Victoria as groups of fifteen to twenty companies meet monthly, and information is presented on a range of issues from management principles and practice to operational effectiveness. Network groups include general manufacturing, quality network, manufacturing excellence roundtables and women in business forum, some of which have operated for up to six years. Each three months all the groups come together for joint functions. Benefits to participating companies
include an expanded knowledge of the region’s capabilities, which leads to local sourcing of goods and services (SEN, 1999).

The association is located in the City of Greater Dandenong (the main business centre in south east Melbourne) and provides links to government agencies, government assistance programs and educational institutions. In addition, the association offers the region a range of consultation services and encourages collaboration between businesses on issues such as business sustainability and growth.

South East Networks believe that they offer benefits to the region from their programs, including the retention and potential increase in employment. Benefits to members of the Networks include strengthened business relationship, improved supply chain systems, access to relevant business information, new business opportunities, improved efficiencies and skills, and peer support.

South East Networks has a broad focus ranging from management to operational effectiveness. Funding for the operation of the association comes from Federal, State and local government initiatives as well as some self generated funds.

E-business offers opportunities for manufacturing SMEs to operate in a global market environment, but the road is littered with risk and greater
competition. Increasing awareness and knowledge, as well as the necessary skills set for SMEs, needs to come from change agents that include industry associations. While industry associations would argue that e-business is incorporated in their activities, a separate identity for e-business, at least in the initial stages of adoption, would assist SMEs to gather the necessary awareness to embark on the path to integration of e-business technologies. Even among those manufacturers that acknowledge the Internet as a vital new form of business, there is a wide disparity between this recognition and the actual application of the technologies (Caswell, 2000).

4.4 CONCLUSION

Electronic business is becoming evident in the Australian manufacturing industry, and SMEs are feeling the pressure to remain competitive in the global environment. The outlook for the manufacturing sector has been quietly optimistic despite recent setbacks, and e-business is viewed as a way to increase competitiveness. Whether full electronic commerce is suitable for manufacturing, especially in areas where products are made to order, is uncertain. A range of e-business activities that fall short of full e-commerce may be the answer.

Manufacturing industry associations, at national and regional level have a role to play in assisting SMEs decide where their organisations sit on the continuum of activities known as electronic business. This role may involve
changes in the focus of the industry associations, and to their subsequent activities.

In summary, this chapter has presented an overview of the manufacturing industry in Australia, as well as south west Sydney and south east Melbourne regions. The operations of the industry associations relevant to the integrated series of studies have also been outlined. This chapter and the previous two chapters have set the framework for the studies into the diffusion of electronic business for manufacturing SMEs in two regional areas of Australia. The next chapter details the methodology used for the empirical studies.
CHAPTER FIVE

METHODOLOGY

Is the model of innovation adoption relevant to electronic business? This is the research question addressed by this dissertation. To address this question, empirical data was needed to apply to the existing diffusion of innovation theory model. To this end, a series of integrated studies was developed to examine the adoption of e-business by manufacturing SMEs for their B2B dealings in two regional areas of Australia. Outcomes of these empirical studies provided input data (adoption patterns of the innovation, factors affecting adoption and effectiveness of the communication channels) for the theoretical study designed to answer the research question.

The research was carried out from 1997 to 2001, with the empirical studies conducted in 1999 and 2000. The previous three chapters have set the theoretical and practical agenda for the research. This chapter will detail the research plan, the series of studies, survey design, sampling, and statistical analyses. A combination of quantitative and qualitative methodologies is applied, with methods detailed for each study. The next five chapters will elaborate on the studies.
5.1 INTRODUCTION

At the beginning of this research in 1997, adoption patterns for SMEs were starting to emerge and descriptively reported for SMEs in some industry sectors. However, applying the adoption patterns to a theoretical framework proved unsuccessful. The research question for this dissertation was developed, and the series of studies in manufacturing was designed to provide primary data for the application to a framework for the dynamic interactive innovation of electronic business.

The next step was to design the elements of the studies, namely, adoption of the innovation (measured by use of IT, specific and planned use of e-business, barriers to adoption, current and planned training methods); communication channels of change agents (measured by the role of industry associations and government); and, the social system (measured by manufacturing SMEs in two regions and industry associations). The Model of Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998b) was used to map the e-business adoption patterns. These primary data output elements provide the input data for the theoretical study. Figure 5.1 is a schema of the research plan and Table 5.1 shows a conceptual view of the series of studies. Statistical analysis is outlined in Table 5.2.

The research question to be addressed is, *Is the model of innovation adoption relevant to doing business on-line?*
Are models of innovation adoption relevant to doing business online?

SME Exploratory Study

SME Replication Study

SME Comparative Study

Industry Associations Study

Government Electronic commerce Initiatives

Applied Theoretical Framework Study

No

Models

Figure 5.1 Research Plan
Series of studies | Chapter
--- | ---
**Study 1:** Diffusion in south west Sydney: a quantitative and qualitative study of manufacturing SMEs | 6

**Study 2:** Diffusion in south east Melbourne: a quantitative and qualitative study of manufacturing SMEs | 7

**Study 3:** Comparison of two Australian regions: a quantitative and qualitative study of similarities and differences between regions and between small and medium organisations | 8

**Study 4:** Change Agents in manufacturing: a qualitative study of national and regional industry associations and federal and state government programs | 9

**Study 5:** Theoretical study to apply outcomes of studies 1-4 to diffusion of innovations theory model | 10

**Table 5.1: Outline of series of Studies**

### 5.2 RESEARCH PLAN

The overall aim of the research was to answer the research question and to provide a flexible theoretical framework in which to position studies of the dynamic interactive innovation of electronic business. The dependent variable
was the level of adoption. The unit of analysis was manufacturing SMEs within the regions.

The focus of the research was the adoption of the innovation (e-business strategies), role of change agents (industry associations, government), and factors that inhibit adoption. This focus will provide data towards the overall aim. In relation to the research question, the following hypotheses will be tested in the theoretical study detailed in Chapter 10:

H1 Null Hypothesis: The model of innovation adoption is relevant to doing business on-line.

H2 Alternative Hypothesis: The model of innovation adoption is not relevant to doing business on-line.

Further to the alternative hypothesis, a subsequent aim was to provide a flexible theoretical framework in which to position studies of the dynamic interactive innovation of electronic business.

5.2.1 Triangulation Research Strategy and Justification

The research plan combines a theoretical approach (reviewing the literature and seeking to modify and extend the diffusion of innovation theory model) and an empirical approach (creating a profile of adoption of e-business in Australian manufacturing SMEs to provide initial data to test the theoretical model). Using the scientific method of survey and case studies as the underlying framework presented a broad comprehensive view of the diffusion process (Cornford &
Smithson, 1994), as does using more than one source of data for the case studies. Therefore survey and case studies were utilised in this research to present a process of triangulation, which presented a more convincing and accurate picture of events (Yin, 1994).

The techniques to achieve triangulation for this research included the survey of manufacturing SMEs, the interviews with participating SMEs, observation of operations and review of documents in case study SMEs, interviews with industry association representatives, and analysis of government programs. Data for the empirical studies was collected via the survey method and case study interviews with participating SMEs and industry associations.

This research strategy was selected on the basis of type of data required for the research (Yin, 1994). The survey strategy for the empirical studies was to answer how many, what and where type questions regarding the adoption of e-business. The case study strategy was to answer how and why type questions regarding SMEs adoption of e-business, and also the role of industry associations. The combination of survey and case study data facilitates comparison of results for consistency, with the survey showing the level of adoption of e-business, and the case studies providing insight (Yin, 1994).
The survey method in the form of a questionnaire was selected to provide a profile of e-business adoption at a given point in time, to act as a starting point for further analysis and model building (Cornford & Smithson, 1996). Case study interviews were selected to provide in-depth exploration (Yin, 1994) of individual SMEs and industry associations, to propose clarification and richer meaning to survey results.

5.2.2 Study 1: Diffusion in South West Sydney (Chapter 6)

This study was an initial exploratory study that focused on manufacturing SMEs in south west Sydney. Industry associations identified this region as having a significant manufacturing base in NSW. The aims of the study were to:

(a) provide information on the use of IT for business;
(b) identify specific and planned use of the Internet for e-business;
(c) identify barriers to using the Internet for business;
(d) determine actual and planned staff IT training methods;
(e) provide data on the reliability of the survey instrument;
(f) test MICA (Burgess & Cooper, 1998b) for manufacturing SMEs; and
(g) identify preliminary recommendations for change agents in the diffusion process.
5.2.3 Study 2: Diffusion in South East Melbourne (Chapter 7)

This study was a replication study to test the results of Study 1: Diffusion in South West Sydney. In terms of manufacturing base industry associations identified this region as equivalent to south west Sydney. The aims of the study were to:

(a) provide information on the use of IT for business;
(b) identify specific and planned use of the Internet for e-business;
(c) identify barriers to using the Internet for business;
(d) determine actual and planned staff IT training methods;
(e) test MICA (Burgess & Cooper, 1998b) for manufacturing SMEs; and

(a) determine confirmation or rejection of preliminary recommendations for change agents in the diffusion process identified in Study 1.

5.2.4 Study 3: Comparison of two Australian Regions (Chapter 8)

This study was a comparative study which identified similarities and differences between south west Sydney and south east Melbourne regions, and also between small and medium sized organisations. The aims of the study were to identify similarities and differences in terms of:
(a) business use of IT;
(b) specific and planned use of the Internet for e-business;
(c) barriers to using the Internet for business;
(d) current and planned IT staff training methods;
(e) support or reject the assumption that the regions are equivalent;
(f) validate the modifications to MICA (Burgess & Cooper, 1998b) proposed in regional studies;
(g) collate information on recommendations for change agents in the diffusion process; and
(h) provide primary data for the theoretical study.

5.2.5 Study 4: Change Agents in Manufacturing (Chapter 9)

This study examined national and regional industry associations in terms of their operation and function, and document federal and state government programs, and compared these with the perceptions of SMEs within the regions under study. The aims of the study were to:

(a) document functions of the industry associations;
(b) compare industry associations’ actual function and the perceptions of SMEs from the regional studies;
(c) document government e-business programs;
(d) compare government programs and perceptions of SMEs from the regional studies; and

(e) provide primary data for the theoretical study.

5.2.6 Study 5: Towards a Flexible Theoretical Framework

(Chapter 10)

This study used the primary data from the empirical studies as input and applied it to the diffusion of innovation theory model. The aims of this study were to:

(a) apply relevant data to the Model of Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998b) and suggest modification for manufacturing SMEs;

(b) identify factors for manufacturing SMEs when planning to move beyond Stage 1 of MICA (Burgess & Cooper, 1988);

(c) apply relevant data to the Diffusion Model (level of adoption and factors affecting adoption) and suggest modification for manufacturing SMES;

(d) provide an answer to the research question; and

(e) suggest a modified theoretical framework for the dynamic interactive innovation of e-business.
5.2.7 Limitations of Research Plan

Limitations of methods in this research are that outcomes cannot be
generalised beyond the population (Yin, 1994; Cornford & Smithson,
1996; page & Meyer, 2000) as defined in section 5.4. However, the
overall aim of this research was in theory testing and building, and as
such can be viewed as the starting point for future research.
Generalising beyond the population was not a priority at this point in
time, and therefore the method was appropriate.

5.3 DATA COLLECTION

5.3.1 Survey Design

The survey consists of four parts: (1) The organisation; (2) Use of
computers, the Internet and current training methods; (3) Planned use
of the Internet and planned training methods; and, (4) Barriers to
doing business on-line. Demographic data was collected from the
respondent (age, gender, and position). A five point Likert scale was
used for some questions, ranging from Very Important to Definitely
Not Important, or Strongly Agree to Strongly Disagree. The same
Likert scale was not used for all questions, some questions included
reverse statements that tested the same construct, and some questions
did not include a Likert scale. These techniques were used to attempt
to control for lose of interest and ease of providing the same type of
answer, such as circling 3 on all occasions.
Space was provided for additional comments with each question, and a longer space at the end of the survey for any other comments. At the back of the survey, a separate detachable page was included for the respondent to indicate their willingness to participate in an on-site interview, and to request a copy of the industry report from the regional study. The survey instrument can be found in Appendix I.

The survey was mailed to the principal officer of the organisation by name. Conventional mail, rather than email, was selected as the diffusion of e-business is in its infancy, and some organisations may not have email facilities. Two separate reply-paid envelopes were included, one for the survey, the other for the detachable page to indicate willingness to participate in on-site interview, and/or request a copy of the report. Respondents were able to request a copy of the regional report as an incentive to participation. One week before the closing date for the survey, follow-up letters were mailed to attempt to improve response rates.

The survey was designed during 1998, and many revisions were made to the question structure, response scales, format and number of pages. As the terms e-business and e-commerce were reasonably new, the removal of any jargon was essential for a non-IT industry survey. Everyday language was used in the survey for complex terminology, for example, doing business on-line rather than e-commerce, to
control for varied interpretation by respondents. A covering letter with the survey explained the research and included the researcher's mail address, telephone numbers and email address if a respondent needed clarification. Format was designed to facilitate easy response, with comprehensive scales and space for additional comments.

5.3.2 Validity and Reliability

Survey design was based on review of the literature, consultation with academics (survey experts), and advice from industry associations and selected manufacturing organisations in south west Sydney (industry experts). Visiting manufacturing organisations identified by the regional industry association, Innovative Technology Network, and working through the questions with the principal officer validated the design of a survey instrument. These organisations were excluded from the south west Sydney study.

Reliability was achieved by pilot analysis based on surveys completed by selected manufacturers, and then comparison between selected questions and similar studies in the literature. A further test of reliability was achieved by conducting the second study in south east Melbourne as a replication study.

Data collection was undertaken within specific time periods, that is, 1999 and 2000. The same survey questions were administered to each
region to control validity associated with testing and measurement biases, and to allow comparison between regions.

5.3.3 Case Study Design

To meet the requirements of triangulation, case studies were conducted to complement the outcomes of the survey. The case studies with participating SMEs were conducted using on-site visits by the researcher. These visits were conducted in two regions in the month following the closing date of the survey to ensure the same time frame was relevant, and the interviewee still had some memory of the survey. The interview, observation of the SME’s operation and review of relevant documentation (web site, reports, proposals for a web site) was undertaken.

Semi-structured interview questions were designed following preliminary analysis of the survey in south west Sydney. The format and sequence of questions remained consistent for both regional studies, and, explaining some of the preliminary results from the survey encouraged discussion. The Model for Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998b) was fully explained to case study participants to enhance discourse and evaluation of the model for their organisation, and for manufacturing SMEs more generally. Throughout the interview, discussion was encouraged. The case study interview questions can be found in Appendix II.
5.3.4 Limitations of Data Collection

Limitations with data collection via a survey can include the self report nature, rather than actual behaviour. The comparative study, and the use of case study interviews to test the results of the survey attempted to control, as far as possible, this limitation. Survey alone cannot provide a true picture of research area, therefore case study interviews were conducted following the survey to complement the findings of the survey.

Limitations associated with using a case study approach as the only method of data collection include not a wider enough exposure to the issue, and results not being reliable. In addition, with the case study approach limitations can occur through not using a combination of techniques to achieve triangulation. The combination of survey and case studies as detailed for this research has been used to attempt to overcome these limitations.

5.4 POPULATION AND SAMPLE

5.4.1 Defining the Population

Australian manufacturing SMEs are the focus of the research, however a reliable sampling frame of all manufacturing SMEs was not available. To ensure a defined population and following discussions with representatives of the national and regional industry associations,
the Australian Industry Group membership was selected as the population. Manufacturing organisations located in the south west Sydney and south east Melbourne regions that had an entry in the 1999 Australian Industry Group (AIG) Yearbook comprised the population-sampling frame. Advice from AIG indicated that the Yearbook contains all their members, and was the only comprehensive listing of manufacturers in Australia.

All members within the two regions that met the Australian Bureau of Statistics' (ABS, 1998) definition of a SME (ie, less than 200 employees) were identified from their entry in the Yearbook, and entered into a population database for the series of studies. The database included 363 SMEs in south west Sydney and 788 SMEs in south east Melbourne.

5.4.2 Defining the Sample

From the database, random samples of half of the SMEs for each region were generated. To ensure that the sample would be representative of the region, each SME was allocated a unique number, and using the systematic sampling technique (de Vaus, 1995), samples were selected to the limit of 50% of the population, that is 178 in south west Sydney and 394 in south east Melbourne. This technique was applied to allow results from the samples to be inferred
to the population, that is manufacturing SMEs that are AIG members in the two regions.

The survey was posted to the principal officer, by name as listed in the AIG Yearbook, at each identified SME. As part of the demographic data collected with the survey, position of the respondent was collected to attempt to control for range of respondents.

5.4.3 Defining the Stratification of Sample

The sample was classified into regions, and into small or medium organisations for the purpose of the comparative study (Chapter 8). The two regions (south west Sydney and south east Melbourne) were identified as being equivalent in terms of their manufacturing base by industry associations (see Chapter 4). The samples were categorised into small and medium organisations according to the ABS (1998) definitions (that is, small less than 20, medium from 20 to less than 200). The comparative study tested for similarities and differences between regions, and thus support or reject the industry associations’ assumption. Also, similarities and differences between small and medium organisations were tested.

5.4.4 Limitations of the Population and the Sample

As members of the national industry association were used as the population for this research, limitations preclude generalising to the
population of all manufacturing SMEs. However, the overall aim of this research was in theory testing and building, and as such is the starting point for future research. Generalising to the population was not a priority at this point in time, and therefore the sampling method was appropriate.

5.5 PARTICIPANTS

Participants in Study 1 and Study 2 were representatives of manufacturing SMEs in south west Sydney or south east Melbourne. Eight case studies were undertaken as part of Study 1, and six as part of Study 2.

Study 3 uses participants from Studies 1 and 2 to examine similarities and differences between regions and between small and medium organisations. Study 4 participants were representatives of industry associations. Study 5 consists of an assessment of government initiatives in electronic commerce. Demographics of the samples are discussed in the following chapters, which present results of the studies.

Participation in the studies was voluntary and confidential. Respondents to the survey were free to complete and return the survey, or not complete the survey. Participants in the case study interviews self-selected by signifying their agreement when completing and returning the separate detachable page with the survey and returned it in the separate envelope provided. Participants
from the industry associations agreed to be interviewed, as part of the research, in response to a request from the researcher.

5.6 DATA ANALYSIS

5.6.1 Model of Internet Commerce Adoption

From responses to the survey in both regions a profile of specific and planned use of the Internet for business was established, and related to the Model of Internet Commerce Adoption (MICA) developed by Burgess & Cooper (1998a) (see Chapter 3 for explanation of the model). This model and the corresponding primary data from the empirical studies were input to the theoretical study on a theoretical framework for diffusion of innovations theory model.

5.6.2 Statistical Procedures

The database from this research was created in the SPSS computer program and analysed quantitatively. Taped data from the qualitative interviews were transcribed by the researcher and analysed using QSR NUD*IST computer program.

Statistical analyses used to examine the research aims for each study are described in detail in the relevant chapters. However, the following analytical plan (Table 5.2) outlines the particular procedures used and their purposes.
<table>
<thead>
<tr>
<th>Study</th>
<th>Analyses</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>1</td>
<td>Descriptives (SPSS)</td>
<td>to ‘clean-up’ data</td>
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<td>to describe patterns in data</td>
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<td>to describe demographics of sample</td>
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<td></td>
<td>T-test analysis</td>
<td>to test for differences in demographic data</td>
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<td>to establish patterns in survey outcomes</td>
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<td></td>
<td>Qualitative Analysis (NUD*IST)</td>
<td>and confirm triangulation</td>
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<td>2</td>
<td>Descriptives (SPSS)</td>
<td>to ‘clean-up’ data</td>
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<td>T-test analysis</td>
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<td>Qualitative Analysis (NUD*IST)</td>
<td>and confirm triangulation</td>
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<td>3</td>
<td>Descriptives (SPSS)</td>
<td>to ‘clean-up’ data</td>
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<td>to describe patterns in data</td>
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<td>to describe demographics of sample</td>
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<td></td>
<td>T-test analysis</td>
<td>to determine differences between groups (regions, small and medium organisations)</td>
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<td>to establish patterns in survey outcomes</td>
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<td>Qualitative Analysis (NUD*IST)</td>
<td>and confirm triangulation</td>
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<td>4</td>
<td>Content Analysis (NUD*IST)</td>
<td>to document functions of change agents and compare with perceptions of SMEs</td>
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<tr>
<td>5</td>
<td>Descriptives (SPSS)</td>
<td>to provide data for application to MICA</td>
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<td></td>
<td>T-tests</td>
<td>to identify factors when moving beyond Stage 1 of MICA</td>
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<td>Chi Square tests</td>
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<td>Spearman Correlation</td>
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5.7 CONCLUSION

A triangular research strategy of survey and case studies provided evidence of levels of adoption of e-business in manufacturing SMEs in two regions of Australia. A series of integrated studies using the survey method and case studies with participating SMEs and industry associations, provided the input data for the theoretical study designed to address the research question.

The survey was designed with assistance from industry associations and manufacturers in south west Sydney. The population was defined as members of the primary national industry association that met the definition of SME, with samples randomly selected. Participation was voluntary and confidential.

The research question and plan were directed towards understanding the adoption process of e-business, and then determining whether the current models of diffusion are relevant to a dynamic interactive innovation.
In summary, this chapter has provided an overview of the research undertaken in this dissertation. It includes the research plan, the aims of the six integrated studies, data collection methods, the population and sample, participants, procedures and analysis.

The following chapters present the results of the empirical studies, starting with diffusion in south west Sydney (Chapter 6).
CHAPTER SIX

STUDY 1:

DIFFUSION IN SOUTH WEST SYDNEY

Diffusion of electronic business by manufacturing SMEs is empirically investigated by a series of integrated studies. The first of these studies examined adoption in the south west Sydney region of New South Wales. The methodology for this study was detailed in Chapter 5, namely a survey to develop a profile of adoption for the region, and case study interviews to qualitatively examine the results of the survey, and to provide an understanding of the issues facing manufacturing SMEs.

In this chapter, the results of the south west Sydney study are presented, and preliminary conclusions are drawn which are tested in the second study in the south east Melbourne region in Victoria, as detailed in Chapter 6.

6.1 OVERVIEW OF THE STUDY

Manufacturing organisations located in the south west Sydney region that had an entry in the Australian Industry Group Yearbook (1999) comprised the population sampling frame. Three hundred and sixty three organisations were identified as meeting the Australian Bureau of Statistics definition. Eight organisations were rejected from the study, as they had participated in
validating the survey. From this group a sample of 178 was selected and the survey mailed to the principal officer (managing director, director, etc) as set out in the AIG Yearbook. Seventeen surveys were returned as left address or no longer in manufacturing. From the final sample of 161, 44 organisations completed the survey, representing 27.33% of the sample. The final page of the survey was a separate detachable page for the respondent to indicate their interest in the project by participating in an on-site interview. In addition to the survey, eight case study interviews were conducted. From responses to the survey a profile of specific and planned use of the Internet for business was established, and related to the Model of Internet Commerce Adoption (MICA) developed by Burgess & Cooper (1998b). See Chapter 3 for explanation and justification for use of MICA. See Appendix I for the survey instrument.

Case study interviews examined experiences of individual organisations in their specific and planned use of the Internet for business. Explanations for the results of the survey, particularly barriers to involvement and staff IT expertise were also investigated. See Appendix II for interview questions and Appendix III.i for case study transcripts.

6.2 AIMS OF THE STUDY

In this initial study manufacturing SMEs in south west Sydney were examined using quantitative and qualitative methodologies as set out in Chapter 5. Specific aims for this study were to:

- provide information on the use of IT for business;
- identify specific and planned use of the Internet for e-business;
- identify barriers to using the Internet for business;
- determine actual and planned staff IT training methods;
- provide data on the reliability of the survey instrument;
- test MICA (Burgess & Cooper, 1998b) for manufacturing SMEs; and
- identify preliminary recommendations for change changes in the diffusion process.

6.3 DEMOGRAPHICS

Table 6.1 shows the Manufacturing Industry segments for the study as defined by the Australian Bureau of Statistics (1998). Table 6.2 shows the sample broken down in small and medium sized enterprises. Industry segments represented in the study are shown in Figure 6.1.

<table>
<thead>
<tr>
<th>Segment *</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal product manufacturing</td>
<td>20</td>
<td>45.5</td>
</tr>
<tr>
<td>Machinery &amp; equipment manufacturing</td>
<td>9</td>
<td>20.5</td>
</tr>
<tr>
<td>Textiles, clothing, footwear &amp; leather</td>
<td>3</td>
<td>6.8</td>
</tr>
<tr>
<td>Wood &amp; Paper product manufacturing</td>
<td>1</td>
<td>2.3</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>11</td>
<td>25.0</td>
</tr>
</tbody>
</table>

*Segments as defined by Australian Bureau of Statistics

<table>
<thead>
<tr>
<th>Small/Medium *</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small: less than 20 employees</td>
<td>22</td>
<td>50.0</td>
</tr>
<tr>
<td>Medium: 20-200 employees</td>
<td>22</td>
<td>50.0</td>
</tr>
</tbody>
</table>

* Size as defined by Australian Bureau of Statistics

Table 6.1: Manufacturing Industry Segments

Table 6.2: Size of Organisation
Industry segments of Metal product manufacturing and Machinery & equipment manufacturing had the highest number of respondents to the survey. This is also reflected in the Australian Bureau of Statistics breakdown of south west Sydney by industry segments. These two segments also formed the majority of the organisations who participated in the on-site interviews. The survey respondents were equally divided between small and medium sized organisations. Of the eight case study interviews, five were small and three medium sized organisations.

6.4 RESULTS

Demographic data for the survey revealed the mean age of the sample was 46.55 years, with a total of 38 males and six females. Position of the respondent was divided into executive (managing directors, CEOs, etc) and non-executive (general managers). The executive group consisted of 18 males
and one female (mean age 45.16 years), and non-executive group consisted of 20 males and five females (mean age 47.60 years). Based on T-Test analysis, there was no significant differences in survey responses based on age, gender or position held. Six males and two females participated in the case study interviews, with the mean age group of 40-49 years.

Respondents generally agreed that the important issues facing the organisation this year were trying to make a profit (90.9%), staying ahead of the competition (90.0%), and staying in business (76.2%). Results of the south west Sydney study based on the aims of the project are set out below.

6.4.1 Business use of Information Technology

Respondents indicated that computers were essential for processing information for business (95.5%). Table 6.3 shows the use of IT for business, overall and broken down in small and medium organisations. Only one respondent indicated that the organisation did not use computers. Results are based on the remaining 43 respondents. All organisations used desktop applications to conduct their business, with all organisations using spreadsheets and 97.7% using word processing. Thirty nine organisations (90.7%) indicated that they had an Internet connection, with 86.0% utilising email communications, 30.2% had a web page, and 15.9% made some use of transaction processing via the Internet. T-test analysis based on Internet connection, email, web page and transaction processing revealed no
significant difference between small and medium organisations on their use of IT.

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Small</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Desktop applications</td>
<td>43</td>
<td>98.8</td>
<td>21</td>
</tr>
<tr>
<td>Accounting SW</td>
<td>41</td>
<td>95.3</td>
<td>19</td>
</tr>
<tr>
<td>Databases</td>
<td>32</td>
<td>74.4</td>
<td>13</td>
</tr>
<tr>
<td>Internet connection</td>
<td>39</td>
<td>90.7</td>
<td>18</td>
</tr>
<tr>
<td>Email</td>
<td>37</td>
<td>86.0</td>
<td>18</td>
</tr>
<tr>
<td>Web Page</td>
<td>13</td>
<td>30.2</td>
<td>4</td>
</tr>
<tr>
<td>Transactions processing</td>
<td>7</td>
<td>15.9</td>
<td>1</td>
</tr>
<tr>
<td>CAD/CAM</td>
<td>24</td>
<td>55.8</td>
<td>13</td>
</tr>
<tr>
<td>Computers to assist manf.</td>
<td>29</td>
<td>69.0</td>
<td>13</td>
</tr>
</tbody>
</table>

**Table 6.3: Type of computer use by size of organisation**

The extent that manufacturing SMEs are using IT for business in the south west Sydney region demonstrate an acceptance of computers, with some organisations moving to doing business on-line. From the organisations that took part in this initial study, a majority have indicated their plans to move to transaction processing via the Internet within five years. Certainly, the main use of the Internet for those with an Internet connection was email as a communication tool.
6.4.2 Actual and planned use of the Internet

Table 6.4 shows the stage that the 13 organisations had reached with their use of the Internet for business, and also where the 44 organisations planned to be within the next five years. Although 90.7% indicated that they had an Internet connection, it was mostly used for communication via email. The organisations shown at Stage 3: Processing also utilise the functions of Stage 2 and Stage 1. The organisations shown at Stage 2: Provision also utilise the functions of Stage 1.

<table>
<thead>
<tr>
<th></th>
<th>Actual Use</th>
<th>Planned next 5 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>STAGE 1: Promotion</td>
<td>2</td>
<td>15.4</td>
</tr>
<tr>
<td>STAGE 2: Provision</td>
<td>4</td>
<td>30.8</td>
</tr>
<tr>
<td>STAGE 3: Processing</td>
<td>7</td>
<td>53.8</td>
</tr>
<tr>
<td>* 13 respondents indicated a Web Page</td>
<td>13 *</td>
<td>100.0%</td>
</tr>
<tr>
<td>** 44 total respondents</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.4: Internet use related to the MICA

Only a small percentage (30.2%) of organisations indicated that they had a Web Page, with 53.8% of these organisations in Stage 3: Processing. However, a majority of the surveyed organisations (70.5%) planned to be at Stage 3: Processing within five years, with some positive attitudes towards moving in this direction:

"Expect high % growth in business when our web site offers Internet ordering and payment in near future." (Co. Secretary, male, 40 years, medium organisation in Other manufacturing)
"Have been investigating Internet for a short time...we feel this could assist us to expand into export markets."
(Manager, female, 37 years, small organisation in Metal product manufacturing)

The assertion, that SMEs will not take up new technologies unless they perceive an advantage to do so, or an immediate disadvantage in not taking them up (Clarke 1997), is supported by the following comments:

"We will adopt the appropriate technology when there is a market demand." (General Manager, male, 56 years, small organisation in Metal product manufacturing)

"Must be simple, as simple as phoning up a company and doing business personally - must be appealing/new/innovative rather than conversion of a work method from paper to electronic - must show returns are greater than implementation costs, and equal to current approach - as a minimum." (Manager, male, 39 years, medium organisation in Machinery and equipment manufacturing)

Case study organisations used their Internet connection to send email (mainly external to the organisation), to do banking, and to download files (such as drawings). Five of the eight organisations had accessed web pages of their competitors.

Three of the eight organisations had an existing web site, which included Stage 1, and some elements of Stage 2 of the MICA. Another
three were in various stages of planning for their web site, which also would include some elements of Stage 2. The results of the survey, and case study discussions would suggest that MICA might need some modification in Stage 1 and 2. Certainly, organisations were planning for interactivity on their web site as an initial step.

Five organisations had a small percentage of overseas customers, and four wished to expand this part of their business via the use of Internet. Six organisations envisaged a general expansion of their business by conducting business on-line.

The trend in the survey to Stage 3 is also reflected in the case study organisations. However, case study organisations raised the issue of needing to conduct parallel business processes, for their on-line customers, and for their customers who do not use technology. Three organisations highlighted that the manufacturing industry has organisations (particularly small organisations) that do not use technology. In addition it was indicated that business-to-business transactions in manufacturing were generally carried out in person or by phone.

As a group, the case study organisations were very aware of the benefits and risks associated with conducting business on-line. Benefits included:
**Marketing Tool**

Customers could access information as many times as necessary. It was acknowledged that promotional material would need to be kept up-to-date, but would reduce the number of brochures and mail outs.

**Communication**

An email link on the web site would provide better communication with customers. Turnaround times on quotes could be reduced from five to three days and in some instances to 24 hours. Regular monitoring of the email system would be necessary.

**Increased Business**

The organisation would be more widely known, particularly internationally, which would lead to more business. The need to maintain quality service was highlighted, particularly the need not to alienate customers not on-line.

**Cost**

Cost of implementing and maintaining the web site was viewed as a risk, but in contrast organisations believed that reduced costs related to printing, mailing, etc would flow to the organisation.

**Risks** to the organisation in doing business on-line included competitor’s accessing their site and stealing ideas about their products. The notion of reduced human contact, which is characteristic of the manufacturing industry, was also viewed as a risk.
along with opposition from some customers. Technical risks of security of transactions and loss of data were also discussed.

### 6.4.3 Barriers To Internet Use

Based on the 44 organisations, Table 6.5 shows the top five barriers to the organisation becoming involved in electronic business. The survey listed twelve barriers and an optional Other category for respondents to add an additional barrier. Respondents were asked to indicate their agreement with statements by circling a number on the Likert scale (1=Strongly disagree to 5=Strongly agree).

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Mean</th>
<th>Std Dev</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concern about security and privacy of transactions</td>
<td>3.63</td>
<td>1.97</td>
<td>26</td>
<td>59.0</td>
</tr>
<tr>
<td>Lack of government incentives</td>
<td>3.40</td>
<td>1.14</td>
<td>21</td>
<td>47.7</td>
</tr>
<tr>
<td>Cost of consultants</td>
<td>3.37</td>
<td>1.05</td>
<td>21</td>
<td>47.7</td>
</tr>
<tr>
<td>Unsure how many people using the Internet</td>
<td>3.14</td>
<td>1.25</td>
<td>18</td>
<td>40.9</td>
</tr>
<tr>
<td>Lack of IT expertise of staff</td>
<td>3.07</td>
<td>0.99</td>
<td>17</td>
<td>38.6</td>
</tr>
</tbody>
</table>

Table 6.5: Barriers to Internet use

Barriers that have slowed down the adoption of Internet as a viable way of doing business have similarities with other studies. In this study concern about security and privacy of transactions (59.0%) is one of the main obstacles. Other studies have rated this barrier lower,
and barriers such as inadequate speed of transmission, lack of knowledge about conducting business on-line, and lack of IT skill of staff, higher. In contrast to this study, only 5% of respondents to the Telstra survey (1998) rated security as a concern. The high level of concern about security may be a characteristic of the manufacturing industry, or the region.

Lack of government incentives was the second highest barrier, and while governments are moving on this issue, perhaps not in practical ways which are relevant to the manufacturing industry. Cost of consultants, and, being unsure how many people are using the Internet is consistent with an overseas study (Hoffman et al. 1999). These barriers affect the decision making process of the organisation, and are illustrated by the following comments:

"My main concern with the Internet as an advertising medium is our company's inability to sort the genuine from non-genuine enquiries." (Manager, male, 62 years, small organisation in Other manufacturing)

"Possibilities and opportunities not widely known - Internet known mainly for playing games and nothing business oriented." (Co. Secretary, male, 40 years, medium organisation in Other manufacturing)

Case study organisations while acknowledging that security and privacy of transactions was a barrier, believed that cost of consultants, not understanding the process and lack of IT expertise within the
organisation were barriers to be overcome in moving to conducting business on-line. Getting the right people to set up the web site that looks good and provides functionality, as well as ongoing support was viewed as critical to maintaining a quality assured standard, particularly when considering functions that would be provided at Stage 3. Experiences of two organisations revealed that cost of consultants vary dramatically, with quotes appearing to offer the same service varying from $1,000 to $10,000.

Not understanding the process was also emphasised as a barrier, which impacts on the barrier of needing to deal with consultants. The necessity to go out and research was identified as a problem, not knowing who to trust, and the lack of a central place for information related to doing business on-line for SMEs. The need to work differently was highlighted and to get training for staff was also viewed as a barrier. Currently, within some organisations there was none or very little expertise to maintain the web site, and very little time to allocate to training. In contrast, one organisation had an IT department, had set up their own web site and was not experiencing any problems.

Lack of staff IT expertise had led to existing information technology not being used effectively, and a belief by some of the case study organisations that the situation will be exacerbated with the
introduction of new web technologies. The issue of workload was raised by a number of the case study participants, who were concerned about the need for parallel systems, and the need to deal with a higher volume of enquiries. Parallel systems would be necessary to enable the organisation to deal with additional or existing customers with online capabilities, and to provide for existing customers without technology. One organisation mentioned that some manufacturers do not have a fax machine. Strategies to deal with more enquiries were viewed as important in maintaining a quality assured standard.

6.4.4 Level of staff IT skills and training

One of the aims of the project was to determine the level of satisfaction with IT skills of staff. The lack of IT expertise of staff was identified as one of the barriers to becoming involved in electronic business. For this series of tables, respondents were asked to tick as many of the items as applicable to their organisation. Table 6.6.1 shows the organisation's satisfaction with the current level of IT skills by staff categories. Table 6.6.2 shows the organisation's training methods currently used for the various staff categories. Table 6.6.3 shows the IT training methods planned to meet the organisation's business strategies.
<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management (salaried employees)</td>
<td>30</td>
<td>69.8</td>
</tr>
<tr>
<td>Office employees</td>
<td>34</td>
<td>79.1</td>
</tr>
<tr>
<td>Factory (award employees)</td>
<td>14</td>
<td>33.0</td>
</tr>
</tbody>
</table>

n=number of organisations

Table 6.6.1: Organisation's satisfaction with level of staff IT skills by Staff Category

<table>
<thead>
<tr>
<th></th>
<th>Management</th>
<th>Office</th>
<th>Factory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>In-house training with internal people</td>
<td>27</td>
<td>62.8</td>
<td>28</td>
</tr>
<tr>
<td>Computer based tutorials with product</td>
<td>20</td>
<td>45.5</td>
<td>16</td>
</tr>
<tr>
<td>External training courses</td>
<td>19</td>
<td>44.2</td>
<td>21</td>
</tr>
<tr>
<td>In-house training with external people</td>
<td>16</td>
<td>37.2</td>
<td>15</td>
</tr>
<tr>
<td>Trained to current level of recruitment</td>
<td>13</td>
<td>30.2</td>
<td>17</td>
</tr>
</tbody>
</table>

n=number of organisations

Table 6.6.2: Organisation's IT training methods used for Staff Category

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employ people with appropriate knowledge</td>
<td>32</td>
<td>72.7</td>
</tr>
<tr>
<td>On-the-job training by fellow employees</td>
<td>32</td>
<td>72.7</td>
</tr>
<tr>
<td>Self-taught staff within organisation</td>
<td>29</td>
<td>65.9</td>
</tr>
<tr>
<td>Knowledgeable employees</td>
<td>26</td>
<td>59.1</td>
</tr>
<tr>
<td>Consultants</td>
<td>20</td>
<td>45.5</td>
</tr>
</tbody>
</table>

n=number of organisations

Table 6.6.3: Organisation's IT training methods planned
The level of IT skills of staff will affect decisions about moving to doing business on-line, particularly if the level of skill is low, or problems have been experienced in getting staff trained. In these circumstances, lack of IT expertise of staff is viewed as a barrier. Organisations in this study appear to rely on in-house training with internal people, and plan to continue this trend to meet the organisation's strategic plan for the next five years. Satisfaction with the level of IT skills of management (69.8%) and office employees (79.1%) is much higher than satisfaction with the level of IT skills of factory employees (33.0%). An explanation for this is provided by the following comment:

"Some factory staff are quite good, but others do not want to learn at all." (Manager, female, 37 years, small organisation in Metal product manufacturing)

To facilitate in-house training, one member of staff attends an external course and then passes on the knowledge to staff:

"Owner/Manager learnt system on external training course and then trained office staff." (Owner, female, 37 years, small organisation in Metal product manufacturing)

However, the acknowledgment that new IT skills are necessary if the organisation is planning to move to doing business on-line is demonstrated by the ranking of "employing people with appropriate knowledge" alongside "on-the-job training by fellow employees".

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Case study participants raised some interesting issues related the staff levels of IT expertise. While generally satisfied with the use of IT by office staff, comments were centred on basic use of applications and lack of initiative, and resistance from factory staff. Some organisations use casual staff who have the expertise for some tasks, or for peak work periods. Issues related to training, are the problem of staff turnovers, and the need to use consultants for software upgrades.

6.5 OUTCOMES OF STUDY

This initial study found that while almost all organisations use computers, a majority have an Internet connection that they exclusively use for email, and only a small percentage are involved in transaction processing. Barriers are mostly non-technical, and planned IT training methods for staff include employing people with appropriate knowledge to supplement current training methods.

Barriers to becoming involved in electronic commerce have been the focus of a number of studies (Crawford 1998; Marzbani et al. 1998; Telstra 1998; Wai-Pun et al. 1997; Clarke 1996), and the Australian Government has targeted the technical barriers of bandwidth capacity and incompatible IT systems (Alston 1999). However, non-technical barriers can create more resistance to change, particularly when considering that important issues facing SMEs in this study are trying to make a profit, staying ahead of the competition, and staying in business. While organisations are planning to
move to doing business on-line, their knowledge of the potential benefits offered by involvement in electronic commerce is only superficial. One way to overcome this lack of knowledge would be for industry associations to get closer to the problem, by disseminating information and conducting seminars in a format acceptable to SMEs. This may need a change of focus, as mentioned in this comment:

"Industry groups are focussed on government regulations rather than Industry tactics or direction of o/s competitors." (Manager, male, 39, medium organisation in Machinery and equipment manufacturing)

The survey highlighted the need for manufacturing to be made aware of the benefits and risks of SMEs becoming involved in electronic business. The case study interviews provided insight into the role that industry associations could provide, namely:

- **a focal information centre of electronic business resources:**
  
  *specifically for SMEs without IT personnel:*
  
  newsletters, booklets, where to find programs and seminars;

- **liaison with regional associations to provide:**

  seminars, briefings at regional level relevant to manufacturing SMEs;

  and

- **globally raising the profile of manufacturing in Australia.**

Raising awareness that can lead to adoption of the new technologies is a priority of the Australian Government, however actually getting education to SMEs needs to be handled at a regional level to overcome barriers associated
with doing business on-line. Regional associations could provide a one-stop point for information about electronic business. The Innovative Technology Network (ITN) at University of Western Sydney, Macarthur was mentioned as a good model for a regional association.

"ITN is closer to industry and is excellent in raising awareness and providing education...a good model...contact the industry association, get referred to ITN...very relevant and local...need two hour briefings early morning." (General Manager, female, 50-59 years, small organisation in Machinery and equipment manufacturing)

"ITN is used to get training in current issues in manufacturing...great for access to information wouldn’t normally get ...company is isolated ... previously sole source of advice was accountant." (Manager, female, 30-39 years, small organisation in Metal product manufacturing)

The process of diffusion identifies three groups that would need to be addressed: early adopters, those who are aware, and those who are not aware (see Figure 6.2). Some subsidy from the industry association was suggested as a way of involving SMEs who are currently not aware of the new technologies. Certainly, without post-adoption support the early adopters group can plateau or move away from the new technologies. Experiences of existing software not being fully utilised, and lack of staff expertise highlighted in this study suggests that electronic business strategies would not reach their full potential.
Industry associations have a role in the diffusion process of electronic business to manufacturing, and more specifically to small and medium sized organisations without IT personnel and expertise. The three groups that need assistance in the diffusion process are defined in Figure 6.2 below.

![Figure 6.2: Groups in the Diffusion Process](image)

The role for industry associations in the diffusion process has two integrated elements: a need for a global business focus in manufacturing, and a need for regional networking and education on how to move towards electronic business strategies. Certainly manufacturing SMEs in south west Sydney are ready to move ahead, and this is indicated by their use of the Internet (30.2% with a web page) which is comparable with the national average of 23%, and with US manufacturers at 32%.

### 6.6 CONCLUSION

This research has highlighted four integrated areas to the diffusion process, and has suggested some action for these areas:
- **What government and industry association can do:**

  provide information to raise awareness adapted to manufacturing SMEs.

- **What the education sector can do:**

  provide knowledge and skills in electronic business for graduates (not just IT-related courses).

- **What SMEs can do:**

  participate in the diffusion process by liaison with industry associations,
  develop strategies for dealing with consultants,
  identify and develop strategies about workload issues

- **What Consultants can do:**

  interact with SMEs to provide service.

As the diffusion process evolves in the future the main issue in electronic commerce will move away from the technology, to a functional and service level. For SMEs, staff will carry out business with support from consultants. Issues will continue to be IT expertise of staff and quality of consultants.

The next stage of this research involves conducting a replication study of manufacturing SMEs in south east Melbourne (Chapter 7). This area has been identified by industry associations as having an equivalent manufacturing base as south west Sydney. Comparative analysis will then be possible on the use of the Internet by manufacturing SMEs across regions of Australia.
(Chapter 8). Investigation of state government and industry association initiatives will also be undertaken and compared with the perception of SMEs within the regions. The issue of planned IT training strategies for staff will be a focus.

In summary, this chapter has presented the results from the south west Sydney study on adoption of electronic business by manufacturing SMEs. The chapter also has drawn some preliminary conclusions that will be tested in the second study in south east Melbourne, which is detailed in the next chapter.
CHAPTER SEVEN

STUDY 2:

DIFFUSION IN SOUTH EAST MELBOURNE

Diffusion of electronic business by manufacturing SMEs is empirically investigated by a series of integrated studies. The second of these studies examined adoption in the south east Melbourne region of Victoria. In the previous chapter the results of the initial study in south west Sydney were presented. The study presented in this chapter replicated the south west Sydney study. In Chapter 5, the methodology was detailed for this study, namely a survey to develop a profile of adoption for the region, and case study interviews to qualitatively examine the results of the survey, and to provide an understanding of the issues facing manufacturing SMEs.

In this chapter, the results of the south east Melbourne study are presented, and support is provided for the conclusions drawn in the south west Sydney study as detailed in Chapter 6.

7.1 OVERVIEW OF THE STUDY

Manufacturing organisations located in the south east Melbourne region that had an entry in the Australian Industry Group Yearbook (1999) comprised the population-sampling frame. Seven hundred and eighty eight organisations were identified as meeting the Australian Bureau of Statistics definition.
From this group a sample of 394 was selected and the survey mailed to the principal officer (managing director, director, etc) as set out in the AIG Yearbook. Seventy two surveys were returned as left address or no longer in manufacturing. From the final sample of 322, 126 organisations completed the survey, representing 39.13% of the sample. The final page of the survey was a separate detachable page for the respondent to indicate their interest in the project by participating in an on-site interview. In addition to the survey, six case study interviews were conducted. From responses to the survey a profile of specific and planned use of the Internet for business was established, and related to the Model of Internet Commerce Adoption (Burgess & Cooper, 1998b). See Methodology chapter for explanation and justification for use of MICA. See Appendix I for the survey instrument.

Case study interviews examined experiences of individual organisations in their specific and planned use of the Internet for business. Explanations for the results of the survey, particularly barriers to involvement and staff IT expertise were also investigated. See Appendix II for interview questions and Appendix III.ii for case study transcripts.

7.2 AIMS OF THE STUDY

In this second study manufacturing SMEs in south east Melbourne were examined using quantitative and qualitative methodologies as set out in Chapter 5. Specific aims for this study were to:

- provide information on the use of IT for business;
identify specific and planned use of the Internet for e-business;
identify barriers to using the Internet for business;
determine actual and planned staff IT training methods;
test MICA (Burgess & Cooper, 1998b) for manufacturing SMEs; and
determine confirmation or rejection of preliminary recommendations for change agents in the diffusion process identified in Study 1.

7.3 DEMOGRAPHICS

Table 7.1 shows the Manufacturing Industry segments as defined by the Australian Bureau of Statistics (1998). Table 7.2 shows the sample broken down by small and medium sized enterprises. Figure 7.1 illustrates the sample by Industry Segment and Size of Organisation.

<table>
<thead>
<tr>
<th>Segment *</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal product manufacturing</td>
<td>25</td>
<td>19.8</td>
</tr>
<tr>
<td>Machinery &amp; equipment manufacturing</td>
<td>24</td>
<td>19.0</td>
</tr>
<tr>
<td>Textiles, clothing, footwear &amp; leather</td>
<td>12</td>
<td>9.5</td>
</tr>
<tr>
<td>Wood &amp; Paper product manufacturing</td>
<td>12</td>
<td>9.5</td>
</tr>
<tr>
<td>Food, beverage, tobacco</td>
<td>8</td>
<td>6.3</td>
</tr>
<tr>
<td>Petroleum, coal, chemical</td>
<td>8</td>
<td>6.3</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>37</td>
<td>29.4</td>
</tr>
</tbody>
</table>

*Segments as defined by Australian Bureau of Statistics

Table 7.1: Manufacturing Industry Segments
Table 7.2: Size of Organisation

<table>
<thead>
<tr>
<th>Small/Medium *</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small: less than 20 employees</td>
<td>54</td>
<td>42.9</td>
</tr>
<tr>
<td>Medium: 20-200 employees</td>
<td>72</td>
<td>57.1</td>
</tr>
</tbody>
</table>

* Size as defined by Australian Bureau of Statistics

Figure 7.1: Industry Segments by Small or Medium organisations

Other manufacturing represents the highest number of organisations in the study, with Metal product manufacturing and Machinery and equipment the highest named segments as defined by ABS (1998). Other manufacturing comprised a diverse group ranging from Plastics to Electronics. The breakdown of industry segments from the Australian Bureau of Statistics for south east Melbourne has Textiles etc. with the highest number of organisations, Metal product manufacturing second, Machinery & Equipment third, and Other manufacturing with the fourth highest number of organisations. As for the survey respondents, Other manufacturing was the
highest industry segment in the on-site interviews (4 Other, 2 Textiles, etc), with two organisations small and four medium sized.

7.4 RESULTS

Demographic data for the survey revealed the mean age of the sample was 43.04 years, with a total of 108 males and 16 females. Position of the respondent was divided into executive (managing directors, CEOs, etc) and non-executive (general managers). The executive group consisted of 56 males and 2 female (mean age 45.43 years), and non-executive group consisted of 52 males and 14 females (mean age 41.05 years). Based on T-Test analysis, there were no significant differences in survey responses based on age, gender or position held. Six males participated in the case study interviews, with the mean age group of 30-39 years.

Respondents generally agreed that the important issues facing the organisation this year were trying to make a profit (88.9%) and staying ahead of the competition (84.1%). This was consistent with respondents to the south west Sydney study at 90.9% and 90.0%. Results of the south east Melbourne study based on the aims of the project are set out below.

7.4.1 Business use of Information Technology

Respondents indicated that computers were essential for processing information for business (94.4%). Table 7.3 shows the use of IT for business, overall and broken down in small and medium organisations. Four
respondents indicated that their organisation did not use computers. Most organisations used desktop applications to conduct their business, with 92.1% of organisations using spreadsheets and 96.8% using word processing. One hundred and twelve organisations (88.9%) indicated that they had an Internet connection, with 81.0% utilising email, 45.2% had a web page, and 14.3% made some use of transaction processing via the Internet. T-test analysis based on Internet connection, email, web page and transaction processing revealed no significant difference between small and medium organisations on their use of IT. Results from the south west Sydney study revealed 90.7% of organisations had an Internet connection, with 86.0% utilising email, and 30.2% with a web page.

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Desktop applications</td>
<td>122</td>
<td>96.8</td>
<td>50</td>
<td>39.7</td>
<td>72</td>
</tr>
<tr>
<td>Accounting SW</td>
<td>122</td>
<td>96.8</td>
<td>50</td>
<td>39.7</td>
<td>72</td>
</tr>
<tr>
<td>Databases</td>
<td>104</td>
<td>82.5</td>
<td>40</td>
<td>31.7</td>
<td>64</td>
</tr>
<tr>
<td>Graphics</td>
<td>75</td>
<td>59.5</td>
<td>30</td>
<td>23.8</td>
<td>45</td>
</tr>
<tr>
<td>Internet connection</td>
<td>112</td>
<td>88.9</td>
<td>48</td>
<td>38.1</td>
<td>64</td>
</tr>
<tr>
<td>Email</td>
<td>102</td>
<td>81.0</td>
<td>38</td>
<td>30.2</td>
<td>64</td>
</tr>
<tr>
<td>Web Page</td>
<td>57</td>
<td>45.2</td>
<td>22</td>
<td>17.4</td>
<td>35</td>
</tr>
<tr>
<td>Transactions processing</td>
<td>18</td>
<td>14.3</td>
<td>8</td>
<td>6.4</td>
<td>10</td>
</tr>
<tr>
<td>CAD/CAM</td>
<td>55</td>
<td>43.7</td>
<td>18</td>
<td>14.3</td>
<td>37</td>
</tr>
<tr>
<td>Computers to assist man</td>
<td>75</td>
<td>59.5</td>
<td>24</td>
<td>19.1</td>
<td>51</td>
</tr>
</tbody>
</table>

n=number of organisations

Table 7.3: Type of computer use by size of organisation
The extent that manufacturing SMEs are using IT for business in the south east Melbourne region demonstrate an acceptance of computers, with some organisations moving to doing business on-line. From the organisations that took part in this study, a majority have indicated their plans to move to transaction processing via the Internet within five years. Certainly, the main use of the Internet for those with an Internet connection was email as a communication tool.

7.4.2 Actual and Planned use of the Internet

Table 7.4 shows the stage that the 57 organisations with a web page had reached with their use of the Internet for business, and also where the 126 organisations planned to be within the next five years. Although 88.9% indicated that they had an Internet connection, it was mostly used for communication via email (81%). The organisations shown at Stage 3: Processing also utilise the functions of Stage 2 and Stage 1. Organisations shown at Stage 2: Provision also utilise the functions of Stage 1.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Actual Use</th>
<th>Planned next 5 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>STAGE 1: Promotion</td>
<td>3</td>
<td>2.3</td>
</tr>
<tr>
<td>STAGE 2: Provision</td>
<td>36</td>
<td>28.6</td>
</tr>
<tr>
<td>STAGE 3: Processing</td>
<td>18</td>
<td>14.3</td>
</tr>
</tbody>
</table>

* 57 respondents indicated a Web Page
** 126 total respondents

Table 7.4: Internet use related to MICA
Almost half (45.2%) of the organisations indicated that they had a Web Page, with 14.3% of respondents (31.6% of organisations with a Web page) at Stage 3: Processing. However, a majority of the surveyed organisations (92.9%) planned to be at Stage 2 or Stage 3 within five years, with some positive attitudes towards moving in this direction:

"When dealing with larger companies, it will become essential. The majority of people will eventually shop/enquire on line (maybe 5-10 years), so business will have to move with technology. Long term, we expect that at least 50% of our business will have some exposure to an Internet site that we are on, either our own or one of our customers’ sites." (Managing Director, male, 45 years, small organisation in Metal product manufacturing)

"My personal opinion is that the best manufacturers will help the customer by trying to form good working relationships (with suppliers also) and a web site helps by giving them information which helps them. We will probably consider a database on-line set-up like many software companies do, with a 'knowledge database' related to our products." (Manager, male, 31 years, small organisation in Metal product manufacturing)

"We are currently getting on-line to promote our products and services to the rest of Australia, and as a bonus, to the World." (General Manager, male, 29 years, medium organisation in Metal product manufacturing)
Of the 45.2% of organisations in the south east Melbourne study with a web page, 31.6% (14.3% of organisations with a Web Page) were at Stage 3: Processing. A majority of the respondents (92.9%) planned to be at Stage 2 or Stage 3 within five years. In line with SMEs in the south west Sydney study, positive attitudes were also expressed:

"New business opportunities currently in plan shall fit better on the Net." (Managing Director, male, 33 years, small organisation in Petrol coal chemical manufacturing)

"Will enable us to communicate more effectively in terms of time and transfer of details such as photos." (Manager, male, 39 years, small organisation in Machinery & equipment manufacturing)

The assertion, that SMEs will not take up new technologies unless they perceive an advantage to do so, or an immediate disadvantage in not taking them up (Clarke, 1997), is supported in the south west Sydney study, and again in this study by the following comment:

"The whole 'net' thing is too abstract for most 'conventional' businesses to absorb. When it is finally put into a 'what it will do for you' format – without the YOU BEAUT extras, it will change." (Managing Director, male, 45 years, small organisation in Metal product manufacturing)

In south east Melbourne, case study organisations used their Internet connection to send email (both internal and external to the organisation), to do their banking, and to download files (such as
drawings). All organisations were in various stages of planning and upgrading their web sites.

Organisational web sites included Stage 1 with some elements of Stage 2, or Stage 2 with some elements of Stage 3 of MICA. Active planning was well under way for the next one to five years, with on-line ordering, and order status enquiry being viewed as important features for the evolution of the web site. The results of the survey, and case study discussions supports the suggestion from the south west Sydney study that MICA (Burgess & Cooper, 1998b) needs modification, particularly with regard to the boundary between Stage 1 and Stage 2. Certainly, organisations were planning for interactivity on their web site as an initial step. Case study organisations planned for business expansion as a result of their web site development. Depending on the product lines this included within Australia, overseas, or a combination of Australia and overseas.

The trend in the survey towards Stage 3 is also reflected in discussions with the case study organisations. In south west Sydney, case study organisations raised the issue of needing to conduct parallel business processes, for their on-line customers, and for their customers who do not use technology. They also highlighted that the manufacturing industry has organisations (particularly small organisations) that do not use technology. In addition, it was indicated that business-to-
business transactions in manufacturing were generally carried out in person or by phone. Moving to on-line transactions will involve a change in this traditional approach.

In south east Melbourne, case study organisations were concerned about dealing with consultants and their apparent lack of expertise within the area of e-business implementation. This concern was exacerbated by the organisation’s lack of knowledge.

Results indicate a progressive trend in adoption of e-business consistent with MICA. However, some revision to the barrier between Stage 1 and Stage 2 is warranted to reflect current thinking that an initial web page would include Stage 1 plus elements of Stage 2. This modification was suggested in the south west Sydney study and is supported by the south east Melbourne study.

As a group, the case study organisations in south east Melbourne and south west Sydney were very aware of the benefits and risks associated with conducting business on-line.

In summary, benefits included (see Chapter 6 for more detail):

*Marketing Tool* where customers could access information as many times as necessary.
Better communication and closer interaction with customers via an email link on the web site, which had the potential to reduce turnaround times.

Improved Business Practices as reduced lead times was viewed as critical in manufacturing.

Increased Business as the organisation would be more widely known, particularly internationally.

In summary, risks included (see Chapter 6 for more detail):

Cost of implementing and maintaining the web site was viewed as a risk, but in contrast, organisations believed that, in the longer term, reduced costs related to electronic transactions would flow to the organisation.

Loss of knowledge, firstly, of the on-line transaction in contrast to the usual face-to-face interaction, and secondly, possible loss of knowledge of the product if only covered by an Australian patent.

The notion that a web site does not necessarily create a positive Corporate Image was raised as a risk. Getting the design and navigation right for different levels of customers was an issue to be considered. Constant monitoring of these aspects was viewed as necessary as the more educated the customer becomes in using the Internet, then the web site will be measured against other sites and what is available. It is a two-edge sword, firstly, efficiency in
responding to customers electronically, and secondly, to have a web site that reflects current trends about design and navigation.

In south east Melbourne, case study organisations were well into their planning and development phase of their web sites, specifically integrating current systems for interactivity, and getting the design right with easy navigation. In contrast, south west Sydney organisations were more focused on security, loss of data, reduced human contact, and competitor's accessing their site and stealing ideas about their products.

7.4.3 Barriers to Internet use

Based on the 126 organisations in south east Melbourne that responded to the Survey, Table 7.5 shows the top four (of 12 listed) barriers to the organisation becoming involved in electronic business. Respondents were asked to indicate their agreement with statements by circling a number on the Likert scale (1=Strongly disagree to 5=Strongly agree). The four barriers shown returned a mean higher than 3. The south west Sydney survey had five barriers with a mean higher than 3.
Table 7.5: Barriers to Internet use

Barriers that have slowed down the adoption of Internet as a viable way of doing business have similarities with other studies. In this study concern about security and privacy of transactions (50.0%) is one of the main obstacles, but less of a barrier than in south west Sydney (59.0%, mean 3.63). Other studies have rated this barrier lower, and barriers such as inadequate speed of transmission, lack of knowledge about conducting business on-line, and lack of IT skill of staff, higher. In contrast to this study, only 5% of respondents to the Telstra (1998) survey rated security as a concern. The high level of concern about security may be a characteristic of the manufacturing industry, or the regions.

Cost of consultants was the second highest barrier (third barrier in south west Sydney, 47.7%, mean 3.37). This finding is consistent with an overseas study (Hoffman et al, 1998), and was a feature of the discussions with case study organisations both in south west Sydney.
and south east Melbourne. Lack of IT expertise of staff rated as the third highest barrier in this study (fifth highest in south west Sydney, 38.6% mean 3.07). Lack of government incentives was the fourth highest barrier, and while governments are moving on this issue, perhaps not in practical ways which are relevant to the manufacturing industry, south west Sydney rated this barrier second (47.7%, mean 3.40). The barrier of “Unsure how many people using the Internet” was not evident in this study, however, was rated fourth in south west Sydney (40.9%, mean 3.14).

Case study organisations in south east Melbourne while acknowledging that security and privacy of transactions was a barrier, believed that cost of consultants, integrating current systems, and lack of IT expertise within the organisation were barriers to be overcome in the evolution of conducting business on-line. Getting the right people to set up the web site which looks good, provides functionality and easy navigation, as well as ongoing support was viewed as critical to maintaining a quality assured standard, particularly when considering functions that would be provided at Stage 3.

Experiences of two organisations in south west Sydney revealed that cost of consultants varies dramatically, with quotes appearing to offer the same service varying from $1,000 to $10,000. Interestingly, in south east Melbourne, a consultant provided a quote for a web site
with particular features at $40,000, and when approached with the same specification the following year, quoted $6,000. These inconsistencies have created an atmosphere of suspicion, with a number of comments, ie:

"Not easy to get good IT people who know what they are doing – consultants charge about $120 per hour and are very expensive – quality of their work depends on how well YOU know computers." (Manager, male, 40-49 years, medium organisation in Other manufacturing)

"The area is so new, consultants are learning at their customers expense at very high fees – smoke and mirrors effect – IT is a very large field, hard to know it all." (Director, male, 30-39 years, small organisation in Other manufacturing).

All of the respondents to the survey in south west Sydney, and 70% of respondents in south east Melbourne believed that the manufacturing industry has not been made aware of what is available for the move to doing business on-line. This lack of awareness is definitely a barrier to an organisations becoming involved in electronic business.

In south west Sydney, not understanding the process was also emphasised as a barrier that overlaps with the need to deal with consultants. The need to go out and research was identified as a
problem, not knowing who to trust, and the lack of a central place for information related to doing business on-line for SMEs. The need to work differently was highlighted and to get training for staff was also viewed as a barrier. Currently, within some organisations there was none or very little expertise to maintain the web site, and very little time to allocate to training. In contrast, organisations in south east Melbourne already were in various stages of developing and enhancing their web sites, either by internal people (not necessarily designated IT staff), or were outsourcing the work. Ideas of what is available and possible were evident, with acknowledgement that the cost of consultants was a barrier. As a consequence, more confidence in dealing with consultants was apparent.

Lack of staff IT expertise had led to existing information technology not being used effectively, and a belief by some of the case study organisations that the situation will be exacerbated with the introduction of new web technologies. In south west Sydney, the issue of workload was raised by a number of the case study organisations, which were concerned about the need for parallel systems, and the need to deal with a higher volume of enquiries. Parallel systems would be necessary to enable the organisation to deal with additional or existing customers with on-line capabilities, and to provide for existing customers without technology. Strategies to deal with more enquiries were viewed as important in maintaining a quality
assured standard. In south east Melbourne, case study organisations were generally satisfied with the current level of staff IT expertise, and were looking at recruitment practices to ensure new employees were computer literate.

7.4.4 Level of Staff IT Skills and Training

One of the aims of the project was to determine the level of satisfaction with IT skills of staff. The lack of IT expertise of staff was identified as one of the barriers to becoming involved in electronic business. For this series of tables, respondents were asked to tick as many of the items as applicable to their organisation. Table 7.6.1 shows the organisation's satisfaction with the current level of IT skills by staff categories. Table 7.6.2 shows the organisation's training methods currently used for the various staff categories. Table 7.6.3 shows the IT training methods planned to meet the organisation's business strategies.

<table>
<thead>
<tr>
<th>Staff Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management (salaried employees)</td>
<td>91</td>
<td>72.2</td>
</tr>
<tr>
<td>Office employees</td>
<td>89</td>
<td>70.6</td>
</tr>
<tr>
<td>Factory (award employees)</td>
<td>37</td>
<td>30.9</td>
</tr>
</tbody>
</table>

Table 7.6.1: Organisation's satisfaction with level of staff IT skills by Staff Category
Table 7.6.2: Organisation's IT training methods used for Staff Category

<table>
<thead>
<tr>
<th></th>
<th>Management</th>
<th></th>
<th>Office</th>
<th></th>
<th>Factory</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>In-house training with</td>
<td>82</td>
<td>66.1</td>
<td>84</td>
<td>67.7</td>
<td>54</td>
<td>43.5</td>
</tr>
<tr>
<td>internal people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External training courses</td>
<td>81</td>
<td>65.3</td>
<td>83</td>
<td>66.9</td>
<td>49</td>
<td>39.5</td>
</tr>
<tr>
<td>Trained to current level on recruitment</td>
<td>80</td>
<td>64.5</td>
<td>75</td>
<td>60.5</td>
<td>54</td>
<td>43.5</td>
</tr>
<tr>
<td>In-house training with</td>
<td>72</td>
<td>58.1</td>
<td>80</td>
<td>64.5</td>
<td>44</td>
<td>35.5</td>
</tr>
<tr>
<td>external people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courses provided by product supplier</td>
<td>65</td>
<td>52.4</td>
<td>69</td>
<td>55.6</td>
<td>37</td>
<td>29.8</td>
</tr>
</tbody>
</table>

n=number of organisations

Table 7.6.3: Organisation's IT training methods planned

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-the-job training by fellow employees</td>
<td>81</td>
<td>65.3</td>
</tr>
<tr>
<td>Employ people with appropriate knowledge</td>
<td>79</td>
<td>63.7</td>
</tr>
<tr>
<td>Consultants</td>
<td>75</td>
<td>60.5</td>
</tr>
<tr>
<td>Self-taught staff within organisation</td>
<td>74</td>
<td>59.7</td>
</tr>
<tr>
<td>Knowledgeable employees</td>
<td>73</td>
<td>58.9</td>
</tr>
</tbody>
</table>

n=number of organisations

The level of IT skills of staff will affect decisions about moving to doing business on-line, particularly if the level of skill is low, or problems have been experienced in getting staff trained. In these circumstances, lack of IT expertise of staff is viewed as a barrier. Organisations in the south east Melbourne study appear to rely on in-house training with internal people, and plan to continue this trend to
meet the organisation’s strategic plan for the next five years. Satisfaction with the level of IT skills of management (72.2%) and office employees (70.6%) is much higher than satisfaction with factory employees (30.9%).

Organisations are now looking at employing staff with general computer literacy (not package specific) at the factory level:

“I expect computer literacy on recruitment, even from factory staff. There is not a guy here who doesn’t touch a keyboard.” (Managing Director, male, 40-49 years, small organisation in Textiles manufacturing)

Case study organisations in south west Sydney, and some case study organisations in south east Melbourne facilitated in-house training by sending one member of staff to an external course who then passes on the knowledge to staff. This approach was extended further by some case study organisations in south east Melbourne. Introductory training (email, Internet) was handled by internal staff, with external courses for more advanced training (Office, MYOB, Photoshop).

However, the acknowledgment that new IT skills are necessary if the organisation is planning to move to doing business on-line is demonstrated by the ranking of "employing people with appropriate knowledge" close to “On-the-job training by fellow employees".
Case study organisations in south east Melbourne raised some interesting issues related to levels of IT expertise of existing staff that needed to be addressed. These issues centre on:

*Top management slow to fully utilise computers in their work.* While some were happy to use email and to a lesser extent the Internet, reports were still being hand written.

*Cost of training and the inevitable staff turnover,* leading to feelings of never being completely satisfied with level of skills.

*Reluctance of factory and older employees who have had to face the challenge of becoming computer literate.*

*Need to recruit staff with general (email, word processing) IT skills.* Package specific (Outlook, Word) skills were not viewed as being as important as skills related to feeling comfortable using computers.

Lack of competency of existing staff in specific areas was also discussed. File management was highlighted as an area that needed to be addressed, particularly when considering the complex structure of public folders and files stored on file servers which had started to become a feature of networking and electronic transactions.

### 7.5 OUTCOMES OF STUDY

The results of the south east Melbourne study support results from the south west Sydney study (Chapter 6) which found that while almost
all organisations use computers, a majority have an Internet connection that they exclusively use for email, and only a small number of organisations are involved in transaction processing. Barriers were mostly non-technical, and planned IT training methods for staff includes employing people with appropriate knowledge to supplement current training methods.

Organisations in south east Melbourne appear to be further along the diffusion process, with organisations planning the evolution of their web site and exploring issues related to content and design. While organisations in south west Sydney are planning to move to doing business on-line, their knowledge of the potential benefits offered by involvement in electronic commerce is only superficial. One way to overcome this lack of knowledge, as identified in the south west Sydney study, would be for industry associations to get closer to the problem, by disseminating information and conducting seminars in a format acceptable to SMEs.

Modification to MICA (Burgess & Cooper, 1998b) is recommended for manufacturing SMEs in Australia based on survey results and case study interviews in both studies. The barrier between Stage 1 and 2 should appear as a soft barrier indicated by a broken circle. The barrier between Stage 2 and 3 should be strengthened to a hard barrier, as organisations believed that their business practices and other issues
needed to be addressed before crossing this barrier. In contrast, having a web presence that encompassed Stage 1 and elements of Stage 2 could be accomplished alongside existing business practices. See Chapter 10 for more detail on the modification.

The survey in both studies highlighted the need for manufacturing to be made aware of the benefits and risks of SMEs becoming involved in electronic commerce. The case study interviews from both studies provided insight into the role that industry associations could provide, namely (previously identified in the south west Sydney study):

- **a focal information centre of electronic business resources:**

  *specifically for SMEs without IT personnel:*

  newsletters, booklets, where to find programs and seminars;

- **liaison with regional associations to provide:**

  seminars, briefings at regional level relevant to manufacturing SMEs; and

- **globally raising the profile of manufacturing in Australia.**

Raising awareness that can lead to adoption of the new technologies is a priority of the Australian Government, however actually getting education to SMEs needs to be handled at a regional level to overcome barriers associated with doing business on-line. Regional associations could provide a one-stop point for information about electronic business.
The process of diffusion identifies three groups that would need to be addressed: early adopters, those who are aware, and those who are not aware (see Chapter 6 for initial discussion). Some subsidy from the industry association was suggested as a way of involving SMEs who are currently not aware of the new technologies. Certainly, without post-adoption support the early adopters group can plateau or move away from the new technologies. Industry associations have a role in the diffusion process of electronic business for manufacturing, and more specifically to SMEs without IT personnel and expertise.

The studies revealed a need for a global business focus in manufacturing, and a need for regional networking and education on how to achieve on-line business. The following comment from this study raises the need to support the early adopters, as well as those who have not yet conducted some form of business on-line:

"The early adopters have broken the ice, and others will come on board, so the next wave will be quite a big one." (Director, male, 30-39 years, small organisation in Other manufacturing)

Industry associations at national level could focus on providing a central point for resources for SMEs wishing to become involved in electronic business, and liaise with regional associations to provide the face-to-face interaction at local level. Almost all case study organisations mentioned that
they did receive a lot of paper from their national industry association, which was mostly not read. This distribution by mail is not meeting the needs of SMEs, and a more timely way of conveying information could be explored. Certainly, targeting early adopters, those who are aware, and those who are not aware, and providing these groups with relevant information would be a step in the right direction.

7.6 CONCLUSION

This study supports the four integrated areas in the diffusion process, which were highlighted in the south west Sydney study (see Chapter 6 for initial discussion):

- **What government and industry association can do:**

  provide information to raise awareness adapted to manufacturing SMEs.

- **What education sector can do:**

  provide knowledge and skills in electronic business for graduates (not just IT-related courses).

- **What SMEs can do:**

  participate in the diffusion process by liaison with industry associations,

  develop strategies for dealing with consultants,

  identify and develop strategies about workload issues.

- **What Consultants can do:**

  interact with SMEs to provide quality service.
As the diffusion process evolves in the future, the main issue in electronic business will move away from the technology, to a functional and service level. For SMEs, business will be carried out by staff with support from consultants. Issues will continue to be IT expertise of staff and quality of consultants.

The use of the Internet by manufacturing SMEs in regional Australia (45.2% in south east Melbourne, 30.2% in south west Sydney with a web page) is more than comparable with the national average of 23%, and with US manufacturers at 32%. Manufacturing industry associations will have a role to play in supporting SMEs in developing strategies for doing business online. The evolution of the diffusion process will rely on awareness and education. This will be the key to moving towards achieving the Australian government's goal of making industry competitive in the global marketplace.

In summary, this chapter has presented the results from the south east Melbourne study on adoption of electronic business by manufacturing SMEs. The chapter also provides support for the conclusions drawn from the south west Sydney study as detailed in Chapter 6. The next stage of this research involves a comparative study between the regions (Chapter 8). Following the comparative study, Chapter 9 examines industry associations and their role in the diffusion process.
CHAPTER EIGHT

STUDY 3:

COMPARISON OF TWO AUSTRALIAN REGIONS

Diffusion of electronic business by manufacturing SMEs is empirically investigated by a series of integrated studies. The third of these studies examined similarities and differences between two manufacturing regions in adoption patterns of electronic business. In the previous chapters, results for the south west Sydney (Chapter 6) and south east Melbourne (Chapter 7) regions were presented. In Chapter 5 the methodology was detailed for this comparative study, namely, identifying similarities and differences firstly between the regions, and secondly between small and medium organisations.

In this chapter, the results of the comparative study are presented, and support is provided for the conclusions drawn in the regional studies. No significant differences were found between the regions; however, there are significant differences between small and medium organisations on a number of factors.

8.1 OVERVIEW OF THE STUDY

This study analysed the data from the two previous empirical studies and collated the results into one group. In research terms, this chapter stands
alone as a separate study. Manufacturing organisations located in SW Sydney and SE Melbourne regions that have an entry in the Australian Industry Group Yearbook (1999) comprised the population-sampling frame. One thousand one hundred and fifty one organisations (363 in SW Sydney and 788 in SE Melbourne) were identified as meeting the Australian Bureau of Statistics (1998) definition for a manufacturing SME. Eight organisations were rejected from the SW Sydney study as their principal officer had participated in validating the survey. From the remaining group of 355 in SW Sydney, 178 organisations were selected. From the group of 788 in SE Melbourne, 394 organisations were selected. A total of 575 surveys were mailed to the principal officer (managing director, director, etc.) as set out in the AIG Yearbook.

Overall 89 surveys were returned as left address or no longer in manufacturing (17 in SW Sydney and 72 in SE Melbourne). In SW Sydney 44 organisations completed the survey, representing 27.33% of the SW Sydney sample, and in SE Melbourne 126 organisations completed the survey, representing 39.13% of the SE Melbourne sample. The overall response rate was 34.97%. The final page of the survey was a separate detachable page for the respondent to indicate their interest in the project by participating in an on-site interview. Eight case studies were conducted in SW Sydney and six case studies in SE Melbourne. Responses to the survey for both regions were combined and used to determine similarities and differences between the regions and between small and medium
organisations. The combined results on specific and planned use of the Internet for business were related to MICA (Burgess & Cooper, 1998b). See Chapter 3 for explanation and justification for use of MICA.

Case study interviews examined experiences of the individual organisation in their specific and planned use of the Internet for business, and looked for explanations of the results of the survey, particularly in relation to similarities and differences identified by the survey.

8.2 AIMS OF THE STUDY

In this third comparative study manufacturing SMEs in two regions were examined using quantitative and qualitative methodologies as set out in Chapter 5. Specific aims of this project were to identify similarities and differences between small and medium organisations and between regions in terms of:

- business use of IT;
- specific and planned use of the Internet for e-business;
- barriers to using the Internet for business;
- current and planned staff training methods;
- support or reject the assumption that the regions are equivalent;
- validate the modifications to MICA (Burgess & Cooper, 1998b) proposed in regional studies;
- collate information on recommendations for change agents in the diffusion process; and

- provide primary data for the theoretical study.

8.3 DEMOGRAPHICS

Table 8.1 shows the manufacturing industry segments for each region as defined by the Australian Bureau of Statistics (1998). Table 8.2 shows the samples broken down by small and medium sized enterprises. Figure 8.1 illustrates the regional samples by Industry Segment and Size of Organisation.

<table>
<thead>
<tr>
<th>Segment *</th>
<th>SW Sydney</th>
<th>SE Melbourne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal product manufacturing</td>
<td>20 (45.5%)</td>
<td>25 (19.8%)</td>
</tr>
<tr>
<td>Machinery &amp; equipment manufacturing</td>
<td>9 (20.5%)</td>
<td>24 (19.0%)</td>
</tr>
<tr>
<td>Textiles, clothing, footwear &amp; leather</td>
<td>3 (6.8%)</td>
<td>12 (9.5%)</td>
</tr>
<tr>
<td>Wood &amp; Paper product manufacturing</td>
<td>1 (2.3%)</td>
<td>12 (9.5%)</td>
</tr>
<tr>
<td>Food, beverage, tobacco</td>
<td>0</td>
<td>8 (6.3%)</td>
</tr>
<tr>
<td>Petroleum, coal, chemical</td>
<td>0</td>
<td>8 (6.3%)</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>11 (25.0%)</td>
<td>37 (29.4%)</td>
</tr>
</tbody>
</table>

*Segments as defined by Australian Bureau of Statistics

<table>
<thead>
<tr>
<th>Small/Medium *</th>
<th>SW Sydney</th>
<th>SE Melbourne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small: less than 20 employees</td>
<td>22 (50.0%)</td>
<td>54 (42.9%)</td>
</tr>
<tr>
<td>Medium: 20-200 employees</td>
<td>22 (50.0%)</td>
<td>72 (57.1%)</td>
</tr>
</tbody>
</table>

* Size as defined by Australian Bureau of Statistics

Table 8.1: Manufacturing Industry Segments by Regions

Table 8.2: Size of Organisation by Region
8.4 RESULTS

Demographic data for the survey revealed the mean age of the sample was 44.8 years, with a total of 146 males and 22 females. Position of the respondent was divided into executive (managing directors, CEOs, etc) and non-executive (general managers). The executive group consisted of 74 males and 3 females (mean age 45.29 years), and non-executive group consisted of 72 males and 19 females (mean age 44.32 years). Based on t-test analysis, there were no significant differences in survey responses based on age, gender or position held. Twelve males and two females participated in the case study interviews, with the mean age group of 40-49 years.

Respondents generally agreed that the important issues facing the organisation were trying to make a profit (89.9%) and staying ahead of the competition (87.1%). Results of the study based on the aims of the project are set out below.
8.4.1 Business use of Information Technology

Respondents indicated that computers were essential for processing information for business (94.95%). Table 8.3 shows the use of IT for business, overall and broken down by region. Five respondents indicated that the organisation did not use computers. Results are based on the remaining 165 respondents. All organisations used desktop applications to conduct their business, with all organisations using spreadsheets and 97.25% using word processing. One hundred and fifty one organisations (88.8%) indicated that they had an Internet connection, with 81.8% utilising email communications, 41.2% had a web page, and 14.7% made some use of transaction processing via the Internet.

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>SW Sydney</th>
<th>SE Melbourne</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Desktop applications</td>
<td>165</td>
<td>97.1</td>
<td>43</td>
</tr>
<tr>
<td>Accounting SW</td>
<td>163</td>
<td>95.8</td>
<td>41</td>
</tr>
<tr>
<td>Databases</td>
<td>136</td>
<td>80.0</td>
<td>32</td>
</tr>
<tr>
<td>Internet connection</td>
<td>151</td>
<td>88.8</td>
<td>39</td>
</tr>
<tr>
<td>Email</td>
<td>139</td>
<td>81.8</td>
<td>37</td>
</tr>
<tr>
<td>Web Page</td>
<td>70</td>
<td>41.2</td>
<td>13</td>
</tr>
<tr>
<td>Transactions processing</td>
<td>25</td>
<td>14.7</td>
<td>7</td>
</tr>
<tr>
<td>CAD/CAM</td>
<td>79</td>
<td>46.5</td>
<td>24</td>
</tr>
<tr>
<td>Computers to assist manuf</td>
<td>104</td>
<td>61.2</td>
<td>29</td>
</tr>
</tbody>
</table>

n=number of organisations

Table 8.3: Type of computer use overall and by region
Based on t-test analysis no significant differences were found between regions on business use of IT. However, some significant differences were found between small and medium organisations. Differences indicated that medium organisations use some technology more than small organisations, such as accounting software \((t=3.045, p<.01)\), databases \((t=2.987, p<.01)\), and computers to assist manufacturing \((t=3.998, p<.01)\). No significant differences were found with Internet connection, email, web page and transaction processing between small and medium organisations.

The extent that manufacturing SMEs are using IT for business in the both regions demonstrates an acceptance of computers, with some organisations moving to doing business on-line. From the organisations that took part in this study, a majority have indicated their plans to move to transaction processing via the Internet within five years. At present, the main use of the Internet for those with an Internet connection is email as a communication tool.

### 8.4.2 Actual and Planned use of the Internet

Table 8.4.1 shows the stage that the organisations with a web page (13 in SW Sydney, 57 in SW Melbourne) have reached in their use of the Internet for business, and Table 8.4.2 shows the stage that all responding organisations planned to be within the next five years.
Based on t-test analysis no significant differences were found between regions or between small and medium organisations in relation to their actual or planned use of the Internet for business.

Overall 41.0% of the organisations indicated that they had a Web Page, with 14.7% of respondents at Stage 3: Processing. However, a majority of the surveyed organisations (90.8%) planned to be at Stage 2 or Stage 3 within five years, with some positive attitudes towards moving in this direction:

"When dealing with larger companies, it will become essential. The majority of people will eventually shop/enquire on line (maybe 5-10 years), so business will
have to move with technology. Long term, we expect that at least 50% of our business will have some exposure to an Internet site that we are on, either our own or one of our customers’ sites.” (Managing Director, male, 45 years, small organisation in Metal product manufacturing, SE Melbourne)

The assertion, that SMEs will not take up new technologies unless they perceive an advantage to do so, or an immediate disadvantage in not taking them up (Clarke, 1997), is supported by the both regional studies.

Case study organisations used their Internet connection to send email (both internal and external to the organisation), to do their banking, and to download files (such as drawings). All case study organisations were in various stages of planning and upgrading their web sites. Organisational web sites included Stage 1 with some elements of Stage 2, or Stage 2 with some elements of Stage 3 of MICA. Active planning was well under way for the next one to five years, with on-line ordering, and order status enquiry being viewed as important features for the evolution of the web site.

The trend in the survey towards Stage 3 is also reflected in discussions with the case study organisations. In SW Sydney, case study organisations raised the issue of needing to conduct parallel business processes, for their on-line customers, and for their customers who do not use technology. They also highlighted that the manufacturing
industry has organisations (particularly small organisations) that do not use technology. In south east Melbourne, case study organisations were concerned about dealing with consultants and their apparent lack of expertise within the area of e-business implementation. This concern was exacerbated by the organisation's lack of knowledge.

In addition, it was indicated that business-to-business transactions in manufacturing were generally carried out in person or by phone. Moving to on-line transactions will involve a change in this traditional approach. As a group, the case study organisations identified benefits (wider marketing, better communication, improved business practices and increased business) and risks (cost of implementing and maintaining the web site, loss of knowledge of the transaction and possibly the product, and the web site not necessarily creating a positive image) associated with conducting business on-line (see Chapter 7).

8.4.3 Barriers to Internet use

Based on the 170 organisations that responded to the survey in SW Sydney and SE Melbourne, Table 8.5 shows the top four (of 12 listed) barriers to the organisation becoming involved in electronic commerce. Respondents were asked to indicate their agreement with statements by circling a number on the Likert scale (1=Strongly disagree to 5=Strongly agree). The four barriers shown returned a
mean higher than 3. SW Sydney had an additional barrier with a mean higher than 3 (ie, Not sure how many people are using the Internet, mean=3.14).

<table>
<thead>
<tr>
<th>Concern about security and privacy of transactions</th>
<th>Mean</th>
<th>Std Dev</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of consultants</td>
<td>3.29</td>
<td>1.19</td>
<td>80</td>
<td>47.1</td>
</tr>
<tr>
<td>Lack of government incentives</td>
<td>3.28</td>
<td>1.11</td>
<td>66</td>
<td>38.8</td>
</tr>
<tr>
<td>Lack of IT expertise of staff</td>
<td>3.10</td>
<td>1.05</td>
<td>63</td>
<td>37.1</td>
</tr>
</tbody>
</table>

Table 8.5: Barriers to Internet use for both regions

T-test analysis revealed no significant differences between regions or between small and medium organisations on the top four barriers to becoming involved in doing business on-line.

However, two barriers listed at equal fifth position overall warrant further examination:

(a) Lack of cost effective telecommunications infrastructure (Overall Mean 2.95)

While no significant difference exists between regions, the difference between small and medium organisations was found to be significant:

Small organisations  Mean 2.78
Medium organisations Mean 3.13
T-test analysis \((t=2.272, p<.05)\) indicated that medium organisations rate "lack of cost effective telecommunications infrastructure" as important to their plans to becoming involved in doing business online.

\((b)\) Not sure how many people are using the Internet (Overall Mean 2.95)

While no significant difference exists between regions, or between small and medium organisations based on t-test analysis, the mean for small organisations (3.06) indicated the these organisations believe that "not knowing how many people are using the Internet" is important to their plans to becoming involved in doing business online.

Barriers that have inhibited the adoption of Internet as a viable way of doing business have similarities with other studies. In this study concern about security and privacy of transactions (51.8%) is one of the main obstacles. Other studies have rated this barrier lower, and barriers such as inadequate speed of transmission, lack of knowledge about conducting business on-line, and lack of IT skill of staff, higher. In contrast to this study, only 5% of respondents to the Telstra survey (Telstra, 1998) rated security as a concern. The high level of concern about security may be a characteristic of the manufacturing industry, or the regions.
Cost of consultants was the second highest barrier (51.8%). This finding is consistent with an overseas study (Hoffman et al, 1998), and was a feature of the discussions with case study organisations both in regions. Lack of government incentives was the third highest barrier, and while governments are moving on this issue, perhaps not in practical ways which are relevant to the manufacturing industry.

Case study organisations, while acknowledging that security and privacy of transactions was a barrier, believed that cost of consultants, integrating current systems, and lack of IT expertise within the organisation were barriers to be overcome in the evolution of conducting business on-line. Getting the right people to set up the web site which looks good, provides functionality and easy navigation, as well as ongoing support was viewed as critical to maintaining a quality assured standard, particularly when considering functions that would be provided at Stage 3.

Experiences of two organisations revealed that cost of consultants vary dramatically, with quotes appearing to offer the same service varying from $1,000 to $10,000 (from south west Sydney). Interestingly, a consultant provided a quote for a web site with particular features at $40,000, and when approached with the same specification the following year, quoted $6,000 (from south east
Melbourne). These inconsistencies have created an atmosphere of suspicion and uncertainty.

All of the respondents to the survey in SW Sydney, and 70% of respondents in SE Melbourne believed that the manufacturing industry has not been made aware of what is available for the move to doing business on-line. No significant difference was found with this belief between regions or between small and medium sized organisations. This lack of awareness is definitely a barrier to an organisations becoming involved in electronic commerce.

In SW Sydney, not understanding the process was also emphasised as a barrier that overlaps with the need to deal with consultants (see Chapter 6). Within some organisations there was no, or very little expertise to maintain the web site, and very little time to allocate to training. In contrast, organisations in SE Melbourne already were in various stages of developing and enhancing their web sites, either by internal people (not necessarily designated IT staff), or were outsourcing the work. Ideas of what is available and possible were evident, with acknowledgement that the cost of consultants was a barrier. As a consequence, more confidence in dealing with consultants was apparent.
Lack of staff IT expertise had led to existing information technology not being used effectively, and a belief by some of the case study organisations that the situation will be exacerbated with the introduction of new web technologies. In SW Sydney, the issue of workload was raised by a number of the case study organisations, which were concerned about the need for parallel systems, and the need to deal with a higher volume of enquiries.

Case study organisations were generally satisfied with the current level of staff IT expertise for management and office staff categories, and were looking at recruitment practices to ensure new employees were computer literate in all categories.

8.4.4 Level of staff IT skills and training

One of the aims of this study was to determine the overall level of satisfaction with IT skills of staff. The lack of IT expertise of staff was identified as one of the barriers to becoming involved in electronic commerce. For this series of tables, respondents were asked to tick as many of the items as applicable to their organisation. Table 8.6.1 shows the organisation's satisfaction with the current level of IT skills by staff categories. Table 8.6.2 shows the top 5 (of 8 listed) IT training methods currently used for the various staff categories. Table 8.6.3 shows the top 5 (of 9 listed) IT training methods planned to meet the organisation's business strategies.
Table 8.6.1: Organisation's satisfaction with level of staff IT skills by Staff Category

<table>
<thead>
<tr>
<th>Management (salaried employees)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office employees</td>
<td>123</td>
<td>72.4</td>
</tr>
<tr>
<td>Factory (award employees)</td>
<td>51</td>
<td>30.0</td>
</tr>
</tbody>
</table>

T-test analysis revealed no significant difference between regions or between small and medium organisations based on satisfaction with the current levels of IT skills of staff at management, office and factory categories.

Table 8.6.2: Organisation's IT training methods used for Staff Category

<table>
<thead>
<tr>
<th>In-house training with internal people</th>
<th>Management</th>
<th>Office</th>
<th>Factory</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>109</td>
<td>112</td>
<td>70</td>
</tr>
<tr>
<td>%</td>
<td>64.1</td>
<td>65.9</td>
<td>41.2</td>
</tr>
<tr>
<td>External training courses</td>
<td>100</td>
<td>104</td>
<td>55</td>
</tr>
<tr>
<td>Trained to current level of recruitment</td>
<td>93</td>
<td>92</td>
<td>62</td>
</tr>
<tr>
<td>In-house training with external people</td>
<td>88</td>
<td>95</td>
<td>53</td>
</tr>
<tr>
<td>Computer based tutorials</td>
<td>85</td>
<td>85</td>
<td>42</td>
</tr>
<tr>
<td>with product</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=number of organisations

T-test analysis revealed no significant difference between regions on current training methods. However, some differences were revealed between small and medium sized organisations:
(a) Small organisations employ factory staff who are trained to their current level at recruitment more than medium organisations \((t=3.746, p<.01)\).

(b) Medium organisations send office staff to external training courses more than small organisations \((t=2.239, p<.05)\).

(c) Medium organisations use in-house training with internal people more than small organisations for their management and office staff categories \((t=2.750,p<.05)\).

(d) Medium organisations use in-house training with external people more than small organisations for their office and factory staff categories \((t=2.530,p<.05)\).

(e) Medium organisations employ permanent IT staff more than small organisations \((t=2.400,p<.05)\).

<table>
<thead>
<tr>
<th>In-house training with internal people</th>
<th>113</th>
<th>66.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employ people with appropriate knowledge</td>
<td>111</td>
<td>65.3</td>
</tr>
<tr>
<td>Self-taught staff within organisation</td>
<td>103</td>
<td>60.6</td>
</tr>
<tr>
<td>Knowledgeable employees</td>
<td>99</td>
<td>58.2</td>
</tr>
<tr>
<td>Consultants</td>
<td>95</td>
<td>55.9</td>
</tr>
</tbody>
</table>

\(n=\) number of organisations

**Table 8.6.3: Organisation's IT training methods planned**

T-test analysis revealed no significant difference between regions on planned training methods. However, small organisations used their knowledgeable employees more than medium organisations \((t=2.548,p<.05)\).
The level of IT skills of staff will affect decisions about moving to doing business on-line, particularly if the level of skill is low, or problems have been experienced in getting staff trained. In these circumstances, lack of IT expertise of staff was viewed as a barrier. Organisations rely on in-house training with internal people, and plan to continue this trend to meet the organisation's strategic plan for the next five years. Satisfaction with the level of IT skills of management (65.3%) and office employees (72.4%) is much higher than satisfaction with factory employees (30.0%). Organisations are now looking at employing staff with general computer literacy (not package specific) at the factory level:

"I expect computer literacy on recruitment, even from factory staff. There is not a guy here who doesn't touch a keyboard." (Managing Director, male, 40-49 years, small organisation in Textiles, etc., SE Melbourne)

Consistent with the survey, case study organisations facilitated in-house training by sending one member of staff to an external course who then passes on the knowledge to staff. This approach was extended further by some case study organisations in south east Melbourne where introductory training (email, Internet) was handled by internal staff, with external courses for more advanced training (Office, MYOB, Photoshop).
However, the acknowledgment that new IT skills are necessary if the organisation is planning to move to doing business on-line was demonstrated by the ranking of "employing people with appropriate knowledge" close to "in-house training with internal people". Case study organisations in SE Melbourne raised some interesting issues related to levels of IT expertise of existing staff that needed to be addressed, such as top management under-utilising the technology, inevitable staff turnover, reluctance of factory and older employees. The need to recruit staff with general, rather than package specific skills was also highlighted, as was the need to address the issue of file management (see Chapter 7).

8.5 OUTCOMES OF STUDY

The results of the study found no significant differences between the regions on business use of IT, specific and planned use of the Internet for e-business, barriers to using the Internet for business, and current and planned staff training methods. This supports the assumption of the industry associations that the regions are equivalent in manufacturing terms.

Significant differences were found between small and medium organisations on business use of some software applications, and current IT training methods. Medium organisations use some current IT training methods and employ permanent IT staff more than small organisations. Government,
industry associations and the education sector could target small organisations.

Comparison analysis found two additional barriers that are factors to doing business on-line. The barrier of “lack of cost effective telecommunications infrastructure” had a mean of 3.13 for medium organisations. This is a current target for the Australian government. The barrier of “not sure how many people are using the Internet” had a mean of 3.06 for small organisations. Industry associations could acknowledge that small organisations need a particular focus. These two additional barriers, along with the top four barriers, are further analysed in Chapter 10.

Proposed modifications suggested within the regional studies for modification to MICA (Burgess & Cooper, 1998b) are validated and will be explored further in Chapter 10. Recommendations for role of industry associations as change agents in the diffusion process are collated and are examined further in Chapter 9. The collective data is applied to the theoretical study detailed in Chapter 10.

8.6 CONCLUSION
This research has collated the data from the two regional studies and provided justification for the application of one group in the theoretical study in Chapter 10. Differences found between small and medium organisations are further examined in Chapter 10.
The next stage of this research examines the role and function of change agents in manufacturing. Qualitative analysis of national and regional industry associations, and federal and state government e-business programs will be undertaken in the next chapter. These will be compared to the perceptions of manufacturing SMEs from the regional studies.

In summary, this chapter has presented the results from a comparative study of two regions, namely south west Sydney and south east Melbourne, on adoption of electronic business by manufacturing SMEs. The chapter highlighted similarities and differences between the regions and between small and medium organisations. Information was collated for the conclusions drawn from the south west Sydney study as detailed in Chapter 6, and the south east Melbourne study as detailed in Chapter 7. This combined information is used for the theoretical study in Chapter 10.
CHAPTER NINE

STUDY 4:

CHANGE AGENTS WITHIN MANUFACTURING

Small and medium organisations in two regional areas of the Australian manufacturing industry was the focus of the empirical studies for this research in diffusion of electronic business. These studies provided the information for the overall aim of the dissertation, which was to provide a flexible theoretical framework in which to position studies into adoption of electronic business, and to identify factors that affect the rate of adoption.

Change agents important to this diffusion process are national and regional industry associations, and federal and state governments. In the previous chapters the empirical studies associated with the SMEs are detailed, and include perceptions of the role of industry associations and governments. This chapter outlines the study, which examined the change agents and compared actual operation with perceptions of the SMEs. The outcomes of this study, along with the empirical studies in the preceding chapters, provided the primary data for the theoretical study related to the model of diffusion of innovation theory. Overall, this research moves towards extending and modifying this theory.
9.1 OVERVIEW OF THE STUDY

Relevant industry associations were identified as Australian Industry Group (national), Innovative Technology Network (regional industry association for south west Sydney) and South East Networks (regional industry association for south east Melbourne). Relevant governments were identified as the Australian federal government, the NSW state government and the Victorian state government.

Case studies were conducted for this study that included interviews with senior staff of the industry associations, review of documents (reports, schedules, web sites), attendance at selected seminars as a non-participant observer, and informal discussions with seminar participants during seminar breaks. See Appendix IV for questions and Appendix V for interview transcripts.

Government programs were assessed via web site content, and documentation from government departments. The investigation was undertaken just prior to the regional studies in 1999 and 2000, and then again in 2001. Case study and survey data from the regional studies was used for the comparison between actual operation and perceptions of SMEs.
9.2 AIMS OF THE STUDY

This study examined the change agents, industry associations and government, in terms of their operation and function, and compared these with the perceptions of SMEs from the regional studies. Specific aims of the study were to:

- document functions of the industry associations;
- compare industry associations' actual function and the perceptions of SMEs from the regional studies;
- document government e-business programs;
- compare government programs and perceptions of SMEs from the regional studies; and
- provide primary data for the theoretical study.

9.3 BACKGROUND TO THE STUDY

Mark Fogarty, Associate Director, Australian Industry Group was interviewed on two occasions prior to the regional studies in 1998 and 1999. Email and telephone consultation was also held. Mr Fogarty provided useful feedback on the survey instrument, and outlined the operation of the national industry association.

Ross Pearce, Manager, Innovative Technology Network was interviewed on two occasions, once prior to first regional study in south west Sydney, and then again following the study in 1999. In addition, consultation on a number of other occasions took place. At the first interview Mr Pearce provided
useful feedback on the initial exploratory project in south west Sydney including the survey instrument. At the second interview he described the operation of the regional industry association and outlined ITN’s plans for an e-business direction.

Sandra George, Manager of South East Networks was consulted via telephone and email prior to the replication study in south east Melbourne, and then interviewed following the study in 2000. Ms George described the operation of the regional industry association and spoke about difficulties in establishing an e-business direction.

9.4 RESULTS

9.4.1 Functions of the industry associations

Industry associations have a key role to play in alerting manufacturing SMEs to the possibilities associated with doing business on-line. This role can be divided into two areas, raising awareness and providing relevant training. Enhancing communication channels is the basis of these two areas.

National industry association

The Australian Industry Group (AIG) is the national industry association with its head office in North Sydney. The role of AIG is to assist industry become more competitive within Australia and globally. Its focus is on economic and related investment, taxation and
regulation, trade, industrial relations, workplace safety, research and development and education and training. Large organisations and SMEs in a range of industries comprise the membership of AIG.

Industry can participate in AIG by attending seminars and briefing organised in most capital cities in Australia. These meetings are on broad based issues and are usually conducted in the mornings. AIG also provides a telephone advisory service. Membership fees from over 11,000 organisations contribute to the funding of AIG. E-business activities are addressed on a wide scale, such as the collection of statistics on adoption patterns. However, e-business does not feature prominently on the AIG web site or in their documentation. Also, while manufacturing and SMEs are part of their brief, they do not feature as separate entities.

**Function of regional industry associations**

The role of the Innovative Technology Network (ITN) in south west Sydney is defined by a contract with State Regional Development, which is the NSW body that implements the policy of the Federal Department of Industry, Science and Resources. ITN is a technology awareness group, and its function is to encourage the uptake of technology.
Local industry participates in ITN by attending monthly activities, which could be a seminar or an on-site visit to a local organisation to view and discuss an aspect of the organisation's use of technology. These events are advertised via a mailing list that utilises fax and email. However, there is no general advertising. Almost all participants are manufacturing SMEs, and the seminars and visits are well attended. Originally the funding came from the Department of Industry, Science and Resources, and now from State Regional Development.

The role of the South East Networks (SEN) in south east Melbourne is not directly affiliated in any government direction, however some funding does come from government sources. More recently, South East Development and the City of Greater Dandenong Council has provided funding for SEN activities. Its function is to provide a focal point for local industry on a range of issues, including encouraging collaboration between organisations.

Local industry participates in SEN by attending early morning meetings for the various networks, and its strength is the different levels of expertise of participants. Almost all participants are SMEs, and as numbers are limited, attendance is good. Difficulties have been experienced with presentations at times not aimed at the audience. SEN believes this is due to presenters not being paid, rather than on
lack of background details. The idea is to provide an understanding of the issue without too much depth, and then provide a workshop if there is sufficient interest. Events are advertised via email and fax, although usually telephone calls are necessary to ensure attendance. SEN believes the motivation to attend is due to the isolated nature of work in SMEs. As the meetings are limited to 15-20, interaction around the table allows the sharing of expertise and technology transfer.

SEN believes that local industry, particularly SMEs, does not have the time to participate in the national industry association events as these events are located in Melbourne, and are more focussed on large organisations. Time is also an issue with participation in SEN:

"Sometimes the very ones you need to get to ... just say that they haven't got time."

(Manager, SEN)

ITN and SEN have established programs for SMEs within the region, however, the issue of electronic business is a focus in Australia, and therefore requires a focus by the regional industry associations.

**Electronic business initiatives**

ITN organised an e-commerce B2B seminar in 2000, with speakers from Compaq and BHP, but it was very poorly attended. The seminar
was repeated, with people from SMEs as the presenters, and again there was a very poor response rate.

These seminars did not attract participants as the language of the promotional material used terminology suitable for adopters, rather than targeting people who were not aware of what is possible for their organisation. A meeting with AIG to establish priorities for e-business awareness would be a way forward. ITN identified that SMEs do not have the time and the emotional energy to participate in these seminars. Lack of knowledge of the owner/manager and lack of IT expertise of staff are barriers to their involvement in e-business, and a reason for avoiding seminars on e-business:

"...when you are ignorant there is a fear of being ripped off. If you ask them to make a tool, then they know what they're on about but going online is different. You can pay a lot of money for nothing, essentially nothing."

(Manager, ITN)

SEN has not organised any e-business activities yet. A difficulty with consultants has been identified, where organisations are not aware or have knowledge in e-business, and consultants are aware, have some knowledge but little expertise. For SEN the question is how to start the planning, who to trust to set up a new group. Past experience with quality issues has led to some difficulty using consultants:
"...because the companies don't really know much about it, the consultants were able to bluff them stupid, and went out and made heaps of dough."

(Manager, SEN)

SEN is facing the same problem as the SMEs with regard to consultants. If a consultant is contracted to run an awareness session, then how can SEN be assured that the consultant can translate the knowledge into a workable solution for the SMEs?

**Viewpoints on staff training**

ITN's experience with staff training in manufacturing SMEs highlights self-taught staff, and internal training with external people, as the most common training methods. From ITN's point of view in-house training is preferably, as it is more tailored to the organisation. A focus group is planned on staff training where managers could hear experiences from other SMEs on what was successful and what was not. Government funding would be needed to set up the focus group, and then the follow-up training sessions.

SEN is planning to set up an activity-based group with a focus on skills analysis, by understanding the current skills and the skills needed for the future. Computers skills are essential for the move to e-business, and SEN is hoping that this group will lead onto e-business technologies.
Interestingly, 100% of survey respondents in south west Sydney, and 70% in south east Melbourne believed that not enough was being done to make manufacturing aware of doing business on-line. Looking at this from another angle would indicate that manufacturing is not responding to attempts to address this issue, and this could be interpreted as resistance to change.

The challenge for industry associations is to develop strategies that encourage manufacturing SMEs to participate. ITN believes that taking away the cost, and taking away the anxiety is a starting point. Getting people into a non-threatening learning situation with a network could address the issue of lack of awareness and knowledge; however, this was hampered by lack of response from the SMEs themselves. As a further step from awareness and knowledge, ITN believes a technology network could be established to guide SMEs through the initial set-up stages of e-business. Government funding would again be needed to successfully implement the program.

9.4.2 Perception of performance of industry associations

In addition to the survey response that not enough was being done to make manufacturing aware of doing business on-line, all case study organisations supported this view. Comments centred on the fact that SMEs do not have dedicated IT staff, and there does not appear to be
information on e-business designed for manufacturing or for the SME sector.

Perceptions of the performance of AIG on the issue of e-business was particularly negative, with case study organisations in both regions stating that a lot of paper is received that is not focussed on e-business, and is generally not read. Case study organisations believe that AIG does not have a separate e-business strategy and does not communicate effectively with manufacturing SMEs:

"They do not have a very up-front face in communicating with small manufacturers."
(small machinery & equipment organisation)

"I think there is a role for AIG to let us know what's happening."
(small machinery & equipment organisation)

"AIG's mission is to try to increase the profile of industry, then the Internet provides greater access to export markets."
(small metal product manufacturing organisation)

"It's part of AIG's role to disseminate information and make people aware - I see a key part of their role is to help their members to develop in a competitive world, and e-business is part of it."
(small metal product manufacturing organisation)

"I don't think there is enough being done - there has not been a proper drive - it's left up to individuals to pick up what they can - really they should be putting things together."
(medium wood and paper manufacturing organisation)
"If something just gets run at a general level then you tend not to pick up all the nuances because everyone's slightly different – I think it would be better done on an individual grouping level – and not include everyone."

(medium wood and paper manufacturing organisation)

"...I have not found them highly beneficial to the organisation... when you want them to do something you feel like a number... now that they are a bit more global it is a bit like a bank – pick a number, take your turn and they will get an operator to respond to you."

(medium textiles and clothing manufacturing organisation)

Case study organisations were more positive towards the regional industry associations, with the Innovative Technology Network featuring in comments:

"ITN is getting into e-commerce awareness and they are probably the most concentrated."

(small machinery & equipment organisation)

"Being a member of ITN has given us access to information that we didn't get until we moved into the region."

(small metal product manufacturing organisation)

Industry associations combining with governments to provide an overall total awareness and training program would be a way forward to achieving what manufacturing SMEs see as important. Certainly, this research has shown that manufacturing SMEs believe that not enough is being done to make them aware of what is available for the move to doing business on-line. This assumption leads to the suggestion that a coordination role is needed between the change agents of industry associations and government and the SMEs.
9.4.3 Government E-business Programs

Diffusion of the Internet for business purposes will depend on government support, and cooperation between governments, for infrastructure development, as well as technology usage. Policies related to the innovation, financial support and incentives would facilitate the diffusion (United Nations, 1997).

Funded projects can increase the rate of adoption, and therefore shorten the process of diffusion. Government is a change agent for manufacturing SMEs, and programs, firstly in e-business, and then programs targeted to SMEs will enhance this process for the manufacturing SMEs that are the subject of this research. As manufacturing is a non-IT industry, governments can play a key role in overcoming reluctance, and encouraging adoption of e-business.

Australian federal government

The Australian federal government has an extensive web portal, with links to industry sectors (including manufacturing) and e-commerce pages. The Department of Industry, Tourism and Resources provides information on a range of issues from getting started with e-commerce to government schemes and grants. Also included are links to state government e-commerce pages.
The e-commerce getting started page displays a guide for small business, and link to the Australian Electronic Business Network (AUSe.NET), which is an independent organisations established by governments, in partnership with industry, to encourage SMEs to use e-commerce technologies.

The Minister for Small Business announced a $21.8m assistance program for Australian small business. The Small Business Incubator Program (SBIP) package includes e-commerce initiatives, including funding for 16 small business projects (MacFarlane, 2001).

The National Office for the Information Economy (NOIE) released the report, “E-commerce across Australia”, which outlines that regional Australia will benefit from e-commerce during the next two decades (Alston, 2000). This report follows on from “E-commerce Beyond 2000”, and asserts e-commerce will be the enabler for economic growth, as it is predicted that industry output will rise by up to 3.6 percent by 2010. The government has supported more than 400 telecommunications infrastructure projects to support the growing need for e-commerce.

The Australian government announced a number of grants that demonstrate Australia’s leading position in global e-commerce (Alston, 2000b). Senator Alston asserts that businesses, industry
associations and the tertiary sector are working together to create e-commerce efficiencies. The projects involve a range of industry sectors, including government, health, beef, law, transport, retail, and tourism. One project involves the Australian Industry Group, one project involves SMEs, and no projects directly involve manufacturing.

The National Office for the Information Economy (NOIE) released two reports on e-commerce, “Advancing with E-commerce” and “B2B E-Commerce: Capturing Value Online” (Alston, 2001). The first report includes a number of SME case studies, and the second includes issues for the future of B2B e-commerce in Australia. The Australian government believes that e-commerce will strengthen growth in the economy, and that collaboration will be a key emerging issue.

The diffusion of e-business has been important to the Australian government for a number of years, and the Electronic Commerce Act (1998) applies to any kind of data message used by industry or government in trade or commerce. The purpose of the Act is to ensure that the rights and obligations of people involved in e-commerce are legally enforceable, and to promote early adoption. As would be expected the Australian federal government has opened the communication channels to Australia, and has taken a national view of
e-commerce. Programs are providing initiatives for adoption of appropriate technologies by organisations, as well as concentrating on the national telecommunications infrastructure.

**NSW state government**

The NSW government has a web portal that includes links to the federal government web site, and links to state specific sites. The Department of Information Technology and Management lists a report, “E-commerce Case Studies” on its home page under major activities. The report contains case studies of NSW-based SMEs that have benefited from e-commerce adoption.

The Office of Information Technology (OIT) has a number of reports associated with e-commerce, including the E-commerce case study report. OIT (1999) commissioned the case studies to examine aspects of B2B e-commerce in progressive SMEs that have successfully adopted the technologies. Featured in this report is one manufacturing SME, that operates in a niche market of harness racing vehicles, and has established a diverse export market.

Prior to the e-commerce case studies report, the OIT (1997) endorsed the “connect.nsw – An Internet Strategy for NSW” as a whole of government strategy that focussed on establishing a common infrastructure for delivery government services and sharing
information, and to accelerate the adoption of e-commerce. As part of the e-commerce strategy, the NSW government highlighted promotion of awareness and use of e-commerce. To achieve this, it was proposed that a legal and regulatory framework be established, and that government adopt electronic commerce in its dealing with business.

The NSW government small business web site includes introductory information about adopting e-commerce. This site also has a manufacturing page that provides information relevant to the state.

**Victorian state government**

The Victorian government has a well designed portal that highlights e-commerce and industries, as well as having a regional focus. Victoria has a “Connecting Victoria” policy and a government body, Multimedia Victoria, to implement it. Multimedia Victoria is part of the Department of State and Regional Development, and works closely with the IT industry, the wider business community, community groups and education and training providers.

Connecting Victoria is a strategy for increasing the state’s IT industry, and then sharing the benefits across the Victorian community (Brumby, 1999). The elements of the strategy include building a learning society, growing the industries of the future and boosting e-commerce. As IT literacy is fundamental to this strategy, it is linked to
the government's education policy. Regional Victoria is targeted to take advantage of e-commerce in a global market. Likewise, manufacturing is a feature of the strategy, and as Victoria produces more than one third of Australia's manufactured goods, new technologies will be critical to the future.

Improving telecommunications infrastructure is a high priority of the "Connecting Victoria" strategy. Funds will also be allocated to providing government services on-line, including e-commerce technologies. "Victoria's E-commerce Advantage" was released in 2001, as a government framework for increasing the adoption rate of e-commerce, and builds on the policy of "Connecting Victoria" (Brumby, 2001). The report includes a summary of current and new initiatives.

The Victorian government communication channels are open and its commitment to e-commerce is very evident through information, reports and initiatives.

9.4.4 Perception of performance of government

In addition to the survey response that not enough was being done to make manufacturing aware of doing business on-line, all case study organisations supported this view. Comments centre on the fact that SMEs do not have dedicated IT staff and there does not appear to be
information on e-business designed for manufacturing or for the SME sector.

Lack of government incentives was listed as the third highest barrier (mean 3.28), after concern about security and privacy of transactions and cost of consultants, for both regions combined. Lack of government incentives was rated second (mean 3.40) in SW Sydney, and fourth in SE Melbourne (mean 3.25). Case study organisation put a different slant on this issue. In open discussion SMEs in SE Melbourne were aware of activities of the Victorian government, and SMEs in SW Sydney were unaware of what the NSW government could do for them. Some of the SMEs in SE Melbourne raised the issue themselves, and spoke about activities of the Victorian government, particularly Multimedia Victoria initiatives, although none had followed up on any of the programs. However, their level of awareness was evident. This level of awareness was not apparent in case study interviews in SW Sydney.

Generally case study organisations, while believing that not enough was being done to make them aware, considered that it was not the government’s role to provide them with funds to get involved in e-business.
If you waited for the government to give you a handout or money you'd do nothing, you wouldn't be in business any longer.

*(medium metal product manufacturing organisation)*

Rather, they felt that assistance with awareness and knowledge should be channelled through other avenues such as the industry associations:

*"AIG could provide information on government incentives for e-business and on what other organisations have done."

*(small machinery & equipment organisation)*

While governments are providing information, funding projects and providing incentives for e-commerce, the message is not getting to manufacturing SMEs. How the government communicates via web portals is not entirely satisfactory. The lack of an e-commerce focus for manufacturing, and/or for SMEs on the web portal is contributing to SMEs not finding the information. It's a bit like, "you don't know what you don't know". SMEs do not have dedicated IT staff, and they do not have web expertise to research directly to the government.

The lack of an effective communication channel between governments and SMEs is the problem. A problem that could be filled by industry associations that are closer to the industry sector. However, lack of an effective communication channel between the industry associations and manufacturing SMEs is also contributing to the problem. SMEs complain that too much paper is received, which is mostly not read.
Industry associations have an e-commerce focus that is not treated as a separate entity, and therefore can be lost to the manufacturing SMEs.

Case study organisations felt that part of the national industry association's role is to disseminate information and make people aware. Providing a central information point on e-business with links to the various state and federal government programs may move towards increasing the awareness of manufacturing SMEs, and perhaps SMEs more generally.

The role for industry associations (national and regional) was suggested in the regional studies (see Chapters 6 and 7). This role has two integrated elements: a need for a global focus in manufacturing, and a need for regional networking and education on how to move towards electronic business strategies. Industry associations and governments would argue that this is already the case. However, communication channels are failing the process. To achieve successful levels of adoption of e-business by manufacturing SMEs, communication channels need to be established or strengthened between:

(a) federal and state governments;
(b) departments of state governments;
(c) governments and the national industry association;
(d) national industry association and regional industry associations;
(e) industry associations and manufacturing SMEs.

9.5 OUTCOMES OF STUDY

This study found that governments and industry associations are working towards the diffusion of e-business, and some interesting programs have been developed. However, manufacturing SMEs are not aware of what is available. Not only are SMEs not aware, but also the belief is that not enough is being done to make them aware.

Regional industry associations have problems with their own level of knowledge of e-business, and in tailoring their seminar programs to the relevant adopter categories. In addition, they are faced with lack of time and motivation on the part of the SMEs, and a lack of funding for their programs.

The national industry association faces the problem of trying to do too much. Their focus is national and the association is viewed as not meeting the needs of SMEs in the area of e-business. More consultation and cooperation with regional associations could find the communication with SMEs more productive in the field of tailoring seminars and briefing to the manufacturing sector. The provision of a central information centre for e-business resources specifically for SMEs would strengthen the communication channels with governments, the manufacturing sector and to SMEs.
Governments are progressing towards a connected nation, however, more visible communication channels between federal and state governments would accelerate this goal. Also, some changes in web design would facilitate researching e-business options by manufacturing SMEs.

9.6 CONCLUSION

This research has highlighted a number of problems associated with communication channels that have an influence on the diffusion process of electronic business. SMEs, industry associations and governments have a stake in addressing this issue, and each need to address a number of problem areas. However, the issues associated with the communication channels were not technical, but do require a number of levels of coordination. Effective communication channels will accelerate the diffusion process.

In summary, this chapter has presented the results of a study into the change agents in manufacturing that will impact on the diffusion of electronic business for SMEs. Results from the regional studies that examined this issue were compared, and the conclusion is that problems exist with the communication channels between SMEs and the change agents. The next chapter takes the primary data from the regional studies and this study and applies a theoretical framework to establish the overall relevance of the diffusion of innovations theory.
CHAPTER TEN

STUDY 5:
TOWARDS A DIFFUSION MODEL
FOR MANUFACTURING SMEs

Small and medium organisations in two regional areas of the Australian manufacturing industry were the focus of the empirical studies for this research in diffusion of electronic business. These studies provided the information for the overall aim of the dissertation, which is to provide an answer to the research question, "Is the model of innovation adoption relevant to doing business on-line?" The hypothesis is that the answer to this question is negative, and therefore a further aim is to provide a flexible theoretical framework in which to position and explain studies into adoption of electronic business.

This chapter focuses on applying the data from the empirical studies detailed in the previous chapters to Rogers' (1995) Diffusion of Innovations theoretical framework to determine an answer to the research question for SMEs in the manufacturing industry. The Model for Internet Commerce Adoption (Burgess & Cooper, 1998b) is also examined for its appropriateness in the diffusion process.
10.1 OVERVIEW OF THE STUDY

The study detailed in this chapter seeks to extend and modify the diffusion of innovation theory and recommend an alternative framework when studying a dynamic interactive innovation such as electronic business. The empirical studies have provided data on level of adoption by SMEs in the manufacturing industry, as well as identifying factors that inhibit the adoption of e-business technologies.

The null hypothesis that the model of innovation adoption is relevant to doing business on-line is analysed. The alternative hypothesis that the model of innovation adoption is not relevant to doing business on-line is also analysed. Further to the alternative hypothesis a modified framework is suggested.

10.2 AIMS OF THE STUDY

This study provides an answer to the research question, “Is the model of innovation adoption relevant to doing business on-line?” Data from the previous studies is used to address a number of issues. An objective of this chapter was to provide a flexible theoretical framework in which to position and explain studies into adoption of electronic business. Specific aims of the study were to:
- apply relevant data to the Model of Internet Commerce Adoption (MICA) (Burgess & Cooper, 1998b) and suggest modification for manufacturing SMEs;
- identify factors for manufacturing SMEs when planning to move beyond Stage 1 of MICA (Burgess & Cooper, 1998b);
- apply relevant data to the Diffusion Model (level of adoption and factors affecting adoption) and suggest modification for manufacturing SMEs;
- provide an answer to the research question; and
- suggest a modified theoretical framework for the dynamic interactive innovation of e-business.

10.3 BACKGROUND TO THE STUDY

Research outcomes from the empirical studies provided input to the research detailed in this chapter. Findings from the comparative study (see Chapter 8) indicated no significant differences between regions based on t-test analysis of:

- survey responses based on age, gender or position held;
- business use of IT;
- actual and planned use of the Internet;
- barriers to Internet use; and
- level of satisfaction with the current levels of IT skills of staff.

Therefore, the regions will be treated as one unit of analysis (n=170) for primary data for the study detailed in the chapter.
Some differences were found between small and medium organisations (see Chapter 8) based on t-test analysis, namely:

- medium organisations use some technology more than small organisations, specifically accounting software, databases and computers to assist manufacturing;

- some barriers, that is medium organisations indicate that "lack of cost effective telecommunications infrastructure" was important to plans to becoming involved in e-business, and small organisations indicate that "not knowing how many people are using the Internet" was important to plans to becoming involved in e-business; and

- some differences in current and planned training methods.

Therefore small and medium organisations are treated as separate entities for the study detailed in this chapter.

10.4 RESULTS

10.4.1 Modification to Model of Internet Commerce Adoption

Modification to the Model of Internet Commerce Adoption (MICA) (Burgess & Cooper 1998b) is recommended for manufacturing SMEs in Australia based on survey results and case study interviews. As organisations have progressed in their approach since the introduction of the model and are planning for interactivity on their web site as an initial step, it is suggested that the barrier between Stage 1 and 2
appear as a soft barrier indicated by a broken circle. This research suggest that the barrier between Stage 2 and 3 be strengthened to a hard barrier, as organisations believed that their business practices and other issues needed to be addressed before crossing this barrier. In contrast, having a web presence that encompassed Stage 1 and elements of Stage 2 could be accomplished alongside existing business practices. Figure 10.1 shows the results from this research added to MICA (Burgess & Cooper, 1998b) (see Figure 3.2 in Chapter 3 for original MICA). See Figure 10.5 and Section 10.5.1 for more discussion on this modification.

Figure 10.1 MICA (Burgess & Cooper, 1998b) with research results suggesting modification
The modification suggests two phases for adoption of electronic business using the Internet. The first phase is moving on-line, that is creating the web site at Stage 1 with appropriate elements of Stage 2. The second phase is moving over the hard barrier to Stage 3, such as adding elements to the web site that requires internal organisational change such as integrating back-end systems.

The modification also suggests the strength of the flexibility of MICA as developed by Burgess & Cooper (1998b). This research was able to fit the model into the manufacturing SMEs adoption pattern and apply modification based on results.

With the adoption patterns mapped onto MICA (Burgess & Cooper, 1998b), the next step was to determine the factors affecting adoption beyond Stage 1. Factors affecting manufacturing SMEs moving to doing business on-line are detailed in the empirical studies (see Chapters 6, 7, 8).

10.4.2 Factors affecting adoption beyond Stage 1 MICA

Results of the comparative study show that 41.2% of SMEs had a web page, and 90.8% of respondents planned to be at Stage 2 or Stage 3 within five years. Based on the T-test results from the comparative study in Chapter 8, a number of further statistical tests were undertaken (n=170), namely Chi Square test, Spearman Correlations
and Factor Analysis (see Appendix VI). The purpose of these tests was to further understand the factors affecting adoption beyond Stage 1 MICA, and to provide data to evaluate the research question.

(a) Chi-Square Test for Goodness of Fit determined significant differences in the frequency of e-business at Stage 1 (91.848, p<.01, minimum cell frequency 41.3), Stage 2 (19.000, p<.01, minimum cell frequency 56.0) and Stage 3 (437.750, p<.01, minimum cell frequency 24.0) of MICA. Results show that 50.3% of the SMEs with a web page were planning to move beyond Stage 1 within 5 years, and 12.7% had no plans to move beyond Stage 1.

(b) Chi-Square Test for Independence or Relatedness determined that the Pearson Chi-Square statistics was significant at Stage 3 of MICA (10.700, df 2, p<.01, minimum cell frequency 7.13), and not significant at Stage 1 and Stage 2. Results show that medium organisations are more likely to be at or move to Stage 3 within five years, than small organisations.

(c) Chi-Square Test for Independence or Relatedness was undertaken to determine if use of e-business at Stage 1 was related to the barriers identified in Chapter 8. The top four significant barriers were concern about security and privacy of
transactions, cost of consultants, lack of government incentives and lack of IT expertise of staff.

Two other barriers that were equal fifth (see Chapter 8 for detail) were considered for the first of two tests, and these include lack of cost effective telecommunications infrastructure and not sure how many people are using the Internet. It was found that the first of these two additional barriers was significant for medium organisations, and the second had a mean over 3 for small organisations. Table 10.1 shows barriers that have a significant influence on plans for e-business involvement for SMEs in this research.

<table>
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<th></th>
<th>Value</th>
<th>df</th>
<th>p</th>
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<td>Concern about security and privacy of transactions</td>
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<td>8</td>
<td>.002</td>
<td>**p&lt;.01</td>
</tr>
<tr>
<td>Cost of consultants</td>
<td>34.104</td>
<td>8</td>
<td>.000</td>
<td>**p&lt;.01</td>
</tr>
<tr>
<td>Lack of government incentives</td>
<td>37.546</td>
<td>8</td>
<td>.000</td>
<td>**p&lt;.01</td>
</tr>
<tr>
<td>Lack of IT expertise of staff</td>
<td>17.838</td>
<td>8</td>
<td>.023</td>
<td>*p&lt;.05</td>
</tr>
<tr>
<td>Lack of telecommunications infrastructure</td>
<td>20.245</td>
<td>8</td>
<td>.009</td>
<td>**p&lt;.01</td>
</tr>
<tr>
<td>Unsure how many people using Internet</td>
<td>30.604</td>
<td>8</td>
<td>.000</td>
<td>**p&lt;.01</td>
</tr>
</tbody>
</table>

Table 10.1: Six Barriers influencing moving beyond Stage 1 MICA

Results show that the six barriers are significant factors influencing SMEs in their plans for e-business. However, the influence of the last two barriers on small and medium
organisations is not evident when treating these organisations as one group.

(d) Spearman Correlation was undertaken to determine if the barriers were correlated to each other. Results show that based on normal approximation barriers identified in this research were significantly correlated, $p<.01$.

Spearman Correlation was then undertaken to determine if use of e-business at Stage 1 was correlated to any of the listed barriers. Table 10.2 shows barriers that had a significant influence on plans to move beyond Stage 1 for SMEs with a web site.

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>T</th>
<th>p</th>
<th>sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of government incentives</td>
<td>-.131</td>
<td>-2.801</td>
<td>.005</td>
<td>**p&lt;.01</td>
</tr>
<tr>
<td>Lack of IT expertise of staff</td>
<td>.156</td>
<td>2.661</td>
<td>.008</td>
<td>**p&lt;.01</td>
</tr>
<tr>
<td>Unsure how many people using</td>
<td>.131</td>
<td>2.221</td>
<td>.027</td>
<td>*p&lt;.05</td>
</tr>
<tr>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10.2: Major Barriers influencing moving beyond Stage 1 MICA

Results show that the six barriers were significant factors influencing SMEs in their plans for e-business, and the three barriers shown in Table 10.2 are significant factors in moving beyond Stage 1.
(e) Factor analysis was undertaken on the six listed barriers to determine the structure of the barriers and to ascertain if the barriers belong to the same construct. Correlation matrix indicates that the barriers are correlated and therefore suitable for factoring. Results of Bartlett’s Test of Sphericity is significant, $(474.252, \text{df} 15, p<.01)$, and the Kaiser-Meyer-Olkin measure of sampling adequacy at $0.766$ is greater than $0.6$. The total variance explained is shown in Table 10.3 and the scree plot is shown in Figure 10.2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total</th>
<th>% Var</th>
<th>% Cum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of government incentives</td>
<td>2.923</td>
<td>48.715</td>
<td>48.715</td>
</tr>
<tr>
<td>Cost of consultants</td>
<td>0.972</td>
<td>16.202</td>
<td>64.917</td>
</tr>
<tr>
<td>Lack of telecommunications infrastructure</td>
<td>0.735</td>
<td>12.251</td>
<td>77.168</td>
</tr>
<tr>
<td>Concern about security and privacy of transactions</td>
<td>0.512</td>
<td>8.530</td>
<td>85.698</td>
</tr>
<tr>
<td>Lack of IT expertise of staff</td>
<td>0.456</td>
<td>7.599</td>
<td>93.298</td>
</tr>
<tr>
<td>Unsure how many people using Internet</td>
<td>0.402</td>
<td>6.702</td>
<td>100.00</td>
</tr>
</tbody>
</table>

$n=70$ (SMEs with a web page)

Table 10.3 Variance for Six Listed barriers
Results using the six listed barriers show that lack of government incentives is the largest contributing factor, which is consistent with findings in Chapter 8. However, the two additional factors, which relate separately to small and medium organisations, have obscured the findings for SMEs as a group.

Lack of government incentives contributes 48.715% of the variance and is a factor for SMEs moving beyond Stage 1 MICA. Cost of consultants (16.15%) and lack of telecommunications infrastructure (12.60%) are also contributing factors. Lack of telecommunications infrastructure is not one of the four top barriers identified in Chapter 8. However, this barrier was found to be significant for medium
organisations but not for small organisations (see Chapter 8). It is therefore necessary to remove the two additional barriers to correctly identify factors for SMEs as a group.

(f) Factor Analysis was undertaken on the top four barriers from Chapter 8 to determine their influence on manufacturing SMEs moving beyond Stage 1. Correlation matrix indicates that the barriers are correlated and therefore suitable for factoring. Results of Bartlett's Test of Sphericity is significant, (118.285, df 6, p<.01), and the Kaiser-Meyer-Olkin measure of sampling adequacy at .704 is greater than .6. The total variance explained is shown in Table 10.4 and the scree plot is shown at Figure 10.3.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Total</th>
<th>% Var</th>
<th>% Cum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of government incentives</td>
<td>2.132</td>
<td>53.288</td>
<td>53.288</td>
</tr>
<tr>
<td>Cost of consultants</td>
<td>.834</td>
<td>20.847</td>
<td>74.136</td>
</tr>
<tr>
<td>Lack of IT expertise of staff</td>
<td>.538</td>
<td>13.448</td>
<td>87.583</td>
</tr>
<tr>
<td>Concern about security and privacy of transactions</td>
<td>.497</td>
<td>12.417</td>
<td>100.00</td>
</tr>
</tbody>
</table>

n=70 (SMEs with a web page)

| Table 10.4 Variance for Top Four Barriers |
Lack of government incentives contributes 53.29% of the variance and is a factor for SMEs moving beyond Stage 1 MICA. Cost of consultants (20.85%), lack of IT expertise of staff (13.448%) and concern about security and privacy of transactions (12.42%) also contributing factors. This analysis further supports findings in Chapter 8 regarding barriers that are contributing factors to the adoption patterns mapped with MICA.

Rate of adoption (Figure 10.1) and factors affecting the rate of adoption (Figure 10.3) for manufacturing SMEs in this research now becomes data for evaluating the diffusion process as set down by Rogers (1995).
10.4.3 Modification to the Diffusion Model

Rogers (1995) identifies level of adoption and factors affecting adoption as elements of the Diffusion Model.

(a) Level of adoption

Diffusion is the process by which an innovation is communicated through channels over time among members of a social system (Rogers, 1995). The four characteristics to the diffusion process as applied to this research are:

Innovation

Innovation is electronic business defined as the use of the Internet for a range of business activities from email for communication to on-line ordering and transaction processing.

Communication

Communication is via channels between SMEs and the change agents of industry associations and government.

Time

Time frame for this research is one year (1999 and 2000) when the regional empirical studies were undertaken.

Members of the social system

Members of the social system are the manufacturing SMEs and the industry associations.
The diffusion of innovations theory model does not map these characteristics in the model of adoption. Figure 2.2 (see Chapter 2) shows the diffusion process and only charts time and level of adoption. Figure 10.4 shows data from this research mapped onto Rogers' (1995) level of adoption model.

Figure 10.4 lacks meaning on level of adoption of a dynamic interactive innovation. As the environment is emerging and not stable, the adoption pattern of this type of innovation is not linear. Therefore when attempting to chart rate of adoption, this model is not relevant. Due to the flexible nature and ability to modify, a more appropriate model is MICA (Burgess &
Cooper, 1998b). See Figure 10.1 for a modified version of MICA based on results of this research.

When the rate of adoption is determined, factors affecting that rate of adoption can be examined.

(b) **Factors Affecting Adoption**

According to Rogers (1995) characteristics of an innovation assist in explaining different rates of adoption of an innovation and include the following variables, which are applied to this research:

1. **Perceived attributes of the innovation:**

   **Relative advantage** (over what is being replaced):

   E-business does not necessarily replace another technology, rather it is another stage in the use of IT by organisations – 92.2% of SMEs agreed that computers were essential for processing information for business. This research has shown that relative advantage of a dynamic interactive innovation such as e-business relates more closely to factors of better communication and closer interaction with customers, marketing, improved business practices and increased business (see Chapters 6, 7, 8).
Rogers (1995) states that relative advantage is one of the best predictors of adoption, and the rate of adoption increases with incentives. As relative advantage (as defined by Rogers) is not as yet apparent with e-business, results of this research indicate that overcoming barriers is a better predictor.

**Compatibility (with existing practices):**

Compatibility with existing practices provides less uncertainty about the innovation. According to Rogers (1995) compatibility with values and beliefs can increase the rate of adoption. This research has shown that e-business practices, such as e-mail for communication, are socially incompatible with existing practices of face-to-face business dealings, and as such moving to Stage 1 is incompatible with existing practices.

However, moving beyond Stage 1 is compatible with existing practices of using electronic methods for conducting some forms of business activities. The re-ordering of the barriers confirms a different view between moving to doing business on-line, and moving beyond Stage 1. As almost all SMEs (96.8%) in this research use computers for business, and 88.8% have an Internet connection, then e-business can be viewed as
technologically compatible. However, true compatibility was not evident as it is socially incompatible.

**Complexity** (more difficult innovations are adopted more slowly):

Complexity of the innovation relates to how difficult it is perceived to understand and use. Rogers (1995) asserts that an innovation can be placed on a continuum from complex to easy, and complexity is negatively related to adoption. E-business is a collection of technologies varying in complexity. This research has shown that adoption of e-business technologies varies according to a number of other factors within the organisation, rather than the complexity of the technology alone, for example cost of consultants and lack of IT expertise of staff.

**Trialability** (innovation sampled before adoption):

Trialability relates to experimenting with the innovation on a limited basis. According to Rogers (1995) being able to trial the innovation is positively related to adoption. As SMEs in this research use computers, and a majority have an Internet connection, trialability is not as much an issue as a progressive trend in the use of technology. Trialability would be an issue for organisations that do not use computers.
Observability (visible and used by others of the social system):

Observability is associated with how visible the innovation is within the social system. Rogers (1995) asserts that observability is positively related to adoption. Observability within the social system may not be evident in the early stages of the diffusion of a dynamic interactive innovation such as e-business, and external visibility is more important, such as through the mass media. As computer technologies encompass e-business applications observability is compromised.

Table 10.5 shows relationship of the innovation factors that affect adoption of e-business by SMEs in this research.

<table>
<thead>
<tr>
<th>Perceived attributes of innovation</th>
<th>Rogers (1995)</th>
<th>This Research</th>
<th>Best Predictor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative advantage</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compatibility</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complexity</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trialability</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observability</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived barriers to adoption</th>
<th>Rogers</th>
<th>this Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of government incentives</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Cost of consultants</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Lack of IT expertise of staff</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Concern about security &amp; privacy</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Table 10.5 Innovation Factors affecting adoption
Table 10.5 shows that the factors affecting the adoption of a dynamic interactive innovation such as e-business go beyond factors set down by Rogers (1995). This research has shown that perceived barriers are the main predictors affecting adopting rather than attributes of the innovation.

When the rate of adoption and factors affecting that adoption are determined, then type of decision-making can be examined.

2. Type of innovation-decision:

Type of innovation-decision relates to the number of individuals involved in making the decision. This research focussed on SMEs and therefore a small number of individuals (in some case only one) were involved in the decision process. The decision can be optional (decision made by an individual), collective (decision is a consensus among members of the social system) and authority (decision is made by a relatively few individuals). This variable is more relevant to large organisations than to SMEs.
3. Communication Channels

Communication channels raise awareness and knowledge and can be interpersonal or mass media. Rogers (1995) asserts that mass media is more effective for less complex innovations. However, as a dynamic interactive innovation such as electronic business is a collection of technologies varying in complexity, raising awareness through mass media can raise suspicion rather than encourage adoption. The use of television for electronic business as is currently evident is appropriate for individuals already aware of the technologies, and not for early adopters. If an inappropriate channel is used then this can result in a slower rate of adoption (Rogers, 1995).

Interpersonal communication channels are evident in this research via industry associations. However, there are problems in these areas as detailed in Chapter 9. Industry associations while trying to address the issue of raising awareness, have been unsuccessful in coordinating actions between national and regional industry associations, between government initiatives and the national industry association, and providing a clear focus in appropriate language. This research has highlighted the need for the national industry association to take a leading role in
managing and coordinating the communication channels between government and SMEs in the diffusion of e-business in manufacturing.

4. Nature of the Social System

Nature of the social system relates to the norms of the system and the extent of interconnection of the communications channels. This research has highlighted that the norm for manufacturing SMEs is face-to-face business dealing, and the level of interconnection is low as evidenced by low levels of involvement with industry associations, and general suspicion of competitors as evidenced in the case studies.

5. Extent of Change Agents' Promotion Efforts

Extent of Change Agents’ promotion efforts can positively affect adoption if it is direct and linear with activity occurring at specific stages of the diffusion process. This research examined the change agents relevant to manufacturing, that is industry associations and governments. Efforts by governments and industry associations have not been direct and linear to manufacturing SMEs (see Chapter 9). While governments have initiatives, their focus as been wide and not specific.
The national industry association has not bridged the gap between governments and manufacturing SMEs.

Table 10.6 shows relationship of social factors that affect adoption of e-business by SMEs highlighted in this research.

<table>
<thead>
<tr>
<th>Rogers (1995)</th>
<th>This Research</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of innovation-decision</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Communication channels</td>
<td>*</td>
<td>in place but needs coordination to activate</td>
</tr>
<tr>
<td>Nature of social system</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Change agents promotion</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Need to manage and coordinate communication channels</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Need for coordination of promotional efforts</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Table 10.6 Social Factors affecting adoption

Table 10.6 shows that the social factors affecting the adoption of a dynamic interactive innovation such as e-business go beyond factors set down by Rogers (1995). This research has shown that the management and coordination of the
communication channels and change agents' promotion efforts is as important as the channels and efforts themselves.

Table 10.5 and Table 10.6 show that factors affecting adoption are innovation-related and social-related and are not linear but interactive when dealing with a series of innovations that constitute e-business.

(c) **Innovation and Rate of Adoption**

The rate of adoption of an innovation can be affected by pressure from other organisations within the supply chain, media advertising, and adoption by others within the industry segment and incentives to adopt (Rogers, 1995). This research has highlighted the factors of perceived barriers to adoption and coordination of communication channels and change agents' promotion efforts need to be added the factors for a dynamic interactive innovation such as electronic business. In addition the adaptation of media advertising needs to be addressed. If these aspects of the diffusion process are not addressed then they can influence the rejection of the innovation in some industry sectors, for example manufacturing SMEs.
(d) **Adopter Categories**

Adopter categories set down by Rogers (1995) are innovators, early adopters, early majority, late majority and laggards. Table 10.7 shows adopter categories aligned with MICA stages.

<table>
<thead>
<tr>
<th>Rogers (1995)</th>
<th>MICA (Burgess &amp; Cooper, 1998b)</th>
<th>Manufact SMEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovators</td>
<td>Stage 3</td>
<td>25 (14.7%)</td>
</tr>
<tr>
<td>Early Adopters</td>
<td>Stage 2</td>
<td>65 (38.2%)</td>
</tr>
<tr>
<td>Early Majority</td>
<td>Stage 1</td>
<td>70 (41.2%)</td>
</tr>
<tr>
<td>Late Majority</td>
<td>Planned</td>
<td>74 (43.5%)</td>
</tr>
<tr>
<td>Laggards</td>
<td>No plans</td>
<td>26 (15.3%)</td>
</tr>
<tr>
<td>n= 170</td>
<td></td>
<td>170 (100.0%)</td>
</tr>
</tbody>
</table>

Table 10.7 Adopter categories aligned with MICA

Rogers' (1995) adopter categories suggest a linear progression of adoption. With a dynamic interactive innovation in an evolving environment this may not necessarily be the case. E-business is not one single thing, but an integrated series of elements that make up the innovation. Therefore a staged model of adoption as defined by MICA (Burgess & Cooper, 1998b) is more appropriate for e-business when explaining rates of adoption.
Critical Mass

Critical mass is reached when the innovation has been adopted to a point where further adoption becomes self-sustaining. The significant point in Rogers’ (1995) diffusion process is between 20 and 30% adoption. With 41.2% of manufacturing SMEs using a web page, the outcomes of this research argue that the 20-30% is too low for a dynamic interactive innovation such as electronic business. Due to fact that e-business is a collection of technologies, critical mass may be measured when 20-30% of organisations reach Stage 3. However, some organisations will stop short of Stage 3 due to the nature of their business, or barriers to doing business online, or barriers to moving beyond Stage 1 MICA. Future research is needed in this area to determine the level of the critical mass of electronic business in manufacturing SMEs.

Predicting Adoption Patterns of E-business in Manufacturing SMEs

Predicting adoptions patterns with manufacturing SMEs may be a little early, and would be more reliable further into the diffusion process. However, this research has shown that modification and extension to Rogers’ (1995) Diffusion theory is warranted for a dynamic interactive innovation such as electronic business.
The comparative study (Chapter 8) found that there were no significant differences between the regions, so the time characteristic can be trialed as data for predicting. Based on the data SMEs with web pages grew from 30.2% in 1999 (SW Sydney study) to 45.2% in 2000 (SE Melbourne study). Figure 10.4 shows this data mapped onto Rogers' (1995) level of adoption model. However, mapping only time and level of adoption does not provide a true picture of adoption patterns.

Results show that any trend at this point in time is inconclusive. However, using the S-curve model for predicting would appear to be a too simple, as Figure 10.4 indicates that full diffusion will be reached before the end of 2004. This outcome is far too simplistic for electronic business, firstly, as it is a group of integrated technologies, and secondly, as its diffusion is not necessarily linear. Future research when manufacturing SMEs are further into the diffusion process would be more reliable using this research as a baseline. Now, this research has shown that explaining levels of adoption and factors that affect the adoption need to look beyond the diffusion model as defined by Rogers (1995).
10.4.4 The Research Question answered for manufacturing SMEs

Taking into account the factors of perceived barriers to adoption, and management and coordination of communication channels and promotion efforts of change agents, this research concludes that the model is not relevant to the diffusion process of a dynamic interactive innovation such as electronic business. A more flexible framework is needed with takes account of specific factors relevant to the industry sector. Therefore, an adaptable framework is recommended when researching this dynamic area.

The answer to the research question is negative, the model of diffusion of innovation is not relevant to doing business on-line. The null hypothesis is rejected, and the alternative hypothesis that the model is not relevant is supported.

10.5 OUTCOMES OF THE STUDY

On an empirical level, results from this study include:

- medium organisations are more likely to be at or move to Stage 3 MICA than small organisations;

- lack of government incentives is a contributing factor moving beyond Stage 1 MICA;

- different view between moving to doing business on-line, and moving beyond Stage 1;

- perceived barriers are the main predictors affecting adoption patterns;
- coordination and management of the communication channels is as important as the communication channels;

- coordination of the change agents' promotional efforts is as important and the efforts themselves; and

- future research is needed to determine the level of the critical mass for electronic business adoption in manufacturing SMEs.

On a theoretical level, this study found that extension and modification of the Diffusion Model (Rogers, 1995) and modification Model of Internet Commerce Adoption (Burgess & Cooper, 1998b) is warranted for manufacturing SMEs when studying patterns of adoption of electronic business (see Figure 10.6).

Level of adoption is more appropriately assessed with MICA (Burgess & Cooper, 1998b), and modification is justified based on results of the research outlined in this dissertation. Factors affecting adoption are more suitably defined by including additional elements when studying a dynamic interactive innovation such as electronic business.

### 10.5.1 Level of adoption

Modification to MICA is shown in Figure 10.5, which indicates that manufacturing SMEs must consider issues related to moving on-line, and then issues related to moving to Stage 3.
When level of adoption is determined, then factors that affect the level of adoption can be examined and described.

### 10.5.2 Factors affecting adoption

Modification to the factors of the Diffusion Model (Rogers, 1995) is shown in Figure 10.6 which indicates that manufacturing SMEs have identified factors that are inhibiting their involvement.
Factors of perceived barriers to becoming involved in e-business, or in moving to Stage 3 are important considerations in researching diffusion of e-business. Also, factors of management and coordination of the communication channels, and coordination of the change agents' promotional efforts are equally important to the diffusion process.

10.6 CONCLUSION

An answer to the research question has been established, by taking data from the empirical studies as input to the study outlined in this chapter. The null hypothesis, that the model of innovation adoption is relevant to doing business on-line is rejected. The alternative hypothesis, that the model of
innovation adoption is not relevant to doing business on-line is supported. Further, a flexible theoretical framework in which to position and explain studies into adoption of the dynamic interactive innovation of electronic business was the focus of this chapter.

This research has highlighted modifications to the Diffusion Model by Rogers (1995) when studying a dynamic interactive innovation such as electronic business. These modifications include using the Model for Internet Commerce Adoption (Burgess & Cooper, 1998b) when explaining the rate of adoption and looking at adopter categories. Also, additional factors need to be considered when explaining the factors that affect adoption, including moving towards doing business on-line, and moving beyond MICA Stage 1. Management and coordination of communication channels and change agents promotional efforts are equally important to the diffusion process.

In summary, this chapter has presented the results of a study designed to answer the research question, “Is the model of innovation adoption relevant to doing business on-line?” Further, a flexible theoretical framework in which to position and explain studies into adoption of electronic business has been outlined. The next chapter summarises the findings of the research, and provides recommendations for industry associations and the education sector in the process of diffusion of e-business. In addition, limitations of the research are discussed, and directions for future research suggested.
CHAPTER ELEVEN

SUMMARY AND CONCLUSIONS

Over the past decade there have been an increasing number of studies that have examined electronic business within SMEs, only to produce a view of adoption patterns limited to various industry sectors. The researcher aimed to further the understanding of the diffusion process of e-business by examining in-depth manufacturing SMEs in two regions of Australia. The subsequent research has shown that adoption patterns are not linear in nature, and therefore require a modified and extended approach to studying the diffusion process of the dynamic interactive innovation of electronic business.

In this concluding chapter a summary of the key findings outlined in this dissertation are presented, including the role of qualitative data in determining the diffusion process. Recommendations for change agents to the diffusion process in manufacturing are outlined for government, industry associations and the education sector. An answer for the research question has been established, and based on the outcomes of the research a modified and extended theoretical framework is
proposed, consisting of two models, namely modified MICA (Burgess & Cooper, 1998b) and extension and modification of Diffusion of Innovations (Rogers, 1995). The overall importance of the research is to contribute to a framework in which to position studies examining diffusion of dynamic interactive innovations, and to contribute to the knowledge base from which a robust theory might emerge.

As the research was conducted within the manufacturing industry and focussed on SMEs, limitations of the research are discussed. Notwithstanding the limitations, directions for future research into diffusion of dynamic interactive innovations are presented.

11.1 SUMMARY OF RESEARCH FINDINGS

The overall aim of the dissertation was to provide an answer to the research question, "Is the model of diffusion of innovation relevant to doing business on-line?" The study outlined in Chapter 10 revealed a negative answer. A further aim of the research was to modify and extend the diffusion of innovations theoretical framework as defined by Rogers (1995). An outcome of the empirical studies revealed a modification to MICA (Burgess & Cooper, 1998b) for manufacturing SMEs.

To achieve the aims of the research, a series of integrated empirical studies was designed to contribute input data to the theoretical study, which provided an answer to the research question. SMEs in the manufacturing industry were
selected as the target sample for the research to provide in-depth information about diffusion of e-business in a non-IT related industry, and within organisations that were less likely to have dedicated IT staff. Research findings from the specific studies are outlined in the following sections.

11.1.1 Diffusion in south west Sydney

Chapter 7 detailed an initial study into adoption of e-business technologies in south west Sydney and found that almost all organisations use computers. A majority have an Internet connection that they mainly use for email, which can involve some forms of e-business activities (communication and file delivery), but only a small percentage use any type of transaction processing. Barriers to involvement in e-business are mostly non-technical (concern about security and privacy of transactions, lack of government incentives, cost of consultants and lack of IT expertise of staff). All organisations planned to have some form of web presence within five years. Planned IT training methods for staff that will be necessary to plan and maintain the web site, included employing people with appropriate knowledge to supplement current training methods.

An outcome of this study included the identification that all organisations believed that not enough was being done to make manufacturing aware of what was available for the move to doing business online. Case study interviews ascertained what was needed
from their point of view, namely a central information point of
electronic business resources specifically for SMEs, liaison with
regional associations to provide seminars and briefings relevant to
manufacturing, and a global raising of the profile of manufacturing.
Some subsidy from the industry associations was suggested in
targeting the three groups in the diffusion process, specifically, those
who are not aware, those who are aware and early adopters. Language
would need to be carefully addressed, particularly when targeting
those who are not aware. The three groups have different needs, with
two main adoption points, namely moving on-line, and then moving to
transaction processing or electronic commerce activities.

This study established four integrated areas to the diffusion process
and action necessary from these areas:

- **Change agents** of government and industry associations have a role
  in raising awareness of what is available.

- **The education sector** has a role for providing knowledge and skills
  in electronic business.

- **SMEs** need to be active participants to the process by liaising with
  industry associations to express their needs, by developing strategies
  for dealing with consultants, and to identify and develop strategies
  about workload issues.

- **Consultants** have a role in ensuring a quality service when
  interacting with SMEs.
11.1.2 Diffusion in south east Melbourne

Chapter 8 detailed a replication study into adoption of e-business technologies in south east Melbourne. The same barriers were identified with only a slight difference in the order of the top four barriers.

Outcomes of this study include support for the findings of the initial study, suggesting that the regions are equivalent in manufacturing terms, and are part of the same population. Case study organisations identified some differences in the issues facing organisations with regard to their involvement in e-business. The cost of consultants was evident as a barrier in both regions, however the regions had a different perspective. South east Melbourne case study organisations were concerned about developing and enhancing their web sites, and raised issues such as navigation and integration of existing systems. In contrast, case study organisations in south west Sydney raised issues related to not understanding the process and not knowing who to trust. The four integrated areas to the diffusion process identified in the south west Sydney study were supported by the south east Melbourne study, namely change agents (industry associations and government), the education sector, SMEs and consultants.
11.1.3 Comparative study of two Australian regions

Chapter 8 looked at similarities and differences in research findings between regions and between small and medium organisations. No significant differences were identified between regions, and this supports the industry associations’ assumption that the regions were equivalent in manufacturing terms.

Outcomes of this study include finding some differences between small and medium organisations on business use of software and current IT training methods, with medium organisations more likely to employ permanent IT staff than small organisations. Comparison analysis found two additional barriers that are factors in doing business on-line. For medium organisations the barrier “lack of cost effective telecommunications infrastructure” is significant, and is a focus of the Australian government. For small organisations the barrier “not sure how many people are using the Internet” is significant, and has implications for industry associations. These findings suggest that small and medium organisations need a separate focus when being targeted by change agents in the diffusion process.

11.1.4 Change agents within Manufacturing

Chapter 9 examined information from the regional case studies, interviews with industry association representatives, and analysis of government e-business programs, to determine how well the
communication channels operate within the social system of the manufacturing industry. The study found that government and industry associations are working towards the diffusion of e-business. However, management and coordination of the communication channels is lacking as SMEs are not aware of the initiatives, and also believe that not enough is being done to make them aware.

Regional industry associations have problems with their own level of knowledge of e-business, and in tailoring their seminar programs with appropriate language to the relevant adopter categories. The national industry association faces the problem that its focus is national, and there is a lack of coordination with regional associations.

Communication channels between governments and manufacturing SMEs appear to be non-existent. The national industry association has a role in management and coordination of the communication channels, that is, between itself and regional associations, and between itself and government programs. Certainly, communication channels without management and coordination are ineffective, and more effective communication channels will enhance the diffusion process.

11.1.5 Towards a diffusion model for manufacturing SMEs

Chapter 10 applied the data from the empirical studies to the Diffusion of Innovations (Rogers, 1995) theoretical framework. This
study provided a negative answer to the research question, and proposed modification and extension to the diffusion framework for electronic business.

The proposed framework suggests that the Model of Internet Commerce Adoption (Burgess & Cooper, 1998b) is a more appropriate model to explain rate of adoption and for looking at adopter categories. Rogers' (1995) model implies a linear progression, which this research has determined is not relevant to electronic business. Electronic business is a dynamic interactive set of technologies that requires an adaptable flexible framework. The strength of MICA is that it does not imply adoption is linear, and is a simple model that can be customised to the industry sector under examination. As electronic business will have different adoption patterns within different industries, flexibility and adaptability are important for a model to allow comparison across and within industry sectors.

This study also suggests that additional factors need to be considered when explaining factors that affect adoption patterns. These include perceived barriers to firstly, doing business on-line, and secondly, when moving beyond MICA Stage 1. Additional factors of management and coordination of the communication channels, and coordination of the change agents’ promotional efforts are important
to the diffusion process. This research has shown that it is not enough to have the communication channels and the promotion efforts if the target audience is not aware of initiatives designed to assist organisations.

In summary, the key original contributions made by this dissertation are shown in Table 11.1:

<table>
<thead>
<tr>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 In-depth profile of electronic business adoption patterns of manufacturing SMEs in two Australian regions</td>
</tr>
<tr>
<td>2 Identification of factors that affect adoption of electronic business at two stages of the diffusion process</td>
</tr>
<tr>
<td>3 Recommendations for Change Agents (government, industry associations and the education sector) in the diffusion process</td>
</tr>
<tr>
<td>4 Modification of MICA (Burgess &amp; Cooper, 1998b) for the manufacturing industry</td>
</tr>
<tr>
<td>5 Modification and extension of Diffusion of Innovations (Rogers, 1995) framework for dynamic interactive innovations such as electronic business</td>
</tr>
</tbody>
</table>

Table 11.1 Original contributions made by this dissertation

11.2 THE ROLE OF QUALITATIVE DATA IN THE DIFFUSION PROCESS

For the research conducted for this dissertation to have contextual validity, it was important to understand the adoption patterns of electronic business in manufacturing SMEs. This was conducted through interviews with participating SMEs and industry associations. The data collected from these
interviews provided a rich and in-depth source of information about factors affecting the diffusion process, as well as providing suggestions for the role that industry associations could implement to assist manufacturing SMEs. Such data assisted the researcher in identifying approaches that could be taken when researching more broadly within the diffusion process of the dynamic interactive innovation of electronic business. Without these insights the outcomes of the research would not have been as compelling and substantial.

11.3 RECOMMENDATIONS FOR CHANGE AGENTS

This research proposes recommendations for change agents in the diffusion of electronic business for manufacturing SMEs, and has implications for the future role of industry associations.

11.3.1 Industry associations and Government

Almost all respondents to the survey in both regions believe that not enough is being done to make manufacturing aware of e-business technologies, and case study organisations supported this view. Case study organisations in the initial study in south west Sydney (Chapter 6) identified a role for industry associations, which was supported by the replication study in south east Melbourne (Chapter 7).

Governments at federal and state level have a number of e-business initiatives, which do not appear to be known by the SMEs. In general
SMEs initially look to their industry association for guidance. The role suggested in the empirical studies has two integrated elements, namely, a need for a global focus in manufacturing, and a need for regional networking and education on how to move towards e-business strategies. Chapter 9 detailed the role for industry associations, and highlighted a lack of management and coordination of the communication channels.

Recommendations for the national industry association, the Australian Industry Group includes establishment or strengthening of communication channels between government and itself, and between itself and regional associations and manufacturing SMEs. While acknowledging that AIG does valuable work, it does not appear to have a separate e-business strategy for SMEs.

Recommendations for the regional industry associations includes providing the face-to-face interaction with SMEs with seminar programs tailored to the relevant adopter categories. The regional industry associations highlighted their own lack of knowledge of e-business and also lack of funding for their programs.

While government and industry associations continue to work on isolated themes, the diffusion process will not be enhanced. Management and coordination of the communication channels is
imperative to progressing the diffusion process, and is a factor that affects the rate of adoption. Acknowledgement of this issue by industry associations is important to highlighting the true areas of need. In addition, industry associations have a role in increasing knowledge and skills for staff already in the workforce as outlined in the next section.

11.3.2 Education sector

The education sector has a role to play in raising the awareness, knowledge and skill level of graduates to enable them to contribute to the use of e-business technologies in their chosen career. This research has focussed on SMEs, which generally do not have dedicated IT staff, so implications for the education sector go beyond specific IT degrees and courses. In addition, the research highlighted a barrier to moving on-line was the lack of IT expertise of staff, and their acknowledgement that employment of staff with expertise was part of the plans for the future.

In general, the education sector requires integration of firstly generic IT skills, and secondly more advanced knowledge and skills of e-business technologies and applications. Certainly these types of skills will assist organisations to be creative with their business processes and therefore maximise their involvement in a global environment.
As manufacturing SMEs employ a range of staff categories (management, office and factory) their educational background is quite diverse (university, TAFE, school), and therefore the recommendation is across the education sector. While this will address new graduates of educational programs, industry associations need to be able to provide training programs for staff already in the workforce.

11.4 LIMITATIONS OF RESEARCH

This research was undertaken following the research plan detailed in Chapter 5. However, some limitations are acknowledged as detailed in this section.

The survey response rate is generally believed to be a limitation to research outcomes. The survey in this research was addressed by name to the principal officer of the organisation, and yielded an overall response rate of 34.97%, which is above the 20% documented as a good response rate (Cornford & Smithson, 1996; Page & Meyer, 2000). However, as almost all organisations use computers within the two regions, the limitation of bias is present. To gain information about the response rate, case study organisations were asked informally why they responded to the survey. Generally, their reply centred on their interest in electronic business and what it could do for their organisation. Case study interviews were planned to achieve the triangulation research strategy, and to try to address any limitations with the survey.
The population for this research consists of members of the Australian Industry Group as detailed in Chapter 5. While AIG believe that most manufacturing organisations are members, the population presents a limitation. As AIG membership was the only available sampling frame, and access to all manufacturing organisations was not possible, generalising only to AIG membership constitutes a limitation of this research. In contrast, the sample was random and selected systematically as detailed in Chapter 5. Therefore the sample is representative of the population (AIG membership).

As the industry is male-dominated, it was not possible to explore gender differences within the context of the empirical studies.

Another limitation is that only one industry sector was studied. Justification for this decision centres on the research plan of providing an in-depth view of the diffusion process, which would not have been possible across industry sectors within the time frame of the research. To address this limitation, the researcher plans studies in other industry sectors as part of a future research agenda.

Generalising beyond the membership of Australian Industry Group is a limitation that is justified by the research plan of theory testing and building. As electronic business is in the evolution progression of adoption, this research is viewed as the starting point for future research into studying the diffusion process using the approach in this dissertation. In addition, the time frame of the empirical studies for this research was 1999 and 2000, and this is
a limitation in reporting the progressive nature of the diffusion. This is addressed in the suggestions for future research.

In attempting to control for limitations in this research, it is important to acknowledge that the innovation of e-business is not a single innovation, but rather a collection of integrated innovations, which are hard to separate. This fact is behind the research, which suggests that e-business needs an extended and modified approach from traditional innovations.

11.5 DIRECTIONS FOR FUTURE RESEARCH

Undoubtedly, the complex ways in which different dimensions of electronic business interact is an area for future researchers to explore. The research in this dissertation provides a benchmark for these studies.

Following on from this research, comparative studies within other industry sectors would test the use of the modified and extended framework, consisting of MICA (Burgess & Cooper, 1998b) and Diffusion of Innovations model (Rogers, 1995). Indeed, comparative studies within manufacturing, in different regions, and with large organisations would enhance the knowledge base and understanding of the diffusion of electronic business. The concern about the cost of consultants highlighted in this research could be the focus of future research, which examines the diffusion process from the viewpoint of the consultants, and the organisations that they deal with.
Replication studies to provide longitudinal data could also be a focus of future research, which would provide additional data to study the diffusion process over a longer period of time. This would broaden and assess the framework suggested in this dissertation, and uncover new issues associated with e-business that may emerge in the future.

In addition, separating the individual innovations that make up e-business, such as e-commerce transaction processing and other forms of e-business, and studying interactions between the separate innovations is research more relevant to the future when e-business is further into the diffusion process to substantiate findings.

Research in the education sector could focus on the integration into the curriculum of the knowledge of e-business technologies and applications within all programs of study. Appropriate seminars and training programs for staff already in the workforce could also form part of an education research agenda.

Finally, e-business research can utilise other theoretical frameworks to explain adoption patterns and factors that affect the adoption. Some of these frameworks were considered for this research, and are outlined in Chapter 2. Outcomes of research using other theoretical frameworks could then be compared with outcomes of this research.
Certainly, the research area of electronic business is vast and research projects are limited only by the ideas generated by researchers. The research contained in this dissertation is the tip of the iceberg.

11.6 CONCLUSION

An outcome of the empirical studies highlighted four integrated areas to the diffusion process within manufacturing SMEs (change agents, education sector, SMEs and consultants). If manufacturing SMEs are to embrace e-business technologies to a level acceptable to the industry sector, then increased awareness, knowledge and skills are needed. Industry associations have an important role to play in managing and coordinating the communication channels between government and themselves, and between themselves and the SMEs. The area of consultants is an area for future research. As some differences were found between small and medium organisations, industry associations need to embrace these differences when performing the role recommended. In addition, factors affecting the adoption are identified for SMEs moving on-line, and then moving further along the diffusion process.

Following on from the empirical studies, this research proposed a modified framework for studying the dynamic interactive innovation of e-business. This framework includes the modification of MICA (Burgess & Cooper, 1998b) to explain adoption levels, and modification and extension of Diffusion of Innovations (Rogers, 1995) model to explain the factors
affecting adoption. The modification to MICA for manufacturing SMEs is the softening of the barrier between Stage 1 and Stage 2 (shown by a dotted line) and the strengthening of the barrier between Stage 2 and Stage 3 (shown by a heavy line) – see Chapter 10 and Figure 10.5 for discussion. The extension of Diffusion of Innovations Model is to include additional factors of perceived barriers, management and coordination of the communication channels, and coordination of promotional efforts – see Chapter 10 and Figure 10.6 for discussion.

In conclusion, the research encompassed in this dissertation has achieved its overall aim and objectives as set out in Chapter 1, and strongly supports a different approach from current practice, when studying diffusion of a dynamic interactive innovation such as electronic business. The modifications to the current diffusion theoretical framework addresses the limitation that presently exists when explaining levels of adoption and factors that affect the rate of adoption. These modifications have been thoroughly tested with a series of integrated empirical studies with SMEs in the manufacturing industry, and have highlighted the need for additional factors that affect the rate of adoption. In addition, the use of MICA (Burgess & Cooper, 1998b) has been demonstrated to be a more appropriate model when explaining levels of adoption for a dynamic interactive innovation than the Diffusion of Innovation model (Rogers, 1995). The new framework includes modified MICA and additional factors that affect adoption. The outcomes of this research can be viewed as the beginning of a progression to study e-business using the perspective outlined in this dissertation.
REFERENCES


R.Lawson 279 References


PART A: THE ORGANISATION

1. Segment of Industry: tick segment most appropriate for your Organisation

Food, beverage, tobacco [ ] Textiles, clothing, footwear, leather [ ]
Petroleum coal, chemical [ ] Printing, publish, recorded media [ ]
Machinery and equipment [ ] Non-metallic mineral product [ ]
Metal product [ ] Other [ ]
Wood and paper [ ]

2. Number of equivalent full time employees:.

4. Approximate Average Annual Sales: $.

3. Postcode of main location:

Note: This survey is confidential, please do not write your name or the name of your Organisation on these pages

WHAT ARE THE THINGS THAT MAKE THIS ORGANISATION SUCCESSFUL?

5. Please rate each success factor for the Organisation:

<table>
<thead>
<tr>
<th>Product Quality</th>
<th>Marketing</th>
<th>Production</th>
<th>Communication</th>
<th>Service</th>
<th>Accounting</th>
<th>Delivery</th>
<th>IT Systems</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Very Important</td>
<td>2 Important</td>
<td>3 Neutral</td>
<td>4 Not Important</td>
<td>5 Definitely Not Important</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment:

WHAT ARE THE ISSUES FACING THE ORGANISATION THIS YEAR?

6. Please rate each issue that is facing the Organisation this year:

<table>
<thead>
<tr>
<th>Issue</th>
<th>1 Very Important</th>
<th>2 Important</th>
<th>3 Neutral</th>
<th>4 Not Important</th>
<th>5 Definitely Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staying in business</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Trying to make a profit</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Coping with government regulations</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Staying ahead of the competition</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Developing computer systems</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Making computer systems Year 2000 compliant</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Asian crisis</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Raising capital to expand (domestic)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Raising capital to expand (export)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment:
PART B: COMPUTERS AND THE ORGANISATION

7. Does the Organisation use computers?
   1 Yes
   2 No → If no, go to Q16 (next page)

8. Number of Personal Computers:

9. Number of Computer Assisted Machines:

10. Does the Organisation have an Internet connection?
   1 Yes 2 No

11. Computers are used for:
    Tick as many as applicable

    Word Processing  [ ]  Integrated Package for:
    Spreadsheets    [ ]  Inventory Control  [ ]
    Databases       [ ]  Human Resource  [ ]
    Graphics        [ ]  Payroll  [ ]
    Accounting      [ ]  Invoicing  [ ]
    Email           [ ]  EDI (Electronic Data Interchange)  [ ]
    Web Page        [ ]  CAD/CAM  [ ]
    Quality Assurance [ ]  Other: ___________________________ [ ]

   Comment:______________________________________________

12. Does the Organisation outsource part, or all, of any activities in Q11? 1 Yes 2 No
    If Yes, which activities:_____________________________________

13. Does the Organisation use computer systems to assist the manufacturing process? 1 Yes 2 No
    If Yes, how do they help:_____________________________________

14. How satisfied is the Organisation with the current level of competency of staff who use computer technology in their work?

   1 Very Satisfied  2 Satisfied  3 Neutral  4 Dissatisfied  5 Very Dissatisfied

   Management (salaried employees)  1  2  3  4  5
   Office employees  1  2  3  4  5
   Factory employees (award)  1  2  3  4  5

   Comment:______________________________________________
15. How did the Organisation train the staff to this current level of computer competence? Please rate the training methods used by the Organisation based on usefulness.

<table>
<thead>
<tr>
<th>1 Very Useful</th>
<th>2 Useful</th>
<th>3 Neutral</th>
<th>4 Not Useful</th>
<th>5 Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Office</td>
<td>Factory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trained to current level on recruitment</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>Organisation employs permanent IT staff</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>Courses provided by suppliers of product</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>External training courses</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>In-house training with internal people</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>In-house training with external people</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>Computer based tutorials supplied with product</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>Computer based tutorials purchased from third party</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

Comment: ________________________________________________________________

PART C: THE ORGANISATION, THE INTERNET AND THE NEXT FIVE YEARS

16. Please rate the significance of each activity to the Organisation’s Strategic Plan for the next five years:

<table>
<thead>
<tr>
<th>1 Already in Use</th>
<th>2 Implementation Planned this Year</th>
<th>3 Plans to introduce in next 5 Years</th>
<th>4 Thinking about Introduction</th>
<th>5 No Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send and receive email messages</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Send and receive files via electronic transfer (ie email)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Access competitor’s Web Pages</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Allow access to the Organisation’s Web Page</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Access information relevant to the Organisation’s business, eg Government regulations such as WorkCover</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Use Internet to do Organisation’s banking</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Set up Intranet within the Organisation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Provide method for placing orders by customers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Provide method for payment by customers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Access Web Pages for suppliers to place orders</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Access Web pages for suppliers to pay accounts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Comment: ________________________________________________________________
17. Other planned activities for the next five years: 
*eg more sophisticated CAD/CAM in the manufacturing process*

18. What is the Organisation’s current use of the Internet for processing transactions:

*No Use of Internet for processing transactions* [ ]

*Estimate Percentage of orders which are processed on-line:* [ ] ______ %

*Estimate Percentage of payments which are processed on-line:* [ ] ______ %

*Year Organisation started to use the Internet for processing transactions:* 19____

Comment: ________________________________

19. How will the Organisation train staff in the more advanced computer skills necessary to maximise the Organisation’s Strategic Plan for the next five years?

*Tick as many as applicable*

**Main source of training:**
- TAFE [ ]
- University [ ]
- Professional/Employer Associations [ ]
- Consultants [ ]
- Technology supplier [ ]
- Knowledgeable employees [ ]
- Self-taught staff within Organisation [ ]
- On-the-job training by fellow employees [ ]
- Employ people with appropriate knowledge [ ]
- Other: ________________________________ [ ]

Comment: ________________________________

20. Where would most of the training take place?

*Tick one*
- Internal (on-the-job) [ ]
- External (attending courses/seminars) [ ]
- Combination of both [ ]
### PART D: YOU AND THE ORGANISATION

#### 21. Please rate each reason for using computers for your Organisation:

<table>
<thead>
<tr>
<th>Reason</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential for processing information for business</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Essential to remain competitive in business</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>An external requirement of supplier</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>An external requirement of customer</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Government regulation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Computers are not really necessary</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Comment:

#### 22. Please rate the following barriers to doing business on the Internet for your Organisation:

<table>
<thead>
<tr>
<th>Barrier</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner/Manager's lack of knowledge about how to conduct business on-line</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lack of technology expertise of staff</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Cost of connection and ongoing costs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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Comment:

#### 23. Do you believe that the manufacturing industry has not been made aware of what is available for the move to doing business on-line?

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R.Lawson 292 Appendix I
24. My personal feeling about the use of computers for business is:

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<th>Neutral</th>
<th>Valuable</th>
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Comment: __________________________________________________________

25. Age:______ years

26. Gender: 1 Male 2 Female

27. Position Title:__________________________________________ (eg Owner, Manager, etc.)

Please make any comments about the future of your Organisation in relation to doing business on the Internet.

If you would like a copy of the report from this research project, please fill in the details on the next page.

THANK YOU FOR YOUR PARTICIPATION AND ASSISTANCE

Robyn Lawson

I am interested in visiting some organisations to discuss the impact that the Internet and doing business on-line will have on small and medium size organisations in the manufacturing industry in Australia. If you are also interested in discussing how this will impact on your organisation, please turn to the next page.
Robyn,

Yes, I am interested in discussing the impact that the Internet and doing business on-line will have on small and medium size organisations in the manufacturing industry in Australia.

Name: _____________________________
Company: __________________________
Contact Number: ____________________

All discussions will be strictly confidential

Yes, I am interested in receiving a copy of the report from this research project. Please mail the report to me at the address below:

Name: _____________________________
Company: __________________________
Postal Address: ______________________
____________________________________
____________________________________
CASE STUDY INTERVIEW QUESTIONS

* id * name of organisation * number of employees * industry segment * name * position * gender * age group * year

1. What products does {name of organisation} produce?

2. Are the organisation's customers mainly Australian, this state (NSW or Victoria), or overseas? Roughly what would be the percentage breakdown?

3. Does the organisation have an Internet connection? If yes, who set up the connection? What is the Internet Service Provider? What has been your experience with the ISP?

4. Is email used? If yes, is it used by all staff? Is it used internally within the organisation? Is it used outside the organisation? What software is used?

5. Who trained the staff in the use of email?

6. Does the organisation have a web page? If yes, who created it? Why was it created? Who maintains it?

7. What are the organisation's plans for the web site (or to set up a web site)? Wait for initial reply, then explain the Internet Staged Model and discuss plans in terms of the stages. What type of data is/will be exchanged?

8. What are the barriers for the organisation in achieving these plans? Wait for initial reply, then discuss outcome of survey question related to barriers, and gain impression of any barriers not initially mentioned. Another factor was too many unnecessary enquiries would be made thus increasing workload. Ask for an opinion.

9. Are you generally satisfied with level of IT skills of staff? Has there been any resistance from staff to gaining new skills? Discuss training on applications in general. How is training carried out in the organisation? What will be the organisation's main source of training?

10. Do you believe that Australian industry associations in the manufacturing industry raising awareness of what is available for the move to doing business on-line? What role do you think could be taken by industry associations? What about government incentives?

11. What do you think are the benefits to the organisation by doing business on-line?

12. What do you think are the risks to the organisation by doing business on-line?

13. What is the main issue facing the organisation this year?

14. Any else you would like to add?
* SWS1 * Wagen Manufacturing * 20 * Machinery and Equipment * Lorraine Plant * General Manager * female * 50-59 years * 1999

* PRODUCT PRODUCED
* LORRAINE: Trolleys and material handling

* CUSTOMERS national
* LORRAINE: 70% of customers in NSW, 30% Australian, with occasional orders from overseas. In about 12 months or 2 years we will be looking at the overseas market. We have a bit of cleaning up in our home market, getting our act together.

* INTERNET CONNECTION
* LORRAINE: Yes, but only for email and banking.

* EMAIL
* LORRAINE: MS Outlook on one PC - we just had someone hook it up. I also have email at home.

* STAFF TRAINING ON EMAIL
* LORRAINE: Some training by the consultant - some self-taught by staff.

* WEB PAGE
* LORRAINE: No web site at this stage, but we are working on that at the moment.

* PLANS FOR WEB SITE
* LORRAINE: Stage 1 and some of Stage 2 together as the first step. Adding information about the products, technical information within two months, and then allowing on-line enquiries within 18 months all going well.

* BARRIERS TO PLANS
* LORRAINE: Don't really see any within the 2 months, as we've set it up. For later, I see the cost of consultants as a concern - money is tight and we have to use it fairly wisely. So we would need to see a real benefit pay back in spending that money, because we would spend it upfront, and its getting it back down the track.

I don't see government incentives as a barrier, it would be nice and it would help and could perhaps bring it forward because if I look at what we are looking at now, which is a $2000-$2500 investment. If I compare that to what we pay Yellow Pages there really is not a lot of difference. The thing that really held us back, it was another thing we did not understand, we had to go out and make ourselves aware of it before we even knew who to trust.

I think the security issue, yes, whilst its a concern we don't know to what level, its a little bit like using your Bankcard, and people have got used to it and they're doing it now. I
think that as people get used to it perhaps there will still be an issue there or as time goes
that'll get tighter. But it would seem to me, and I could be talking out of ignorance, that
as people get further down the track there are ways of doing it and safeguarding. Its no
different to, I see Hawker de Havilland sending information right across the country on
airplane plans and all sorts of things and they encrypt and decode it into all sorts of
computer language stuff and they're quite happy with the security. I think over time
people will probably be more accepting of it. Maybe it where education should be.

If you get enquiries from overseas and you are not really geared up to that or don't have
the expertise in-house to understand that market I would see that as, not a disadvantage,
but something I would have to cope with and try to come to grips with a bit faster than
perhaps I would have. On the other side I see a lot of smaller companies that we deal
with are not really going to be up to speed - some do not have email and some do not
even have a fax. For the lower end if you are dealing with the big companies who are
geared up, then you need to be geared up to run with them.

* STAFF TRAINING ON APPLICATIONS

* LORRAINE: Our staff could certainly have better expertise in the software that we're
using and again, I think its a time and cost factor, and probably workload a bit but if you
send people out for training it costs hard cold dollars up front. And I know at the end of
the day we'd get a lot more benefit back if they're all fully trained, but its that, actually
by the time you get them trained, and then you have a change of staff, or you upgrade
software, and its just a never ending bind in a really small company when you don't have
somebody that's got the expertise.

I've worked for larger companies where you had an IT person that could spend time with
these people and get them up to speed. For us we are always trying to do it on the run.
We tend to bring people in-house to train, like sort of Microsoft, things like that I would
send somebody out for a course, but with our tracker database I've brought a consultant
in to train us. That person came for a day, but it never seems to be enough. You'll have
maybe one person that's quite computer illiterate and if they catch on to it fast and then
the rest lag behind and they need to use it full on then you almost need to get them back
for another day or you don't tend to do it, you get caught up and its another thousand
dollars. Where you lose out you don't get them using the extra initiative and coming to
you with what they could be doing with it, they really get to be operating it so it does
what you need it to do as distinct from what it could be doing, which I see as a
disadvantage.

The staff is looking forward to learning about the new developments, but they are at
different levels of computer literacy. They are very open and if there's an area that say
one particularly is not so computer literate they offer help - they'll work between
themselves. The people in the store downstairs do not use computers at this stage but
there are plans down the track. There will be a bit of resistance, but they will be able to
do it quicker and I will work through it with the individuals, I mean, if its in the plan and the long term plan, just negotiate you're way through this.

Our main training method would be knowledgeable employees. With staff training on applications, I would get a consultant in probably or send somebody out for a course. There's a bit of internal and probably most of that's done by myself for the things I'm up to speed with. Sometimes we experiment amongst the staff. We upgraded to Publisher 2000 and could not get an eternal course - we are ahead of them. We do have a consultant who comes from Pennant Hills and we have used him fairly heavily.

* AUSTRALIAN INDUSTRY ASSOCIATION
* LORRAINE: The Innovative Technology Network in the south west is getting into e-commerce awareness and they are probably the most concentrated. I have my own personal awareness hasn't necessarily been targeted through manufacturing - I've picked up a lot around the traps. We are a member of AIG - they don't seem to be into the awareness sort of stuff - they are always there for wage type questions and awards questions. I've only been to one breakfast that I thought was quite good and that was a year ago. They don't have a very upfront face in communicating with any of us.

We have not been made aware, especially small manufacturers like ourselves that don't have the in-house expertise and don't have specialists in all these things. I think there is a real need for opportunities to go and listen to experts and just to know that you need to talk to somebody, that whole awareness thing. A short seminar, not a whole day, and at Parramatta or Bankstown or somewhere not too far away - the city is hopeless for us.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* LORRAINE: Wider promotional value, making it easier for people to contact us - automatic email that people can click on - its like, don't put it off, do it right then - just click and it happens. Also being able to have our product visible - a picture tells a thousand words - you say you sell trolleys, what sort of trolleys, but if they see one of our brochures with pictures on it - we want something like that.

While I say we have standard products, a lot of our work is actually custom built. So I see it getting the customers back to us so we can talk to them. Talking to the customer, with automatic payments coming later. The trolleys are a capital item, the darn things last for years, and so while you are looking after your current customers, you are continually servicing and making the new customers aware. The web site should replace some of the direct mailing over time. We will be able to do a much wider area than our current 4-5 areas.

* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE
* LORRAINE: With our products, I mean people can take the item, use it, if you put in a picture of your product, with your R&D and knowledge in the industry over 28 years onto the screen in front of them, where any backyarder can have a look and see, yeah, I
could make that, go out and sell it more cheaply, cause he doesn't have the overheads. In this industry everyone copies everyone else. Its every difficult unless its something very specific, I mean, a trolley is a trolley is a trolley, its a case on wheels.

Also, the costs of the connection and the ongoing costs of maintaining the web site. With computers the costs are never ending - it's not only the computer but all the software, training on it all, and the time that will be wasted coming up to speed. Hopefully, it will increase the business. Once everyone is on-line it should be a level playing field, and you will be better known. You have a choice in how you do it, what you do, and how much you pay for it.

* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* LORRAINE: Growth leading to profit - our plans for the Internet are part of it.

* DOES THE ORGANISATION WANT TO EXPAND
* LORRAINE: Yes. I would see overseas markets as being about 1-2 years away. We will set up the Australian infrastructure first. We do sell to other states but not in big quantities - I would see that increasing over time.

* OTHER COMMENTS
* LORRAINE: We have just taken on a new sales manager who has knowledge in the industry so everything can come together at once.
* **SOUTH WEST SYDNEY CASE STUDY TRANSCRIPTS**

* SWS2 * Wisby and Leonard * 18 * Machinery and Equipment * John Wisby * Managing Director * male * 50-50 years * 1999

**PRODUCT PRODUCED**

* **JOHN:** We're contract machinists and laser cutting, but we also build special purpose machines and power curves, materials handling equipment. What we do is we make a lot of parts and they're all metal parts, we primarily stay in metal, but its anything from railways signals to railway breaking systems, conveyor components and electronic components.

* **CUSTOMERS** national
* **JOHN:** Probably nearly 100 percent.

**INTERNET CONNECTION**

* **JOHN:** Yes, we outsourced it. It was set up by a consultant, he's the guy that supplied our hardware and services the software. Our Internet Service Provider is Telstra Big Pond - we have been happy with the service.

This industry is not really geared up to do business over the Internet. I mean we don't sell a product over the Internet. But we're using the Internet for downloading of files and drawings and things like that - it's more convenient. We don't have a web page at this stage. We use the Internet for email and banking. We exchange data files and drawings.

**EMAIL**

* **JOHN:** We use MS Outlook to email external to the organisation. We have a situation - we've had some files come through and we're probably not diligent enough to go and check the files every day and there are a couple of things been there for 2 weeks, you know, cause we don't use the Internet. I would have thought that if somebody's sending a file through to you they'll ring up and say 'listen I'm going to send that file now', but they don't do that. Now, I don't know whether that's our fault or theirs, but we don't need to have the Internet in the office in this environment, I mean the place is not big enough at any rate. I don't see that this place will ever be big enough to do that. And I've got a personal thing that I don't think we should do. I think, you know, it's more important to go and talk to somebody.

**STAFF TRAINING ON EMAIL**

* **JOHN:** None really.

**WEB PAGE**

* **JOHN:** No, but we're certainly looking at it. We've got some products that we're currently developing at the moment, so once that's up and running, once we've resolved them then we'll probably put a web page up, but there's just 3 areas of our business and we need to promote the three areas.
* PLANS FOR WEB SITE
* JOHN: Yeah, we will, we'll probably put a web page up, we've budgeted for it this year so within the 12 months cycle, we'll probably put a web page up. But as far as the next steps go, I'm not sure.

* BARRIERS TO PLANS
* JOHN: The know-how, the how to do it, the nuts and bolts. We need to, we really do need to find somebody that has got some experience it, who's got a track record, but we're not going to pay over the top, you know, that's the thing, I mean, the really good web pages are quite expensive, and I honestly don't know whether you're going to get the return, that's my concern is how much its going to cost us. And how much time we have to put into it ourselves as well.

There is a lot to consider - I mean, we can put up a web page and we've always been considered a quality company, we're quality endorsed and to put up a junky sort of a web page, really doesn't fit with the image of the company. So we want to try and do it right, but we don't want to pay mega bucks either, and I don't know how much it costs. I mean we haven't even got to that stage yet, but there's some suggestion that we should have an interactive web page, but I don't know whether we can do that. I don't know what information to put in there because we cover such a broad range of customers you know; it's a different industry.

With interactivity like technical information, certainly when we put these items of materials handling equipment up then there'd be some technical information on them but in our day-to-day business we really can't supply technical information, you know, its just the nature of the business.

We're worried about the security of our system and that, our Internet unit down there, the hardware is stand alone, it's not part of our network, so we don't have that connected up, if somebody has to check the email, they go down and have a look at it, they can't pull it up on any of these other screens, that's one aspect of security. But as far as the others are concerned, no I'm not, it's never been issue, and I've never really looked into it to be honest. You know, and if we putting our information on the web page then security - I don't think is an issue, I think its up to anyone who wants to look at it.

It can be an issue, our engineer that does all the detail work for us, he's really concerned about who has access to files, but at this stage that information is not on the Internet.

Not having government incentives is not a barrier, because if you're going to do it, you do it yourself. You shouldn't be asking for help.

Cost of consultants is a concern to find the right one first up. We don't mind paying for anything, but you've got to get value for money and that's the thing that concerns me.
I think that having more enquiries would be a bonus actually. In our case it would be, I mean if somebody genuinely gave you an enquiry it's worth following up because, whose to say, we've got three parts of the business and if we follow them up and say well look they've enquired on this materials handling equipment, well there's a chance that the other two sections of the company getting some work out of it, you know, so that's an advantage for us.

* STAFF TRAINING ON APPLICATIONS

* JOHN: I'm generally satisfied with their skills. It's all pretty basic, I mean, how long is a bit of string, how good have they got to be. I mean, if we can do the job and we're basically getting through it, we've got a situation here with the software program we've got for our scheduling that we need to, not update it but get rid of it, its very very slow, its cumbersome, and we're currently looking at ideas, we've been talking to the University, whether we get the uni to do a program for us, like the whole software program, or we go and buy an off-the-shelf item and we're currently evaluating that at the moment so.

Other than that, we've got a girl, she's not in today, two girls actually, and they're very good as far as Word and Excel and all those sorts of things so we don't really need to know about that. The guys that are programming, you know, whether it be downstairs where we're programming machines, they're very good, or upstairs here with our software package, you know, we're good enough, we're not super, but we're good enough, so basically we're reasonably happy with it. No resistance, everybody seems to be happy to sort of jump on and have a play and try and get the thing to happen, but generally it's been pretty good, we've never had any problems.

We employ people who have already have the skills, say with Excel and Word and that sort of thing, that's sort of dedicated to that area there, the rest of it is sort of production type software, its not worth us guys fiddling round trying to make up a pie chart or something, let them do it, we've got more important things to do.

With the web site we'd probably have to get somebody in from outside. Like, if we buy this new software, either one, whether we buy the package from the uni or we buy it off the shelf then training has got to be provided by somebody. Generally our training is in-house - that is how people spread the knowledge, and then the last resort is either sending them out to do a course or bringing in a consultant.

* AUSTRALIAN INDUSTRY ASSOCIATION

* JOHN: I might have a bit of tunnel vision there, but I just don't see that the industry, its not like going to Harvey Norman where you just buy a National television over the Internet, you have to talk to people about it, no matter what you want to do in manufacturing. I'm on the AIG at any rate, but I think that there's a role for them to let us know what's available.
* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* JOHN: I think with the web page is the promotion, you've got to have somebody. I mean the type of business that we're in you tend to know who to contact to buy whatever you're looking for, so I wonder just how much value there is, but its the old story that if you're not in it, you don't know what you're losing, and that's the main reason that we'll probably put a web page up. I don't know what the main advantage is, as I said, promotion is probably the main thing, the fact that you're there and somebody can see you.

* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE
* JOHN: I've mentioned cost, and, only that you bear all to your competition don't you, that's the only other risk that I see, they know exactly what you're doing if you put all the information on the web page. And I think that is an issue, I don't know how you get around that, maybe you veil it in secrecy and something. I mean because, we spent a lot of time and money developing some of these products, you've got to be careful how much information you make freely available to your competition, I mean, if we get a customer rings up, that's different you go and talk them, again you talk to them, you wouldn't be able to do the business over the phone or over the email, you've got to go, physically go and have a look at what they're doing and what type of products they want to handle and that type of thing.

I don't see paying the ISP as a major issue, I mean there's costs associated with everything and providing that there's some benefit that outweighs the cost, I mean we wouldn't do it just to have the thing there, obviously we'll want some sort of benefit out of it.

* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* JOHN: Probably getting the software package up and running, its really slowing us down, we're not getting the information back out of it, that's our biggest issue at the moment.

* DOES THE ORGANISATION WANT TO EXPAND
* JOHN: Yes, we want increased business.

* OTHER COMMENTS
* JOHN: No, as I said, if its for manufacturing I just don't see that its the sort of thing where you can do it exclusively on-line. I mean sure you can, there's some communication and some information, but basically I think, at the end of the day, you've either got to go and talk to the customer, have a look at his problem. I think the Internet is time consuming, but it's a scattergun approach, and we're not looking for that, we're trying to target the people that we want to deal with.
* SWS3 * Zip Heaters * 180* Metal Product Manufacturing * Neil Smith * Chief
Financial Officer * male * 40-49 years * 1999

* PRODUCT PRODUCED
* NEIL: Water Heaters, hand dryers and water chillers.

* CUSTOMERS national
* NEIL: NSW would be 25% of our business; the rest of Australia would be about 40%,
and the balance overseas.

* INTERNET CONNECTION
* NEIL: Yes and no - we did have, we have now gone off it and we're building a whole
new web which will be operational by, all things being equal, 1st of October. It was set
up by a combination of internal staff and a consultant. We use Ozemail and our
experience with them has been reasonable.

* EMAIL
* NEIL: Yes, we use MS Outlook for email within the organisation and external.

* STAFF TRAINING ON EMAIL
* NEIL: Internal staff carried out the training on email.

* WEB PAGE
* NEIL: No web page yet.

* PLANS FOR WEB SITE
* NEIL: We are currently developing a web page, but it's not up yet. The development
work is being done by our Marketing Director and our Technical Manager who are
working with a consultant from Zoo.

We are developing it because every other man and his dog is into it and its a sign of the
times and its basically a new way of marketing directly to a world in the true sense of
the word, and making people aware of who we are.

Initially we will use it for promotion, but we plan to be at Stage 3 within a year once we
get going we don't frig around as the saying goes. Initially it's just going to be
promotional, or who we are and what sort of products we provide, how to contact us,
who are our sales agents or how you can place enquiries. Within a year we will have
ordering on-line and all the rest - email access, customers to place orders, payments by
customers, order from suppliers and pay suppliers. We have an overseas operation we
will be transferring financial data between ourselves, sales and financial data - a few
companies already do it - instead of faxing them through you may as well have them
coming through that way.
* BARRIERS TO PLANS
* NEIL: There are probably about three barriers. In priority, the first is basically money, to do it properly you've got to get it done, set up, looks pretty, and is functional there and realistically because we don't have internally the expertise, we have to pay consultants, and money is one factor.

Another factor is what senior management base their ideas around - while we've got it and know what we're going to do is OK, so it's a lack of understanding to some degree.

Thirdly to a lesser degree once we've got it, how are we going to manage it - OK, but that's less of a problem to tell the truth.

Lack of government incentives doesn't worry me, why should the government hand out money all day to help us do these things. If you waited for the government to give you a handout or money you'd do nothing, you wouldn't be in business any longer.

I don't know how you stop too many unnecessary enquiries that would cause an increase in workload. It is a consideration but it's the way it is - you can't do anything about it. You don't know at the end of the day its, what's that saying, big trees grow from little acorns, OK and somebody that makes an enquiry, on the face of it you might think what a waste of time, for all you know it could be quite substantial, you don't know. Its one of those things, its a risk I suppose, risk is not the word. Its one of those things that happens, you don't know. It might be little Johnny basically sitting at home all day just at his web site all the time, that's the way it goes.

* STAFF TRAINING ON APPLICATIONS
* NEIL: I'm not satisfied with the level of IT skills of staff and if anybody suggests that, they are lying. There has been some lack of understanding from top management - which is understandable with all due respect. The younger we are the more we are au fait with things like the computer world. The older people, maybe not always, are not up and running. Overall there has been no resistance from staff - its another string to their bow.

We use in-house training with internal people, and if necessary send one person to an external course who then trains others. Our main source of training is on-the-job training by fellow employees. When we need to fill the gaps we employ people with the necessary skills.

* AUSTRALIAN INDUSTRY ASSOCIATION
* NEIL: I agree that not enough is being done to make manufacturing aware. I suppose you could actually have, you know they've got the industry association - I'm talking about the industry association not the government here, be it either state or federal, industry associations may be aware but they're missing this fact. I think they could do more like disseminating information, hold some seminars.
I am a university graduate many years ago and even though I'm involved in higher training as well, rightly or wrongly a lot of people, especially in Western Sydney, see the university as basically not in touch with the real world. They don't hold themselves up when they send out... like Macquarie Uni sends out all these big mail-outs left, right and centre, all day every day. I think it's better if the industry groups do it, its sort of lower key culturally. And they've got more practical experience - I'm generalising when I say that. And they can relate to the industry more because that's where they're coming from. Unfortunately, as I said, a lot of universities are getting too technical up here, one way or the other. I'm generalising when I say that.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* NEIL: There will not be a reduced workload to tell you the truth. I'll tell you why I say that, we, the majority, as big manufacturers, we have our main distribution channels which are big wholesalers in inverted commas, going along this line, we're going to be dealing with more mums and dads, we're going to have more workload as a result of this, the only good side of this is we're going to be better known, and on a world wide basis, its really the world side we're looking at here, because we are also currently world wide, if we were purely an Australian based company it might not be as appealing.

* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE
* NEIL: No risks, not really, because at the end of the day we're going to be doing it methodologically correct and I don't see any risk.

* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* NEIL: As well as staying ahead of the competition and staying in business, I would add on top GST - we've got uncertainty of where we're going there. Also, Year 2000 - we have done a lot, but who knows at the end of the day what's really going to happen there.

* DOES THE ORGANISATION WANT TO EXPAND
* NEIL: Yes, we would like more exposure, and the customers are an added benefit.

* OTHER COMMENTS
* NEIL: I don't see any major savings in time. As I see it, the web is going to create work, because we are going to get these enquiries through, which we're going to have to answer, and a lot of them will be dud type of enquiries, but they might not be.
* SWS4 * KJ Clapham Metal Spinners * 20 * Metal product manufacturing * Susan Scott * * female * 30-39 years * 1999

* PRODUCT PRODUCED
* SUSAN: Metal spinning, spun metal products, outings, some presswork, project lighting

* CUSTOMERS national
* SUSAN: Probably 90% of our customers are in NSW, with 10% mainly in Melbourne and Brisbane, a couple in South Australia and a couple of small ones in Perth. We have one overseas customer - in New Zealand.

* INTERNET CONNECTION
* SUSAN: Yes, we use email and do the banking. The initial connection was done by staff. We've just changed over to another Internet Service Provider and we outsourced that. We were with Telstra BigPond and they're hopeless, terribly slow, wouldn't give us a good connection, it kept dropping out, speed was an issue, couldn't download big files, it was a real pain. Slow, terribly slow, drops out in the middle of the day all the time, loses its connection. When you talk with different computer people they all say, a small business like use that doesn't have a big usage at the moment, they're not going to give you a good link, you're only on a 10 megabyte mail server, and you've got people in line, you just can't, your link keeps dropping out.

We're now with Hotlinks the guy has given us 100 megabyte link and we're going get them to help us, well particularly the guy that we outsourced it to is going to give a hand to design our web page and set all that up.

The person who set up the connection initially was our toolmaker, but then he sort of progressed into something more, so he came to an office job, so he was more like a project manager, coordinating things in the factory.

* EMAIL
* SUSAN: Just using Outlook Express - this could change in the future. We use email mostly outside at this stage, internally its only a small office, you usually run down and ask things or write notes.

* STAFF TRAINING ON EMAIL
* SUSAN: We taught each other. Its just something that we just sort of picked up and how do you do this, someone else comes along and, Oh, try this.

* WEB PAGE
* SUSAN: No, not yet, but the design of it is discussed now.
* PLANS FOR WEB SITE

* SUSAN: Stage 1 by Christmas and as part of that stage, I think we'd probably have some technical information already in there, on-line enquiry, a lot of this in Stage 2, but it would only be in a very basic format. I'd say another 12 months Stage 3, because it's not something that you want to just throw at your customers, you want make sure it works.

We've got new software ordered and part of that in the software is inbuilt for these, for a lot of these, order status enquiry, on-line orders, don't know about links to the warehouse, but all these are sort of inbuilt in the software so how that integrates into your web page we're not sure at the moment so, like say, we'll do this bit first, Stage 1, get the software up and running and then we'd probably look at whether it will link in with it.

We've got nearly a dozen really big clients, and we're still dealing with a lot of small clients, some of them are just one man bands, I mean some of them still haven't got a fax machine. There are a couple of the real old die-hard blokes that won't even have a fax machine. They won't even accept payments by EFT.

It's got huge potential from a marketing point of view, as long as you do it right though. From what I can understand if you have too many graphics and it's too slow to use - people won't use it, so there's a lot goes into the design to make sure that it works well and gives people the information that they want.

I've had quotes to build a web page ranging from ten thousand down to a thousand. There's a big difference there. So, I don't know what the difference is, they don't appear to look any different as far as service.

We will exchange data, email, reports, documents and drawings. Actually drawings is the main reason why we got the Internet on because a client can email a drawing to us and then we can download it straight into CAD without needing to redraw the file. That's a big, big thing for us. We're not getting any orders at the moment by email, invoices aren't going out by email at this stage either.

* BARRIERS TO PLANS

* SUSAN: Lack of skilled staff is a big issue. Lack of time is another issue - the time just to sit down and think about it. The cost, depending whether it's ten thousand or a thousand to set it up and then the ongoing maintenance of a site - having the time to do that. I don't even know what's involved in maintaining it; obviously you've got to keep the details up to date. Cost could be when you've got your on-line payments and stuff, you've basically got to have a separate email server other than the Internet server, because you don't want these people being able to get into your main server. That's my understanding of it, so you've got to have a separate server.
Security is a big issue, and there's a huge cost involved in that, and talking to Scottish Pacific it costs them millions to set up the security of it. You've got to deal with it, but its a barrier, for a small business - its a big cost - a big chunk in your cash flow. Security would be a big thing for sure.

I've heard stories of unnecessary enquiries leading to increased workload, people, not so much here, but say, my sister in law, she went away for a month and she came back and she had 250 emails to read from three weeks, different people sending different things and it was, most of it wasn't really relevant to her anyway. We're not finding it a great issue at the moment but it could be. If you get an enquiry its time consuming to email them back, but you don't know where that's going to lead and what's going to come out of it. It could be an issue if it was abused, but its the same thing with your fax, sometimes you get people, once they get your fax number they just keep sending you reams and reams of advertising stuff, but I mean, you just ring them up and get stuck into them and it stops. Like these phone service providers they keep coming around, and the same crowd comes around every time. I got to this stage and its like, get out the door and don't come back, cause they just won't give up.

* STAFF TRAINING ON APPLICATIONS
* SUSAN: I'm not really satisfied with the level of IT skills of staff. It's an issue that we're going to address with some training. No actual resistance from staff towards training in general - see over there we just won the Macarthur Industry Awards on Tuesday for training in business. I mean that's more for training in the factory, there has been a bit of resistance with the computers at some times, because, they haven't performed the way they're supposed to. Which then comes back to a software issue, that's why we're changing software.

Jamie and I are the only ones that have been trained, so that's up to us to teach them how to do it, and because its been a thing that's been growing and changing and updated, we've just been slowly, its been something that's evolved, so as far as the guys in the factory, there's really no need to send them out to do Excel and Word courses and that type of thing.

We have a temporary woman, well she comes trained with all those things there, but that would be the way that we've done it in the past, or we've just taught ourselves. We've just been playing and teach ourselves.

Its been very busy, that's why we've got five trainees through the factory now, try and sort of pick up that side of it and get some more work out.

* AUSTRALIAN INDUSTRY ASSOCIATION
* SUSAN: Jamie goes to Macarthur and he belongs to the ITN out there and as part of that its given us access to information that we didn't get before we moved out here, so we've never put a value on that sort of thing because you'll just never know what you'll
learn and what you'll find out. It's been a big, big boost to us, it takes up more time, but before we were at Peakhurst, had a different accountant, and we were very isolated. She was our sole point of contact for advice and information and we really found that was a big downfall for us, but since we've come out here we've become much more involved in these sorts of things and its given us access to different information and ideas.

The information is there, but you've just got to go and seek it. By the same token, probably big business are much much more aware, there's not much information around for small business, but say in the last two or three years there's been huge jump in software and computers that are available for small business. Some people like everything given on a plate - I mean everyone knows that the Internet is out there, they could go and look for it, and they can go and ask questions and find someone who can help them.

No information that I've seen has come through from AIG about doing anything on-line. I don't know if they should be doing anything, its very hard. I don't really know how far their role should go, but if their general mission is to try and increase the profile of the manufacturing industries, then obviously they want increase manufacturing in Australia. The Internet is giving us greater access to export markets. So maybe from the AIG's point of view that is something that they should be pushing, to raise the profile of their smaller members, but by the same token those smaller members need to do something to lift their standards a bit to be able to compete overseas.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE

* SUSAN: With on-line orders, a lot of this could cut down our phone calls so we could cut down staff. So reduce your costs, reduce your staff, reduce your overheads in every area in the business and that's what, for a business like us to be competitive overseas we've got to keep those costs right down.

Once we go to the new software, I can see this job (motions towards temp sec/receptionist) like she's here three days a week, that could drop to one, because of the savings that are involved in different things in different forms of the software I can see it saving probably just our guy in the warehouse it will save him anywhere between 3 and 5 days full days a month, OK, so its a really big savings,

The Internet, people are going to be able to put orders on-line, this order status enquiry, if we had that on the Internet we'd cut our phone calls by 50%, cause that's what most of them want to know, OK its due today, when am I going to get it, so I'll have to ring you back, so that will cut our phone calls back to them down, save them time, that, more than anything else would cut our time down immensely. If we had that accurately going, and that's where the software will adjust that every day that would cut our phone calls by 50%.
* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE
* SUSAN: Security is a risk. I suppose there's a risk that if you don't do it you'll get left behind. That's the risk that we see, if you don't do it, you're going to get left behind. If you're not on the Internet in about three years time you can kiss your business goodbye.

For us 50% of our sales at least would be reliant on the commercial lighting area, so that's something that we're working really hard at the moment to diversify, so we're not reliant on one industry, so therefore with the export we're not solely reliant on Australia, you're rely on a wide variety of markets.

* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* SUSAN: Cash flow. Training is a very big issue for us at the moment because if we don't train, cause we can't just say put an add in the paper and say I'll have a metal spinner tomorrow thank you, they just don't exist. Its in the actual manufacturing area, we just can't employ, can't get the staff, so unless we get the staff we can't get the work out the door, we don't have a cash flow, we don't have a profit, and I mean from there the next issue is the business plan, because your business plan should incorporate all your goals as far as your Internet and everything anyway.

Part of the award for training in business was they scrapped the trade from TAFE, they don't call them awards like you know at one time you'd have gone and you'd have done an apprenticeship, now there's a competency standard, you work your way through different levels of things, and so there was nothing there for our trade so we got a grant from DEET to actually write the competency standard and part of that grant was that we had to put five trainees through in twelve months and actually trial that, but the standard belongs to DEET and then it will be available for everyone else to use, but as part of that we can get that training, we can get like a trainer from outside to come in and assess their skills and issue these guys with their trade ticket, but there still won't be a TAFE course available, so we can send them to TAFE for selected modules, but for the actual training on the lathe we have to do that in-house.

As far as getting more business using the Internet, or just working differently, I think it will be a bit of both; it's a bit of unknown quantity? I mean it depends on the people that you're dealing with, whether they're willing to get onto the Internet. I've been asking people, have you got email, Oh no, not yet, we're thinking about that, that would be the general response I get.

* DOES THE ORGANISATION WANT TO EXPAND
* SUSAN: Yes, but I do not really want to get involved in export - its a major hassle.

* OTHER COMMENTS
* SUSAN: No, I don't think so.
* SWS5 * Technidoors * 20 * Machinery and equipment * Terry Chalk * General Manager * male * 50-59 years * 1999

* PRODUCT PRODUCED
* TERRY: We produce refrigerated cabinet display door systems.

* CUSTOMERS national
* TERRY: They probably 99% Australia wide. There was some overseas components some years ago, but that just tended to go away, that was Indonesia, and Indonesia of recent times has been a difficult market. So, we could say that 99% of our output is for the Australian market, and I'm sorry that's not strictly true, Australasian market, including New Zealand.

* INTERNET CONNECTION
* TERRY: Yes, set up by a member of staff, the Sales Coordinator. Our Internet Service Provider is Ozemail. We haven't had any problems and they were recommended to Steve by other people and the recommendation seems to have been OK.

* EMAIL
* TERRY: Yes, we use Lotus Notes. It's primarily within the organisation, but we also use it for outside. Certainly, with other companies within the group, and outside occasionally to customers who have an email address. We exchange documents via email. Most of our communications still are via fax to outside customers.

The group is quite security conscious, and concerned about getting nasty stuff in from the outside. The email is filtered fairly heavily before it gets in. Intragroup is OK for sending and receiving documents, but not external from the group, Intragroup means with another half dozen companies that are part of the refrigeration group.

* STAFF TRAINING ON EMAIL
* TERRY: Internal catch and kill your own, there was some basic training provided, so training was by doing.

* WEB PAGE
* TERRY: No we don't, we have a web address but there's nothing on the web page. I've been gnashing my gums for probably 12 months now, you'll notice on the brochure we have a web address, getting the group to actually progress to the stage of really having a web page is another very slow moving issue.

* PLANS FOR WEB SITE
* TERRY: We have one in mind. We would certainly look to moving to Stage 2 straight away, I think we would set Stage 1 plus technical information within the next 18 months. Email facilities would be a question mark, certainly with technical information,
and I don't quite know what's meant by value added information, but I imagine it is some sort of class of technical information.

Our type of business is one that we are unlikely to go to Stage 3 certainly in the near future, we deal mostly with contractors, and companies of that type who tend not to be technologically too advanced. So they would look up our web site to find out sizes, technical information and the like, its unlikely that they would go to a stage of placing orders and following up their orders through.

I don't think Stage 3 suits the business, we have probably 150 customers all up across Australia, and of those probably 50 who are, in our terms substantial in terms of size and frequency of contact through the years, so 50 customers is not a hard number to keep track of by any means.

* BARRIERS TO PLANS
* TERRY: In the great IT scheme of things it's not seen as being overly important by upper management. There's an IT steering committee that has bigger issues to deal with and the Technidoors web page comes up periodically and the answer is yes, yes, we must do something about that. It's not a funding issue it's just a matter about resources and priorities. We haven't got internal people; we outsource most of our IT support.

I agree that security and privacy of transactions, lack of government incentives, and cost of consultants are all barriers to going on-line. I think cost of consultants is probably even more significant than government support. I wouldn't see too many unnecessary enquiries as an issue for our business.

* STAFF TRAINING ON APPLICATIONS
* TERRY: I'm generally satisfied with the level of IT skills of your staff, both for current and future. I haven't seen any resistance from staff. We use in-house training with internal people, or they send one person out for a training course and then they come back and train.

Employing people with the knowledge is the main driver for us. I would expect for us to send off for training, for example, with the system we put in at Technidoors the production manager has been down to Melbourne for 2 days to do a course on aspects of the production management that the system has. I would expect him to train the supervisors and also to ensure that the sales manager understands how it works and also ensure that the accounts people understood how it works.

* AUSTRALIAN INDUSTRY ASSOCIATION
* TERRY: I guess they, I know this sounds like a circular answer, but they need the information that they're not getting, I'm involved in a group, its a manufacturing focus group run by the advanced manufacturing centre down in Redfern, now through that group I've become aware of government incentives, I've become aware of things that
other organisations have done, unrelated to IT, unrelated to other areas, but something that parallels that is probably needed for the IT area.

I think the industry groups or common interest groups can do, partly what its doing at the moment, which is to provide training, which the AIG does, and provide newsworthy information which they also do in other areas.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* TERRY: Just ease of access for customers, ease of access for more information than they might otherwise seek. Somebody will ring up and ask for some information, what's the size of something, and you tell them what the size is, but they don't really want to know the size is they really want to know what the clearance base is and how thick it is and lots of other stuff, so they may currently via the telephone have 3 or 4 goes until eventually hook it down to all the information they want. Whereas if all of that's available by looking it up, they can scratch around and look up whatever they like. So the other advantage is that we don't spend time giving them that information, they can get it themselves.

* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE
* TERRY: It would be public domain information that we put out, I suppose the only risk is its easy for competitors to get information that they could get anyhow, it just makes it a bit easier for them, the reverse side of the coin is it makes it easier for us to get information about their products as well.

* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* TERRY: Sustaining an adequate business level. Times are tough and things are hard, but that's reasonably common. In terms of profit, I guess that's one issue, the other issue is, I don't know how to describe it - proper manufacturing discipline. I guess is the best way to actually call it, doing things properly, you can do things the cheap and nasty way, but in the end that eventually bites you. If you don't do things the cheap and nasty way, sometimes you suffer along the way because you're not cheap and nasty like everybody else, so that's what I say, establishing a proper manufacturing discipline and still making a profit, so you put yourself in a position where you're not competing on a level playing field with other people who don't do what I call the proper things, and that's the biggest issue.

Quality, durability, the right product at the right time, employee conditions, occupational health and safety, you know the whole gamut of things that you should do as distinct from the things that you can get away with not doing and staying competitive.

* DOES THE ORGANISATION WANT TO EXPAND
* TERRY: Yes, within Australia we'd like 100% of the market, I suppose everybody would. Not interest in export at this stage, there are some reasons for that and they're to do with our licence agreement with our major licensor who has restrictions on our access
to overseas, cause they also access overseas markets, so its not purely a market driven issue, its a commercial constraints issue.

* OTHER COMMENTS
* TERRY: No, I don't think so. Apart from, we have a reasonably small number of customers so therefore EDI and things of that nature are probably not a big issue for us. There's an element of customers that we currently don't access and probably don't even know exist, they'll at least have the opportunity of finding us so we would expect there to be some opening up of access to other customers.

People can get the information easier, straight away, doesn't tie up your staff. They can get the information, yeah, you know someone ringing in enquiring about a quote, is still somebody enquiring about a quote and somebody still has to do the quote, so there is a marginal time saving at the front end, but in terms of the overall process of it I don't see a big time saving.

The cost can be justified in terms of accuracy of information that's out there out in the market place, which then avoids mistakes, and the fact that we would perhaps see ourselves accessing more customers.

* SWS6 * HVOF Aust Pty Ltd * 11 * Metal product manufacturing * Wayne Hooper *
* Position * male * 30-39 years * 1999

* PRODUCT PRODUCED
* WAYNE: Its a fairly specialised area, so its not likely that many people would know much about it, its thermal spraying basically, or metal spraying to give another term for it.

* CUSTOMERS national
* WAYNE: probably 75% in New South Wales, 20% interstate and 5% export to Indonesia.

* INTERNET CONNECTION
* WAYNE: Yes, set up by the Engineer. Our Internet Service Provider is Ideal, and they have been good.

* EMAIL
* WAYNE: We use Outlook to email outside the company with suppliers, customers, and various places.

* STAFF TRAINING ON EMAIL
* WAYNE: We trained ourselves.

* WEB PAGE
* WAYNE: No.
* PLANS FOR WEB SITE
* WAYNE: Yes, well an idea, no firm plans at this stage, but it is possible, yes. On-line enquiries would certainly be the first thing we would be trying to achieve but I am aware that having the email address and all that within the web page allows people to contact you very easily. I guess the answer is yes, because you can add to these things after you've achieved stage 1.

We exchange information via email currently, like reports and documents and things. We also access competitor's web pages. We certainly access information that's relevant to our business concerning government regulations and certainly technical information as well. We're relatively new users of email, its only been this year we've started with the Internet connection so its early really.

We bank on-line. Well, when we say, we'd still operate manual systems for manual checks that people don't have the facilities. About 40% of our cheque paying, bill paying would be on-line. We encourage our suppliers to give us their access to a bank account number so we can do a direct transfer. I guess it would make it a bit easier for them to order on-line, its difficult for us at the moment we don't have a web page, but I guess they could email us an order, but we haven't used email for that, with orders they're generally faxed, or mailed.

* BARRIERS TO PLANS
* WAYNE: I don't see any barriers, because I haven't gone far enough down that track to actually get my own, but I guess the only barrier is finding someone who knows what they're doing to do the work for you and give you what you're after, provide the guidance, but I'm sure those people are around when you start looking.

Security and privacy would be a concern for any transactions. If people are emailing orders and that sort of thing, well you've got to make sure that no-one else can access them. I'd need to talk to the experts about that.

Cost of consultants would definitely be a barrier - I haven't looked at how much they cost, but I'm sure some of the rates that people are charging would be fairly high.

* STAFF TRAINING ON APPLICATIONS
* WAYNE: I'm generally satisfied with the level of IT skills of staff. There has been no resistance from staff in gaining new skills - we're not a big organisation. If it's within the abilities of the in-house people to do the training then we would do that, or bring in someone to do it. I'm just to trying to conceive whether there'd be any need, you know, if we had a web page and were doing on-line orders and things like that, I imagine that would be straight forward enough that once its set up correctly you wouldn't need to get external people to do training.
* AUSTRALIAN INDUSTRY ASSOCIATION

* WAYNE: In manufacturing, certainly some seminars that you know would help to make available some knowledge on the opportunities that are there for that kind of business, e-business, just who would run them and how much they would cost and that sort of thing - but it would help.

Then you've got to remember with manufacturing, unless they're large they're not going to have staff dedicated to this sort of work that they're more involved with getting the product out the door - so taking time out to undergo any such training or awareness is sometimes difficult. Even if the seminars are available doesn't mean it's going to happen.

They don't know what they don't know. I guess in a way its like any new technology there's early adopters and there's people sort are aware of it but are keen to see how things go and then adopt it, so it'll grow as some of the other manufacturers adopt it and see people you are in contact with in business having success in the area, and say well this is something that will help us now.

It's part of industry associations' role to disseminate information and make people aware. I see a key part of their role is to help their members who are primarily manufacturing organisations to develop, in a competitive world and that's part of it.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE

* WAYNE: Well, I guess the main thing would be convenience, particularly to your customers, and that's what we're about, providing service, and as more and more of our customers change to regular users of the Internet, I'm sure it would make it easier for them to do - handle the paperwork associated with ordering, invoicing, whatever.

For our staff as well, and because we're customers of other organisations, there would be benefits there. There's going to be an evolution rather than a revolution I think. Something that, as more and more people become more au fait with the Internet and then they're on-line themselves, it would be worth doing, but its related to how many established users there are out there at the moment, cause what you don't want to do is alienate customers that aren't on-line, feel that they've got to go that way to place an order with you. We would need two systems.

* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE

* WAYNE: There's the loss of information, potential loss of information, and problem of backing up and that sort of thing. With the security issue I believe that encryption techniques are pretty good these days but you'd need to look at that, so again I'd need expert advice on that.
* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* WAYNE: The main issue is continuing the growth of the business, well we're making a profit, there's an increase in turnover and therefore increase in profit. There are opportunities; you've just got to take advantage of those.

* DOES THE ORGANISATION WANT TO EXPAND
* WAYNE: Yes, but not necessarily overseas. A number of our customers export, so they're exporting our products for us, but they also sell domestically so, we already have an export market, perhaps a lot more than that the 5% I indicated initially. It's pretty hard to put a number on it because our customers don't necessarily tell us. Indirectly yes we want some growth there, if you're asking have we got any specific strategies in place to export, at this stage the answer is no, because we believe that we need to strengthen ourselves a bit more domestically. We're only a relatively young company.

* OTHER COMMENTS
* WAYNE: I can see it as getting us more business, making it easier for other customers to find us, to know what we do. Banking on-line is also a timesaving issue and bank fees I think.
PRODUCT PRODUCED
* STEN: We produce electrical transformers and distribution equipment.

CUSTOMERS national
* STEN: About 50% in NSW, 45% Australian and rest 5% overseas to Singapore and
Thailand.

INTERNET CONNECTION
* STEN: Yes, set up by Trainee Manager. We only outsourced the setting up of the
computer network to comply with the Y2K requirements. Our Internet service provider
is Ozemail. Our experience with them has not been good initially, from the invoicing
and customers relations point of view.

EMAIL
* STEN: Yes, we use Outlook to email outside the organisation mainly. There's just a
few, there's one, two, three, four, staff members who use it, office staff and
management.

STAFF TRAINING ON EMAIL
* STEN: They were trained by staff member who set up the connection.

WEB PAGE
* STEN: Yes, set up by staff member. He is currently trying to source how we can do e-
commerce on it, but at the moment its just mainly information, people can go in, get an
idea what we do, they can't purchase.

We'd be in Stage 2 because there's technical information in there, and there's also the
ability that they can from the web site they can directly email us. We're certainly not at
Stage 3 - we would be halfway between Stage 1 and Stage 2. We are definitely thinking
about Stage 3.

I've found that, at first, when we first got it set up, it was a bit of a, I don't know, people
were a bit hesitant to use it, but its been there a year now that its been set and its in more
and more use now, its, email's quite common, though transferring data, especially
overseas, you know, its a fraction of the cost of sending a fax and its much quicker - all
our work overseas is done by email.

We exchange reports and documents via email, a couple of orders via email. We've got
the link between the web page and the email. We access competitor's web page, and they
can access ours. We would occasionally access government regulations and use the
Internet as a resource to find tenders and information on tools. We do our banking via a direct line, not through the Internet.

* PLANS FOR WEB SITE
* STEN: We do plan to offer a method of placing orders by customers, but payment will not be through the Internet. All of this is going to be resolved on the 22nd October isn't it. What the company does, we go through a strategic planning, we did strategic planning 4 and a half years ago, and we have a large seminar on 22nd of this month where we are going to do our strategic plan for the next 5 years. One of the topics as part of the plan is to look at the effect of the Internet and what we should do and what connections we should make etc.

But, its planned, our plan, overall plan is that within 12 months we will have facilities for on-line ordering, and on-line payments, particularly with a push to marketing to south east Asia.

* BARRIERS TO PLANS
* STEN: No, we don't see any barriers not at the moment. We've got the staff, financially we are OK, I really can't see any barriers. I think that the barriers would be the mentality of the people in the organisation, if any, but I can't see that. However, some people are not prepared to go outside the comfort zone. It's a big step. It's a big change.

I really don't think, in our organisation in terms of the manufacturing that we do, that security and privacy is a great concern. We run a rather open style management organisation, therefore I really can't see that as a problem.

I have never believed that if you want to be successful you should have your hand out, you, an organisation should develop out without the need for government incentives.

We have used consultants, we're using a consultant at the moment to organise our strategic plan - its part of the process and part of the evolution in business. Having said that because we have been targeted as a high growth company, the next strategic plan is going to be subsidised by the NSW government to the tune of 50%. When we did this original strategic plan the NSW government advisor got a copy and we have been monitored to see how we achieve and as a result of that that's why now they're prepared to come in and give us the 50%.

Additional enquiries are part of the marketing process and is not a barrier to us.

* STAFF TRAINING ON APPLICATIONS
* STEN: I'm, not 100% satisfied with the level of IT skills of our staff - but we are planning to provide additional training for some of our people. We will use courses, 3-day seminars and that sort of thing. We don't see any resistance - it's part of the
managers job I suppose, if it was a fundamental requirement of the company, the staff would be told they would have to do it.

We have in-house training with internal people and external training courses - but we've sent more than one person out to training seminars. At the seminar that we're going to have, we are shutting the company down for a day, we are including all our staff, including factory people, production workers, the lot. I would say that the main source of training would be definitely external.

* AUSTRALIAN INDUSTRY ASSOCIATION

* STEN: I think the manufacturing industry through people like Australian Industry and the old Metal Trades Industry Association, if management spends the time to read all the paper that comes from these organisations, there has been a hell of a lot of information being provided. I mean there is a monthly magazine that comes, that has had a lot of articles in it. As I said if the manufacturing industry doesn't know about its because they don't want to know about it. I believe they provide some training courses too - we're quite happy with the role they're taking.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE

* STEN: The ultimate benefit is that it provides a marketing tool to be able to manage the marketing function in a much quicker way. So the response time comes down considerably. If you're working by fax the normal old procedures, you might have a response times of 3 to 5 days, our current response time is maximum 36 to 48 hours, we want to cut that down to a maximum of 24. At the moment about 50%, maybe 60% of all our enquiries are probably a response time of less than 10 minutes.

In manufacturing the normal process is that somebody will look up the web page, they will be interested in the product, then they would probably send an email and make an enquiry. The next question is how long will it take for us as an organisation to reply to that email. We only manufacture to order. We see the benefit of the Internet and email and the complete process of being great benefit going into south-east Asia. We're already doing it with Singapore.

My philosophy is that an Australian manufacturer should be able to have a response time of say 24 hours, by the time, lets say the Europeans, respond we should be able to have the goods on a plane flying over to Singapore, because the Europeans traditionally are very, very slow. I deal with Europe, we import from Germany as well and a typical response time is in the order of about 3 to 4 days. It still comes back to the philosophy of the organisation, regardless of all the electronic media, or all the facilities, it comes back to the philosophy in the organisation.

We now live in a market, which is not an Australian market, we now live in a market that is global market. People in Brazil are selling to Australia. Australians are selling to
Europe that was unheard of 15, 20 years ago. So an organisation has got to tune in to a new way of doing business.

* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE
* STEN: The only risks that we see are financial. We are not convinced yet that methods of payment and e-trading in terms of the flow of cash, of electronic cash, is secure enough at this stage, and that we see as a problem - security of the money flow - there have been cases now where things are in cyberspace - I've got a case right at the moment, 22 thousand dollars in cyberspace, which I've sent through my bank and its, it can't be tracked. So that I think the ability to have secure transactions definitely has to be improved for us to feel comfortable.

* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* STEN: Determining the path of growth in the company for the next 5 years that's really the main issue. The strategic plan, that's what we're trying to assess. We've grown at the rate of roughly 17 to 18 percent per annum over the last 4 years. As you grow there are human resources, problems, the training of the staff, the quality of the staff, and one has to then balance that against the mission statement that you have and the philosophy that you have in terms of running the company.

One thing that we do not want to create in this company is, what we call a flywheel effect, large companies have got a lot of inertia and to create change and to make people responsive is a very very difficult exercise, with the different levels of management. We have maintained all the time a fairly flat management style with fairly quick response time, so if we've got very little inbuilt inertia we can make things change very rapidly and that can't happen in a larger organisation, and I suppose that we are at the stage where if we're going to have, say 5 to 10 million dollars turnover, we are going to create some of this inertia whether we want it or not, that's what we're doing the strategic plan for.

The flat management structure has been proven correct, I mean we have been doing it for 20 years and we have seen organisations with 4, 5, 6 tiers of management and what is happening the last 2 or 3, 4 years, with a lot of people being made redundant is that middle management has just been wiped out.

* DOES THE ORGANISATION WANT TO EXPAND
* STEN: Yes, how far and how big we want to become, that is another question. We see our role mainly to provide a better return on the capital employed and that has been happening after the last strategic plan and that is by looking at costs very regularly. There is a risk if companies take on too much without having the adequate resources to be able to handle it, either financial or human resources. And we have seen a lot of competitors come into our industry that have made the very fatal mistake of growing very quickly within 2 years and on the 3rd year they can't sustain it and they go bankrupt.
* OTHER COMMENTS
* STEN: We see it as a new way of doing things. I do think that there are probably, and here I'm putting my head on the chopping block, but I do think that there are too many commercial cowboys in the market, the development of a multitude of e-trade companies, can't be sustained. A lot of people are going to have to fall by the wayside, but the smart boys are coming in, creating public companies, walking out with millions, and the poor people who are going to suffer will be the poor shareholders, later on. It can't be sustained. I mean if you look at just Sydney in the last 6 months the number of companies that have been floated for Internet and e-commerce - it's just ridiculous.

It's interesting to watch what's happening in America too. So, I might be wrong but I think that it'll take about 2 years for the thing to sort out. A lot of our customers are in their own way, in the process of setting up e-trading and we do payments and we receive payments by electronic means.

We've got customers that, what we call relationship customers, 25 years, who have developed out in the same way as we did. Some of them are large international companies, much bigger than we are, but they've gone through a similar process. Basically, they have the same problems of staff training and application and selection of software and all that sort of thing, I know at least 2 companies, one company has taken more than 12 months because of the size of the company. I believe we are in a better position than them because we do not have the flywheel inertia effect, we can make things happen and change a lot quicker.
* SWS8 * ACB Packaging & Displays * 22 * Wood and paper * Ian Hottes * Manager * male * 50-59 years * 1999

* PRODUCT PRODUCED
* IAN: Corrugated displays, all point of sale stuff. If you go into a supermarket and you see all Smiths Chips and all those sort of things. Within a few months though it'll probably be the displays and short run corrugated work. I really ought to put that in because that really is what this plant's been set up to do - ordinary cardboard boxes, anything from one to two hundred and fifty, that's what we mean by short run.

* CUSTOMERS national
* IAN: Our customers would be 100% NSW, some of them do have stuff delivered interstate, just as part of an overall order, but our actual customer base is here in NSW.

* INTERNET CONNECTION
* IAN:
We're just in the process of hooking up; it is being set up by our Marketing Assistant. We didn't outsource or use consultants.

* EMAIL
* IAN: Yes, we use Outlook for email in the organisations and outside. Everybody in the office has got it, not in the factory.

* STAFF TRAINING ON EMAIL
* IAN: We've got our own IT department and they do the training.

* WEB PAGE
* IAN: At the moment, no, but it is sort of half finished - they're waiting on some information from me to go into the guts of the whole thing. We do all of that stuff internally, and we've got a fairly big IT department nationally, so, and we've got our own set up at Smithfield.

* PLANS FOR WEB SITE
* IAN: Well, with this, we're only doing it for this business here, because of the nature of the business and the small size of the customers we deal with, we believe that that's the way to go, they're getting more and more sophisticated even though they're small customers. It'll save us, we believe, additional sales staff, we'll be able to do a lot of the dealing over the Internet - advertising, take orders, enquiries, do our quoting, all that sort of thing without actually having to send somebody out there. So we see it as being an economically way of doing business.

We're at the point where we've planned right to the outer edge, that's all done and as soon as we go up we'll be right through from Stage 1 to Stage 3 in one go - on-line payments, on-line orders, on-line sales, order status, links to warehouse. We don't really
have distributors - we do all our own distribution. Maybe FAQs, maybe not. It should have been up a fortnight ago, I'm just a bit slow doing something, so, it will be within the next month.

We exchange documents, orders and invoices - we go backwards and forwards from here to the other sites. We send and receive files via electronic transfers, access competitor's web page, and allow access to organisations web page, obviously, access information relevant to organisations business.

We run EFTPOS and all that sort of stuff here - EFTPOS, Bankcard, and Mastercard and all that sort of stuff. Stage 3 activities will be there in the system to do that.

* BARRIERS TO PLANS

* IAN: We really didn't have any problem with it. We believed we should do it and we just did it - we really didn't find it a problem. We did talk to consultants - I'd been away on a thing with one of our suppliers and in all of that was this sort of stuff that's coming up and they were talking about a particular company that they'd used, so we went and had a talk to them, and then just went away and did our own thing. The charges that they wanted to pass on were enormous, well we thought they were for what they were going to do - we couldn't see why we couldn't do it ourselves, which is quite right, and we were able to do it quite easily really.

Well, the cost of consultants obviously is one barrier I think they're a bit overpriced. There's probably some who are quite reasonable but maybe we just spoke to the wrong one. Security and privacy would be a little bit of a concern too, I think we might find that we've still got some customers who won't necessarily want to pay on the Internet - I think that may be problem. We'll have to wait and see just how it works. We don't really know if it's a problem.

The more enquires we get in here the happier I am really because at least then the advertising part of this is attracting people and we're getting better known around the trade, so I don't see that as being a major problem, all you have to do is turn that stuff into orders.

* STAFF TRAINING ON APPLICATIONS

* IAN: I'm generally satisfied with the level of IT skills of our staff - I think we're reasonably well off. I don't think there has been any resistance, I'm the only one that resists all this stuff - I have trouble with the computers, I'm too old for all this stuff. I can at least turn my on, and get my email and send email messages and print a few reports and that'll do me - anything else somebody can do it.

I think the only way you can do it is to put together the right sort of training within the company, and its got to be made fairly simple for them, and do it in stages - not try and load them up with all the information in one go, I mean just do it a bit at a time.
We do most of our own training in-house anyway; we have our own IT people. The only
time we would send anybody out would be for something for very specific that we don't
have the skills in-house. I mean as far as, for instance, the sales training that we do here I
give them the whole program for that, and that's a six part training thing that we've done
in-house here - written by ourselves and done internally. But bigger things like, I mean if
its stuff for certificates and things like that well we'll send them to TAFE or to the uni,
Institute of Management or whatever it might be.

It's a mixture really - just depending on what we're trying to train for. If its something
very specific we want we would go to the IT people at Smithfield and get them to have a
look at it - we don't have the expertise here to do that, but they do.

* AUSTRALIAN INDUSTRY ASSOCIATION

* IAN: I don't think there's been enough done, there hasn't been a proper drive. Its sort of
been left to individuals to pick up where they think things can be improved or can be
used or whatever, I mean, its sort of make your own money from there really. The sort
of things that should be done through manufacturing groups I would think, you know
where there's associations and different groups of companies, and they have their own
associations, like the printing association or whatever it might be. Really they should be
putting some of this stuff together and running classes for training.

I think within your own industry there would be, I mean if something just gets run at a
general thing you tend not to pick up all the nuances and those sort of things, cause
everybody's slightly different - and I would think that it would be better to be done on an
individual group, and I mean it can be a broad grouping, but not everybody.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE

* IAN: Well, it's quick; get the information out quickly, its there at the customers'
fingertips. It keeps our overheads down too, which is very important. I mean all of that
stuff runs for the bottom line. Cost and profit really, because I would believe that we
will make more money out of that sort of sales than we would out of obviously where
you've got sales people running round at whatever their salaries are, and a car and
phones, and petrol, all the things that go with that, and then this is a comparatively cheap
way of doing business.

* RISKS TO THE ORGANISATIONS BY DOING BUSINESS ON-LINE

* IAN: Not really, the only risk would be perhaps that your opposition get to learn more
about you, that'd be my only concern, but of course the things you don't really want them
to know you don't put on the Internet anyway. So there's probably, there would be
minimal risk to the business out of all of it. As far as being paid and all that sort of stuff,
I don't see that as being a problem because all of that is pretty much lodged before the
goods are delivered anyway.
* MAIN ISSUE FACING THE ORGANISATION THIS YEAR
* IAN: Settling into the new plant is our major issue this year - we've got to settle down a manufacturing plant. Its getting machinery in, running, everything running right, get our costing systems up properly that relate to those machines - its a lot of internal issues, getting the right number of people, getting the right people. A new manufacturing operation takes a little while to settle, so that's our biggest challenge this year for sure.

* DOES THE ORGANISATION WANT TO EXPAND
* IAN: Not really. Too much, from our point of view there's too much of a hassle with that. As far as, if there's anything going overseas it generally gets done through the big plants where they can handle all of that. We really wouldn't be in that sort of market anyway - ours is much more localised.

* OTHER COMMENTS
* IAN: Not really I think you've covered it fairly well. It makes it easy, or it makes it much easier, I mean, IT people have a mind of their own too, but they're all busy on their own little projects, but having them here, I mean, if you really need something you can get hold of them.

We wouldn't be doing, we really wouldn't be doing this if we didn't believe it was going to increase our sales. I think we'll find, well Amcor has an Internet site as an overall thing at the moment, I think you'll find, well there's another division in Melbourne, Service Containers, we're part of Service Containers, they're up on the web site in Melbourne now, so I think you'll find that all our short run plants, whether they're reporting on a state basis or a national basis will all be on web sites, well certainly by the end of the year.
* Sem1 * ABM Plastics * 120 * Other: value-add printing for packaging * Eugene McConville * IT Manager * male * 40-49 years * 2000

* Product produced
* Eugene: Flexible packaging materials, which are then used by other manufacturers: Food, pet food, and wine industries.

* Customers national
* Eugene: 30% Victoria, 70% rest of Australia, no direct overseas market but we print for OS markets.

* Internet connection:
* Eugene: Yes. Set up by IT staff (2) in conjunction with ERP company. ISP Telstra Big Pond for Internet. Service has been good.

* Email
* Eugene: Yes. MS Exchange/Outlook - service provided by Ozemail primarily because of domain name .com. Use scheduling as well as email. Email in organisation and outside.

* Staff training on email
* Eugene: Everyone is on email. Training on MS Outlook by IT staff.

* Web page
* Eugene: Yes. 2 years. Created by external company, which we are involved with for printing graphics as they had expertise. Ozemail on contract. Why: Got to be there to be visible - packaging is global - get more inquiries. Stage 2 of Model (Stage 1 plus email, technical information, elements of on-line enquiry). On-line inquiries directed to MD, Sales and Marketing area, and IT area. Data exchanged drawings in .pdf format.

* Plans for web site
* Eugene: Stage 3 within 5 years - depends on customers (B2B), and what other manufacturers are doing. Packaging is very specialised - specific to a company and a job.

* Barriers to plans
* Eugene: Functionality of integrating current systems (i.e. ERP Financial System for manufacturing developed in the US). ERP are developing some e-commerce functions, which may not suit us. Also design of the web site is important to channel appropriate inquiries. Resistance from small customers - mainly manufacturing is driven by the large manufacturers.
* STAFF TRAINING ON APPLICATIONS
* EUGENE: Staff IT skills are currently satisfactory at this point, but scope to take it to the next level. Top management use email and Internet, but still hand write reports, etc. Training is a combination of external courses and expertise within the organisation. Advanced Excel course would be run by one of the accountants because they use it all the time. Introductory would probably be run by IT staff. Employing people with IT skills is now a part of recruitment.

* AUSTRALIAN INDUSTRY ASSOCIATION
* EUGENE: Not aware of any local associations. AFTA group, which covers graphics. Attend some sessions run by AIG. Not aware of any e-commerce activities put out by AIG.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* EUGENE: Reduced lead times critical in this industry - less lead time less opportunity for things to go wrong. If an order came to use electronically which did not have to be printed would be beneficial, something like Adobe Illustrator quality. Staff would benefit from a changed workload. Organisation would benefit with reduced costs. I think that customers will start to ask a second question - Are you a quality assured company? Do you deal electronically?

* RISKS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* EUGENE: If we don't do it, and the bigger guys do it, then we are at a disadvantage - they will be able to get economies of scale are huge and they will be reduce their cost base to a point where we will become uncompetitive, or very uncompetitive, and the value-add we've got isn't sufficiently attractive to some of the customers.

* MAIN ISSUE FACING ORGANISATION THIS YEAR
* EUGENE: Process improvement - which could involve plans for the Internet.

* DOES THE ORGANISATION WANT TO EXPAND
* EUGENE: Yes, within Australia.

* OTHER COMMENTS
* EUGENE: Only put the What on the web, not How you do it. Networks and cables are holding it back to some extent. WAP will make a big difference and blow it to the next level.
* SEM2 * Unitex Granular Marble * 48 * Other: building product manufacturing * Scott Gavenlock * General Manager (with IT background) * male * 30-39 years * 2000

* PRODUCT PRODUCED
* SCOTT: 4 product lines: textual products, architectural coatings basically, moulded products (facade improvements) dry mix, columns

* CUSTOMERS national
* SCOTT: 70% Victoria, 30% rest of Australia. No OS market - product is too fragile.

* INTERNET CONNECTION:
* SCOTT: Yes. Set up by SmegNet in Mittagong. ISP is Ocean - a local company - very reliable, experience has been good.

* EMAIL
* SCOTT: Yes. MS Outlook. Email in organisation and outside. Staff reaction has been slow - mainly older members of staff.

* STAFF TRAINING ON EMAIL
* SCOTT: Training on MS Outlook by Scott (only computer person) on basics of email and sending attachments. Top management not using it and writes on reports on paper and gets the secretary to type and format.

* WEB PAGE
* SCOTT: Yes. Created 2 years ago by Scott using FrontPage and some knowledge of HTML and then fixed up by an external company. It's a really good site. We think it set a new standard in building products sale - it has been so well received in the industry that other companies are now doing it - we have specification files on it. Other people stealing our ideas is not a concern. We've spent hundreds of thousands of dollars on research and development over the last few years. The product is on the site, but not how to do it. Our products and materials are so vastly different from what others use - they have been trying to find out what we actually use because our products are so much more stable that theirs is. It is patented and is our competitive edge as the moment.

Stage 2 (Stage 1 plus email, on-line enquiry, technical information, links to other pages). Exchange of information includes plans from architects.

Interacting with customers is critical in manufacturing - need face to face consultation so customers can see what they are buying.

* PLANS FOR WEB SITE
* SCOTT: Plans for Stage 3 within 5 years. Some technical problems to be solved, eg credit card numbers and security.

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* BARRIERS TO PLANS
* SCOTT: Order status enquiry - our accounting system integration would be a barrier. Also, our MD reticence at actually opening up our accounting system - he doesn't understanding the concept of firewalls and security gateways. He doesn't use the Internet very much, and doesn't understand how it works. He thinks when you are accessing the site you are directly accessing that computer, whereas you're not, you are actually accessing 50 computers to get to the end result. Andrew is a chemist, he doesn't understand computers.

The purpose of putting up a web page is to get known.

* SATISFACTION WITH STAFF COMPUTING SKILLS
* SCOTT: Never satisfied with computer skills, just as people get set as you want them, someone will leave. I've never been satisfied with skills of the staff, because if you are you are going to stay in your little park where you are now - you'll never be able to expand and grow, basically to reach your goals.

* STAFF TRAINING ON APPLICATIONS
* SCOTT: 90% of training is external. If you use on-the-job knowledge then you are further and further entrenching the culture - which is all well and good if you are happy with the way the organisation operates, but if you are always looking to take the organisation just a little bit further to entrench culture is not a very good move, it is too difficult to unfreeze them.

To employ people with the skills is very hard to get - sometimes you have to employ the person with some of the skills, and then train them externally, and then this is how we want the show run.

MS Office used. Quite a lot of money spent in the last 12 months on training in MS Office, particularly Excel. Expertise is spread around, eg, Word, Excel and PowerPoint, to about three different people. These people provide expertise and training to other staff. Training is expensive. If it costs you money to train people and they leave well so be it. We accept the fact that people will leave after training. It's not going to change in the next 10 years. The Australian IT industry is not providing a service like overseas.

* AUSTRALIAN INDUSTRY ASSOCIATION
* SCOTT: No real interplay with AIG. I'll keep an eye on what they have to offer, but it is rare that I will go along - I've been to a couple of breakfasts. I'd like to go the Society for Computer Professionals because not so much what the presentation is offering, it's who the people who are sitting there and what they know - building yourself a little private network of your own is so much more beneficial than actually going and listening to someone talk on the dais with a PowerPoint presentation.
You can generally tap into other people's ideas and what other companies are doing, and people are very open to bragging - if someone has done something so far ahead - they are going to want everyone to know about it - so you can pick up there.

* BENEFITS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* SCOTT: None at the moment, but in five years time the benefit will be that it will bring the world closer to us. We are looking to an export market - but we have a few things that we need to deal with within Australia first - as soon as those issues are covered and we have our market set up in Australia we will find somewhere overseas, probably skip Asia and more into Europe I suspect. It is something that is part of the plan.

* RISKS TO THE ORGANISATION BY DOING BUSINESS ON-LINE
* SCOTT: Always the risk that someone internationally will pick up your product, because patents don't go past the boundaries of Australia, unless you go to international patents for products. But even then copying is going to be the big risk - you may want to set yourself up a licensee in a European country somewhere and basically say here is your licence you pay us a $1m and you have the whole of Europe that you can market to. Well, will be good for the guy for a couple of years, but how is he going to get his $1m back, with 200 other people see the product and think they can make money out of this, and they pick it up. Competition is the biggest risk, plus a loss of technical knowledge - once somewhere else has got it then you've lost the knowledge.

* MAIN ISSUE FACING ORGANISATION THIS YEAR
* SCOTT: Distribution - of production - we have managed to grow our sales to a certain level where we can't keep every customer satisfied, so that's our biggest challenge. We have our own truck, but also use couriers and taxi trucks. Some do a good job, some don't - it all care, but no responsibility. I don't work for you - as long as you pay my bill I don't care - that's the attitude.

* DOES THE ORGANISATION WANT TO EXPAND
* SCOTT: Australia and overseas.

* OTHER COMMENTS
* SCOTT: In management, women now fit in just as well as men.
* I think there is a future for manufacturing on-line but not a big one. On-line business will be more service related and tangible products.
* WHAT PRODUCTS ARE PRODUCED?
* RUSSELL: Three revenue groups: industrial automation 80% electronic products which we import and the other 20% is mechanical products of which about 5% are manufactured here. Over the last 5 years we would have made about 20%. The other revenue group is environmental products, which are entirely manufactured in USA by our principal company. The third revenue group is petroleum products, which we define as mechanical type products (as opposed to electronics) and we would manufacture about 40% per year.

Up until 1992 we did more manufacturing here. As the market evolved and as that product got to the end of its life cycle, the company did not embrace a lot of the new electronic new products, which would have allowed it to move forward, and it stayed stagnant. Through market attrition of those products, and as the older people left, the company moved forward as it is today.

* ARE YOUR CUSTOMERS MAINLY IN VICTORIA, AUSTRALIA, OR OVERSEAS?
* RUSSELL: 90% Australian nationally, 10% in New Zealand and South East Asia. 60% Victoria and NSW (30/30) rest evenly distributed in other states.

* DOES THE ORGANISATION HAVE AN INTERNET CONNECTION?
* RUSSELL: Yes, since 1995. Set up by Russell (not only computer person). ISP is Ozemail, not happy with them, poor service. We will change very soon.

* DOES THE ORGANISATION USE EMAIL?
* RUSSELL: Yes, we use MS Outlook inside organisation and outside. Reaction by staff is mostly positive.

* WHO CONDUCTED STAFF TRAINING ON EMAIL?
* RUSSELL: Training at elementary level by Russell. Fear and reluctance has been evident. Once involved they become more responsive. Factory floor staff have faced a big challenge.

* DOES THE ORGANISATION HAVE A WEB PAGE?
* RUSSELL: Yes, since last year. We have four domain names, which we want to look at the same site. Plan to use the .com domain as it is cheaper and has less regulations than .com.au Created by WWW Institute. Basic page at the moment, but we hope to do our own development in-house.
The idea was to have a presence on the Web like everyone else, and to get some experience with a web page as opposed to just email - so we outsourced and see how they would do it and the costs. We haven't advertised it for the 12 months to see whether people could find it on their own.

In the next 12 months we plan to change the domain name because it is an easy name and catchy (veeroo.com) and hopefully easy to find. All advertising will be on the web site - our web site will look the same as our brochures, catalogue and advertising.

At the moment we exchange .pdf and .zip files with our principal suppliers overseas, and to a lesser extent with customers, eg MS Office files, quotes, orders, etc.

We get much more information now on our competitors than we ever did before.

* WHAT STAGE FOR THE WEB PAGE?
* RUSSELL: Stage 1 plus some elements of Stage 2 (on-line enquiries and email). We are putting the added value in, the technical information, downloadable product manual and specification sheets, and frequently asked questions. Also the distributor information and pricing information but not the links to other pages. Email messages go to 3 people in the organisation - one person responds for refers to others for action - 3 to 4 downloads per day. Definitely at Stage 2.

* WHAT ARE YOUR PLANS FOR WEB SITE?
* RUSSELL: Plans to move to Stage 3 within the next financial year. Mostly for the global market, i.e. South East Asia, rather than for our pre-existing customers. The unknown customers may come across our web site by using multiple search methods and find that we can provide a method of buying easily, especially in South East Asia because we can ship very quickly to there. It is our target market, for example, if you think globally, a company like us and the US, or UK or Europe in South East Asia - we can serve them the best, because of the same time zones. I am committed, at an experimental stage, to see if we can do anything in that part of the world, and then maybe we can tie it up with some sort of advertising in magazines that are common in their market. These plans will be driven within the company, in anticipation that customers will demand this type of service. It is the next progression, like electronic payment banking - at least 30% of our customers now do it. A lot of companies are starting to embrace the new technologies and are saying "do it". The early adopters have broken the ice, and others have come on board, so the next wave will be quite a big one.

* WHAT ARE THE BARRIERS TO ACHIEVING THESE PLANS?
* RUSSELL: For us the biggest barrier will be cost of doing it. I cannot see any other barrier other than cost. I know when you get to doing a proper e-commerce system it either done on your own server, which is costly, or in our situation, it will have to be outsourced to somebody else. What I have learned from companies who have done it, the early adopters who have been breaking the ice, is that it has been very, very costly,
although, I think, in that they have learned a lot, so hopefully those next ones won't have to bear the same cost.

As far as staff are concerned I think it will be a new way of doing business, maybe some inertia to change, to the transition of learning something. We are too small for resistance, basically a tight knit group. Although 12-15 months ago, with the old management, it would definitely have been a problem.

A lot of consultants have a similar background to me, and are learning at their customers expense. They are earning very high fees, at the customer expense. The area is so new, and lack of experience. IT is a very large field, and it is hard to know it all. A lot of consultants do hardware, software, etc a little bit of everything because they can afford to do so. Its the smoke and mirrors effect.

* ARE YOU GENERALLY SATISFIED WITH LEVEL OF IT SKILLS OF STAFF?
* RUSSELL: Yes, there will be problems with going to a full e-commerce operation. We will be putting on an engineer, who does other engineering duties, with a view to training them up to be more proficient in IT and web-based applications such as e-commerce - only because once we get to that level, we don't want to rely totally on consultants and paying exorbitant fees, when we are smart enough to know what needs to be done, and we are not going to be carrying their errors at $150-200 per hour.

* WHAT IS THE MAIN SOURCE OF TRAINING?
* RUSSELL: Training on MS Office and applications have been by external courses either TAFE or community, which is more relevant to the age groups within the organisation. Not that I think MS Office is the best package, but it is transportable. Lotus is its biggest competitor but it is not that widely adopted. MS Office is also simple to use, eg menu bars are all the same - Word, Excel, Access, PowerPoint and Outlook. Office staff help each other and feel comfortable with the packages, and use applications in different ways.

Managing Director is a CPA and very computer literate. Previous management were totally opposed and is probably a reason for transformation over the last twelve months when these people retired. For example, previous management did not use the computer system, which was installed about five years ago and does more than we want today.

* WHAT DO YOU THINK THE AUSTRALIAN INDUSTRY ASSOCIATION COULD DO TO MAKE MANUFACTURING AWARE OF THE INTERNET FOR DOING BUSINESS?
* RUSSELL: No involvement with AIG as yet. I'm a new player in the management area. I do see some material from AIG, but not specifically e-commerce. We were very involved with Australian Chamber of Manufacturers for a very long time (have been subsumed by AIG). We will be using the training group of AIG as a guide for the new
appointments, because one will be a Traineeship. Through the training group I have seen references to local groups.

* WHAT DO YOU THINK ARE THE BENEFITS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* RUSSELL: There is a number of opportunities and a number of risks, depending on how the transaction is conducted. Firstly, we are involved over the phone, or face to face we have a lot more knowledge of the transaction. If it is done on-line then we do not have much knowledge of the transaction, it is very much a clean cut transaction where no information does get exchanged, other than identifying what they want and getting it quickly - so for the customer it is a way of efficiently getting something, provided they know what it is that they want, and how it applies to what they want to do. A lot of our products are very technical application specific products, and quite often basically we are involved, at least the first time. We know most of our customers.

I think for us the biggest benefit is the widening opportunity, because there a lot of bigger companies overseas, especially South East Asia, which, I believe, are quite intuitive, especially in manufacturing. We have five customers in South East Asia who have just found us someway over the Internet, and they buy a lot of product from us. They know what they want, they know how to apply it, and they are very simple customer for us. I'm thinking, if we can find more customers like that and do simple transactions, that's good business. Very clean business. I guess if we look at our top 15% of customers, then they fit that bill. If we can reach a wider geographical zone on that we are going to attract a lot more customers than we actually want, rather than ones that we spend a lot of time. It like 80% of your business comes from 20% of your customers, and the 80% you spend a lot of time on to achieve nothing. You got to have them, its all part of the wheel.

* WHAT ARE THE RISKS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* RUSSELL: I've been doing a number of transactions to see how they make a transaction, the level of information that they gather before they make a transactions. I've purchased some software in the last twenty four hours, specifically to see how it works, how long it took me to get it, what sort of feedback did I get. One of them has been very interactive, that is how we want to do it. The other player is kind of like an email back hole on the Web, and I guess, I'll wait for something to turn up.

* WHAT IS THE MAIN ISSUE FACING ORGANISATION THIS YEAR?
* RUSSELL: Because we have just restructured, the main issue this year will be the application of the restructure, of which the Stage 3 Web site is part of it.

* DOES THE ORGANISATION WANT TO EXPAND?
* RUSSELL: Yes, in Australia and overseas.
* WHAT PRODUCTS ARE PRODUCED?
* ANTHONY: School apparel and some accessories

* ARE YOUR CUSTOMERS MAINLY IN VICTORIA, AUSTRALIA, OR OVERSEAS?
* ANTHONY: 50% Victorian, 50% Australia, <1% overseas
In the future I perceive ourselves as not necessarily manufacturing, I see our strengths in sales and marketing. However, we will continue to manufacture, I see us taking a lot of our focus away from that area. Potentially, over time, I think with the way the Rag Trade is going we will be moving towards purchasing the finished product, potentially from overseas.

* DOES THE ORGANISATION HAVE AN INTERNET CONNECTION?
* ANTHONY: Yes. Set up by IT staff (2 people). ISP is Connect.com from November 1999, experience has been very good. Changed from previous ISP, CyberNet, due to bad service.

* DOES THE ORGANISATION USE EMAIL?
* ANTHONY: Yes, MS Outlook, within the organisation and outside. All staff with computers have email. Manufacturing staff do not have a computer. Admin, production, management use email daily.

* WHO CONDUCTED STAFF TRAINING ON EMAIL?
* ANTHONY: Internal training sessions on email, but not extensive. We've been on-line for about 2 and a half years, so new staff haven't been sent to external training, we have been training them internal.

* DOES THE ORGANISATION HAVE A WEB PAGE?
* ANTHONY: Not at this point. We have an internal Intranet, but at the same time we have a domain name. Also, we do have a very basic web page, it is a pretty boring page. We did it about 4 or 5 years ago. We had a copy of one of our brochures transcribed and it cost about $700 from memory. One of our sales reps was speaking to Mildura Primary School, and they said they found us through the Internet. Someone in the organisation at the time created the page.

* WHAT STAGE FOR THE WEB PAGE?
* ANTHONY: Planned to be out at Stage 2 in two years, and then Stage 3.

* WHAT ARE YOUR PLANS FOR WEB SITE?
* ANTHONY: We are planning to have a site. Predominantly, every marketing situation that we have been attending have said to us that unless you know why you are putting
this through and how it is going to benefit your organisation, and generate income if that is your outcome, then do not waste your money, and I have followed it very clearly, as I had other marketing ideas that I can work on. Even though we use the web, is it a question of just information and having fun in terms of looking at it, or is it going to be an active medium for the organisation, and we haven't developed that active medium concept for the organisation totally.

Within two years we will have active site. All three stages will be part of the process, we want to be able to look at order entry status and on-line sales. We will have two stages, Stage 1 and some of 2, and then another stage to include some of Stage 3. At the moment we trade with schools as our customer base, so e-commerce with credit cards, I can't see that happening straight away. Our first step would the order entry system and if they want to enquiry on customer sales that would one side. Depends on how our marketing strategies are, and if we expand and we widen the other side of the e-commerce tree.

* WHAT ARE THE BARRIERS TO ACHIEVING THESE PLANS?

* ANTHONY: The integration of the existing day-to-day systems that we have internally, and how you want to display the information. You might get the situation where it just doesn't work. Before you hang any serious washing out make sure it works. All work will be done externally, web site and standard design, but integrating the data will be done internally. Maintenance, however, will be done internally.

Barriers will be proper planning (research of knowing what it is that we want to put on the site) and cost. I can allocate a budget to it, but I need to know what the budget is for that I allocated to it at this particular point. I need to know where it fits in overall.

We would be looking at increasing our sales from direct usage, so we would have the product line that people could purchase off the Internet, which would become a window of opportunity at that point. The major things that I would be looking for would be using it as an information source for a database, so getting specific information of a customer and getting pretty clear in those areas. I don't see the end-user having a great need for primary school wear at this point, although I would potentially see us linking to a number of good fun sites for kids. We will probably link to KidsNet, and Luna Park and anywhere where the kids can have a game, Disneyland. We will provide links to those areas, but essentially we want out parents to choose to purchase off the Net.

We want to be able to improve our communications and we see this as a medium to do so. Every time we put a newsletter out we put a newsletter out through there as well. We want our customers to know what is going on with their orders, or status or things like that. We have focus groups now that we have been working on with our customers, and we would rather than Net meetings with our customers instead of just focus groups. We often ask our customers what they know about the Internet usage and so on. There is a survey that goes out with every order than goes out the door, and the customer have a
choice to fill it in, and we get about 3.5% response on average, and we are now getting about 40-50% now of people that use the Internet. The schools themselves are on it, but they are not our target market. Our target market is the uniform lady who is aged somewhere between 30 and 45, 99.9% female, mothers and don't know how to use it extensively. I would see the school themselves, as a link to the uniform ordering page. The parent may come through us, and we can help the school by providing a uniform ordering page on the Internet.

* ARE YOU GENERALLY SATISFIED WITH LEVEL OF IT SKILLS OF STAFF?
* ANTHONY: Generally, yes. There is a lack of competency in some areas. We should be able to have a measuring point for each individual in terms of each computer skill that they have. It hasn't eventuated yet, but we are looking at it for a while, to get a medium across, so we want to be able to find out what is the skill competency of the position requirement. Where are they at? What needs to be done to move them to the next level where they need to be at.

Recruitment is a pretty serious focus for us. We are focussed towards employing people who have the skills.

* WHAT IS THE MAIN SOURCE OF TRAINING?
* ANTHONY: External courses for people who were going to be influencing most of the others. Generally, when we interview new people, we would interview people who have the skills, particularly in the relevant areas. Whilst we don't ask that they have Outlook experience, we ask them to have email experience, or Word or Excel, or specific skills that we test for. We use MS Office, Word, PowerPoint, Excel, we don't use Access. Nearly all would use Word, Excel and Outlook. We do have weaknesses in our file management, people don't have a good grasp of file management overall. We have public folders and they are an absolute nightmare, and even now it is not really synchronised. We have department folders and we started to go through and clean a lot of this stuff up in folders and sub-folders, and put them into logical categories and so on, and it hasn't been done well. The other problem is that the public folders are open to everyone and open to corruption by anyone as well. We are concerned about it.

Depending on the situation, I would consider a combination of external courses and internal training session as the main source of training. If it was a new development of an application then we would consider external courses, or locking them away in a training environment, but quite often if there is an improvement in the features of software the staff communicate quite frequently with each other.

* WHAT DO YOU THINK THE AUSTRALIAN INDUSTRY ASSOCIATION COULD DO TO MAKE MANUFACTURING AWARE OF THE INTERNET FOR DOING BUSINESS?
* ANTHONY: No, they send us material. I haven't been to anything for a while, some of staff have. Local industry associations include Kingston Mossedge - 2 or 3 of us attend a
breakfast meeting probably six times a year. It's a business breakfast group. Being local definitely helps. I don't think they are good, boring. The times when I have had to ring them to ask for information I haven't found them highly beneficial to the organisation. When you want them to do something you feel like a number. I preferred the ACM when it was around, I think I had a lot more personal contact with them. Now that they are a bit more global, it is a bit like the bank - pick a number, take your time and we'll get an operator to respond to you. The Moorabbin industrial area is the biggest industrial area in the southern hemisphere. There needs to be a lot more done for this specific area overall. Some of Australia's biggest companies are here, Coca Cola, Philip Morris, etc.

* WHAT DO YOU THINK ARE THE BENEFITS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* ANTHONY: Closer interaction between customers and ourselves.

* WHAT ARE THE RISKS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* ANTHONY: Whenever you are communicating with a customer, you have an opportunity to move the barometer either in a positive or negative direction. I think that you can by virtue of having a site, can create not necessarily a positive image. Also, another risk is not being responsive enough - the educated they become in what's occurring, you are getting measured against the other sites and what's available. The cost downside of keeping that update. As technology significantly improves, as we know nothing comes cheaply, and everything has to change around it, eg more PCs, or more servers, or more operating programs, or those sort of issues. It's not the cost itself, it's the back hole of running costs. The greatest risk is the security risk of corruption through email on the web site. Getting the design right and navigation around the site.

I've been using amazon.com to purchase books, to get experience and see the problems.

* WHAT IS THE MAIN ISSUE FACING ORGANISATION THIS YEAR?
* ANTHONY: Structure of the organisation.

* DOES THE ORGANISATION WANT TO EXPAND?
* ANTHONY: Yes, Australia and overseas to a smaller extent, probably New Zealand.
* WHAT PRODUCTS ARE PRODUCED?
* BILL: Plastic seals that fit on pistons for compressors.

* ARE YOUR CUSTOMERS MAINLY IN VICTORIA, AUSTRALIA, OR OVERSEAS?
* BILL: 50% Asia, 30% Australia, 20% Victoria

* DOES THE ORGANISATION HAVE AN INTERNET CONNECTION?
* BILL: Yes. Set up by Bill and IT Company. ISP is Ozemail, but they are a bit of a pain. Ozemail has split their business and personal customers. To get help is an absolute pain, they use voicemail, and I try to not deal with them. As far as getting the email is OK - its the help side.

* DOES THE ORGANISATION USE EMAIL?
* BILL: Yes, we run Novell network with Groupwise as the email. Email is used inside the organisation as well as outside. All staff use email. No resistance, it was a tidal wave when it came in, about 2-3 years ago. I've used it longer. Dealing with Asia its good, it's the best way.

* WHO CONDUCTED STAFF TRAINING ON EMAIL?
* BILL: I trained the staff - no outside help. It's not bad to use. I use MS Outlook Express at home. I think works nicely with the other packages. When a new person arrives on email it will throw them into the Address Book, Groupwise doesn't do that. Groupwise is still quite good.

* DOES THE ORGANISATION HAVE A WEB PAGE?
* BILL: Yes, the new page has been there for 6 months. Before that we had an old web page that had been there for about 2-3 years. I created the new page. I'm the only computer person, everyone knows a little bit here and there, but I'm basically the main person. I did the web page by myself, registered the domain name and got the IP address. I applied for the permanent connection, and got the details then we have a Linux firewall and I needed someone to set up the Linux firewall and get it to talk to the Novell server - the technical communications. I suppose to look after the factory, not play with the computers.

It was a strategic issue related to our company and the way we interact with the Group. We are a manufacturer and we sell to the sales department of the Group, and they sell to the end user.
Sales companies in other countries. We were bought by the Group about 5 years ago, and we were told that we would be a manufacturer and sell the product to trading companies in Asia, who would sell to the end users, the refineries and so on. We had to
generate a brand for ourselves, because we were purchased any brand and equity we had disappeared when the old brand left. When trying to generate a name for ourselves, well the first thing is to get a web page up and people can see you at least. Two years ago, when I started I used to use it a bit, now I use it all the time. If I'm looking for promotion on a company it is the first place I go, I don't bother with Yellow Pages any more.

You have to be smart - we copy from other people, but we also have a lot of innovative things going on with materials, special materials that you cannot copy. They are too expensive to patent, but I'm not bothered about putting things on the web. Its not easy to know what the materials are, we'll give it a name, but we won't tell anyone what it is.

* WHAT STAGE FOR THE WEB PAGE?
* BILL: Stage 2, but we are bordering on Stage 3.

* WHAT ARE YOUR PLANS FOR WEB SITE?
* BILL: The Group has a couple of software programs that they run which is a company Intranet which I knew existed, but I thought it was mainly dealing with the other side of the company, the other products, not our products so I wasn't really interested. I'll get onto that within the next 4-6 weeks. They also run a very smart database server, I think it runs Oracle, and it is a global database on the compressors, which the product is specked in - that has all the information of compressors, world wide. I need to work with the guys in the UK to add our products as well, and from there we look at being able to generate case histories, quotations, and all sorts of things. They are two things, which I will probably get working on in the next 4 to 6 weeks.

Also, I am in the process of linking order status enquiry. The current system is a manual set-up, essentially we had a supplier in Sydney that supplies us this material, and it is all very standardised stuff, and has lots of paperwork, phone calls, fax and so on. I think it is just a bit pointless having so much work when it is all standardised. I want to set up a database on the server, which they can see, and we can see, and we'll place requests for quotes on it, and they can reply, and also tell us when orders are due. If we can both see it then it would be beneficial. We exchange drawings and quotes via email with our customers.

Within a year I would like to have those two applications running, and also the database. To go further, on-line payments, we already do a bit of work with the bank for wages and tax. All our business is business to business. All invoices are pulled together and balanced out in a month with the other companies in the Group - this is done electronically.

* WHAT ARE THE BARRIERS TO ACHIEVING THESE PLANS?
* BILL: The short term barrier is my knowledge. The hardware is not that much, it is just getting the people out to do it, and also getting them to understand what I want. It's actually not easy to get IT people who know what they are doing. There is a guy who
works freelance who set up our Linux and he is a real smart guy, and I have been trying to get him to help me with this database, but he is just so busy that I hardly call him. The other option is for me to do it myself. I'm quite interested in it, and I continue to learn and try to do it myself.

Regarding concern about security and privacy of transactions I'm of the opinion that a lot of business, if you want to do business properly, then you have to trust your suppliers and customers. Unless you can generate a good trusting relationship you are not going to have a good long term business partners anyway. So I'm not that worried.

Consultants charge about $120 per hour and are very expensive. The quality of their work depends on how well you know computers, because I've had these guys up here complain when we have had our consultants come in and they have complained about "he's had the system down all day, and he hasn't done anything". I see it differently, because I understand where he's coming from, and I understand what I have asked him to do, and I also know how hard it is to keep up with the everything. I can barely keep up myself, and the guys, well we run Novell and most sites run NT - he's the one Novell guy within the consultant group that knows what he is doing. I also know, this is a funny story, where I last worked, the Financial Controllers thought we would flex his muscles when it came to the IT system, especially the cost, and had a go at the IT company that was maintaining the system, he got fed up with them and got into an argument and basically sacked them, and brought in another consultant who immediately said, "well I didn't set this up, I don't know any of this", and charged a whole lot more to come in. He (financial controller) was ignorant, he should have know better.

* ARE YOU GENERALLY SATISFIED WITH LEVEL OF IT SKILLS OF STAFF?
* BILL: The computer skills of staff are OK. I think they are lazy, they do rely on me, probably my fault. Generally speaking they are pretty good, the engineers run AutoCAD and they are very good at that, they know what they are doing.

* WHAT IS THE MAIN SOURCE OF TRAINING?
* BILL: MS Office is the main application, Word, Excel. There are two directors and I am one of them, and we report to Head Office. We all use applications to do reports, etc. and Excel. I do the training, I do it all.

On-the-job training is the main source of training by me.

* WHAT DO YOU THINK THE AUSTRALIAN INDUSTRY ASSOCIATION COULD DO TO MAKE MANUFACTURING AWARE OF THE INTERNET FOR DOING BUSINESS?
* BILL: Generally speaking I don't have much to do with AIG, I occasionally attend one of their seminars. They send a lot of material, but not a lot on e-commerce.
A sub-group of the AIG, which is a Personnel group that I am aware of. Dandenong and District Personnel group which deals with personnel issues, I am a member, but don't get involved with them. The only thing is that they do surveys on salary in the region, so I generally use these surveys to see what is going on. Other industries are involved, but the survey is only on manufacturing, it is all to do with fitters and turners, and machinists. I have heard of the South East Network.

* WHAT DO YOU THINK ARE THE BENEFITS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* BILL: Flexibility and efficiency, flexibility is very important in this company. Lead times are very important, I think we have our lead time done as much as we can, but as far as the information flow goes, its good to have a good channel but you have to have someone at the other end who needs to respond. The lead time meant organising a good system with the supplier in Sydney, and we have a good system running with them, except that it is manual, which could be automated.

* WHAT ARE THE RISKS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* BILL: Upgrading software is a risk. We had the hard server crash about 3 months ago that was pretty expensive. That was interesting, we had a hard server crash and luckily we had backed up. There is nothing like a hard server crash to know where your deficiencies are - there was a rapid learning curve at that stage. It took 2-3 days to recover - the biggest pain was the lack of email - everything else was annoying, but it was very bad not having email.

* WHAT IS THE MAIN ISSUE FACING ORGANISATION THIS YEAR?
* BILL: We need more sales, which is a regional problem, not a whole company specific problem - generating sales. The web page will help indirectly, not directly, part of this will be to improve our image. We're in the background, we need to bring ourselves into the foreground, for instance, getting ourselves on the Intranet and show that our product group is on this Oracle server, because they use it, they will see us there - they don't see us there now. The other issue is efficiency - how efficient and how flexible we are. We have an old product and other make it, but within the Group we are the only one. Outside the group, other companies make the product, we are up against the competition. It's not the competition that is holding us back, it's the reluctance of the Group to sell the product, which is holding us back. They are not used to selling valves for years and years, they feel uncomfortable - you need to be far more technically competent to sell that, they are not, they are just salesmen, they don't have the technical experience and skills to sell it. Because of all of this, they stick it in the background and that's is where the problem lies.

* DOES THE ORGANISATION WANT TO EXPAND?
* BILL: Yes, expansion overseas. Australia is a saturated market.
* OTHER COMMENTS?
* BILL: When I came here they worked in an absolutely terrible state, from an IT point of view. They were doing things manually, manual quotation registers, they had fax machines sort of working, they did not how to fax - they were handwriting out faxes. I would have to say that in the last 4 years we've probably reduced the workload to a point where we are having trouble finding work for one of the ladies upstairs. All of the IT has reduced the workload a fair bit. The staff handled the transition, and I think they will handle the next.

MRP/ERP software is half employed here. They have these programs which do everything, ordering, scheduling - it is rubbish if you need even the slightly amount of flexibility. There is no program, which does everything. If you are making the same product all of the time, then fine, but, we are using just the minimum, accounting software to do the accounts, the stock, quotations, sales orders and that's it. Even though we have the additional units to run the MRP within the company I refuse to implement it, because it restrict us too much. I've spent a lot of time setting up our own databases, and software and tailored it to suit us - it's not too hard - you use MS Access, Excel, and Visual Basic. You can get it to talk to each other. I'm of the opinion if you want to get the best out of company in a software point of view, you use one of those packages with just the basics on it just to run the standard stuff, and you tailor the rest yourself - I've tailored part of the stock stuff on Access, the costing is done on Access because we can suit ourselves exactly. A lot a people don't do it. A CEO will wander into a company and think he is doing a great thing by buying a $100,000 package, and thinks it is going to improve the efficiency by 50% and someone has told the CEO you are better off buying $20,000 package and getting a couple of the keen engineers who really know what is happening on the shop floor to link in with the package and design their own thing, then I think that is a far, far better way of doing things.
* WHAT PRODUCTS ARE PRODUCED?
* VIC: specialised carpet made according to specification

* ARE YOUR CUSTOMERS MAINLY IN VICTORIA, AUSTRALIA, OR OVERSEAS?
* VIC: Victoria 80% Australia 10% Overseas 10% (United States) - hoping to turn those percentages around - our carpet is expensive in Australia, but not expensive in US. We could say make a carpet for $120 and it sounds expensive, when converted to OS currencies it doesn't sound expensive.

* DOES THE ORGANISATION HAVE AN INTERNET CONNECTION?
* VIC: Yes, set up by ISP - Optus - it was a pretty good deal, service has been OK. I went away from Ozemail and HotKey.

* DOES THE ORGANISATION USE EMAIL?
* VIC: We use MS Outlook, but I hope to change to SBS (Small Business Server). Currently we only have one email account, with SBS everyone will have their own. We use email within and outside the organisation. We send files electronically from the office to the manufacturing computer.

* WHO CONDUCTED STAFF TRAINING ON EMAIL?
* VIC: No training was given to the staff to use email - they picked it up themselves.

* DOES THE ORGANISATION HAVE A WEB PAGE?
* VIC: Yes, I have a small web page to show people what we do. It is connected to my home socket. I created the page about 4-5 months. So many people kept on asking, can you describe what you do, then they say can you send me a sample, well the web page does this.

* WHAT STAGE FOR THE WEB PAGE?
* VIC: The current page is Stage 1.

* WHAT ARE YOUR PLANS FOR WEB SITE?
* VIC: I have written a three stage plan for the new web site. Our first stage will include Stage 1 and parts of Stage 2. Frequently asked questions is a good way to describe our product. In the second stage we will probably do some of Stage 3 features, maybe online orders. We plan to be at Stage 2 within 6 months, and 1 year for Stage 3.
* WHAT ARE THE BARRIERS TO ACHIEVING THESE PLANS?
* VIC: Time and money are the barriers. Actually I don't think its cost, the price of getting stuff on a web page done by an outside company has plummeted. I took the same quote I got for somebody to produce a good Stage 1 with email, FAQs and technical information, a year ago it was $40,000, and without letting the guy know that he had quoted on it a year before, it was $6,000. A lot of people out there are only good at FrontPage or Dreamweaver. Staff will not be directly involved in putting up the web site, but we already pay for stuff over the Internet, we already pay our wages over the Internet, we already pay any customers we can over the Internet. I think it will make it easier, because if we can make the World Wide Web the way in which every outsider, even though they make work for us, sends us a design that we have to make, and it will be very easy for him to put some filters and things like that to send it back to the guy, right this isn't eight colours, you have twenty six colours, and will save staff (Kevin) time. We can have a pre-download on it, we could analyse the drawing as to how many colours that we see for making carpet, and what size we think it is that you are sending us. We say its 60 metres by 90 metres, then you realise that you have 10 pixels across instead of what? upfront.

Security of transaction is not a concern of mine. In my circle of friends I can think of tonnes of people who ring up someone and quote their credit card number yet they will not send it over the Internet. In both cases the transaction is guaranteed, because there has to be a delivery address or something got to be delivered. If you buy software over the Internet they can prove that they delivered it to you over the Internet. When someone hacks the line, they can't bill you and you have to pay the bill unless they gave you a service.

* ARE YOU GENERALLY SATISFIED WITH LEVEL OF IT SKILLS OF STAFF?
* VIC: I am generally satisfied with the level of IT skills of staff. I have most disappointed with one and two day courses. When I have sent away people to do courses in most cases, the people have already been at a greater level than what is being taught. We use Word, MYOB, Excel, Adobe Photoshop, Corel Draw, and FrontPage. I've sent people to Photoshop courses quite a few times - this has been unsatisfactory. I've sent people to a MYOB course and that was very good.

* WHAT IS THE MAIN SOURCE OF TRAINING?
* VIC: External training courses and on-the-job training by members of staff. I wouldn't employ people in the first place (i.e. afraid of using a keyboard) unless they had skills for were willing to learn. The guys out there (factory floor), one of my critical questions is 'what is your email address'. If they leave it blank, then I am going to question them a fair bit about they know about computers. If they have an email address it is part of the way they work. I expect computer literacy (turn on the computer whether for games or whatever) rather than specific computer skills. There is not a guy here who doesn't touch a keyboard every couple of hours.
* WHAT DO YOU THINK THE AUSTRALIAN INDUSTRY ASSOCIATION COULD DO TO MAKE MANUFACTURING AWARE OF THE INTERNET FOR DOING BUSINESS?
* VIC: There has not been enough done to make manufacturing aware of doing business on-line. I used to go along to quite a lot of things just to learn about doing business in various countries. I go not so much to network but to gain knowledge. I haven't noticed much come out about doing business on-line. I am aware of local industry association, but we are a manufacturer, but really our principal focus up until now has been R & D, rather than manufacturing and sales. One of things we have to do fairly soon is to get another director who is more that way oriented.

* WHAT DO YOU THINK ARE THE BENEFITS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* VIC: It will add to a smoother expansion, and customers from areas we did not expect. I actually think that our product, once we go on the Web, I wouldn't be surprised if we got an order from somewhere like Fiji, or Samoa, or Tonga, or back woods of New Guinea, where the guy can't get out and find the stuff.

* WHAT ARE THE RISKS TO THE ORGANISATION OF DOING BUSINESS ON-LINE?
* VIC: I don't see any risks. If you are worried about technical issues, like the Web going down, then you should be worried about the electricity going down - then in the same category. You wouldn't have the Web server in the office, you would get someone to host it who is in the Web business. I would expect the cost involved would be borne by the extra business.

* WHAT IS THE MAIN ISSUE FACING ORGANISATION THIS YEAR?
* VIC: Finding good sales staff. I intend to get an Intranet with my sales distributors, which will be open to the group.

* DOES THE ORGANISATION WANT TO EXPAND?
* VIC: In Australia and overseas.

* OTHER COMMENTS?
* VIC: Manufacturing is not a clean enough industry for females. It's not attractive, and because they don't understand the grassroots of it, they don't succeed in the management side.

Here is another way to show how serious I am about the Internet. I am seriously thinking of instead of having sales reps. going around calling on people, I will just employ a whole lot of callers temporarily, the door to door people, to take around postcards and a little sample, and say 'this is what we make, go and have a look on our web site, when you have time. I will not take up your time now'. The beauty of this is that we can hit a city, discover who logs on and fills out our questionnaires. The large number of people
who got the call, they have already seen the ad, you could do Melbourne say in a week with 20 people, then go into Sydney, do Sydney in a week with 20 people. They are not skilled in the product or anything, chances are they could be pretty girls. We've got a new bin supplier out here. The girl who came to sell the bin had such a personality that she made me look at the contract. She knew nothing, and I said 'what's the out clause', and she said 'what's that?'. She knew nothing about what she was selling, apart from we have bins of this size and this size.

You have to think bigger than people might copy - show what not how. This thinking is holding manufacturing back. It's just as dangerous talking to a customer.
REGIONAL INDUSTRY ASSOCIATIONS INTERVIEW QUESTIONS

* id * name of industry association * region * name * gender

1. What is the role of {name of industry association}?

2. How does local industry participate in {name of industry association}?

3. Where does the funding come from for {name of industry association}?

4. Has {name of industry association} had any involvement with AusIndustry?

5. Has {name of industry association} had any involvement with Australian Industry Group?

6. Some manufacturers see the Internet as a way of expanding their business overseas; do you see a role for {name of industry association}?

7. How many women participate in {name of industry association}?

8. What percentage would be small or medium enterprises?

9. 70% of the Melbourne study, and 100% of the Sydney study though that not enough has been done to make manufacturing aware of doing business on-line. Your thoughts?

10. The Sydney study identified three groups: early adopters, those who are aware, and those who are not aware. Internet stages of maturity were used to evaluate the organisations. In Sydney 30% had a web page, and in Victoria 45% had a web. Your thoughts?

11. Participants in the survey rated barriers to doing business on-line (Survey Q22). From your experience in the area, what would you see as the highest barrier?

12. From your experience with local manufacturing SMEs, what would you consider to be staff IT skills and training methods?

13. Any questions or other comments?
WHAT IS THE ROLE OF THE INNOVATIVE TECHNOLOGY NETWORK (ITN)?
ROSS: ITN's role is defined by our contract with State Regional Development, which is the State body that implements the policy of the Federal Department of Industry, Science and Resources. It is essentially to encourage the uptake of technology, both soft and hard technologies. It is a technology awareness group.

HOW DOES LOCAL INDUSTRY PARTICIPATE IN ITN?
ROSS: They participate by attending our monthly activities. We have one activity per month, which is either a seminar at the university on some aspect of manufacturing, mainly manufacturing, or we have on-site seminars. We'll go to a factory where we'll have an hour's discussion about some aspect of their technology, and then a factory tour and questions. Participation is by attending the monthly events. They find out about the events due to a very efficient fax and email stream and we send material out a few weeks before from our database of local industry, which we update regularly. However, there is no general advertising, so, I guess, it would be hard to know how you would reach out to people who are new to the district.

WHERE DOES THE FUNDING COME FROM FOR ITN?
ROSS: ITN started with quite generous funding from Department of Industry, Science and Resources, which was seed funding. As I recall it lasted for two years, which was quite generous. When that was completed, we went again to Industry, Science and Resources and asked them for more funding, so that we could extend the program, but they refused because they believed that the seed funding should have enabled us to go and extend the program and so forth. We then picked up funding from State Regional Development - they get their funds from the Federal Department. They pay us $20,000 and we put on ten seminars per year, either on site or at the university. We also now charge a fee, which varies, which is a fee to join ($350) or a fee ($44) to attend a seminar. What we have found is that most people did not want to join as a member; they would rather just send people along as a one-off.

ITN was a general network which built an innovative culture within the region, and wanted to get a number of groups running where they would be specific, where people would come along and stay and work together on say, building up quality systems, and they may last for a few months, and then we would build up another one, and so forth. It would be a short-term focus group, and we wanted funds to do that. We also wanted a young person's focus group, in terms of looking at how young people could work more innovatively in organisations. We thought that there wouldn't be enough dollars out there to do this. There is no one who has the dollars to say, "I'm going to see if I can make this work for six months, or three months".
HAS ITN HAD ANY INVOLVEMENT WITH AUSINDUSTRY?
ROSS: We do not have a direct link with AusIndustry, but we do cross paths with them, and we might bring them in to discuss things and so forth.

HAS ITN HAD ANY INVOLVEMENT WITH THE AUSTRALIAN INDUSTRY GROUP (AIG)?
ROSS: Before AIG was formed, we had a relationship with the Chamber of Manufacturers, and we were looking at building up a close relationship. I became a member of the Chamber of Manufacturers’ Council and when they went across to AIG I stayed on the council. But, we did not see that there was a great deal we could do, we didn’t feel that we could build a strong relationship with them. We probably could have fitted in, but the only thing is, I suppose, we were looking for money too, funds, and they were looking for funds as well. So it didn’t look like it was a great deal of potential synergy there. I suppose in a way we should pursue it more. What happened though was, when the funds dried up, where I was being paid a salary, and was working most days, now I just contract in. I get the $20,000, $2,000 per seminar, and I have an agreement with the Manager that I come in one day per week to organise the seminars and make sure that they happen. As I have other interests, I do not have the time to pursue this. The university manages the money from Regional Development, and pays me.

SOME MANUFACTURERS SEE THE INTERNET AS A WAY OF EXPANDING THEIR BUSINESS OVERSEAS; DO YOU SEE A ROLE FOR ITN/AIG?
ROSS: I think we could build an IT focus group in this region. People who want to put up a web page and get on-line to see what they can do, and how they can do it. They might meet once every couple of weeks, they could decide how often. We could bring in experts to talk about how to build their web page, and they can start building their web pages, and visit each other and talk to each other, like, "How are you going?", "How many hits are you getting?", that type of thing. They would work through it, and that might take them through to, say, twelve months roughly. By the end of the twelve months they would be on-line, they would be knowledgeable, they probably would have someone in the organisation to act as a part-time Webmaster. With the new software, most companies should be able to do it themselves. They would probably have someone who they could train up and who becomes their Webmaster. They would not be great, and a lot of organisations do not want a 'bells and whistle' operation anyway - like, "Don't show me pictures, just get the information on-line". Regional Development need to get out there and start looking at how they might put together a more effective way of bringing smaller companies forward as far as technology is concerned.

HOW MANY WOMEN PARTICIPATE IN ITN?
ROSS: Only a few, about 1% are women. We would like to get more women, and more young people. We tend to get middle age, middle class men. There are not that many women in manufacturing.
WHAT PERCENTAGE WOULD BE SMALL OR MEDIUM ENTERPRISES:
ROSS: Just about all are manufacturing SMEs.

70% OF THE MELBOURNE STUDY, AND 100% OF THE SYDNEY STUDY,
THOUGHT THAT NOT ENOUGH HAS BEEN DONE TO MAKE
MANUFACTURING AWARE OF DOING BUSINESS ON-LINE. YOUR
THOUGHTS?
ROSS: We organised an e-commerce business-to-business seminar recently, with good
speakers, from Compaq and BHP, and it was very poorly attended. The Compaq
computer guy gave a rather big macro view, and I found that very exciting. The BHP
guy gave a very practical approach. But, we had a very, very poor response to it. We
repeated the seminar from last year where we had small people (SMEs) doing it, and we
had a guy who makes patterns in concrete, and again, we didn't get much of a response
to it. We have over 1,000 people on our database, which includes nearly every small
manufacturer in the district. We asked ourselves, "Why hadn't that hit home?" I think in
fact too, we get the stuff off to them, it was like saying, "Look, if you don't know about
it, come along and you will learn how to do it". Perhaps, they do not feel that a two-hour
seminar is going to give them anything, unless we say, "Come along, and we are going
to meet once every couple of weeks, and you can really learn how to do it".

We had another one, AusTrade did one here as well. They had guys come and talk. It's
interesting, that for one reason or another, we are putting up some seminars, we're
sending out stuff, we're not hitting the mark. Obviously, not hitting the mark at all. So,
they don't think anything is being done at all.

Maybe we should meet with AIG, and get three questions to be addressed, such as "Do
you want to meet once a month?", "Do you want to get up a web page?", and "Do you
want to learn about it?". When we get the people in, say "Do you want to meet once a
month". Up front, we could say, "This will be the first meeting for the continuing
development of your expertise to do it". So send someone along who can do it, come
yourself, bring someone along who can take this responsibility. Try to get it going again.

THE SOUTH WEST SYDNEY STUDY IDENTIFIED THREE GROUPS: EARLY
ADOPTERS, THOSE WHO ARE AWARE, AND THOSE WHO ARE NOT AWARE.
INTERNET STAGES OF MATURITY WERE USED TO EVALUATE THE
ORGANISATIONS. IN SW SYDNEY 30% HAD A WEB PAGE. YOUR
THOUGHTS?
ROSS: I can see a problem with our seminar. We targeted those who are aware, and
those who are not aware, but used language relevant to the adopters. Most people think
that they are not going to learn much at a seminar. We need to say that it is a seminar,
which is going to lead into a longer-term training program for you, or one of your
people, where you are really going to become competent in putting your organisation on
the web. Topics could include using email, making on-line enquiries, and moving to
setting up a web page. Also, this was not to replace your current manual system of talking to your customers, but as a beginning to moving on-line.

PARTICIPANTS IN THE SURVEY RATED BARRIERS TO DOING BUSINESS ON-LINE (SURVEY Q22, TABLE 5) FROM YOUR EXPERIENCE IN THE AREA, WHAT WOULD YOU SEE AS THE HIGHEST BARRIER?
ROSS: Just having the time to get your head around it, and having the imaging. It seems to me that most of these people are so flat out just trying to get business, and keep themselves solvent. They think, yes, that's something else, I'm going to have to do that, I'll definitely do it, and I just don't want to do it this week. It's not just a matter of time, its time and having the intellectual and emotion energy to do it, when they're thinking about keeping the business going. Also, they haven't got the technology expertise in the staff. They can hire someone and say, "It's your responsibility to do that", but that would be like carrying someone for a while.

With regard to the awareness and knowledge, when you are ignorant there is the fear of being ripped off. If you ask them to make a tool, then they know what they're on about, but going on-line is different. You can pay a lot of money for nothing, essentially nothing.

FROM YOUR EXPERIENCE WITH LOCAL MANUFACTURING SMEs, WHAT WOULD YOU CONSIDER TO BE STAFF IT SKILLS AND TRAINING METHODS?
ROSS: Self-taught staff within the organisation is the most common training method I have encountered visiting manufacturers. Or they get taught by the software or hardware guys who sell the package to the organisation, and come in for a couple of days and train the staff on-the-job. The real question is how can we improve their knowledge, how can we provide the service, and it seems that it needs to be in-house preferably. This is a perfect set-up for a focus group. The thing with a focus group, you can buy people in, manufacturers who have done a bit, and say, "This is where we came from, we got this bloke in, he was good, and not too expensive, you can use him". Also they could teach each other, but, again, you need some seed capital, funding. This is where government could come in.

I think this is interesting, and I think it shows the complexity of how you, in fact, diffuse a new technology where you have a lack of resources within small organisations, and very much a lack of time by the managing directors and senior staff. You can see the resistance, and why people are reluctant to move forward with it. The challenge will be how to develop those sorts of networks and training systems that effectively get people from small manufacturing organisations to come on board. It's about taking away the cost in terms of dollars, and taking away the anxiety for them. You need to get these people into a non-threatening learning situation, and a network would do that if they could come up here every couple of weeks. The thing is you say, "Do you want to meet in two weeks, three weeks, a month, what are we going to do?, "We're going to come back and do this". We are going to buy a computer, and we're going to get an on-line
connection - some of them would not have that. This is "How to do that", "This is what it actually does". You learn a little bit, and go away and do it, then you come back and learn a bit more. You could ring other blokes up, and say, "What's happening, mine's not working, how is yours going?". That is the sort of thing you need to develop. But again, you need someone to sit in the middle of all that, and organise and get it to go, at least, in the early stage. Somehow, I think that is where the government funds need to come in.
WHAT IS THE ROLE OF THE SOUTH EAST NETWORKS?

SANDRA: SE networks have been running for seven years, and they have just been expanded, and expanded upon since 1992. They were originally brought together under the banner of import replacement. It was a time when, in Dandenong in particular, a lot of manufacturing was going down the drain because of the motor vehicle industry disappearing from here, like Nissan and so forth. Nobody was actually working with the manufacturing sector at all - everyone was working on other things. It was perceived to be a real need - we had a very healthy rolling stock industry, and a lot of very healthy automotive component industry. So put all those things together, there was a fear, I guess, that once the big boys started to go that there would be nothing left for them.

There was a stimulated interest, but a particular interest, which, I worked a lot with the industrial supplies office in those days because they too were funded to look at how we could have more imports replaced. Over the years they have gone on to bigger and better things, I think in everything we have done we have been three steps ahead of everywhere else. But, because we've bumbled and led, bumbled our way through, by the time others go into it, and launched it their wonderful things, because "Oh, this is the greatest thing since sliced bread", where we have struggled to even get recognised, and that gets very, very frustrating. The leaders don't get any recognition, it's the second wave where people start looking at it. And we are continuing to do that, we're still leading but we're not getting any support that we really should be getting. Everyone that has had anything to do with the groups, at any given time, either coming in to speak to them, or going to what we call an open function, thinks they are fantastic, but outsiders who don't have anything to do with them have difficulties with actually understanding how they operate.

In the mornings we meet from 7.15 to 9.00 am so we don't get a lot of time to go too in depth. The idea is to give them an understanding of what it might be, then cut to the chase, and if they need more information, and there is sufficient interest across all the groups, then we will do a workshop. Sometimes the very ones you need to get to, will come and love it, and then they will get busy, and just say that I haven't got time. We have had companies merge through the networks. They certainly do business with each other.

Someone was asking me about a mentoring program. We've talked about it, but we don't have the time and resources to set it up structurally. It happens by default. The beauty of what we deliver I suppose is the different levels of expertise around a table, so they don't have to go to one person for five, they can tap into the expertise of five. While some people say we should have gone down the industry line, and certainly people do that all over the world, for here we found it beneficial coming from different areas.
What I would like to do with them, is to get more activity based groups. We did some skills analysis the other day, because it was the big companies, 500 plus. He considered himself a medium company, but everyone else considered them as big. He was probably at that level, and the benefits of understanding the skills that you need in the future and the skills you have now. At the end of it, I said who would be interested in forming a working group, and only one company put their hand up, and I realised then that the one this guy presented it was good, but it was just seen as being too much - the presentation was not aimed at the audience. It is difficult because we have this mix, the big in with the small, the experienced in with the non-experienced - it does make it hard for a presenter, I must agree.

The network is about business growth and development, and the more information that they have the better understanding they have of what can impact on them, the more they are able to cope with it. If they can share that technology transfer they can do things better which helps to make them more competitive, so its about sustainability, good practice, growth, and I think that's probably nuts it out. The other things are added benefits, the camaraderie, the understanding of capability in the whole of the region. We led some people along with one of the judges of business awards, and we went around judging at the beginning of this year for about 15 companies. There was some very high quality stuff there. You know who they are, and who is going to win. I remember one bloke saying on the night, "I was sitting here thinking how good I was, and we are going to win this, until I watched the video saw what good things other companies are doing". We do a video, 2 minutes on each company. Ultimately he did win, but suddenly realised that he was not the only one.

Large quality industry associations, because they run things mainly in Melbourne, local industry doesn't have the time, they barely have the time to come to these at times, particularly the smaller enterprises.

* HOW DOES LOCAL INDUSTRY PARTICIPATE IN SE NETWORKS?

* SANDRA: I hate the word 'network'. My interpretation is that we have got varying levels of networks, which I would class primary, secondary and tertiary networks, and beyond. The primary being those big ones where, like the AIG conferences and things like where you have business awards, and business award functions and you might get 120 or 200 or whatever, depending on who's speaking, and I certainly feed my networks groups into that, and we get a lot of winners of awards as they are going through. What that does, it gives people a chance to mix with other people and swap business cards. They don't actually get down to the nitty gritty of business.

I run the next two stages, I suppose, which is the secondary networks. What makes the program different is that it is fairly unique, in that we have between 15 and 25 to a group and that's it - it just means that you have to run more groups. Each quarter they come together externally, usually every 4 months, and each year we have a manufacturing dinner, and the other times we have breakfasts. And then I open up to a broader scope of
people, so in my database, besides just the members, I've got like the solicitors, one or two - I don't open it up too much, and education, government bodies and things like that - I've got a select group, and a few consultants. These people get an invitation, so members get an opportunity. I keep the externals happy, because I've been running these for seven years - they meet monthly over breakfast. I've run four groups for 4 or 5 years, I've now got another 1 permanent group and 2 that are still in the pilot stage - so that's 7 groups, and 5 of those I have to get a speaker every month, and I don't have any money to pay for them.

I'm a great believer of on-line, and I want the on-line stuff too, for my networks, I couldn't say it strongly enough. But I don't think, as some people think, it will ultimately dispense with face-to-face contact. One of the biggest reasons that companies participate in networks, is that they are sick to death of the isolation. Even if they work in a company full of people, and it's a bigger company, they themselves still feel isolated from other peers in that production process or whatever. They think they are doing everything right, but what do they have to compare it with. It is not possible that on-line can be the only way.

I think the uniqueness of what we do, and why people like it, is because there is not too many sitting around. There is enough around the table for interaction, but there are not too many that they are afraid to speak. As time goes they become more and more honest, more and more open about what the issues are, and whether their practices are good or bad or whatever. So, it is the size and the frequency that they like, and the fact that there has been a continuity. In fact, I have members who started seven years ago, and they are still coming. I can't throw them out - they won't go. Not that I want to, particularly throw them out, because, but, there certainly are questions around as to they should be thrown out to make room for others, surely, they've learnt. It an evolving thing, its about information, education, and everyone you talk to is getting something different out of it. It's the ability to communicate, the ability to eyeball someone and say, "Well I've watched you for a while, and I'm quite prepared to do business with you now". Whereas if I got you out of the phone book, or business directory, I wouldn't know you as well. It's about sharing expertise, its technology transfer. People within the groups will do presentations on their processes, others have experience in other fields and will share that. There is a whole range of issues. What started off, as purely, looking as import replacement soon became obvious to a few of us, that industrial supplies were not going to supply every month, they got involved in the big contracts.

* WHERE DOES THE FUNDING COME FROM FOR SE NETWORKS?
* SANDRA: Before it was part of the Federal Government's OMNOR program - as the South East Taskforce we were part of it. Besides the networks we did a whole range of things, employment, I headed up the Federal Government's Pathways program. We were contracted to manage that, we were in the wonderful position of being non-affiliated in any government direction, because we were also pressured into putting in for State Government's Community Based Employment program. Those programs and the
Pathways, and the Schools to Industry program, we managed those and they were successful, simply because I had all the industry contacts. You can't work in these environments if you don't have those contacts and that's why they were successful.

To bring people in to talk to these groups where appropriate for nothing on a long term basis is hard work. When the taskforce closed, we were going to let it go, because nobody had offered to pick it up. Then South East Development came to the party with 50% of the perceived funding, and City of Greater Dandenong offered to pick it up in conjunction with South East Development. So the two of them did it in the first year 1998-99, and then from 1999 to now the Council has paid for it. It's approved in the budget for the coming year but I am hopeful for some extra funding. We have tried to get other councils involved, because it is the ideal region to do it.

South East Development, which is an area consultative committee downstairs, they got funding for, this came out of the study that was done into home-based business, and they have got funding for existing businesses, not specifically home-based, but whose owners have a multicultural background. This is a pilot for 18 months running two groups, to bring them together to see how we can help them understand requirements. It will be interesting to see whether the issues that confront them really are any different issues, as they probably believe, or if there are issues no different from any other small business starting up. I suspect that the micro businesses it will be the WorkCover, taxation issues, compliance and all of these things that will be the bane of their life, rather than the fact that they have a multicultural background or linguistic problem. We have approval for the program, but we haven't got the participants yet. We know that a lot of the home based businesses, because Casey Council have taken that further, and they now have funding to put people on-line and that sort of thing.

* HAS SE NETWORKS HAD ANY INVOLVEMENT WITH AUSINDUSTRY?
* SANDRA: Yes, but not a lot. When AusIndustry was pretty strong, in the days of the business-networking program, yes, we had quite a bit to do with them, but not as much today. We link into Local Business Victoria, we have the regional body here, Business Fix. We get information through those, and I do a lot of work with Small Business Victoria. The first group, very simply called Groups 1, 2, 3, the manufacturing groups. One of those, the third group was set up predominantly for small enterprises, and it was set up with SBV because they wanted to get something going in the industry for small business in Victoria.

* HAS SE NETWORKS HAD ANY INVOLVEMENT WITH THE AUSTRALIAN INDUSTRY GROUP (AIG)?
* SANDRA: Some. The Victorian government has tried hard, and AusTrade has a very good e-commerce export program, but getting companies to take it up is a problem - they struggle with export a lot of them, and like the AIG business, they still seem to think, "It's for the big boys". They suggest, that if you want to export you've got to be able to do, this, this, this and this. You can get an EMDG grant, an export development
grant, but I think the perception in the past, and I haven't looked at the rules lately, but you've got to put in $20,000 and put on an export manager, and they look at you as if you've got two heads. I struggle to get $200 for a seminar out of them, let alone $20,000. Their minds just don't work that way - they cannot look beyond. The few visionaries that there are would venture down that line - but too many are struggling, and I think that there is a lot more to be looked at there, and more help could be given.

* SOME MANUFACTURERS SEE THE INTERNET AS A WAY OF EXPANDING THEIR BUSINESS OVERSEAS, DO YOU SEE A ROLE FOR SE NETWORKS? * SANDRA: Yes, some I think would see it as a great opportunity, others are still struggling and I think we really need to be able to provide excellent service at home, before we think about going offshore. But, others use that as an excuse, "Oh there is plenty of market here, we could be market leaders, and with the highest market share here, we would be laughing". But then others, I don't think look at it realistically - that, if they had the highest market share it would still not be enough to keep their business going. It all depends on what they are doing.

We run the secondary style of network, where they actually get hands-on, and the tertiary style being what we do in the strategic industry research foundation. Beyond that, the ultimate would be the consortia approach - getting their act together, getting together and forming a consortia - a legal consortia and chasing business around the world, I think that's what we ultimately aim for, and the other forms of cluster style of development, if you are looking to get investment in this.

That's the general way we look at them, and I've got the three manufacturing and I've got the South East Network, which is an open network for both manufacturing and the service sector. The focus is mainly on continuous improvement, which once upon a time was fairly narrow, because it was nearly all to do with standards and certification, but now it is broad, its just another network.

* HOW MANY WOMEN PARTICIPATE IN SEN? * SANDRA: There is a Women in Business group, with two women from manufacturing. Those in the other groups aren't interested in belonging to women's groups. I was reluctant to set up a women's group, because I've avoided them all my years, and here I am running one. It took me 8 months to get my head around how to run it, because it's so different. You have to be careful what you say, whereas the guys, like, "This is the way it is, like it or lump it", and they don't get offended. But, it has really grown, I've worried about it for about 9 months, and what's happened now is that I've got two or three women in each group, except the manufacturing group. I've got Star Electrics, Beaumack Engineering and that one the wife is actually heading up, the husband runs the company, the hands-on, and she does other elements. I've got another woman in GBC Scientific who is operations manager, so she is really in at the production end, its a bigger company. And a couple of others, they belong to the manufacturing networks, but they also started coming to the women's group, which I
find very interesting, they like the hands-on stuff in the manufacturing networks, but they also like that interaction. If you put a group of men around a table you do get those who are very good and very well behaved, and you get those who really don't give a tinker's cuss.

* WHAT PERCENTAGE WOULD BE SMALL OR MEDIUM ENTERPRISES?
* SANDRA: 90% are small to medium enterprises. There wasn't really a perceived need from the big boys. They think they know it all, but they don't. A rolling stock manufacturer of about 450 people are now down to 10 - they used to be quite strongly involved. We do have a lot of support from the big companies, but mainly small to medium enterprises participate. One of the good things is that they are able to build the long-term relationships. The fact that they come together in December and then again in April. I usually try to get a few new people into those. One guy who attended in December, sent me an email afterwards asking if I could tell him a bit more about the groups, because he found the interaction and the feeling within that group that night, the atmosphere, he hadn't seen that before, and he was fascinated as to how involved it was.

* 70% OF THE MELBOURNE STUDY, AND 100% OF THE SYDNEY STUDY, THOUGHT THAT NOT ENOUGH HAS BEEN DONE TO MAKE MANUFACTURING AWARE OF DOING BUSINESS ON-LINE. YOUR THOUGHTS?
* SANDRA: I guess the difficulty, it's a bit like when quality and the quality consultants first came out, because the companies don't really know much about it, the consultants were able to bluff them stupid, and went out and made heaps of dough. I must admit that probably hasn't happened, but by the same token unless you put it under their nose and lead them, they don't look for it either, or they will see something put into the paper but they won't participate in it. A lot of them don't go out of their way to learn it.

If I had someone I could trust, who could go through the step-by-step process, we could set up a separate user group to do it. This is the beauty of what we have here, we can form separate entities if we want to. I used people over the past 12 or 18 months, and I look and I think, "I'm bringing you in here, I don't have the knowledge to judge how good you are, but I'm bringing you in good faith", as the companies know, and they have to make up their mind, it is exposure to information that is free, but you honestly don't know who is bull dusting and who isn't. I'm thinking now of getting hold of IBM and getting them to come out to explain what it is, or what we should be looking for. That's it, it's getting the right person to come, and I don't know who that right person is.

* THE SOUTH WEST SYDNEY STUDY IDENTIFIED THREE GROUPS: EARLY ADOPTERS, THOSE WHO ARE AWARE, AND THOSE WHO ARE NOT AWARE. INTERNET STAGES OF MATURITY WERE USED TO EVALUATE THE ORGANISATIONS. IN SW SYDNEY 30% HAD A WEB PAGE. YOUR THOUGHTS?
* SANDRA: No particular knowledge in this area.
* PARTICIPANTS IN THE SURVEY RATED BARRIERS TO DOING BUSINESS ON-LINE (SURVEY Q22). FROM YOUR EXPERIENCE IN THE AREA, WHAT WOULD YOU SEE AS THE HIGHEST BARRIER?
* SANDRA: If you don't know what you want, or if you don't know what's out there, if I'm a dumb bunny with computers. You've got to have good computer skills. You need to have Word 97, because that's what I got, whereas Word 2000 is out there.

* FROM YOUR EXPERIENCE WITH LOCAL MANUFACTURING SMEs, WHAT WOULD YOU CONSIDER TO BE STAFF IT SKILLS AND TRAINING METHODS?
* SANDRA: No particular knowledge in this area.

* ANY QUESTIONS OR OTHER COMMENTS?
* SANDRA: No
### FACTOR ANALYSIS – SIX BARRIERS

#### Correlation Matrix

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<tr>
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<th>Lack of infrastructure</th>
<th>Concern about sec &amp; pri</th>
<th>Lack of staff expertise</th>
<th>Unsure how many people</th>
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Determinant = .196
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### KMO and Bartlett's Test

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<tr>
<td>Bartlett's Test of Sphericity</td>
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*R.Lawson Appendix VI*
### Anti-image Matrices

<table>
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<tr>
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<th>Lack of govt incentives</th>
<th>Cost of Consultants</th>
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a Measures of Sampling Adequacy(MSA)
### Communalities

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Extraction Method: Principal Component Analysis.

### Total Variance Explained

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<th>Cumulative %</th>
<th>Extraction Sums of Squared Loadings</th>
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Extraction Method: Principal Component Analysis.
STATISTICAL ANALYSIS

Scree Plot

Factors

Component Matrix

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Extraction Method: Principal Component Analysis.

1 components extracted.
### FACTOR ANALYSIS – TOP 4 BARRIERS

**Correlation Matrix**

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**Sig. (1-tailed)**

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a Determinant = .475

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### Anti-image Matrices

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a Measures of Sampling Adequacy (MSA)

### Communalities

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Extraction Method: Principal Component Analysis.

### Total Variance Explained

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<th>% of Variance</th>
<th>Cumulative %</th>
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<th>% of Variance</th>
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Extraction Method: Principal Component Analysis.

### Scree Plot

Factors

- Lack govt incent
- Cost of consult
- Lack of staff exp
- Sec & priv

R.Lawson Appendix VI
Component Matrix

<table>
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Extraction Method: Principal Component Analysis.

a 1 components extracted.