

The Information Technology Adoption Process within Indonesian Small and Medium Enterprises

Samiaji Sarosa (S.E., M.Info.Sys.)

A THESIS SUBMITTED FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

**University of Technology Sydney
Faculty of Information Technology**

2007

Certificate of Authorship/Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated and referenced in the thesis.

Signature of Candidate

Production Note:
Signature removed prior to publication.

Acknowledgements

All thanks and praise is due to God Almighty for granting me the opportunity of writing this thesis.

This thesis was completed with the support of a range of people and organizations. I must appreciate the help and support of my supervisors Associate Professor Didar Zowghi, Associate Professor David Wilson, and Dr. Jim Underwood, who devoted an enormous amount of their busy time to me during the entire course of the study. Specifically, I would like to thank Didar and Jim for their help, guidance and support during this period. I am thankful to them for their open mind, patience, and guidance. Especially, their time at the final stages is something exceptional. Without their help, encouragement and support, this work would have never reached this stage. The early version of my thesis proposal has been developed under the supervision and assistance from Associate Professor Rodney Clarke of the University of Wollongong Australia.

This work was edited in accordance with parts D, language and illustrations; and E, completeness and consistency of the *Australian Standards for Editing Practice* by Dr Bruce Howarth, who has taught in the IT field, and has experience in systems development

The help and support of my friends at Requirements Engineering Research Laboratory, Faculty of IT, UTS; Ms Norazlin Yusop, Ms Nurmuliani, Dr. Mahmood Niazi, Dr Tom McBride, and Mr Chad Coulin are appreciated for their willingness to share and discuss my research ideas. Special thanks to Mr Siswanto and Mr Tony Pongoh for their great help and commitment to overcome my problems which significantly impacted the completion this thesis. Thanks are due to all the staff at Faculty of Economics, Atma Jaya Yogyakarta University, and Dr Koesmargono from

the Faculty of Engineering for facilitating my return to work. I am thankful to the interview participants who had dedicated their valuable time for my study. It is a pity that due to ethical consideration I could not publicly appreciate their invaluable contributions. I also would like to thank various research visitors at Requirements Engineering Research Laboratory Faculty of IT, UTS, Dr Vincenzo Gervasi, Prof. Alan M. Davis, Dr João Araújo, Dr Tracy Hall, and Prof. Dave Bustard who had been willing to listen to my ideas and contribute their valuable suggestions. I also would like to thank my virtual friends at DB Net who have helped me going through hard days while I was in Australia by continuously amusing me.

Another special appreciation goes to AusAid representatives at UTS, Ms Kaye Osborn, Ms Raquel Armedilla, Ms Eva Postlep, Ms Aki Plume, Ms Susanne Clark, and Mr Steve Haddad for helping me and my family to settle in Sydney and contribute to our wonderful life while we were in Australia.

Last but definitely not least, I would like to thank my wonderful wife Retno and my lovely daughter Sati for their patience and support during the lengthy process of this study. I am also grateful to my parents, Iman Sarosa Sukardi and Siti Supartini, my parents in law, Mr Heribertus Sugiyanto and Christina Sri Suratilah, my brothers Yoyok, Dea, and Nana, and other family members for their best wishes, prayers and support.

Table of Contents

| | |
|---|------------|
| Certificate of Authorship/Originality | ii |
| Acknowledgements | iii |
| Table of Contents..... | v |
| List of Tables..... | ix |
| List of Figures | x |
| Dedications..... | xi |
| Abstract | xii |
| Chapter 1 – Introduction | 1 |
| 1.1. Problem Statement and Motivation | 1 |
| 1.1.1. Problems in Managing SMEs | 1 |
| 1.1.2. Problems in using IT within SMEs..... | 3 |
| 1.1.3. Study of IT adoption within SMEs | 5 |
| 1.1.4. Studies of IT Adoption within Indonesian SMEs | 6 |
| 1.2. Investigating IT adoption within Indonesian SMEs..... | 7 |
| 1.3. The Scope of Research..... | 9 |
| 1.4. Contributions of the Thesis..... | 10 |
| 1.5. Thesis Roadmap..... | 11 |
| Chapter 2 – Information Technology Adoption within Small and Medium Enterprises..... | 13 |
| 2.1. SMEs definition | 14 |
| 2.1.1. Characteristics of SMEs | 16 |
| 2.1.2. SMEs and IT in Indonesia | 18 |
| 2.2. Definition of IT Adoption | 20 |
| 2.2.1. Perspectives on innovation in organisation theory..... | 22 |
| 2.2.1.1. Individualist perspectives..... | 25 |
| 2.2.1.2. Structuralist perspectives | 35 |
| 2.2.1.3. Interactive process perspectives | 37 |
| 2.2.2. Selection of theoretical basis | 40 |
| 2.3. IS Success and failure | 41 |
| 2.3.1. IS Success..... | 42 |

| | |
|---|------------|
| 2.3.2. IS Failure | 43 |
| 2.4. IT adoption within SMEs | 46 |
| 2.4.1. Factors influencing IT adoption | 48 |
| 2.4.2. An interactive process-based model of IT adoption within SMEs.... | 50 |
| 2.5. Cultural Issues..... | 54 |
| 2.6. Summary | 55 |
| | |
| Chapter 3 – Research Design | 58 |
| 3.1. Qualitative and quantitative approaches..... | 58 |
| 3.2. Research approach, methods, and tools selection..... | 60 |
| 3.3. Research design..... | 63 |
| 3.3.1. Design of the semi-structured interview | 63 |
| 3.3.2. Participant selection | 64 |
| 3.3.3. Data analysis | 66 |
| 3.4. Limitations of research design | 67 |
| 3.5. University of Technology, Sydney ethics requirements. | 69 |
| | |
| Chapter 4 – Data Collection and Analysis | 71 |
| 4.1. Data Collection | 71 |
| 4.1.1. Participant selection | 71 |
| 4.1.2. Interview process | 73 |
| 4.1.3. Data management..... | 76 |
| 4.2. Data Analysis | 77 |
| 4.2.1. Open coding and mapping of respondents answers to interview questions. | 79 |
| 4.2.2. Identifying Themes from the Data | 80 |
| 4.2.3. Gap Analysis | 81 |
| 4.2.3. Relating other emerging themes to relevant literature | 82 |
| 4.2.5. IT adoption process revision | 82 |
| 4.3. Summary | 82 |
| | |
| Chapter 5 – Indonesian SMEs IT Adoption Practice and Experience..... | 84 |
| 5.1. Participants: a Brief Description..... | 85 |
| 5.1.1. Failed Group..... | 86 |
| 5.1.1.1. Retry the development..... | 86 |
| 5.1.1.2. Adaptation..... | 90 |
| 5.1.1.3. Complete failure and abandonment..... | 95 |
| 5.1.2. Successful Group | 99 |
| 5.1.2.1. Internal development staff. | 99 |
| 5.1.2.2. Outsourced – custom made..... | 104 |
| 5.1.2.3. Outsourced – COTS. | 109 |
| 5.2. Factors affecting IT adoption within Indonesian SMEs | 110 |
| 5.2.1. Internal Factors..... | 111 |
| 5.2.2. External Factors | 118 |

| | |
|---|------------|
| 5.3. Factors Influencing the success or failure of IT adoption | 121 |
| 5.3.1. Developers | 121 |
| 5.3.1.1. Internal developers | 123 |
| 5.3.1.2. Outsourced – custom made | 125 |
| 5.3.1.3. Outsourced – COTS | 131 |
| 5.3.2. Type of application deployed | 132 |
| 5.3.2.1. Web Catalogue | 132 |
| 5.3.2.2. Accounting Application and ERP | 136 |
| 5.3.2.3. COTS | 137 |
| 5.3.3. Users and origin of idea for adoption | 139 |
| 5.3.4. Manager’s educational background | 143 |
| 5.3.5. Reasons for adoption and actual applications deployed | 145 |
| 5.4. Failure and recovery | 148 |
| 5.5. Summary | 150 |
| | |
| Chapter 6 – The IT Adoption Process within Indonesian SMEs | 151 |
| 6.1. Factors affecting IT adoption within Indonesian SMEs | 151 |
| 6.1.1. Internal Factors | 152 |
| 6.1.1.1. Manager | 152 |
| 6.1.1.2. Resources | 153 |
| 6.1.1.3. Staff | 153 |
| 6.1.2. External Factors | 155 |
| 6.1.2.1. Government | 155 |
| 6.1.2.2. Customers | 156 |
| 6.1.2.3. Competitors | 156 |
| 6.1.2.4. IT Vendors and Consultants | 157 |
| 6.2. Comparison of findings about factors | 157 |
| 6.3. Failure and recovery | 159 |
| 6.4. Comparison between failed and successful participants | 161 |
| 6.5. Revised model of IT adoption process within Indonesian SMEs | 166 |
| 6.5.1. Decision stage | 169 |
| 6.5.2. Implementation stage | 170 |
| 6.5.3. Evaluation stage | 171 |
| 6.6. Summary | 173 |
| | |
| Chapter 7 – Conclusions | 174 |
| 7.1. Overview of the thesis | 174 |
| 7.2. Findings - Factors for IT adoption within Indonesian SMEs | 177 |
| 7.3. Findings – IT adoption process within Indonesian SMEs, failure and recovery | 182 |
| 7.3.1. Decision stage | 182 |
| 7.3.2. Implementation stage | 183 |

| | |
|---|----------------|
| 7.3.3. Evaluation stage | 183 |
| 7.3.4. Findings – IS Failure and Recovery | 184 |
| 7.3.5. Discussion | 186 |
| 7.4. Implications on theory | 187 |
| 7.5. Implications for practice | 189 |
| 7.6. Limitations and Future Work..... | 190 |
| 7.6.1. Limitations | 190 |
| 7.6.2. Future work..... | 192 |
| Bibliography | 194 |
| Appendix 1 Semi-Structured interview guide questions | 211 |
| Appendix 2 Invitation to participate | 212 |
| Appendix 3 Sample of coding process | 218 |
| Appendix 4 UTS HREC Ethics Approval..... | 235 |
| Appendix 5 List of Publications | 236 |

List of Tables

| | |
|--|------------|
| Table 2.1. Slappendel’s framework (Slappendel 1996, p. 109) | 24 |
| Table 2.2. Factors affecting SMEs’ IT adoption (from literature)..... | 50 |
| Table 5.1. Classification criteria for factors influencing IT adoption..... | 111 |
| Table 5.2. Codes mapped to factors influencing IT adoption | 121 |
| Table 5.3. Findings on participants type of application acquired and the impact | 122 |
| Table 5.4. Findings on deployment idea, developers, and end user | 140 |
| Table 5.5. Findings on managers’ education background | 144 |
| Table 5.6. Findings on reasons for adoption and actual application deployed | 146 |

List of Figures

| | |
|--|-----|
| Figure 2.1. Contingency model of Organisational Behaviour (Robbins 2003) | 25 |
| Figure 2.2. Innovation–Decision Process Model (adopted from Rogers 1995) | 27 |
| Figure 2.3. Theory of Reasoned Action (adopted from Fishbein & Ajzen 1975) | 30 |
| Figure 2.4. Theory of Planned Behavior (adopted from Ajzen 1991) | 31 |
| Figure 2.5. Technology Acceptance Model (adopted from Davis 1989) | 33 |
| Figure 2.6. Multi perspectives on innovation on organisation | 53 |
| Figure 2.7. IT adoption process | 54 |
| Figure 4.1. Data analysis framework | 78 |
| Figure 6.1. Indonesian SMEs’ decision stage of IT adoption | 167 |
| Figure 6.2. Indonesian SMEs’ implementation stage of IT adoption | 168 |
| Figure 6.3. Indonesian SMEs’ evaluation stage of IT adoption | 169 |

Dedications

I would like to dedicate this thesis to:

- The loving memory of my father, Iman Sarosa Sukardi who passed away when I just started my PhD
- My lovely wife, Retno for her support and willingness to accompany me to Australia and abandoning her bright career
- My lovely daughter, Sati who was born in the middle of my PhD. I am sorry for being unable to provide you with a better environment when you were born. I wish it could be better.

Abstract

This thesis examines the adoption process of Information Technology (IT)-based solutions within small and medium enterprises (SMEs) in Indonesia, in the furniture and handicraft industries. As the Indonesian SMEs grew in size, they faced new problems in managing their businesses. They have tried to use IT to support their business and resolve some of these problems. Yet in their efforts to adopt IT, they often faced new problems by introducing new technology into the organisation.

The thesis examines the experiences of 35 Indonesian SMEs when they adopted IT. We investigated what factors were influencing IT adoption; the process of IT adoption which covers decision making, implementation or deployment and evaluation; and how SMEs cope with and recover from failure. The participants' experiences were compared to what has been reported in the existing literature.

Analysis of the relevant research literature revealed some unexplored issues concerning IT adoption within SMEs. Most of the published research has been conducted in developed countries, with little in developing or less developed countries. From those few, only one was conducted in Indonesia and it was about IT diffusion. The focus of previous studies was mainly to explore factors influencing IT adoption and they mostly utilised survey techniques to elicit the factors. The scant literature suggests that exploring IT adoption can be approached from three different perspectives: individualist, structuralist, and interactive process. This thesis uses the interactive process approach to explore how well those factors that have been well documented in the literature actually work in Indonesian SMEs' IT adoption. As a result of our exploration, we formulated a model of an interactive process view of IT adoption within Indonesian SMEs.

A qualitative approach was used to answer research questions and explore the participants' experiences in depth. In this thesis, we used in-depth interviews to explore participants' experiences. These interviews enabled us to draw out not only IT adoption processes but also successes and failures in IT adoption. Semi-structured interviews were used as the data collection tool. They provided guidance so the interviews stayed well within the focus of the thesis, yet provided room to explore new and relevant issues that emerged during the interview process. Content analysis of the interview transcripts was used to extract answers given during the semi-structured interviews and to identify new themes that emerged from the data.

The analysis resulted in important findings. First, it confirms some factors found in the literature as actually influencing IT adoption in Indonesian SMEs. Despite some similarities, we found some differences such as government role and competitors' influence on IT adoption. The other findings are concerned with the failures faced by some of the participants. We then explore the differences between failed and successful participants, and how Indonesian SMEs cope with and recover from failed IT deployment. Finally, we revised the initial model of the interactive process of IT adoption. The extended model captures new insights into success and failure of IT adoption, and could provide a better understanding of IT adoption within Indonesian SMEs. The interaction between different factors in the IT adoption shows how those factors influence each other and how different stakeholders could manage their own interests related to IT adoption. The improved model could be used to guide Indonesian SME managers to manage their adoption of IT more effectively.

Chapter 1 – Introduction

1.1. Problem Statement and Motivation

Small and Medium Enterprises (SMEs) arguably form a significant proportion of economic development in many countries including Indonesia (Aragon-Sanchez & Sanchez-Marin, 2005; Beal, 2000; Chau & Turner, 2002; Clapham, 1985; Diermen, 1997; Drew, 2003; Hill, 1995; Levy & Powell, 2005; Lewis & Cockrill, 2002; Mehrrens, Cragg & Mills, 2001; O'Regan & Ghobadiah, 2004; Rothwell & Zegveld, 1982; Sadowski, Maitland & Dongen, 2002). Many governments have encouraged the development of SMEs as a part of an industrial portfolio to complement existing oil and heavy manufacturing industries (Hambali, 1990). In Indonesia, SMEs have been promoted as one of the tools to overcome the 1997 economic crisis (Hill, 2001). We observed how Indonesian SMEs struggle to acquire and deploy IT solutions and how in some cases they have failed. Our personal observations and experiences of working with some of Indonesian SMEs in adopting and implementing IT solution has provided additional motivation for conducting this study.

1.1.1. Problems in Managing SMEs

SMEs are unique and different compared to bigger businesses, especially in the availability of organisational resources, so managing SMEs is different from managing larger businesses (Aragon-Sanchez & Sanchez-Marin, 2005; O'Regan & Ghobadiah, 2004; Welsh & White, 1981). As SMEs grow, they face new problems. The first problem is due to their limited staff: growth means that existing staff must deal with additional workload and new duties brought by the growth. The immediate problem is controlling and managing SMEs as a whole. The second problem is limited access to

resources (Welsh & White, 1981). For SMEs to grow, they must acquire more resources, yet due to their original smaller size this is not an easy task. The limited resources owned by SMEs lead to limited options in conducting business, limited options in acquiring assets and technology, and limited access to financial assistance such as loans. The third problem relates to their increasing customer numbers: SMEs must dedicate some of their already limited staff and resources to managing their relationship with customers.

These limitations also apply to adopting IT. SMEs have limited options for acquiring IT solutions to support their business. This is due to the limited capital to be invested in IT and the limited internal knowledge to handle the adoption process, operate the acquired IT solutions and maintain the IT resources (Aragon-Sanchez & Sanchez-Marin, 2005; Chau, 1995; Chen, Chong & Chen, 2000; Chesher & Skok, 2000; Cragg & King, 1993; Levy & Powell, 2005; Mako, 2005; O'Regan & Ghobadiah, 2004).

Due to their limited resources, it is vital for SMEs to consider their IT investment carefully (Gutter & Saleem, 2005; Hunter, 2004; NOIE, 2000). A relatively small percentage of SMEs adopt E-commerce because they cannot see the immediate impact on their business. A conservative approach toward the adoption of IT is necessary since SMEs have to invest a significant proportion of their capital for IT, or any other investment for that matter. One incorrect decision on IT investment could leave SMEs with considerable financial damage and unusable IT components.

Another problem with the adoption of IT within SMEs is caused by lack of resources (e.g. human resources, financial resources, technological resources, etc). SMEs frequently do not have adequate IT knowledge and expertise within their organisation or funds to acquire the knowledge. This can lead to inappropriate adoption

of IT or even failure to adopt IT (Al-Gahtani, 2004; Chakravorti, 2004; Fink, 1998; Putranto et al., 2003; Rogoff, Lee & Sub, 2004). Failure to acquire appropriate IT solutions can lead to financial problems. In this case, the IT investments can become useless and might become a barrier to doing business. In Indonesia, similar problems exist. Hambali (1990), Putranto et.al. (2003), and Sandee and Rietveld (2001) found that one of the factors causing SME failures is a lack of capability to acquire appropriate technology that is important for the business. The failure to adopt appropriate IT might cripple SMEs financially and leave them with systems of limited use.

1.1.2. Problems in using IT within SMEs

The term IT has been widely used in existing literature. Definitions of IT include the technology side of Information Systems (IS) (Hollander, Cherrington & Denna, 2000), the technology that enables computer-based information systems (Laudon & Laudon, 2000), and the collection of computer systems used by an organisation (Turban, MacLean & Wetherbe, 2002). However, the following preferred definition describes comprehensively what IT is:

'Information technology comprises those technologies engaged in the operation, collection, transport, retrieving, storage, access presentation, and transformation of information in all its forms...' (Boar, 1997, p. 28).

Similarly in this thesis, the term IT is defined as all the technologies that are used by an organisation to collect, process, and disseminate information in all its forms. Therefore, the components of IT will include hardware (computers, printers, scanners), software (operating systems, application development languages, office applications), and telecommunication devices (modems, networking hubs, network interface cards).

Information technology (IT) provides support for companies to operate in more efficient and effective ways (Laudon & Laudon, 2006; Turban et al., 2006; Utomo & Dodgson, 2001; Willcocks & Lester, 1996). IT can reduce the cost of doing business,

which is important for SMEs because they could allocate funds saved from using IT to other more important areas of their core business.

IT has been adopted and used within business organisations for many years. Research literature has shown the usefulness of IT for supporting business (Adams, Nelson & Todd, 1992; Andrews & Papp, 2000; Broadbent, Weill & Clair, 1999; Guinea, Kelley & Hunter, 2005; Sarkar & Sawy, 2003). Many SMEs adopt IT solutions to support their businesses and keep a competitive advantage (Bridge & Peel, 1999; Chau, 1995; Drew, 2003). It is believed that IT promotes more efficient ways to conduct business (Chau, 1995; Laudon & Laudon, 2006; Turban et al., 2006). Different options for IT adoption within SMEs can be categorised as follows (Avison & Fitzgerald, 2002; Beal, 2000; Bridge & Peel, 1999; Chau, 1995; Chen, Chong & Chen, 2000; Chesher & Skok, 2000; Dutta & Evrard, 1999; Laudon & Laudon, 2006; Turban et al., 2006):

- *Internal development*, where SMEs develop their IT solutions from scratch using internal resources.
- *External development*, where SMEs outsource their IT development from scratch to a software development company.
- Implement *Commercial-Off-The-Self (COTS)* solutions, where SMEs acquire COTS products with or without adaptations. The software producer could do the modification of COTS by request or the modification may be done by the SMEs by using either internal or external expertise. In this thesis we define COTS as any software application that is publicly available in the market. Typical COTS applications are packages like office suites (word processor, spreadsheet, presentation), internet access application (browser and email client), image processing (photo manipulation, drawing), and communication application (facsimile, dial up connection).

- *Application service provider (ASP)*, where the applications deployment and management are managed by vendor through the internet or private networks.
- Any combination of the three options above.

1.1.3. Study of IT adoption within SMEs

Most of the existing research literature on IT adoption within SMEs seems to concentrate more on drivers of and barriers to IT adoption (Dutta & Evrard, 1999; Fink, 1998; Khalfan & Alshawaf, 2004; Raymond, 1985; Rooks & Snijders, 2001; Scupola, 2002; Singh, 2002; Tarafdar & Vaidya, 2005; Tatnall & Burgess, 2004; Thong, 1999, 2001; Thong & Yap, 1996; Utomo & Dodgson, 2001; Walczuch, Braven & Lundgren, 2000; Winston & Dologite, 1999), and pays less attention to how those drivers and barriers affect IT adoption. There are also conflicting findings on government roles in IT adoption. In Europe, SMEs perceive that government roles should be reduced (Dutta & Evrard, 1999), while in Indonesia, Utomo & Dodgson (2001) found that government support is necessary for IT diffusion for SMEs.

Rogers's theory of diffusion of innovation has been used in majority of the IT adoption literature. However, it is criticised due to its assumptions that the innovation is desirable for the community and that not adopting an innovation is considered resistance to change (McMaster & Kautz, 2002). As McMaster and Kautz (2002) argue, not every innovation is desirable, adopting an innovation is not always the best decision to make, and diffusion of IT involves many factors both technical and social in nature.

The next weakness of the IT adoption literature is the existence of at least three different definitions of adoption (Damanpour, 1987; Kautz, 2005; Palen & Grudin, 2003; Rogers, 1995; Russell & Hoag, 2004; Thong, 1999; Zaltman, Duncan & Holbek, 1973). The differences concern the different use of the term "adoption" within the stages of adoption. In this thesis we use IT adoption to describe a three-stage process:

1. The decision-making stage is when information concerning the IT is gathered and evaluated and a decision to adopt IT is made.
2. The implementation stage is when the IT components are deployed.
3. The evaluation stage is when the IT solutions that are implemented in the business are evaluated.

In their effort to adopt IT to support their business, SMEs need to consider several factors during the process of adoption. The next section will discuss the adoption of IT by Indonesian SMEs in more detail, including factors considered during the process of adoption.

1.1.4. Studies of IT Adoption within Indonesian SMEs

Research literature on the adoption of innovation within Indonesian SMEs is scarce. For example Schiller & Martin-Schiller (1997) investigated the furniture industry (including adoption of new manufacturing technology) in Jepara, Central Java. Sandee and Rietveld (2001) investigated the adoption and diffusion of semi-automatic roof tile manufacturing systems. On IT, only Utomo and Dodgson (2001) have investigated the factors influencing diffusion of IT innovation within Indonesian SMEs. They argue that within the organisation itself, level of IT knowledge, level of IT investment, and coherent IT strategy influence the adoption. They also conclude that government support is a contributing factor while educational and research institutions are not. Utomo and Dodgson's study did not consider the process of adopting IT within Indonesian SMEs, neither did it consider any aspects of success and failure in IT adoption. Furthermore, their data collection techniques consisted of a questionnaire and analysis of the returns using statistical tools. Their method is quite valid, but like any other quantitative approach, it cannot reveal the whole story (Crotty, 1998). Therefore, a more thorough and deeper study is needed to explore the issues surrounding IT adoption

within Indonesian SMEs. We used a qualitative approach to enable us to study the phenomena of IT adoption within their context and reveal a rich and complex process (Creswell, 2003; Crotty, 1998; Leedy & Ormrod, 2005). We are interested in exploring in depth how Indonesian SMEs adopted IT, whether they succeeded or failed, why they succeeded or failed, and what they did after a failure.

1.2. Investigating IT adoption within Indonesian SMEs

In the previous sections, we have argued that IT can solve some of the problems associated with the growth of SMEs. These problems are control and management of the growing SMEs, limited access to resources, and managing relations with the growing number of customer. Due to their limited resources, SMEs also have difficulties in accessing resources needed for using IT to support their business.

Despite the significant number of studies that have been dedicated to exploring IT adoption within SMEs, some problems remain. First, most of the studies concentrated more on a “snapshot” of factors that influencing IT adoption (e.g. Fink, 1998; Hwang et al., 2004; Tatnall & Burgess, 2004). They did not show how those factors influence SMEs throughout their IT adoption process. Second, there is a lack of in-depth studies dedicated to investigation of the IT adoption within Indonesian SMEs. We explored IT adoption as an interactive process rather than just the factors influencing IT adoption.

The review of the literature shows that IT adoption needs to be explored as an interactive process rather than considering only the factors that influence it (Jaakkola, 1996; Slappendel, 1996; Thong, 1999; Thong & Yap, 1996). We argue that Indonesian SMEs are no exception. By exploring IT adoption using an interactive process model, this thesis shows how different stakeholders of an organisation interact within an

environment to achieve their own goals (Slappendel, 1996). IT adoption within Indonesian SMEs is influenced by several factors (Utomo & Dodgson, 2001). An exploration from a process-based model perspective should show how those factors interact in IT adoption by Indonesian SMEs, and would therefore help in improving the understanding of IT adoption within Indonesian SMEs.

The following questions relating to Indonesian SMEs have guided the study reported in this thesis:

- RQ1. What factors as identified in the literature influence the adoption process of IT within SMEs?
- RQ2. What factors are actually considered, in practice, that influence the adoption process of IT within Indonesian SMEs?
- RQ3. What process is followed by Indonesian SMEs in their IT adoption?
- RQ4. Are there any differences in the factors influencing the IT adoption process within Indonesian SMEs compared to the factors reported in the literature?
- RQ5. What are the factors that influence the success and failure of IT adoption within Indonesian SMEs?
- RQ6. How do Indonesian SMEs cope with and recover from failure in IT adoption?

We used a qualitative approach to answer the six research questions. Analysis of the relevant research literature was carried out to find answers for RQ1, RQ4, and RQ5. For RQ5, we explored and analysed the literature on the area of success and failure of Information Systems (IS). To answer RQ2, RQ3, RQ4, RQ5, and RQ6, we used semi-structured interviews to elicit data from respondents. An analysis of each interview was conducted to find answers. The qualitative approach was deemed appropriate for this research since the use of a process-based perspective required a thorough analysis and understanding of the IT adoption process. The qualitative approach with semi-structured

interviews allowed us to explore in depth all the factors and the interaction of all stakeholders within an IT adoption process (Creswell, 2003; Crotty, 1998; Leedy & Ormrod, 2005).

1.3. The Scope of Research

In this study we are interested to discover any factors that are unique to the Indonesian context. Our findings would be reflected in the IT adoption process model formulated. The definition of SME in this study is a business organisation that possesses assets less than US \$1 million (excluding land and buildings) and has annual sales turnover less than US \$5 Million (SMIDEC, 1998b). In general, the Indonesian government and its agencies use total assets and annual turnover as indicators of SMEs rather than number of employees. Other studies in other contexts often use number of employees as the indicator for SMEs. It is not clear how the difference in employee numbers would influence the result of this study. However, we argue that in IT adoption, not every staff member in an Indonesian SME will use the IT equipment. Usually, only administrative staff would be involved in using IT. The number of administrative staff using IT in this study is still well within the other studies' definitions of SMEs.

Studies on diffusion of innovation often use the terms “adoption“ and “diffusion“. Diffusion is the process of spreading the innovation to general population, while adoption is the decision to accept the innovation (Rogers, 1995). Although diffusion and adoption could be seen as the two side of a coin, in this thesis we are interested in examining the adoption process in depth and not the diffusion process.

1.4. Contributions of the Thesis

In this thesis, we have explored and studied IT adoption within Indonesian SMEs. We started by developing an initial model of IT adoption from the literature. The initial model consisted of factors influencing IT adoption compiled from the research literature. In this model we also proposed how those factors would interact with and within SMEs during the process of IT adoption. We used this initial model to design a semi-structured interview.

Interviews with 35 participants helped us to refine the model. From the interviews, we extracted descriptions of the way each factor operates in the actual context of IT adoption. As a result we have developed a detailed understanding of the IT adoption process within Indonesian SMEs. This study not only gives a better insight of these processes, but also suggests new ways of looking at the IT adoption phenomenon. Finally, we extended the initial model using the results of the interview analysis that illustrates a complete model of the Indonesian SMEs IT adoption process. This model contains factors and interactive processes within SMEs that are unique to the Indonesian context.

Adoption of an IT process could be considered as being successful or a failure. We explored concepts of success and failure based on their definitions within the research literature. We applied the concepts of Information Systems (IS) failure to analyse the failure of Indonesian SMEs' IT adoption. We also explored the actions taken by Indonesian SMEs, if their IT adoption failed as well as how they coped with and recovered from the failure. The issue of how SMEs cope with and recover from failure in systems development has not been previously covered extensively in the research literature. We believe that exploring these actions is important due to the limited resources of SMEs. An appropriate course of action might enable Indonesian

SMEs to reap some benefit from failed IT investment or even save Indonesian SMEs from bankruptcy.

In summary, the major contributions of this thesis are:

1. Improved understanding of the IT adoption process within Indonesian SMEs.
2. Development of an interactive process model of IT adoption by Indonesian SMEs that shows factors influencing IT adoption and how those factors influence the IT adoption process.
3. Increased understanding of IT adoption “failure” and how Indonesian SMEs deal with failures.
4. By understanding the IT adoption process, Indonesian SMEs could prepare their organisation better when they decide to adopt new IT.

The minor contributions of this thesis are:

1. Applying different concepts of IS failure to analyse Indonesian SMEs failure in IT adoption.
2. Transforming the factors-based model of IT adoption from the literature to a process-based model of IT adoption specific to Indonesian SMEs.

1.5. Thesis Roadmap

This thesis is organised as follows. In Chapter 2 the relevant literature is reviewed. The concepts and terminology of IT adoption are described along with the theoretical background commonly used to study innovation adoption. The concepts and problems in managing SMEs are also described and discussed in this chapter. At the end a

proposed model of IT adoption within Indonesian SMEs drawn from the literature is presented.

In Chapter 3, the research design is presented. It starts with the discussion of the underlying epistemology of the qualitative approach used in this thesis, followed by the justification for choosing the qualitative approach along with suitable methods and tools.

In Chapter 4, the actual data collection and analysis are presented. In the data collection, the participant selection process, interview process, transcription, and data management are described. In the data analysis, the coding protocol followed in this study is described along with the analysis of interview transcripts.

In Chapter 5, a summary of all findings is presented. It starts with the actual factors influencing IT adoption within Indonesian SMEs, followed by analysis of participants' IT adoption experience. The failure and recovery efforts of some of the participants are also discussed in this chapter.

In Chapter 6, the participants' experience in IT adoptions are discussed and compared to the literature. At the end, the proposed model drawn from literature is refined.

Chapter 7 provides the conclusion of this thesis.

Chapter 2 – Information Technology Adoption within Small and Medium Enterprises

In this chapter we will discuss the relevant theoretical background underlying this thesis. We believe it is important to cover the following concepts:

- The definition of SMEs and problems in managing SMEs in general and managing IT within SMEs in particular.
- The concepts of IT adoption within SMEs. Since the research on IT adoption is vast, we need to structure our literature review in a systematic way. We found that Slappendel (Kautz, 2004; Kautz & Nielsen, 2004; Slappendel, 1996) has conducted an extensive literature review on the adoption of innovation. Slappendel also produced a framework that we believe is appropriate to structure our literature review.

Chapter 2 covers four topics in small and medium enterprises (SMEs) management and IT adoption. The discussion begins with the definition of SMEs according to the Indonesian government, which is different from that used in many previous studies, followed by the characteristics of SMEs and their management, which influence their IT adoption. The second part of this chapter discusses the theoretical background regarding IT adoption. It starts with the definition of IT adoption itself in Section 2.2. The following section (2.3) discusses various models of IT adoption research that have been structured according to Slappendel's framework (Fink, 1998; Slappendel, 1996; Thong & Yap, 1996; Utomo & Dodgson, 2001). Section 2.4 discusses the concepts of IS success and failure as the end result of an IT adoption process. IT adoption process could either fail or succeed. We cover the concepts of both success and failure in this section as a theoretical basis for analysing success and failure of IT adoption by our participants. The following section (2.5) deals with the issues

surrounding IT adoption within Indonesian SMEs. Section 2.5 is a compilation of the previous three sections. In this section factors that influence IT adoption within SMEs found in the research literature are mapped by the origins of the factors (internal and external). The research literature is also used to develop a theoretical model of IT adoption within Indonesian SMEs that is presented in section 2.4.

2.1. SMEs definition

SMEs contribute to the national economy by providing work and contributing significantly to Gross Domestic Products (GDP) and Gross National Product (GNP) (DeLone, 1988; Diermen, 1997; Foong, 1999; Guinea, Kelley & Hunter, 2005; Gutter & Saleem, 2005; Hill, 1995; Kuan & Chau, 2001; SMIDEC, 1998a; Tambunan, 2005; Utomo & Dodgson, 2001; Walczuch, Braven & Lundgren, 2000). The definition of SMEs itself varies between organisations and countries. There are various indicators used across the world to define SMEs. For example, the Small and Medium Industries Development Corporation (SMIDEC) in Malaysia uses the following criteria to define SMEs (Drew, 2003; SMIDEC, 1998b):

- Number of employees
- Invested capital
- Total amount of assets
- Annual sales turnover
- Production capacity
- Average income

The World Bank's definition of SMEs is as follows (IFG, 2002):

- Small enterprise: up to 50 employees, total assets of up to \$3 million and total sales of up to \$3 million.
- Medium enterprise: up to 300 employees, total assets of up to \$15 million, and total annual sales of up to \$15 million.

The World Bank definition of SME incorporates three criteria (number of employees, total assets, and total sales). In general, definitions of SMEs usually use the number of employees, sales turnover, and total assets as indicator. However, in many previous studies such as Dutta and Evrard (1999), Drew (2003), and Fink (1998), the number of employees criterion has been used to define SME in accordance to the local regulations.

The Indonesian government uses total assets and annual sales to define SMEs. Their definition of an SME is any business organisation that possesses assets less than US \$1 million (excluding land and buildings) and has annual sales turnover less than US \$5 million (Drew, 2003; SMIDEC, 1998b). We found no official explanation of why the Indonesian Government uses total assets and annual sales rather than number of employees. One could speculate that one reason relates to the Indonesian government's effort to reduce the unemployment rate. With a population of more than 200 million, the number of unemployed in Indonesia is quite high. The development and growth of SMEs is one of the methods employed to reduce unemployment (Diermen, 1997; Hill, 1995). Since the focus of the Indonesian government's assistance to SMEs is to help them grow and reduce unemployment, the number of employees as a criterion of SMEs is not relevant. Some research on Indonesian SMEs used different definitions than the Indonesian government's (for example Berry, Rodriguez & Sandee, 2001; Utomo & Dodgson, 2001 using the number of employees). However, there is no explanation why such definitions were used or where they came from. The second reason may be that the

number of employee within Indonesian SMEs can be very fluid. It can change rapidly from time to time to accommodate fluctuations in the company's operation, especially in manufacturing companies. Results from our field study confirmed this observation. Therefore within this study, the official Indonesian government SMEs definition will be used.

2.1.1. Characteristics of SMEs

Attributes often discussed as typical of SMEs are limited resources (Welsh & White, 1981), informal management style (Kotey, 1999; Kotey & Slade, 2005; Wilkinson, 1999), flexibility (Aragon-Sanchez & Sanchez-Marin, 2005), and dependence on single decision makers (Feltham, Feltham & Barnett, 2005). Those attributes influence how SMEs are managed and run.

The most common problem for SMEs is their limited resources compared to big enterprises. This creates what Welsh and White (1981) called "resources poverty". SMEs usually have limited options in their business, and must focus on their core business and expertise. This has led to many SMEs outsourcing their non-core business activities such as IT to third parties whenever they could afford such an investment.

Resources poverty leads to more constraints for SMEs in their operations. Limited financial resources mean that SMEs must be careful with their investment and spending. In terms of capital spending, most investment is aimed at supporting core business functionalities. New technology investment for the core business is difficult (Berry, Rodriguez & Sandee, 2001; Sandee & Rietveld, 2001), let alone for supporting technologies such as IT.

Limited financial resources also affect the human resources. Limited financial resources lead to limited capabilities to recruit, train, and retain employees. Human resources practice within SMEs is usually informal (Kotey & Slade, 2005), meaning

that staff are recruited not according to prescribed theory with formal procedures and standardised recruitment as in bigger companies. With a limited number of staff, it is not unusual for SME staff to perform multiple functions that require different skills and knowledge, yet limited financial resources mean that the skills and knowledge have to be acquired using the cheapest means. It often means they must learn by themselves or wait for external assistance such as government and educational institutions to provide training and education (Utomo & Dodgson, 2001). However, a study involving SMEs in the European Union by Dutta and Evrard (1999) showed that most government assistance did not meet its original intention. It was too generic and did not meet the individual SME's needs.

Limited funds for training and education lead to limited knowledge and skills possessed by SMEs. They must choose which knowledge and skills are most relevant to their business. This usually means skills related to production, marketing, finance and accounting. IT skills and knowledge, as long as they are necessary to carry out their normal business, are deemed important. However, more sophisticated and complex IT functions are either outsourced or ignored.

Despite their limited resources, SMEs are also known for their flexibility (Aragon-Sanchez & Sanchez-Marin, 2005). SMEs can quickly adapt themselves to new challenges and pressures. SMEs' flexibility is possible since their internal structure tends to be simple and informal.

The informal management style means that decisions are made quickly, since there are only a handful of staff to be consulted and there is not the complexity of bigger companies. In SMEs, managers directly control all the resources and manage all the staff. The SME's structure is usually flat and allows direct communication between manager and staff.

The informality and flexibility of SMEs may be attributed to the fact that many SMEs are started as family businesses (Berry, Rodriguez & Sandee, 2001; Feltham, Feltham & Barnett, 2005; Sandee & Rietveld, 2001). As a family business, the relationship between manager and staff is like in the family, in fact they are often closely related to other members of the company. The consequence of this is that SMEs usually depend on a single decision maker, the manager (Feltham, Feltham & Barnett, 2005), who is often also the owner of the SME.

2.1.2. SMEs and IT in Indonesia

In Indonesia, SMEs have contributed greatly to the national economy, even during the economic crisis that started in 1997 (Berry, Rodriguez & Sandee, 2001; Hill, 2001). Many SMEs, especially export-oriented ones, have survived and even experienced considerable growth. International markets have increasingly purchased Indonesian SMEs' products such as garments, furniture and handicrafts. The key to such acceptance is the improvement in quality of products and ability to meet demand on time (Schiller & Martin-Schiller, 1997). This is the result of improvements in productivity through varied mechanisms such as technological upgrading (Berry, Rodriguez & Sandee, 2001). Technological upgrading is deemed as a cause for improvements in an SME, among other things better machinery (Sandee & Rietveld, 2001), better workplace organisation, improved production management which could be attributed to technological upgrade, and advances in product design (Schiller & Martin-Schiller, 1997).

There are several reasons for these improvements. First, international customers have played a significant role in exporting industries (Schiller & Martin-Schiller, 1997). They demand a certain level of product quality and they want to make sure that the production process can achieve such levels of quality. Therefore Indonesian SMEs must

comply with certain levels of quality standards that affect the choice of machinery, raw materials, and finishing. International customers also want their orders delivered on time. To coordinate such orders, international customers usually communicate intensively with the Indonesian SMEs. The most affordable and efficient way to do so is by using email. This means that Indonesian SMEs must have access to computers to be able to utilise email. Using email can reduce the cost of communication significantly, since SMEs often have to report regularly to their international customers during the period needed to manufacture and ship orders. The report will contain text and pictures of product and design; picture quality will be better if they are sent using email rather than facsimile.

A second reason for improvement is the encouragement to introduce automation machinery to Indonesian SMEs, especially in manufacturing activities (Sandee & Rietveld, 2001; Schiller & Martin-Schiller, 1997). The Indonesian government has promoted SMEs as a priority in their economic program since 1995 (Indonesia, 1995). Therefore, many programs aimed at assisting SMEs have been introduced. Some are aimed at improving the manufacturing and administrative processes. The government provides financial loans and training to improve SMEs' capability in those areas.

The third reason for improvement, especially in technological upgrade, is the vendors' efforts (Berry, Rodriguez & Sandee, 2001). Vendors often provide information on new technological solutions as part of their marketing effort. The promotional efforts by the vendors have created awareness in SMEs of alternative ways to improve their current business. Moreover, vendor's information usually can be demonstrated by showing tangible products rather than abstract concepts.

International customers' demands, government encouragement, and vendors' information inputs have inspired Indonesian SMEs to adopt new technologies in their

organisations. They can afford such investment by using the profits gained from foreign currency received for their exported products and government-sponsored loans. One of the technologies adopted is computers (information technology). The term IT has been discussed in Section 1.1.2. Although IT usually is not considered as a core business technology, Indonesian SMEs use IT to communicate with international customers or to improve their administrative and manufacturing process. Considering the limited financial resources and human resources within Indonesian SMEs, adopting IT could be problematic.

2.2. Definition of IT Adoption

Studies of the adoption of IT can be considered as originating from the study of the diffusion of innovation (DOI) and more specifically diffusion of IT innovation. Within this study, we shall consider three different terminologies: *diffusion*, *adoption*, and *IT innovation*. The notion of diffusion is often associated with the effort to spread innovation to a greater audience using communication channels, while adoption is often associated with the decision to accept and use the innovation (Bøving & Bøker, 2003; Brown, 1981; Rogers, 1995; Schon, 1971; Zaltman, Duncan & Holbek, 1973). Innovation is associated with something new, such as ideas, artefacts or products (Rogers, 1995). In this thesis, new IT equipment, systems, or infrastructure introduced into the organisation are considered as new, hence the notion of IT innovation.

Within the diffusion and adoption of innovation literature, there is no commonly accepted definition of the word adoption (Kautz 2005 personal communication, 31 March). Basically there are three different definitions of adoption of innovation. The first refers to the Diffusion of Innovation (DOI) theory (Rogers, 1995), in which adoption means the physical acquisition of technical artefacts or a commitment to

implement innovation with the emphasis being on the decision to adopt (Aiken, Bacharach & French, 1980; Evan & Black, 1967; Fichman & Kemerer, 1993). The commitment to use the innovation is the result of a decision to make full use of an innovation or adoption (Rogers, 1995). Rogers's diffusion of innovation theory was drawn mainly from communication theory. Accordingly, its main idea was concerned with the process of communicating the idea of innovation to the potential adopters. The main objective is to convey the innovation message and encourage the potential adopters to accept the innovation. Adoption would be achieved in the adopter's mind and it is not important how the innovation is actually put into use by the adopter.

The second definition of adoption is from the works of Thong and Yap (1995), where adoption of IT is defined as using IT to support business. This definition has similarities with the third definition of IT adoption, which is using innovations as intended by the designer (Bøving & Bøker, 2003). The difference is that Bøving and Bødker (2003) argued that modification of an innovation by a user in practice or by reinvention (Rogers, 1995) was not supported by their findings, therefore it was concluded that not all use of innovation was equal and could be called adoption. Only a full use of innovation as intended by the designer without reinvention can be called adoption. On the other hand Thong and Yap (1995) did not differentiate between full use and modified use of IT in their studies. Still, these two definitions argue that unless the innovation is put to use, it is not an adoption. This argument is in line with Zaltman et.al. (1973), Damanpour (1987), and Damanpour and Evan (1984); they considered a new idea as innovation when implemented.

Zaltman et.al. (1973) divided the innovation adoption process into initiation and implementation stages. Palen and Grudin (2003) furthermore supported this distinction by using the term adoption for the decision to begin using a technology and using the term deployment for making the technology available. For IT adoption, in this thesis we

argue that the definition of adoption should include the implementation stage. IT as innovation is not only ideas but also includes artefacts. It is not enough that the use of IT is only accepted or decided upon without any physical implementation. Rogers (1995) noted that all activities until the decision is made to adopt innovation were mental activities and the implementation of the innovation required physical activities. Therefore, we believe that adoption of innovation is not only an acceptance of a new or novel idea (mental activities) but also putting the idea to work (physical activities). In this thesis, we adopt the definition of adoption from Thong and Yap (1995): using IT to support business.

2.2.1. Perspectives on innovation in organisation theory

Adoption of innovation has long been studied and covered extensively in the literature. Although these studies are strong in identifying theoretical foundations, factors, players, organisational structure, and how these factors influence adoption of innovation in an organisation, and provide a comprehensive coverage of the topic, there is still a need to take a fresh, systematic look at the literature to map and structure the vast amount of information it provides. A few studies have proposed frameworks to analyse the literature such as the dichotomy of variance research and process research (King, 1990), the distinction between diffusion, determinants, and process research (Wolfe, 1994), and roles and the interaction between individual and organisation (Slappendel, 1996). Rogers (1995) stated that diffusion of innovation involved a social system, where the elements within that system interact in the adoption process. Slappendel's framework is the only one that takes a different perspective of the interaction between individual and structure. The paper also contains a comprehensive literature review to support the findings (Kautz & Nielsen, 2004). Therefore, we believe that it is the most appropriate framework to analyse the literature on adoption of innovation in this thesis. The other

frameworks did not provide as complete a set of perspective as Slappendel's. Slappendel's framework looks at an individual perspective, organisation perspective, and interactive process perspective (Kautz, 2004; Kautz & Nielsen, 2004; Slappendel, 1996). The other frameworks only provided either individualist perspectives (for example Elliot, 1996; Fink, 1998; Iacovou, Benbasat & Dexter, 1995; Thong, 1999; Thong & Yap, 1996; Utomo & Dodgson, 2001) or structuralist perspectives (for example Bagchi, Hart & Peterson, 2004; Gefen et al., 2005; Premkumar & Ramamurthy, 1995; Thong & Yap, 1995; Yao et al., 2003). Only Slappendel's framework provided the interactive process model (Kautz & Nielsen, 2004). This model views innovation as a dynamic phenomenon, therefore the adoption of innovation (in this thesis IT) is also a dynamic phenomenon.

Slappendel's framework identified three perspectives on innovations studies: individualist, structuralist, and interactive process. The elements of the framework are illustrated in Table 2.1.

Slappendel (1996) also suggested the use of case research and case histories as a research methodology to investigate the adoption of innovation from the interactive process perspective. We mentioned in Chapter 1 that adoption of IT within Indonesian studies in this thesis is best investigated by using a qualitative approach. Slappendel's suggestion (Slappendel, 1996) supports our view.

Slappendel's framework is also supported by the perspectives of individual behaviour in an organisation or organisational behaviour. A model of organisational behaviour contingency shows the development of organisational behaviour as individual, group, and organisational systems, as depicted in Figure 2.1 (Robbins, 2003). The contingency theory of organisational behaviour recognises that an

organisation is situated in an environment and consists of individuals who interact with each other within groups.

| | Individualist | Structuralist | Interactive Process |
|--|---|---|--|
| Basic assumptions | Individuals cause innovation | Innovation is determined by structural characteristics | Innovation is produced by the interaction of structural influences and the action of individuals |
| Conceptualisations of an innovation | Static and objectively defined objects or practices | Static and objectively defined objects or practices | Innovations are subject to reinvention and reconfiguration. Innovations are perceived |
| Conceptualisations of an innovation process | Simple linear, with focus on the adoption stage | Simple linear, with focus on the adoption stage | Complex process |
| Core concepts | Champion, leader, entrepreneur | Environment, size, complexity, differentiation, formalisation, centralisation, strategic type | Shocks, proliferation, innovative, capability, context |
| Research methodology | Cross-sectional survey | Cross-sectional survey | Case studies, case histories |

Table 2.1. Slappendel's framework (Slappendel, 1996, p. 109)

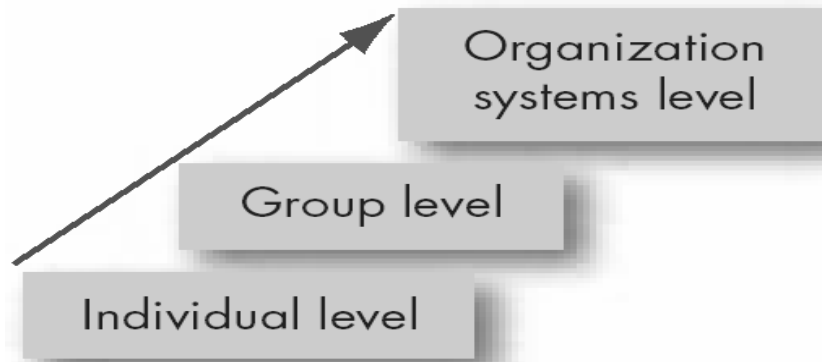


Figure 2.1. Contingency model of Organisational Behaviour (Robbins, 2003)

With this model as a guide, it is understandable that the study of adoption of innovation takes different perspectives within an organisation according to the organisation's building blocks (Slappendel, 1996), rather than process research, diffusion, and determinants (King, 1990; Wolfe, 1994). In the following sections, each perspective will be discussed along with their contribution toward the initial model of IT adoption used for this study which is presented in section 2.4.

2.2.1.1. Individualist perspectives

Individualist perspectives assume that the major sources for innovation and changes within organisations are individuals. Such individuals act with their own agenda and make rational decisions to maximise value or utility. Within the literature of adoption of innovation, individualist perspectives are apparent in the Innovation–Decision Process Model (IDPM) (Rogers, 1995), Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), which was later modified and evolved into the Theory of Planned Behaviour (TPB) (Ajzen, 1991), and the Technology Acceptance Model (TAM) (Davis, 1989). Within those theories, the focus was on how individuals accept new ideas (as a

predictable behaviour in TRA and its derivatives) and factors influencing the acceptance. The following sections will discuss these theories further.

2.2.1.1.1. Innovation Diffusion and Innovation Decision Process Model (IDPM)

Innovation diffusion uses an approach in which the decision to adopt new technology is mainly based on perceptions of the technology within the decision-making unit (Rogers, 1995; Tatnall & Burgess, 2004). IDPM was based on communication theory, where the innovation was communicated to the audience (potential adopters). IDPM could be viewed as the adoption part of the Diffusion of Innovation model by Rogers (Seligman, 2000). The IDPM stages as depicted in Figure 2.2., defined by Rogers (1995) are:

- ***Knowledge.*** The decision-making unit is exposed to the existence of innovation. In this case the innovation could be new hardware, software, methodology, or tools. The main activity in this stage is cognitive (knowing). The knowledge about innovation might come through different communication channels. It could be in the form of advertising, word of mouth, formal education or training. Hassinger argues that the knowledge-finding activity is not a passive exercise (cited in Rogers, 1995). The knowledge-finding activity would be initiated when the need for innovation exists.
- ***Persuasion.*** The decision-making unit forms an opinion toward the innovation. This opinion could be favourable or unfavourable. The main activity in this stage is affective (feeling). The decision-making unit would actively seek information about the innovation of concern before developing an opinion.
- ***Decision.*** The decision-making unit decides either to reject (rejection) or accept (adoption) the innovation. Usually, the decision to adopt or reject would be made based on a trial period. The result would determine either to adopt or reject

the innovation. External parties might be involved by providing an opportunity to demonstrate the innovation.

- **Implementation.** The decision-making unit actually uses the innovation. This is where the activities shift from strictly mental to real action. It would involve behaviour change due to the implementation. In this stage, the decision-making unit would discover whether the initial knowledge and perception of innovation were true or not. The implementation stage would end when innovation becomes an integrated part of the adopter's life or the innovation perceived as useless.
- **Confirmation.** The decision-making unit confirms or reverses the decision to reject or adopt the innovation made in the previous stage. The reason for this change is that information received about innovation may have conflicted with the previous beliefs.

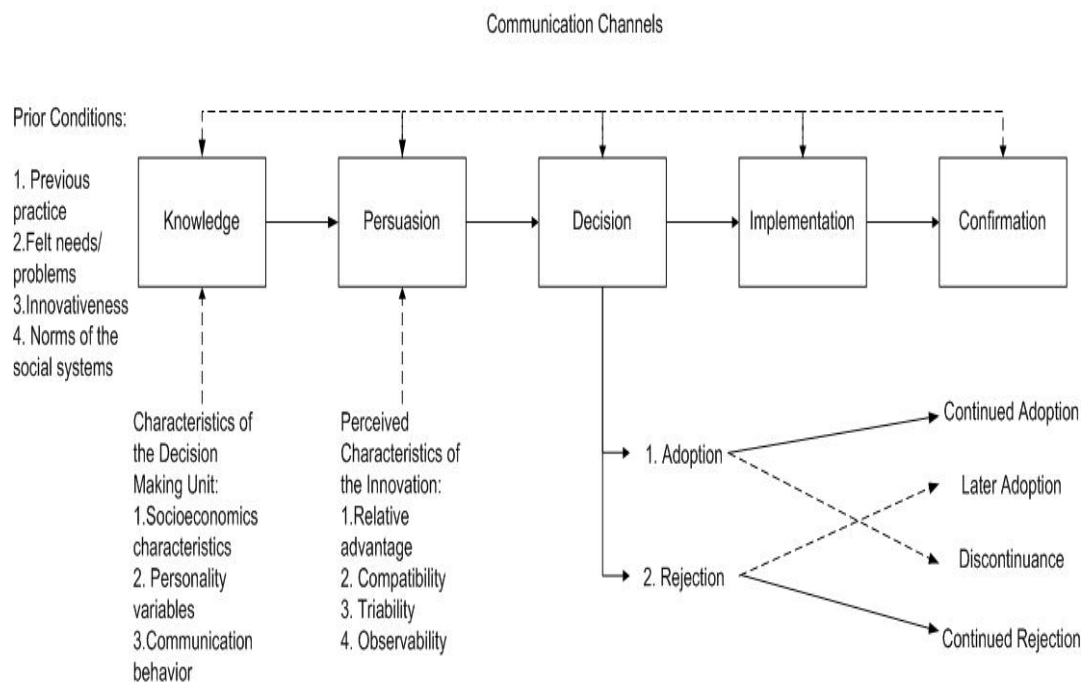


Figure 2.2. Innovation–Decision Process Model (adopted from Rogers, 1995)

IDPM also incorporates the conditions prior to the knowledge stage that influence the knowledge stage. These conditions are previous practices, the need to be fulfilled or the problem to be solved, innovativeness of the decision-making unit, and the norms of the social systems. IDPM assumes that the adoption process is continuous (Rogers, 1995). A decision to adopt or reject an innovation could be changed in the future if more knowledge and persuasion become available to the decision-making unit. It also could change due to the realities faced during the implementation process.

IDPM has been used to study IT adoption. IDPM has been used to find factors affecting IT adoption in general (Everdingen & Wierenga, 2002; Knol & Stroeken, 2001; Premkumar & Ramamurthy, 1995; Premkumar & Roberts, 1999; Waarts, Everdingen & Hillegersberg, 2002; Wong, 2003), EDI adoption (Angeles et al., 2001; Jimenez-Martinez & Polo-Redondo, 2004), computer technology adoption in less developed countries (Al-Gahtani, 2003; Anandarajan, Igarria & Anakwe, 2002; Utomo & Dodgson, 2001), senior IS managers' adoption of new computing architectures (Bajaj, 2000), and adoption of web service standards (Chen, 2003). Others have studied the relationship between the level of internet adoption and competitive advantage (Teo & Pian, 2003), general IT diffusion patterns (Teng, Grover & Guttler, 2002), and the role of change agents in IT adoption (Elsammani, Hackney & Scown, 2003). The research in IT adoption uses Rogers's IDPM stages to find factors influencing the whole adoption process within a particular context or to explain the role of a particular factor in a particular adoption process (Akkeren & Harker, 2002; Al-Gahtani, 2003; Chau, 2001; Fink, 1998; Sharma & Rai, 2003).

In IDPM, it is assumed that every innovation is desirable and therefore rejection of innovation would be considered as resistance to change (McMaster & Kautz, 2002; Robertson, Swan & Newell, 1996). The reality is that not every innovation is embraced by the community, as Rogers himself (1995) pointed out in the Persuasion stage. The

innovation characteristics of relative advantage, compatibility, triability, and observability would influence the opinions of the decision-making unit toward the innovation.

Within the IDPM model depicted in Figure 2.2, Rogers portrayed the implementation stage when the decision to adopt was made; however, the real action of implementation was not the focus of this theory. Instead, the focus is more on the communication of information regarding the innovation to the adopter that might change the perception toward innovation. The emphasis on the communication process implies that the adoption is achieved when the decision to accept the innovation is made.

IDPM explains the adoption of innovation on an individual level very well, but not at the organisational level. Most studies using IDPM assume that organisations are at the same level of granularity as an individual level. The consequence of this assumption is that the interaction among individuals within an organisation as an integrated unit has been ignored.

2.2.1.1.2. Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), and Technology Acceptance Model (TAM)

TPB and TAM were both derived from TRA, which originated from the psychology discipline. Basically, TRA is concerned with the prediction of behaviour based on psychological variables of an individual. TPB was designed as an improvement to TRA, while TAM was designed specifically for technology acceptance. These two theories will be explained in the following two sections.

2.2.1.1.2.1. Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB)

TRA was formulated in 1967 in an attempt to provide consistency in studies of the relationship between behaviour and attitudes (Fishbein & Ajzen, 1975; Werner, 2004).

TPB (Ajzen, 1991) is considered as an extension of TRA (Werner, 2004). The main assumption of TRA and TPB is that individuals are rational in considering their actions and the implications of their actions (decision-making). Rational decision-making assumes that the decision is made under uncertainty (Basu, 1996; Eppen et al., 1998). Rational decision-making implies that either optimum results were expected or the decision-making unit was aware of all the impacts and consequences (Basu, 1996; Bazerman, 2002; Eppen et al., 1998).

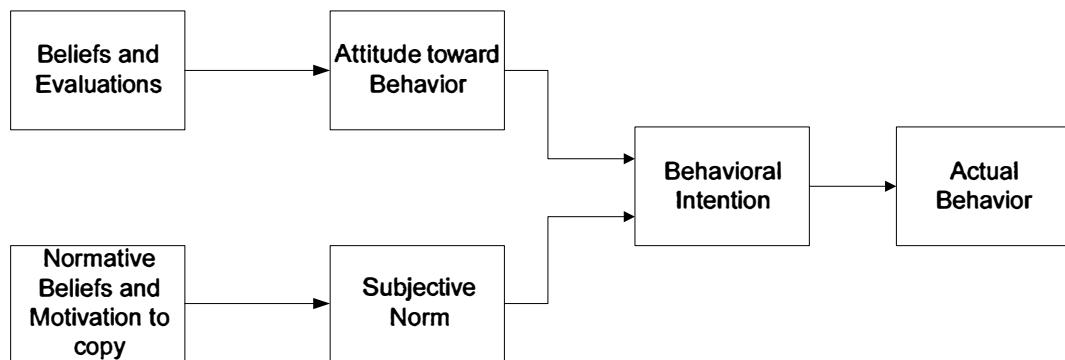


Figure 2.3. Theory of Reasoned Action (adopted from Fishbein & Ajzen, 1975)

TRA was developed to examine the relationship between attitudes and behaviour (Ajzen, 1988; Fishbein & Ajzen, 1975; Werner, 2004). There are two main concepts in TRA: “principles of compatibility” and the concept of “behavioural intention” (Ajzen, 1988; Fishbein & Ajzen, 1975). Principles of compatibility specify that in order to predict a specific behaviour directed to a specific target in a given context and time, specific attitudes that correspond to the specific target, time and context should be assessed (Ajzen, 1988; Fishbein & Ajzen, 1975). The concept of behaviour intention states that an individual’s motivation to engage in a behaviour is defined by the attitudes that influence the behaviour (Fishbein & Ajzen, 1975). Behaviour intention indicates how much effort an individual would like to commit to perform such behaviour. Higher commitment is more likely to mean that behaviour would be performed.

Behaviour intention is determined by attitudes and subjective norms (Ajzen, 1988; Fishbein & Ajzen, 1975). An attitude refers to an individual's perception (either favourable or unfavourable) toward specific behaviour (Werner, 2004). 'Subjective norm' refers to the individual's subjective judgment regarding others' preference and support for a behaviour (Werner, 2004).

TRA was criticized for neglecting the importance of social factors that in real life could be a determinant for individual behaviour (Grandon & Peter P. Mykytyn, 2004; Werner, 2004). Social factors mean all the influences of the environment surrounding the individual (such as norms) which may influence the individual behaviour (Ajzen, 1991). To overcome TRA's weakness, Ajzen (1991) proposed an additional factor in determining individual behaviour in TPB (Figure 2.4), which is Perceived Behavioural Control. Perceived behavioural control is an individual perception on how easily a specific behaviour will be performed (Ajzen, 1991). Perceived behavioural control might indirectly influence behaviour.

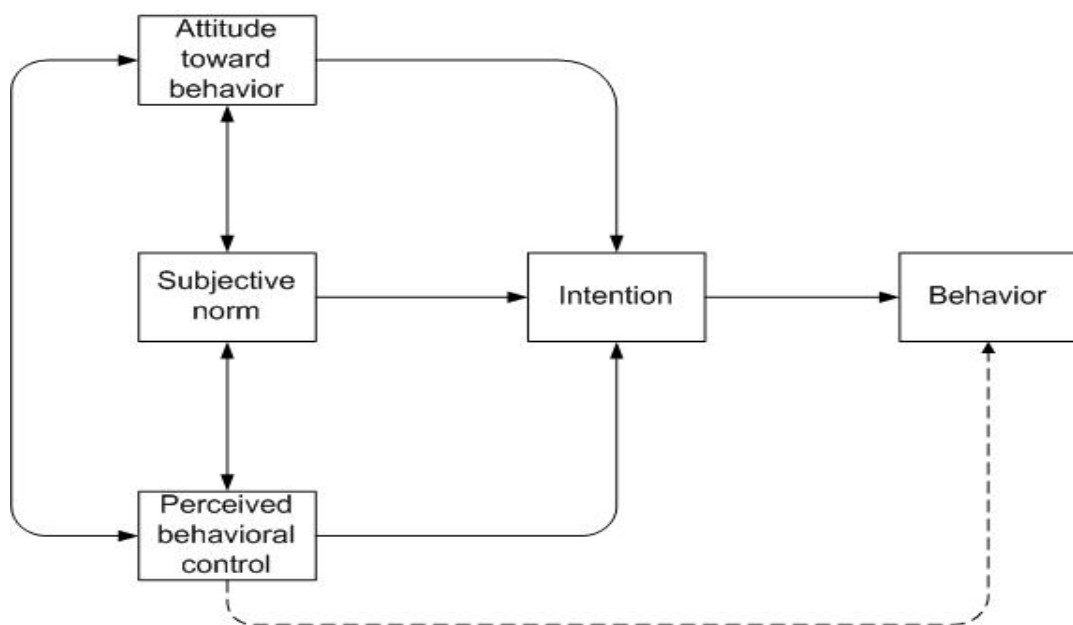


Figure 2.4. Theory of Planned Behavior (adopted from Ajzen, 1991)

TRA and TPB have some limitations in predicting behaviour (Werner, 2004). The first limitation is that intention determinants are not limited to attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). There may be other factors that influence behaviour. Empirical studies showed that only 40% of the variance of behaviour could be explained using TRA or TPB (Ajzen, 1991; Werner, 2004). The second limitation is that there may be a substantial gap of time between assessment of behaviour intention and the actual behaviour being assessed (Werner, 2004). In that time gap, the intention of an individual might change. The third limitation is that both TRA and TPB are predictive models that predict an individual's action based on certain criteria. However, individuals do not always behave as predicted by those criteria (Werner, 2004).

In terms of IT adoption, TRA and TPB have been used to explain the adoption process from individual perspectives. TRA was modified into TAM to predict user acceptance of new computer technology (Chin & Marcolin, 2001; Karahanna & Straub, 1999; Legris, Ingham & Collette, 2003). TAM uses the same principles as TRA in predicting acceptance of IT (behaviour) from an individual's intention to accept IT. The similarity has been assessed in a study involving 107 MBA students at the University of Michigan (Davis, Bagozzi & Warshaw, 1989).

TPB has also been used to explain the adoption of IT. For example, TPB has been used to explain the adoption of voice-mail technology (Benham & Raymond, 1996) and WAP service (Hung, Ku & Chang, 2003). TPB is also comparable with TAM in explaining web presence in SMEs (Riemenschneider, Harrison & Mykytyn, 2003).

2.2.1.1.2.2. Technology Acceptance Model (TAM)

TAM was formulated by Fred D. Davis to provide a valid measurement scale for assessing user acceptance of computers (Davis, 1989, 1993). TAM is focused more on

technology, and is claimed to be different from previous measurements as it provides a valid measurement scale to predict user acceptance of IT. These measurements were derived from TRA. To measure user acceptance, TAM uses two variables, “perceived usefulness” and “perceived ease” of use (Davis, 1989, 1993). Perceived usefulness (PU) refers to the degree to which the user believes the new technology would enhance job performance (Davis, 1989, 1993; Davis, Bagozzi & Warshaw, 1989). Perceived ease of use (PEU) refers to the user’s belief that using the new technology would require minimum effort (Davis, 1989, 1993; Davis, Bagozzi & Warshaw, 1989). TAM suggested that the user’s intention to use new technology is jointly determined by attitudes toward using and perceived usefulness (Davis, 1989, 1993; Davis, Bagozzi & Warshaw, 1989) as shown in Figure 2.5:

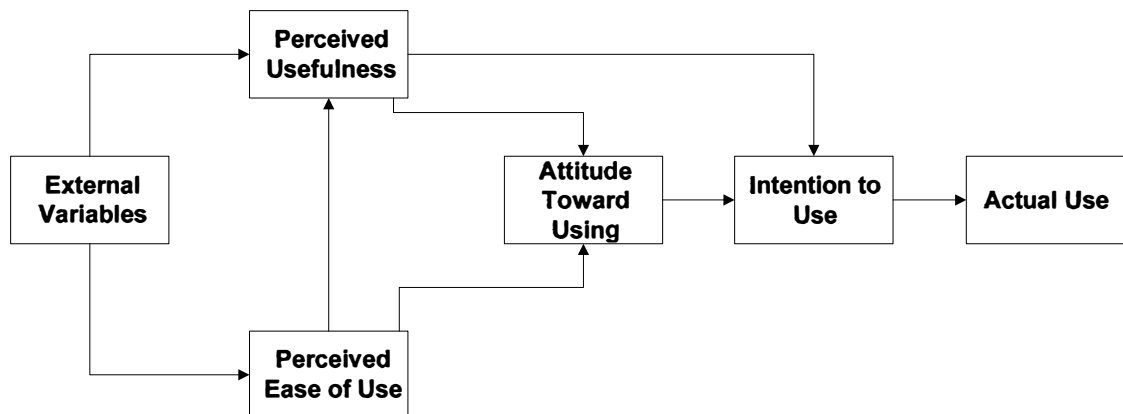


Figure 2.5. Technology Acceptance Model (adopted from Davis, 1989)

PEU may be influenced by two factors: the “availability of training and support” and “perceived accessibility” of the new technology (Karahanna & Straub, 1999). PEU is also influenced by computer self-efficacy, objective usability, and direct experience (Venkatesh & Davis, 1996). PU may be influenced by three factors: the availability of training and support; the social presence of the technology through communication channels; and the social influence to use the new technology (Karahanna & Straub,

1999). However, in TAM the main focus to measure user acceptance is PU and PEU. TAM seems to ignore *subjective norms* found in both TRA and TPB. Probably TAM assumes that *subjective norms* are included within external variables.

As a model of measuring and predicting user acceptance of new technology, TAM has been tested in various contexts. It has been tested on IT adoption in North America, Switzerland, and Japan (Straub, Keil & Brenner, 1997). It has also been tested with government employees (Roberts & Henderson, 2000), web systems and e-commerce (Chen & Tan, 2004; Lederer et al., 2000; Moon & Kim, 2001; Yi & Hwang, 2003), electronic supermarkets (Henderson & Divett, 2003), and even in agricultural sectors (Flett et al., 2004). TAM is widely used and has been perceived as valid in different contexts.

Although TAM has been widely used, it has been found that it could not explain the IT adoption experience in Japan (Straub, Keil & Brenner, 1997). Straub et.al. (1997) believe that this is due to cultural differences. Although it is not clear whether culture is the cause of differences in that study result and what the specific cultural characteristics are that cause the differences, TAM still could not explain the Japanese experience in IT adoption. Furthermore, TAM measurement tools (questionnaires for PEU and PU) could be biased if the researcher changes the order of questions asked. Changing the order or even the wording of questions is common practice when adapting TAM for investigations in different contexts (Davis & Venkatesh, 1996). The order of questions and the translations of TAM's questionnaire might be responsible for the Japanese result. Other research has found that although TAM is useful for predicting user acceptance of new technology, it is better in explaining technology adoption if the researcher takes into account human and social change processes and also the adoption of innovation model (Legris, Ingham & Collerette, 2003). TAM's focus on PU and PEU

did not cover whether there is the need for applicability of a technology (IT) or whether it is “objectively” useful.

Finally, TAM has been extended and evolved into TAM2. TAM2 extends the original TAM to include factors such as subjective norms, image, job relevance, output quality, result demonstrability, experience, and voluntariness (Venkatesh & Davis, 2000). TAM2 has also incorporated some aspects that are similar to the innovation adoption model: observability, triability, and compatibility (Rogers, 1995) as suggested by Legris et.al (2003).

Even with the modification, TAM is used to explain behaviour based on specific stimuli given to individuals as is the case with TRA and TPB. It does not take into account the interactions between individuals within an organisation. TRA, TPB, and TAM usually predict the acceptance (or behaviour) of innovations as a statistical aggregate from respondents’ responses.

2.2.1.2. Structuralist perspectives

Unlike individualist perspectives, a structuralist perspective argues that diffusion of innovation is determined by organisational characteristics (such as technology, strategy, differentiation, etc) and organisational variables (such as size, complexity, professionalism, formalisation, and governance) (Slappendel, 1996). Structuralist perspectives are not only concerned with the organisation itself but also its environment. Within structuralist perspectives, the environment influences the adoption of innovation for an organisation and at the same time innovations are facilitated by communication between the organisation and its environment (Duncan, 1972; Zaltman, Duncan & Holbek, 1973). Typical environmental factors are customers, suppliers, competitors, and government (Duncan, 1972). Customers could be a source of innovation information or may demand new products or services that push the organisation to adopt innovations,

while suppliers might make organisations aware of innovations. On the other hand, the competitive pressure from competitors might initiate adoption, although with limited effect. Finally, governments with their policies also influence the adoption of innovation within organisations, although many structuralist perspectives articles do not discuss this (Slappendel, 1996).

Typical examples of structuralist perspectives on adoption innovation can be seen in the literature on inter-organisational information systems or any systems which would involve third parties outside the organisation. The following are examples:

- Teo and Pian (2003) investigated the strategy, size, and competitive advantage influence toward web adoption.
- Soliman and Janz (2004) found that inter-organisational information systems were affected by the systems characteristics, pressure from competition, and trading partners' influence.
- Utomo and Dodgson (2001) argued that for IT diffusion to be successful, the support of government and research institutions were important as well as the organisation's strategy.
- Yao, Xu, Liu, and Lu (2003) found that organisational characteristics, especially size, influenced the adoption of Automatic Teller Machines (ATMs) at a university.

It can be seen that the focus is really on the organisation's characteristics and its environment affecting adoption of innovation. It is also noted that the processes within organisations were not a focus in structuralist perspectives (Slappendel, 1996). Internal organisational processes such as the development of structure, pattern, and interaction were important factors to explain organisation characteristics. Organisation characteristics can explain why semiformal organisations such as SMEs can be more

flexible than larger enterprises, so may explain why an SME can adopt innovation more quickly than larger enterprises.

2.2.1.3. Interactive process perspectives

It can be said that interactive processes offer more comprehensive perspectives of innovation within organisations. Individuals' actions and the structure of an organisation would determine the adoption of innovation. The interactive process acknowledges that individuals might act within the organisation and its structure, yet at the same time organisational characteristics and its environment would influence the individual's actions. Adoption of innovation is a process which involves the individual, the organisation, the environment, and the interactions between them (Slappendel, 1996). Research using interactive processes is also found in the Computer Supported Cooperative Work (CSCW) area. One example is the work of Palen and Grudin (2003). They investigated the adoption and deployment of calendaring application within organisation. The organisation deployed the calendar application and the process of individuals using the calendar began. Palen and Grudin called this discretionary adoption. Within interactive process perspectives, Actor Network Theory (ANT) is one of the emerging theories that attempts to explain adoption of innovation as a result of interaction process.

2.2.1.3.1. Actor Network Theory (ANT)

ANT is often accredited as the work of Michel Callon, Bruno Latour, and John Law (Callon, 1986, 1999; Latour, 1987, 1988, 1999; Law, 1999; Sidle & Warzynski, 2003; Sismondo, 2004; Tatnall & Burgess, 2004; Tatnall & Lepa, 2003). ANT deals with (Bardini, 1997):

“... progressive constitution of a network in which both human and non-human actors assume identities according to prevailing strategies of

interaction. Actors' identities and qualities are defined during negotiations between representatives of human and non-human actors. The most important of these negotiations is 'translation', a multi faced interaction in which actors:

Construct common definitions and meanings

Define representatives

Co-opt each other in the pursuit of individual and collective objectives."

The translation process consist of four stages (Callon, 1986):

1. ***Problematization.*** Key actors attempt to define the problem and roles of other actors to fit the proposed solution, which was made by the key actors.
2. ***Interresment.*** Processes that attempt to impose the identities and roles defined in problematisation on other actors.
3. ***Enrolment.*** A process where one set of actors (key actors) imposes their will on others. The other actors will be persuaded to follow the identities and roles defined by the key actors. This will then lead to the establishment of a stable network of alliances.
4. ***Mobilisation.*** This is where the proposed solutions gain wider acceptance. The network would grow larger with the involvement of other parties that were not involved previously. This growth is due to the influence of actors.

When using ANT to investigate IT adoption, a researcher would focus on issues such as network formation, human and non-human actors, alliance, and network build up (Sismondo, 2004; Tatnall & Burgess, 2004). Stronger alliances would be likely to influence the decision to adopt or reject IT. In conclusion, ANT recognises that adoption of innovation is initiated by individuals who build a network of individuals (in

the form of an organisation) and nonhumans (machine, tools, etc.) to adopt innovations.

ANT is different from DOI in several ways:

- It breaks the communication into stages (of translation).
- It considers the details of “resistance” (anti-program).
- It treats non-humans as actors.
- It explains success and failure with the same model.

ANT was originally developed to explain the diffusion of science into society (for example the idea of pasteurisation in Latour, 1988). It is similar to Rogers’s DOI. The difference is that Rogers’s DOI viewed the diffusion as merely a communication process, while ANT viewed diffusion of innovation as involving a political game where an actor (who wants to spread the innovation) builds a network that will use the innovation.

The use of ANT in explaining the adoption of innovation is still in its early stage. Some examples are the works of McMaster (McMaster, 2001; McMaster, Vidgen & Wastell, 1997) and Tatnall (Tatnall & Burgess, 2004; Tatnall & Lepa, 2003). In those studies, the process of translation was believed to be richer and deeper in that it acknowledged the intertwining and inseparability of technical and social issues. Ciborra has also used ANT to study the management of IT infrastructure and knowledge management (Ciborra & Hanseth, 1998a, 1998b; Ciborra & Patriotta, 1998; Hanseth, Ciborra & Braa, 2001). Development of knowledge management and management of IT infrastructure are considered to be political processes, where different stakeholders try to win power and spread their “ideology”.

ANT is an example of a theory to explain how different stakeholders in an organisation try to spread their ideas to the other stakeholders and influence them to

accept the ideas. From the ANT perspective, an actor would build a network of power to overcome other networks of power so he or she could win and impose their ideas. At the end, the actors would use the network to achieve their own goals. In the context of adoption of innovation, the ANT perspective could be used to show how different actors spread their ideas (innovation) to be adopted by others through the development of a network. When their ideas (innovation) are accepted by the other stakeholders (the development of a network), the actor could use the network to achieve his or her own goals.

2.2.2. Selection of theoretical basis

We have discussed the relevant literature on IT adoption, using the perspectives of the innovation framework from Slappendel (1996). We believe that the interactive process is the most appropriate perspective to study IT adoption by Indonesian SMEs. However, we also recognise that studies using individualist and structuralist perspective are also valid and worth considering.

Rogers's IDPM (Rogers, 1995) has informed us about the adoption process. However, Rogers's IDPM is mostly concerned with the acceptance of innovation and not the actual use of the innovation. We believe that adoption of innovation should include the use of the innovation. Slappendel's (1996) framework has informed us that there are many factors involved within the interactive process of adoption of innovation. Individualist perspectives theory such as TAM (Davis, 1989, 1993), TRA (Fishbein & Ajzen, 1975), and TPB (Ajzen, 1991) have shown us how an individual might decide to act on something based on certain variables. The action concerned might be the adoption of innovation (for example in TAM). Structuralist perspective research has informed us that the process of adoption of innovation involves not only an individual action but also other individuals and non-individuals (organisation and environment).

ANT has informed us that the adoption of innovation can either succeed or fail. We use our discussion in this section to develop the initial model that will be discussed in Section 2.4. The notion of success and failure from ANT has also motivated the exploration of the theoretical foundation of IS success and failure.

2.3. IS Success and failure

This section will discuss the concepts of IS failure and success before moving to the IT adoption process (in Section 2.4). Rogers (1995) believed that adoption of innovation is about accepting the innovation, not whether the innovation works. With IT adoption, it is different since an IT solution often must be tailored to each SME. We would not necessarily say it was “adopted” until it was in use – (i.e. it had succeeded). Failure might be a combination of when the idea for IT is accepted, but the implementation is not. The acceptance of an innovation (in this thesis the innovation is IT) could be associated with the success of IS and rejection could be associated with failure of IS. This view is also supported by ANT, where ANT explains the success or failure of adoption of innovation is based on the interaction between networks.

IT adoption process could result in either IT being accepted and used to support the business (which might lead to further adoptions) or rejected (Rogers, 1995). The acceptance and usage of IT is often associated with the success and failure of implementation of IT as part of an Information System (DeLone, 1988; Raymond, 1985; Turban, MacLean & Wetherbe, 2002). Adoption of IT could be closely associated with the success or failure of the initial implementation. On the other hand, the failure might be a slow process. The technology might seem to work well in the early stages, but then it may fail (Turban et al., 2006). We are interested in the assessment of failure or success in the early stages of implementation, because the flaw (which may lead to

failure in the later stage) might be detected and fixed, which may be able to prevent the ultimate failure.

First, the definition of success and failure should be established. We will discuss these definitions in this section. Second, it is possible to look at the factors influencing IT adoption, with the view of examining how those factors influence the success or failure of IT adoption. The following sections will discuss the concepts of success and failure of an IS.

2.3.1. IS Success

The concept of IS success is problematic and can be interpreted in different ways (Caldeira & Ward, 2002). For example, Brabander and Thiers (1984) defined IS success as related to the efficiency of the IS itself in meeting the requirements. IS success is also often associated with the benefits gained from the IS compared to the cost to acquire the IS (Ives, Olson & Baroudi, 1983). However, cost–benefit analysis to measure IS success is difficult and previous studies were inconclusive in providing definitive evidence of benefits arising from IS or IT investment (Cragg, 2002; Tallon, Kraemer & Gurbaxani, 2000). Other measurements of IS success are related to its effectiveness, which is associated with the IS contribution toward achieving the organisation’s goals and performance (Raymond, 1990; Thong, Yap & Raman, 1996). However, measuring the impact of IS on organisational performance is also problematic, since it is difficult to isolate the impact of IS from other factors influencing organisational performance (Delone & McLean, 1992; Turban, MacLean & Wetherbe, 2002).

In order to measure IS success, two surrogate measures in the form of two variables are often used: computer utilisation and user satisfaction (Delone & McLean, 1992; DeLone, 1988; Raymond, 1985). Computer utilisation refers to the actual use of computers within organisation, which is shown by the frequency and length of use

(DeLone, 1988). User satisfaction, according to some authors such as Raymond (1985), emphasises factors that contribute to user satisfaction, including whether the applications were developed internally, usage of administrative applications, whether applications are interactive, the presence of high ranking MIS functions, and whether the organisation is situated in a less remote region. DeLone (1988), on the other hand, argues that user satisfaction is shown by the actual usage of the applications by the user.

Looking at the different definitions and measures of IS success, we need to formulate a way to measure IS success. In this thesis, IS success is measured by:

1. Computer usage by looking at the actual usage of computer (e.g. what the computer is used for, by whom, etc)
2. Impact on the business measured by number of applications in used, perceived application importance, and perceived application success.

2.3.2. IS Failure

While most studies in IS success are interested in defining or measuring the success itself, there are also studies in IS failure that usually looked for factors or causes of the failure. This section will discuss concepts of IS failure and the two main approaches used to define IS failure.

Information systems (IS) failures have been documented extensively in the literature. Research literature in recent years has attempted to explain the reasons for and the impacts of an IS failure within organisations (eg. Beynon-Davies, 1999; Poon & Wagner, 2001; Southon, Sauer & Dampney, 1999). The problem with this type of research about IS failure is that it focuses mainly on the reasons for and impacts of the failure and little is revealed about what the organizations did to recover after the failure. Furthermore, most studies were conducted on larger corporations and only very few for

SMEs (e.g. Lees & Lees, 1987). Arguably, the impact of IS failure within SMEs could be as significant as within larger companies or sometimes even worse due to the SMEs' limited resources (Fink, 1998; Welsh & White, 1981). Accordingly, action taken after an IS failure could be a critical point for SMEs.

IS failure is a complex phenomenon that is difficult to define. There have been a number of efforts to adequately define the concept of IS failure since 1970 (Beynon-Davies, 1999). The term IS failure itself is often influenced by the perception of people who are involved in it (Jiang et al., 1999; Keil et al., 2000; Peterson et al., 2002; Poon & Wagner, 2001). While one group of researchers perceive the notion of "failure" in IS as termination of a project due to an unbearable accumulation of flaws, others consider failure as the inability of an IS to meet its stakeholders' expectations (Beynon-Davies, 1999). A flaw is a condition that if accumulated might cause the system to fail, but it can be corrected at the later stage at a cost or accepted at a cost (Beynon-Davies, 1999). Accordingly, different organisations will behave differently when coping with IS failure within their organisations. Many of the definitions of IS failure assume that technology is neutral and unproblematic (Mitev, 2000) as stated by one summary that defined IS failure as (Wilson & Howcroft, 2002):

'System failure is constituted by the system not working properly: it does not perform as expected, it is not operational at the specified time and it cannot be used in the way intended'.

This definition, however, does not portray the full complexity of IS failure as a combination of technology and social issues.

Two approaches related IS failure to the social and organisational context (Beynon-Davies, 1999), namely the concept of "expectation failure" (Lyytinen & Hirschheim, 1987) that was later broadened by Lyytinen (1988) to distinguish

between “*development failure*”, and “*useage failure*” with the concept of “*termination failure*” (Sauer, 1993).

Lyytinen and Hirschheim (1987) identified four major categories of IS failure. Lyytinen (1988) argued that stakeholder groups might recognise failure in either the development or the use phase. In the development phase, the stakeholders try to fit the IS development process to their interests, while in the use phase the stakeholders endeavour to align the IS with their ongoing concerns. Ewusi-Mensah and Przasnyski (1994), while supporting Lyytinen’s idea, argued that IS failure is better defined as failure in IS usage or operation, whereas failure in the development of IS should be called project abandonment. The project abandonment itself can be categorised into three different types:

1. *Total abandonment* is where all project activities are terminated completely before implementation.
2. *Substantial abandonment* is where major modification occurs to the project that makes it significantly different from the original specification before implementation.
3. *Partial abandonment* is where the original specification is reduced without resulting in major changes before implementation.

Sauer (1993) portrays IS development as an interaction of project organisation, supporters and IS arranged in a triangle shape. The project organisation depends on its supporters for the provision of support. Supporters depend on IS for benefits, and IS depends on the effort and expertise of the project organisation to sustain it. In this model, the IS development process is open to flaws, defined as an undesired problem that needs to be solved. The flaws need to be corrected within an acceptable cost range. When flaws are not adequately dealt

with, they might reduce the capacity of the IS to serve its supporters and might introduce new flaws into the systems. At some stage the accumulation of flaws might trigger a decision to stop support and terminate the project. Accordingly, IS cannot be deemed a failure until the development or operation ceases and the supporters are dissatisfied because the IS no longer serves their interests. This is what Sauer referred to as termination failure.

Sauer's definition of IS failure is somehow narrower than Lyytinen and Hirschheim's that the failure is caused by an unbearable accumulation of flaws as a result of interactions between the three components of Sauer's model. Even with a tolerable accumulation of flaws, IS failure still can occur when environment variables such as unfavourable government regulations or economic conditions influence the triangle interactions. Lyytinen and Hirschheim's definition on the other hand provides a wider understanding of IS failure.

The literature has shown the different definitions of failure and the stages where failures might occur (Ewusi-Mensah, 1997; Lyytinen, 1988; Lyytinen & Hirschheim, 1987; Sauer, 1993). However, there is little coverage of how an organisation copes and recovers from failures, especially for SMEs. Failures in IS could have a considerable effect on SMEs due to their lack of resources. We believe that the issues of IS success and failure as the end result of IT adoption process and how the SMEs cope and recover from such failure need to be explored further in this thesis.

2.4. IT adoption within SMEs

Adoption of innovation is a complex phenomenon. Attempts have been made to explain it from three different perspectives: individual, structural, and interactive process (Slappendel, 1996). We believe that Slappendel's framework is the most appropriate

framework to approach IT adoption by Indonesian SMEs. From each perspective, numerous studies have been made to explore the adoption of innovation. Research in the individualist framework tends to focus on the acts of the individual who initiates the adoption process, while the structuralists believe adoption of innovation is determined by the organisation's characteristics and its environment. The interactive process school believes that adoption of innovation is a result of interactions between individuals, the organisation, and the environment. The views of the different perspectives are supported by the contingency theory of organisational behaviour, which recognises that an organisation is situated in an environment and consists of individuals who interact with each other within groups.

The intention of each individual within SMEs to use IT can be seen as resulting from efforts to spread the IT (diffusion) by other parties (Rogers, 1995). For Indonesian SMEs', the idea of using IT has been introduced by vendors and international customers (Schiller & Martin-Schiller, 1997), while the government indirectly stimulates improvement in general business areas (Berry, Rodriguez & Sandee, 2001). Meanwhile, as suggested by Cragg and King (1993) and Fink (1998), trading partners also contributed toward SMEs awareness of new technology.

At the individual level, as suggested by Davis (1989) through TAM, decisions to accept new technology were determined by individual perceptions of ease of use and usefulness. As described by Karahanna and Straub (1999) perception of ease of use was influenced by training and support availability and accessibility. In Indonesian SMEs' case, this is where vendors of IT products take part. Vendors are an important way of opening access to new technology (Berry, Rodriguez & Sandee, 2001). They may also provide the products and training to use them. Utomo and Dodgson (2001) suggested that educational institutions and governments are also able to provide such training.

Usefulness is influenced by availability of training and support, the social presence of the technology through communication channels, and social influence to use the technology (Karahanna & Straub, 1999). Availability of training and support and awareness of technology have been covered by vendors and also government initiatives. Social influence to use the technology could come from business partners and customers, who often force Indonesian SMEs to use certain types of technology.

In conclusion, both IDPM (Rogers, 1995) and TAM (Davis, 1989) have been able to provide theoretical foundation for analysing individual adoption of IT. However, as Slappendel (1996) pointed out, adoption of innovation is not only an individual decision but also involves other elements within the individual environment (e.g. organisations). To some extent, IDPM and TAM have already shown that individual decisions were influenced by the environment. SMEs as organisations adopting IT have gone through interactions between individuals within the organisation and between the organisation and its environment. Therefore such interaction is covered in the IDPM and TAM. In the next section, we will discuss the factors influencing the adoption of IT.

2.4.1. Factors influencing IT adoption

The existing literature has documented some of the factors that affect IT adoption by SMEs in developed¹ countries (e.g. Chau, 1995; Cragg & King, 1993; Drew, 2003; Dutta & Evrard, 1999; Fink, 1998; Ihlstrom et al., 2003; Thong & Yap, 1995; Walczuch, Braven & Lundgren, 2000). Meanwhile Al-Gahtani (2003), Khalfan and Alshawaf (2004), and Tarafdar and Vaidya (2005) focused on IT adoption in developing or less developed countries such as Saudi Arabia, Oman, and India. However, their studies were not specifically aimed at SMEs. So far only Utomo and Dodgson (2001)

¹ Worldbank classifies and lists developed, developing, and less developed countries based on their Human Development Index (HDI), where a developed country has HDI 0.8 or better, developing countries have HDIs between 0.5 and 0.8, and less developed countries have HDIs less than 0.5.

focused on SMEs in a developing country, Indonesia. However, their study only covered factors that influenced IT diffusion within Indonesian SMEs. Utomo and Dodgson's (2001) study explored the diffusion of IT within Indonesian SMEs. They used a variant of case study method called the positivist case study approach (Leedy & Ormrod, 2005; Yin, 2003). They found factors influencing the diffusion of IT within Indonesian SMEs by analysing survey questionnaires. We did not find how those factors influenced IT adoption during the IT adoption process. It appears that those factors work individually as suggested by Slappendel (1996), as attributes of the individualist perspective. Utomo and Dodgson's (2001) approach tends to look from the diffusion perspective. They were looking at how IT as innovation was being diffused to the general population (Indonesian SMEs) rather than how it was introduced, deployed, and used within an organisation.

We also noted that many of the previous studies have proposed drivers for and barriers to IT adoption. Drivers are factors that have positive impacts toward IT adoption and barriers are factors that have negative impacts toward IT adoption (Chau, 2001; Ihlstrom et al., 2003; Lawrence, 2002; Lee & Runge, 2001; Rotchanakitumnuai & Speece, 2003; Walczuch, Braven & Lundgren, 2000). We use the term factors in this thesis instead of drivers and barriers. We argue that drivers and barriers are similar to factors with either negative or positive impacts toward IT adoption. For example, one barrier to IT adoption is unfamiliarity with the Internet (Walczuch, Braven & Lundgren, 2000 p. 563). If the SME is familiar with the Internet it would not be a barrier but a driver.

We classify the factors into those internal to the SME and those external, as suggested by Drew (2003) and Ihlstrom et.al.(2003). Internal factors are usually controllable by the SME's management while external factors are less controllable or even uncontrollable by SME's management. These factors and the research that

identified them are shown in Table 2.2 and summarised in Figure 2.6 as part of the interactive process model. These factors are mostly derived from research in developed countries, except for Utomo and Dodgson (Indonesia).

| Internal | | External | |
|--|--|---|--|
| Factors | References | Factors | References |
| Manager Perception toward IT such as benefit, cost, risks IT experience IT knowledge Perceived alignment with business strategy | (Cragg & King, 1993; Diermen, 1997; Fink, 1998; Ihlstrom et al., 2003; Thong & Yap, 1996; Utomo & Dodgson, 2001) | Government Public infrastructure availability Policy and regulation Subsidies Training | (Dutta & Evrard, 1999; Utomo & Dodgson, 2001) |
| Resources Financial resources availability Internal IT infrastructure availability Operational cost | (Drew, 2003; Dutta & Evrard, 1999; Fink, 1998; Ihlstrom et al., 2003; Thong, 2001) | Customers Initiatives or pressure for IT adoption | (Drew, 2003; Fink, 1998) |
| Staff Staff readiness IT experience Staff acceptance for IT adoption | (Chau, 1995; Drew, 2003; Fink, 1998; Mirchandani & Motwani, 2001; Utomo & Dodgson, 2001; Winston & Dologite, 1999) | Competitors Competitive pressure | (Attewell, 1992; Cragg & King, 1993; Fink, 1998; Turban, MacLean & Wetherbe, 2002) |
| | | IT Vendors, Consultants Information, support | (Chesher & Skok, 2000; Cragg & King, 1993; Fink, 1998) |

Table 2.2. Factors affecting SMEs' IT adoption (from literature)

2.4.2. An interactive process-based model of IT adoption within SMEs

In light of such complexity, a combination of perspectives is needed to give a more comprehensive view of adoption of innovation. We used Slappendel's framework (Slappendel, 1996) as the basis of our analysis of research literature on adoption of

innovation. In Slappendel's original framework (Slappendel, 1996) we did not find a specific model which could be used to explore and explain IT adoption within Indonesian SMEs. What we found was that Slappendel classified the theory of adoption of innovation into three categories, as depicted in Table 2.1. We believed that an interactive process model is the most appropriate approach to be used in this thesis. However, we did not find a model of such an interactive process in Slappendel's framework. Slappendel's framework only provides a perspective to look at adoption of innovation as an interaction between different stakeholders. Therefore we need to build an initial model that could guide us in exploring the adoption of IT by Indonesian SMEs from the interactive process perspective.

On the other hand we also have factors influencing IT adoption drawn from the research literature, as shown in Table 2.2. These factors are mostly drawn from studies using either individualist or structuralist perspectives. What we proposed next is the combination of factors influencing IT adoption within SMEs and how those factors interact during the process of IT adoption. Our proposed model has the following assumptions:

- As each organisation consists of individuals who interact with each other (Robbins, 2003), therefore it is necessary to acknowledge that individual characteristics and their actions influence the adoption of innovation.
- Organisations are situated and interact within their environment (Robbins, 2003; Zaltman, Duncan & Holbek, 1973), therefore it is also important to acknowledge that environment and organisational characteristics influence the adoption of innovation.

Relevant literature for the adoption of IT within SMEs has been searched and analysed. It was used to define and understand the different nature and ideas about IT

adoption within SMEs (Hart, 1998; Leedy & Ormrod, 2005). This review included the following disciplines:

- Adoption of innovation, particularly related to IT adoption. Since IT is a wide discipline, the literature review also covered areas such as software engineering and information systems.
- Management, especially related to managing SMEs.
- SMEs and entrepreneurship.
- Organisational behaviour.

Therefore in viewing the process it is necessary to include individuals, organisational characteristics, and the environment (competitors, customers, trading partners, and government), as depicted in Figure 2.6.

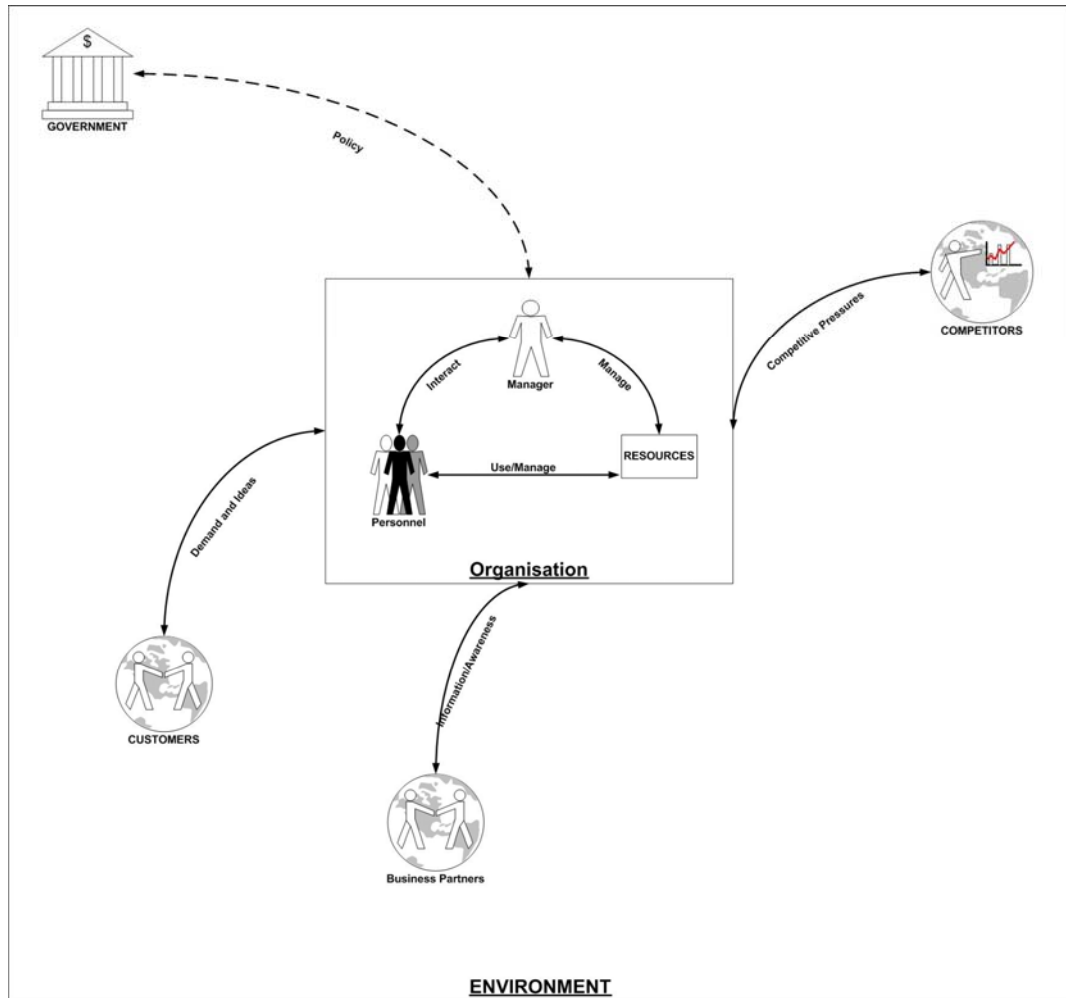


Figure 2.6. Multi perspectives on innovation on organisation

Government interaction with the organisation is not shown as a solid line since it was not clearly documented within the literature (Slappendel, 1996). Based on this model, the adoption of innovation is shown as a process where:

- Individuals, organisation resources and characteristics are involved and interact in order to adopt innovation. In this model, the individuals are the manager and staff, while other resources are organisational resources that are used and managed by individuals.

- Customers, trading partners, and competitors may influence the adoption of innovation, while the government can drive the adoption of innovation indirectly by implementing policy and providing stimuli, although this is unclear.

As mentioned previously in Section 1.1.3, the IT adoption process is a three stage process as shown in Figure 2.7.

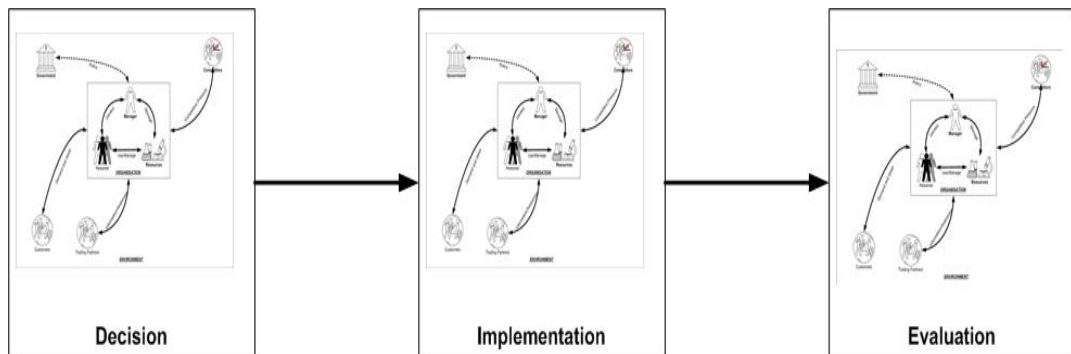


Figure 2.7. IT adoption process

We used both models, depicted in Figure 2.6 and 2.7, as the basis for the semi-structured interview design that will be covered in Chapter 3. Based on the results of the semi-structured interviews we can refine the initial model to reflect the reality of IT adoption within Indonesian SMEs.

2.5. Cultural Issues

Investigating phenomena such as IT adoption within Indonesian context using theories developed mostly in western countries, cultural issue could be important factors to be explored and dealt with. Elliot (1996) suggested that the effect of national culture could be seen in the adoption of innovation. Within the boundary of an organisation,

organisational culture which include the manager and staff could influence the process of adoption of innovation (Thong & Yap, 1995).

Hofstede (1997) have been used extensively to explain the effect of national culture to various phenomena which also include adoption of innovation. National culture could make a theory which might work in certain countries might not work in other countries as in case of TAM in Japan (Straub, Keil & Brenner, 1997). While organisational culture could also have similar impact toward adoption of innovation as national culture. Organisational culture is developed by the interaction of people within organisation and organisation with its environment (Robbins, 2003).

Although culture (both national and organisational) is an important factor, it is often that culture is also an escape goat for failure or problems such as lack of managerial and communicational skills (Bagchi, Hart & Peterson, 2004; Damian & Zowghi, 2002). Culture will be influencing what and how people works and the reason they do what they did (Robbins, 2003). Therefore, in this thesis we would like to avoid “blaming” culture as factor influencing IT adoption. We would like to explore the individual factors that actually influencing IT adoption. After all, if we looked at all the factors and the adoption process as a whole, it might be a representation of a culture.

2.6. Summary

In this chapter, we have covered the concepts and definition of SMEs, Indonesian SMEs, adoption of innovation, and IS success and failure. We have identified factors influencing IT adoption within SMEs that might apply to Indonesian SMEs. Since we are interested in the IT adoption process as well as factors influencing IT adoption, we have proposed a process-based IT adoption model based on the factors we identified from the literature and Slappendel’s framework.

Every adoption of an innovation could result in either acceptance or rejection (Rogers, 1995). We have discussed the concepts of success and failure of IS implementations in Section 2.3. Acceptance of the innovation (in this thesis the innovation is the new IT) is one measure of IS success. Therefore we believe that it is also necessary in this thesis to cover the results of the IT adoption process in term of IS success or failure. We are also interested in investigating how Indonesian SMEs cope and recover from their IT adoption failures, since these may cause a significant financial loss in SMEs due to their limited resources.

At the beginning of this thesis we posed six research questions to guide us in investigating IT adoption within Indonesian SMEs. In this chapter we have identified the theoretical basis of adoption of innovation, which can be viewed from three different perspectives (structuralist, individualist, and interactive process). We use the interactive process perspective in this thesis as we believe that IT adoption, especially within Indonesian SMEs is better explored from such perspective.

Despite using interactive process perspectives, we recognise that there are other elements involved in the adoption. Such elements in this thesis are referred to as factors. RQ1 asks about the well-documented factors influencing IT adoption. We found that most of the research literature suggesting factors influencing IT adoption used either individualist or structuralist perspectives. We have divided the factors into external and internal factors in Table 2.2.

Given the factors influencing IT adoption by SMEs from the literature, we are interested to see whether those factors are considered by Indonesian SMEs during their IT adoption process. Therefore we posed RQ2, to find what factors are influencing IT adoption within Indonesian SMEs. Then we compared the factors found in literature to the factors actually considered by Indonesian SMEs (RQ4).

As we used the interactive process perspective when we proposed our initial model as depicted in Figures 2.6 and 2.7, we want to explore the process of IT adoption within Indonesian SMES (RQ3). We are interested in finding how Indonesian SMEs actually adopt IT, what factors actually influence them and how those factors are combined to influence them.

As the result of IT adoption could be acceptance or rejection, we would like to investigate this further. Acceptance could be associated with success while rejection could be associated with failure. We would like to see why Indonesian SMEs failed in IT adoption (RQ4). The research literature in IS success and failure, as far as we know, did not much cover the aftermath of failure, especially in Indonesian SMEs. We would like to explore what Indonesian SMEs did to cope and recover from any failures in IT adoption (RQ6). Recovery could be crucial for Indonesian SMEs, because IT investment within IT adoption process by Indonesians SMEs could be substantial, and SMEs are generally characterised as lacking resources.

In the following chapters, this thesis will discuss how we have answered the research questions using semi-structured interviews as the data collection tool and the analysis of the results. In Chapter 3 we will discuss the research design that guides the rest of the research process.

Chapter 3 – Research Design

This chapter describes the research methodology used throughout the project. The discussion starts with the epistemology, underlying theory, and methods used throughout the entire research project and will justify the selection of particular approaches and methods. In this thesis, we used a qualitative approach. We believe that this approach will give a better understanding of how the static factors actually influence Indonesian SMEs in their effort to adopt IT. This chapter will begin by discussing both qualitative and quantitative approaches to conduct research. The second section will discuss the research approach used and the selection of method and tools that are coherent with the research approach we took. The third section will discuss the research design. Finally, the last two sections will cover the limitation of the research design and a discussion of University of Technology, Sydney ethical research requirements and how this thesis has addressed them.

3.1. Qualitative and quantitative approaches

The research questions posed at the end of chapter one, explore IT adoption phenomena as an interactive process. We believe that in order to investigate such phenomena, we need to take an approach that allow us to investigate all the factors involved in IT adoption process within Indonesian SMEs and also investigate how the factors interact during the process. Slappendel (1996) suggested the use of case research and case histories as a research methodology to investigate the adoption of innovation from the interactive process perspective. We follow Slappendel's suggestion, which lead us to the use of qualitative approach. The use of qualitative approach to investigate research problems as in this thesis deemed appropriate as suggested by Leedy and Ormrod (2005) and Yin (2003) and also following example from previous research in the work

of Utomo and Dodgson (2001) and McMaster et al. (1997). We will discuss our selection of qualitative approach in the next part of this section.

In recent years the debate on qualitative versus quantitative research has been well documented (e.g. Crotty, 1998; Leedy & Ormrod, 2005; Miles & Huberman, 1994). Much of this debate does not take into account the underlying epistemology, ontology, and theoretical perspectives from each side (Crotty, 1998; Miles & Huberman, 1994). As a result, issues of validity, objectivity, and the ability to generalise results become the main focus of debate rather than looking into the origins of the differences. In this section, the underlying principles and philosophy of qualitative and quantitative research will be discussed, followed by the justification of the qualitative approach used in this research.

The fundamental difference between qualitative and quantitative research is in epistemology, the theory of knowledge embedded in the theoretical perspectives (Crano & Brewer, 2002; Crotty, 1998). The qualitative approach adopts the *constructionist* view as the main epistemology while the quantitative approach adopts the *objectivist* view (Crotty, 1998). Constructionists argue that meaning and meaningful reality are constructed by humans. Objectivists, on the other hand, believe that meaning and meaningful reality exist outside any human consciousness. Therefore, the qualitative approach often uses in-depth involvement with the phenomena studied using tools such as participative observation or interview. The quantitative approach often takes distance from the phenomena studied, using tools such as survey questionnaires or controlled experiments in the laboratory (Leedy & Ormrod, 2005). Quantitative researchers often use models that simplify the phenomena studied into several variables while assuming that other variables are constant (Leedy & Ormrod, 2005; Sekaran, 2000). Qualitative researchers reject such simplification and argue that ignoring some of the variables would make unrealistic and simplistic representation of the phenomena. Rather than

making any simplification, qualitative researchers try to explore and understand the complexity of phenomena studied by immersing themselves into the subject matter. The models developed by qualitative researchers try to show such richness and complexity. That is why most qualitative research uses methods that interact directly with research participants such as in-depth interview and observation.

This thesis studies the complex and interrelated phenomena of IT adoption within Indonesian SMEs. It involves SMEs as organisations with individuals and resources, environments in which the SMEs are situated, and the technology (IT) that was introduced into the SMEs. Individuals within organisations are expected to work together to achieve both organisational and individual objectives (Robbins, 2003). The organisation is also related and situated with its environment in their effort to achieve their objectives (Robbins, 2003).

The aim of this study is to learn and understand how IT was introduced and put into use by the SMEs within their context (environments). Such a complex process requires an approach that is suitable for understanding the whole process, therefore in this study the qualitative approach is selected. This approach enables researchers to study the phenomena within their context and reveal rich and complex processes (Crotty, 1998; Leedy & Ormrod, 2005).

3.2. Research approach, methods, and tools selection

IT adoption within SMEs is a complex sociotechnical phenomenon (McMaster, 2001; McMaster & Kautz, 2002; Rogers, 1995; Slappendel, 1996). SMEs consist of individuals and other resources that interact with each other in their daily operations. By introducing an innovation (in this case IT) the interaction both within an SME and between the SME and its environment will change. Such complexity needs to be

explored in its fullness. Any effort to reduce such complexity into mere numbers and figures could obscure the real picture. A quantitative approach using tools such as surveys was considered but not adopted since the use of a survey tends to prejudge the outcome beforehand. In the end, the quantitative approach will either accept or reject the hypothesis. Instead of making an educated guess at the outcome, the qualitative approach used in this study will explore the phenomena. The outcome should provide a more complete picture drawn from the data collected by semi-structured interviews.

To explore such complex phenomena, a qualitative approach was selected to study IT adoption within Indonesian SMEs. As discussed in the previous section, the qualitative approach allows the researcher to study the phenomenon in its context and with all its complexity (Leedy & Ormrod, 2005). It enables the adoption of IT within Indonesian SMEs to be explored beyond just the factors influencing IT adoption by Indonesian SMEs and also allows an investigation of the complexity of adoption process experienced by Indonesian SMEs.

Establishing the research approach used in this study also establishes the selection of methods and tools to collect and analyse the data from research participants. As it is the intention of a qualitative research to study the phenomenon in its context, the methods used has to enable interaction with the research participants (Crotty, 1998; Leedy & Ormrod, 2005).

We adopt case study methodology (Leedy & Ormrod, 2005; Yin, 2003) to be used in this research. We also grounded our selection of methodology based on Slappendel's (Slappendel, 1996) suggestion that research in adoption of innovation as interactive process using case research and case histories.

In this study, the data comes from the participants' experience in adopting IT for their organisation. One method of collecting such data is the interview, which may be

structured, semi-structured, or unstructured (Creswell, 2003; Gillham, 2000b; Leedy & Ormrod, 2005; Yin, 2003). A structured interview provides a set of questions prepared by the researcher and the participants are required to give answers to those questions (Gillham, 2000b; Leedy & Ormrod, 2005). In a way, it is similar to delivering a survey orally and the data collector filling in the survey rather than asking the participants to fill the survey. Unstructured interviews do not have any detailed guidance on how the topic should be explored (Gillham, 2000b; Leedy & Ormrod, 2005). The unstructured interview could get carried away from the main research topic and might not capture the required data. Therefore, the semi-structured interview with open-ended questions is selected as the method to collect data for this study. The semi-structured interview allows the researcher to explore participants' experiences of IT adoption and to focus on the main issues, yet at the same time allows the interviewer to explore participants' responses further or to clarify issues emerging during the interview (Gillham, 2000b; Leedy & Ormrod, 2005; Sekaran, 2000). The semi structure interview guides questions can be seen in Appendix 1, the design of semi structured interview is discussed in section 3.3.1, while the interview process will be discussed in chapter 4.

Once the data is collected, content analysis can be used as an analysis tool. Content analysis is used to identify patterns and themes within the data (Boyatzis, 1998; Leedy & Ormrod, 2005; Neuendorf, 2002). The analysis is based on the interview questions and the detailed method is discussed in Chapter 4. From the analysis, factors affecting the adoption of IT within the participant's organisation can be identified, along with other relevant information that may be important but does not directly relate to the adoption of IT.

3.3. Research design

In this section, we will discuss our research design. We will start by discussing the design of our semi-structured interview as a data collection tool in Section 3.3.1. Section 3.3.2 will discuss how we planned to acquire the participants for semi-structured interviews. Section 3.3.3 will discuss our plan for data analysis.

3.3.1. Design of the semi-structured interview

The model of IT adoption within SMEs (Miles & Huberman, 1994) formulated from the literature review is the foundation to develop the semi-structured interview. The model in the literature review (discussed in Chapter 2 Section 2.4 and depicted in Figure 2.6 and 2.7) portrays the typical process of IT adoption within SMEs. A set of guide questions were developed to inquire about the participants' experiences in adopting IT for their organisations. The questions were open ended. Open-ended questions do not have any prescribed answer to be selected by participants as do the closed questions used in surveys (Cooper & Schindler, 1998; Creswell, 2003; Leedy & Ormrod, 2005). Open-ended questions enable participants to answer the questions in their own words (Gillham, 2000b; Miles & Huberman, 1994; Yin, 2003). The questions are aimed at specific stages of IT adoption as portrayed by the model. The relatively detailed questions allowed the interviewer to pay direct attention to participants' experiences, while the open-ended answers allowed participants and the interviewer to follow up specific issues, dismiss them as insignificant, or suggest additional views during the course of the interview (Gillham, 2000a; Leedy & Ormrod, 2005; Sekaran, 2000).

Since the study was conducted from an institution with English as the main language (UTS), the initial set of questions were developed in English. However, the field study was conducted in Indonesia and with Indonesian participants. It was

necessary to translate the set of questions into the Indonesian language. The translation needs to be formalised in writing due to the following reasons:

- Both versions of the questions set have to be approved by UTS Human Research Ethics Committee (UTS HREC) to check that the translation into Indonesian language is accurate;
- To provide consistency in translation for the interviewer;
- To ensure consistent answers from participants.

Before the set of questions was submitted to the UTS HREC for approval a pilot study was conducted. A few Indonesian students were asked to translate some parts of the questions to evaluate the consistency of the translation. The pilot participants' translations were compared to the translations we made. There were no significant differences between the pilot participants' translation and my translation. However, some improvements were made to produce a more consistent and unambiguous translation.

3.3.2. Participant selection

The participants were selected from a list of Indonesian SMEs in the furniture and handicraft industry and situated in the Yogyakarta and Surakarta regions in Central Java; the list was compiled from data provided by the Indonesian Yellow Pages and the Indonesian SMEs council and association. The furniture and handicrafts industries were chosen because they are not obviously information intensive; these SMEs usually do not have a dedicated IT department, yet they need to use IT in their day-to-day operations. All the participants already used basic computer applications for their business, such as office applications (for administrative functions, reporting, and book-keeping), internet

applications (for simple business intelligence, email, simple marketing and order tracking), and graphic manipulation applications for product design.

Two of the companies had computerised inventory systems, but none had company web sites. The chosen (adjacent) regions of Central Java are considered one of the main centres for furniture and handicrafts in Indonesia; as all the SMEs are from the same region they face similar business environments (transportation, raw materials sources, export markets, etc.) We had been working with various SMEs prior to this research project as an IT consultant. Some of the SMEs we have been working in the past were in the furniture and handicrafts industry. Therefore, it was easier to initiate contact and invite the participants since we were known.

Within the participants' organisations, the interviewee was the manager or one of the staff who had been responsible for introducing IT to the organisation. The participants' selection was purposive rather than representative (Leedy & Ormrod, 2005; Sekaran, 2000). The participants were selected on the basis that they had been exposed to the usage of IT in their business. This selection criterion would provide participants who would be able to tell of their experience in adopting IT for their business.

Potential participants were invited to participate by mail, facsimile, and email. Follow up telephone calls, face-to-face meetings, and email were used to secure an interview appointment. The participants within Indonesian SMEs selected to be interviewed were the manager or the IT manager, whose participation was approved by the manager. The managers were selected because in SMEs almost all decisions are made by the manager and they are often directly involved in the IT design and implementation (Fink, 1998; Thong & Yap, 1996).

3.3.3. Data analysis

All the interviews were recorded and transcribed in Indonesian. All the participants' real identities were removed from the transcripts and a random code was assigned as a means of identification. A separate list of participants and the codes assigned to them is kept confidential. The Indonesian language transcripts were not translated into English for analysis to preserve language-sensitive information that might be lost in translation. If necessary, quotations from the transcripts were translated into English to provide a more detailed and direct account from the participants. From the transcripts, a content analysis (Boyatzis, 1998; Neuendorf, 2002; Weber, 1985) was conducted to discover the factors influencing the manager's decision for IT adoption, the process of IT adoption from decision making until evaluation, roles and influence of stakeholders during adoption process, and an interaction between stakeholders. Similar phrases and sentences spoken by the participants were grouped into categories and then a factor name was assigned for each group. From time to time the original recorded interviews were replayed to ensure the consistency of the data extracted. The content analysis was conducted according to steps adapted from Yin (2003) and Miles and Huberman (1994) as follows:

- Specific facts about the participants arranged in chronological order. The order was aligned with the sequence of questions asked.
- Multiple responses were grouped into meaningful groups and a code was assigned to the group.
- Specific facts were examined if there was an indication that they may have relation to the study.
- Identification of patterns emerged from the data

As the result of the data analysis, we could develop an overall model of the IT adoption process within Indonesian SMEs.

To validate our findings, we send our final model to the participants to be validated. The part we send include the codes (factors) that we extracted from the interview and final model along with the description of both the model and factors.

3.4. Limitations of research design

As in any study using the qualitative approach, there are inherent limitations to the research design. The qualitative approach is more concerned with the detail of the sample studied rather than the representation of a population (Creswell, 2003; Leedy & Ormrod, 2005; Morse & Richards, 2002). In other word the result may not be applicable to other contexts. However, it is not the intention of this study to generalise the result. The design and enactment of this study has been explained in enough detail in the research design and later on in the data collection and analysis sections for others to be able to perform similar studies in different contexts.

There are also limitations in the data collection tools, namely semi-structured interviews. The participants' responses were based on their perception, memory, and experiences. It is possible that their responses did not describe what actually happened. The semi-structured interview was designed to repeat some similar questions at different stages of the IT adoption process. From the participants' responses, verification could be made and a further clarification could be sought from the participants. A comparison between individual participant's responses would also serve as a verification tool. Another limitation is the translation and interpretation process of interview transcripts from Indonesian language to English by researcher. To reduce the risk of loosing the contextual aspect of data, the interview transcripts were not

translated to English, All the analysis were done in its original language (Indonesian language). Only the result of analysis is written in English.

Within the data analysis, the limitation is in the interpretation of the data by the researcher. This is influenced by the researcher's background and assumptions. There are some strategies that could be employed to overcome researcher's bias, such as (Creswell, 2003):

- Check the result with participants
- Use a rich description in order to inform reader about the study

We have sent the original interview transcriptions to the participants. We did not receive any objections or suggestions from the participants. We also sent excerpts from the initial analysis to the participants (the rich description part) to seek their comments. They again did not have any objections or comments.

As mentioned previously, the qualitative approach also challenges researchers to examine and evaluate their assumptions and bias toward the research problems (Avison & Myers, 2005; Creswell, 2003; Leedy & Ormrod, 2005; Myers & Avison, 2002; Orlikowski & Baroudi, 2002). The assumptions and biases possessed by the researcher could influence the data analysis. We had some assumptions based on our own values and belief as an Indonesian in the way we looked at Indonesian SMEs prior to the research. The initial assumptions were:

A.1 We believed that Indonesian SMEs' employees would comply unconditionally with their employer's orders. From our previous observation as an Indonesian academic and researcher, we assumed that Indonesian people usually agreed to whatever their supervisor or employer asked them to do in form of silence or a smile. Therefore we selected only the managers for our interview participants.

We believed the manager will have all the knowledge about organisation and the manager's order will be carried out by the staff without any objections.

- A.2 A computer is a luxury item. The knowledge to operate a computer might be limited to those who could acquire a computer. Therefore, we believed that the acquisition of a computer and the knowledge of how to operate and use a computer might be a problem for Indonesian SMEs.
- A.3 We also believed that the Indonesian SMEs might have adopted IT or any other innovation for that matter, just because their business partner or competitors have adopted it.
- A.4 We also believed that since the Indonesian government has publicly announced and declared that SMEs would be the backbone of the Indonesian economy, the government would dedicate a considerable amount of resources to assist the growth of Indonesian SMEs. We assumed that the assistance would cover IT.

The research findings related to the above assumptions will be discussed in the conclusion (Chapter 7).

3.5. University of Technology, Sydney ethics requirements

Before conducting the field study, the research design has to be approved by UTS HREC. An application was prepared and submitted for UTS HREC. The approval was granted on 18 July 2003; the approval number is UTS HREC 03/103A. All the participants should be protected from harm, loss of privacy, and deception. All the participants must be invited to join this study; hence, without their written consent the interview could not take place. A consent form translated into Indonesian for managers and participants (in case the participant was not the manager) was prepared in

compliance with UTS HREC standards and participants signed the consent form at the time of interview. The participants also were free to select the place and time of interview. All the data collected during this study were recorded on audio tape, digitised, and kept in secure network storage within the Faculty of IT at UTS. The network is kept secret and safe. All hard copies were kept in a locked cabinet in a locked room at Faculty of IT, UTS campus. All soft copies were stored in Faculty of IT, UTS network, protected by password and only the main researcher has access to them. Supervisors will only see the field study documents on a limited need-to-know basis. All the publications from this study will maintain the privacy, confidentiality, and secrecy of participants. As a token of goodwill, all participants will be offered a copy of published articles.

Chapter 4 – Data Collection and Analysis

This chapter describes the actual data collection and analysis process. The discussion starts with the data collection process in which participants were selected, invited, and interviewed. The transcription, storage, and data management processes are also covered. The second part discusses the data analysis process in which the interview transcripts were analysed using open coding. We finally describe how the codes extracted from the interview transcripts were interpreted and arranged in order to understand the issues surrounding participants experience in adopting and deploying IT.

4.1. Data Collection

This part describes the data collection stage. It will discuss the participant selection, interview process, and management of data collected from the interview. The field study took place between December 2003 and February 2004.

4.1.1. Participant selection

Within the Central Java region there were few centres for furniture and handicraft industry. One such is located at the south coast of Central Java, and consists of Yogyakarta Special Province and the Surakarta region (part of Central Java Province). A list of 317 companies within the furniture and handicraft industry were compiled from the Yellow Pages directory, the Indonesian Ministry of Industry SMEs directory, and the membership lists of the Furniture and Handicraft Association (Asmindo) local chapters. In some cases, interviewees provided and initiated contacts with other companies which they thought would fit with and be willing to participate in this study. The potential participants were invited by using email, mail, and facsimile. The invitation letter also included a brief description of the study (see Appendix 2)

From 317 potential companies, 42 could not be contacted by any means. Emails sent bounced, telephone calls made were unanswered, facsimiles sent were unanswered or could not be sent, and physical inspection to the business premises found that the business no longer existed at the listed location. The company may have relocated without updating their contact details, changed their business name, or simply closed for some reason. The remaining companies on the precompiled list were contacted. Whenever necessary, follow up telephone calls and face-to-face meeting were arranged with the potential participants if they wanted further clarification of the study. Finally, 36 companies accepted the invitation. However, only 35 were included in this study as the 36th company did not fit Indonesia's SME definition, as it has more than US \$1 million assets and more than US \$6 million annual sales turnover. The following are the reasons why the other 239 companies on the list did not participate:

- 14 companies refused to participate because they either did not use IT or had used IT in the past but were no longer using IT. We tried to persuade them to participate, especially the companies who had used IT before. It was deemed necessary to explore the reason why they did not continue the IT adoption. However, they refused to participate. It might be that the decision to discontinue their IT adoption was seen as a failure and people usually are reluctant to discuss their failures. It was decided that the study would focus on the experience of the companies which participated in this study.
- 12 accepted the invitation but we were unable to reach agreement on an interview schedule (mostly due to the potential interviewees' busy schedules). We have offered many different time slots for interview but for some reasons they could not find time for interview.

- Four companies originally accepted the invitation but when the appointment to interview was arranged the person who was supposed to be the interviewee had resigned from the company. The person who replaced them refused to participate citing that they would like to concentrate on their new jobs.
- 209 companies refused to participate citing various reasons from busy schedules to the simplicity of their systems (hence they did not believe that they were worthy enough to participate). Further persuasion could not change their minds.

4.1.2. Interview process

For each of the 35 participants, an appointment to interview was made. The participants decided where the interview took place for their own convenience. Most interviews took place at the participants' business premises, although one participant was interviewed at his customer's shop while he delivered orders. The typical steps taken in interviewing participants were:

- Secured an appointment for interview at specific time and place. If necessary prior to interview, the participants received further clarification on the interview although they had received the brief description of study with the invitation to participate.
- At the time of interview, the participants were given the consent form and a brief description of the study. They were asked to read carefully and understand their rights. The participants were also briefed on their privacy and anonymity by explaining various procedures to remove their personal data from any publications, data safe keeping, and the complaints procedure to UTS HREC. The participants were also informed that the interview was recorded and at any time during the interview they were free to ask not to be recorded.

- Once the participants expressed their understanding and acceptance, they were asked to sign the consent form. However there was one participant who asked for a signed written letter that guaranteed the identity of his company would not be revealed. The letter was delivered one week after the interview and the participant was satisfied.
- The interview was started by asking them the demographic questions (as seen on Appendix 1). This part of interview was not recorded.
- After all demographic data questions were answered, the recording started if the interviewee agreed. All the interviewees agreed to be recorded although there were some points during the interview where they asked not to be recorded since they believed the information given was sensitive. Afterwards the recording was continued.
- During the interview, we also created brief notes regarding specific issues being discussed. The notes were also important to document unrecorded sensitive information.
- At the end of interview, the participants were informed that they could contact us whenever they would like to know the progress of the study and would be notified about any publications from the study.

Typical interviews lasted for 30-45 minutes. Immediately after each interview additional notes were made and the recorded interviews were digitised using Express Scribe software. The audio tape data was digitised using the Express Scribe format, but could easily be transferred into WAV or MP3 files and stored on a computer hard drive. After the transfer, the audio tape used for interview was erased and used for other interviews.

The semi-structured interview questions (see Appendix 1) were designed to explore participants' experiences in IT adoption. Based on the literature review, the IT adoption process was modelled as a three-stage process (decision-making, implementation, and evaluation). Decision-making refers to the stage before the adoption process started until the decision to adopt is made. Implementation refers to the period during the adoption process starting when the decision to adopt has been made and continuing until the deployment of the IT solution was completed. Evaluation refers to the stage when the adoption process is completed and the IT has been in use for some time. The questionnaires were developed based on the initial model of the IT adoption process discussed in Section 2.4 and depicted in Figures 2.6 and 2.7 in Chapter 2.

Within each process, participants were asked to reveal all the parties involved and all the processes existing before, during, and after the adoption. At an initial glance, the three different sections of the questionnaire seemed to contain redundant questions since at some points they asked the participants similar questions. In practice, however, the "redundant" questions proved to be useful. First, the similar questions in each part of the questionnaire can verify if the participants' stories were accurate by looking at the consistency of their answers. Second, they helped the participants to recall their experience further and often during the interview they remembered and revealed additional information they had forgotten when they answered the previous set of questions. They also enabled us to explore and to clarify further by referring to the participants' answers to the previous set of questions. Finally, these similar questions helped during the data analysis stage by revealing the differences between each stage of the IT adoption process.

4.1.3. Data management

A list of interviewees along with their contact details was created using a Microsoft Excel worksheet in tabular form. Once the list was completed, a random number was generated for each interviewee in the range 1–35. The letter R (for respondent) was added in front of the number and made up the code, so respondents would be known as R01, R02, ..., R35. The respondent list was sorted based on the code. From that point all respondents were identified by their codes.

Once the interview audio file was digitised, it was stored in the Express Scribe software directory. Each participant's interview record was named with their code. All notes relating to the particular participant were also labelled with the participant's code.

Express Scribe acted as a dictation machine. The user can use this software to type in the transcription while the software plays the recorded interview. The transcription can be stored as a plain text file or could be pasted to any word processor and stored as a document file, and it is associated with the recorded interview files. In this study, the transcripts were stored as RTF files so that the transcript files could be analysed using NVivo™ version 2.0 software from QSR International. NVivo is an application to assist researchers in managing and analysing qualitative data such as interview transcripts. NVivo can only read plain text files or RTF files. Again, the participant's code was assigned as a label to each transcript. As soon as the transcripts were ready, the participants were contacted and asked to verify if the transcripts represented what they said. The final treatment for the transcripts before data analysis was removing any identities within the text and replacing them with the participant's code. As an alternative verification method, the summary of the revised IT adoption process model (after the interview) with a brief description was sent to all participants by email. They were asked to provide feedback. Some of the participants gave responses and acknowledge that they received the model. They did not express any

comment or objection. One even said that he had not realised that the IT adoption process he experienced was as complex as the model sent to him.

In compliance with UTS Research Ethics requirements, as described in the research design section, all the data regarding the study are secured in appropriate places. All digital data are stored in the Faculty of IT – UTS network and is only accessible by the researcher using a password. Regular backups made by the IT service within Faculty of IT – UTS prevent any data loss that might occur in the future. A set of backup copies is also stored in the researcher's personal computer. All the hard copy, notes, and printout of data from field study are stored in a locked file cabinet in the researcher's office in the Faculty of IT building. Access to the office room is only available to authorised personnel. All the hard copy documents relating to participants' data were identified only with participants' codes. All the publications made related to this study used the field study in aggregate format whenever possible and if necessary, the participants' code used as an identifier to hide the real identity of respondents. All reasonable measures have been employed to protect the privacy and confidentiality of the respondents' data and their identity.

4.2. Data Analysis

This part will discuss the procedure and steps taken to analyse the data from the field study. Figure 4.1 shows the framework used for data analysis.

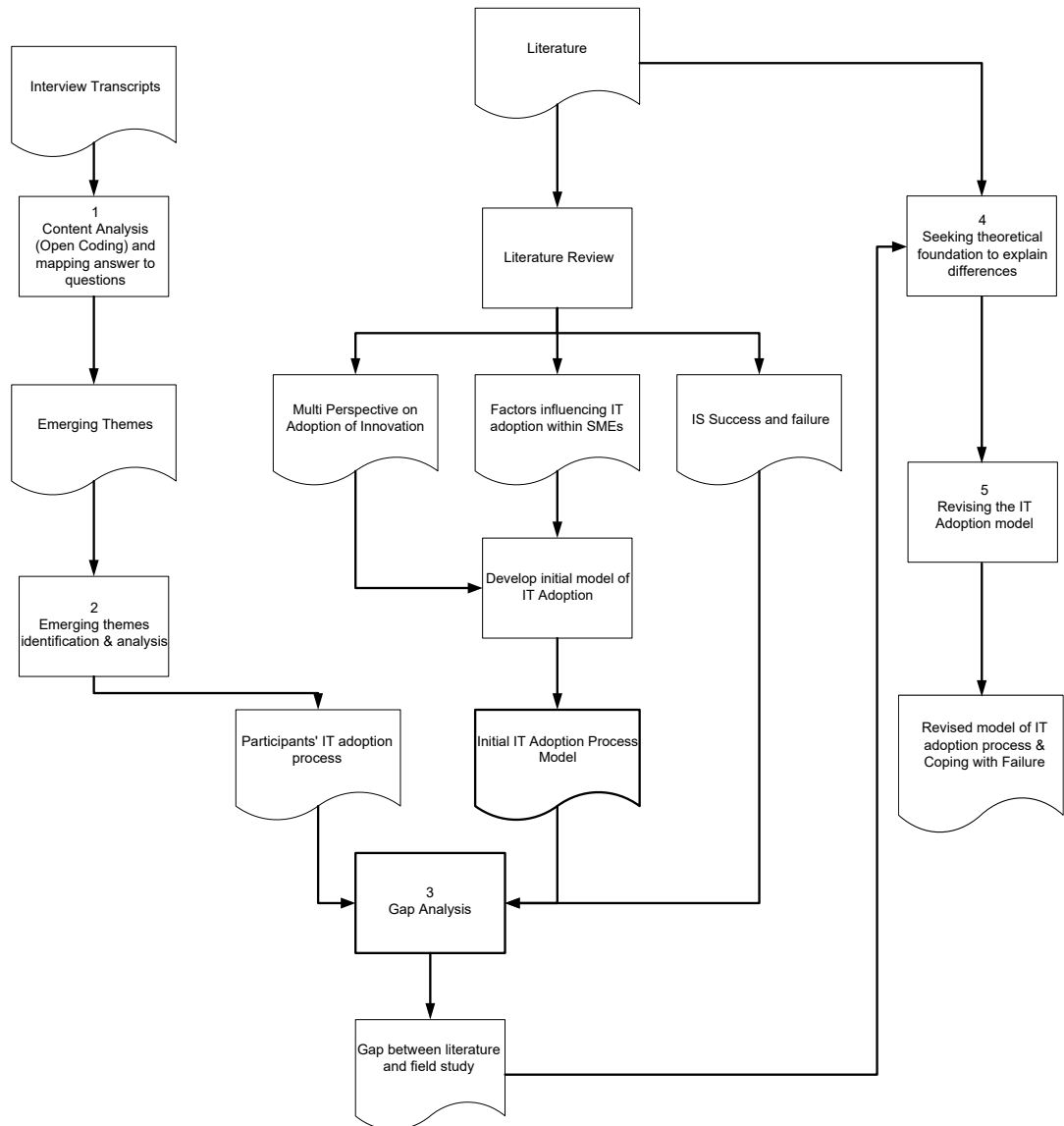


Figure 4.1. Data analysis framework

First, as explained in Chapter 2, a model of IT adoption process was developed based on the literature. The model was used to develop the semi-structured interview as seen in research design and data collection sections. After the interview all the recordings were transcribed. The interview transcripts were analysed using the following steps:

1. Open coding and mapping of respondent's answers to interview questions (content analysis)
2. Identification of themes from the data
3. Gap analysis
4. Relating new emerging themes/codes to relevant literature
5. IT adoption process revision

The steps will be discussed further in the following sections.

4.2.1. Open coding and mapping of respondents answers to interview questions.

Coding in this study is a process to generate categories that contain pointers to the actual data (Morse & Richards, 2002; Richards, 2005). The process of coding started by using descriptive coding (Miles & Huberman, 1994; Morse & Richards, 2002) where phrases, words, and sentences from interview transcripts were labelled using relevant words or phrase. Since there is no association among the codes, they are called open codes. By creating open codes (labels) the data began to be categorised and patterns within the data were identified.

At the same time, apart from the open codes created, respondents' answers to the interview questions were mapped into the original semi-structured interview questions guide. This was done as another way to categorise the data. The reason is that because the interview was based on the three-stage model of IT adoption process described in Chapter 2, it was necessary to map the data into the model; we could then observe where the data would fit into the initial model and identify any gaps.

Open coding was conducted by reading the individual interview transcripts. Using NVivo, we highlighted phrases, sentences, and words that we believed answered the questions we asked. We mapped the answers to a particular question. We compared the answer to a particular question with the other respondents' interview transcripts. We also identified the answers to follow up questions. After we identified the answers to each interview guide question (and the follow up questions), we looked at the transcripts again to see if there was anything left that might be a new theme emerging from the data. A sample of the coding process can be seen in Appendix 3.

Almost all (except R24) the interview were conducted in Indonesian language so were the transcripts. The analysis of interview were conducted using the original language. Only the result of analysis (codes, themes, etc) were written in English. This has to be done to avoid losing contextual meaning of the data which might loss if the data were translated to English.

4.2.2. Identifying Themes from the Data

In Identifying themes from the data we used approach suggested by case study methodology, which are:

- Specific facts about the participants arranged in chronological order. The order was aligned with the sequence of questions asked.
- Multiple responses were grouped into meaningful groups and a code was assigned to the group.
- Specific facts were examined if there was an indication that they may have relation to the study.
- Identification of patterns emerged from the data

We identified the pattern emerging from the data by looking at the similarity between all the free codes we extracted from the interview transcripts (Gibbs, 2002; Miles & Huberman, 1994). We classified and reclassified free codes into groups to find relation between one participants to another (Leedy & Ormrod, 2005). A sample of this process could be found in appendix 3.

4.2.3. Gap Analysis

Gap analysis attempts to find differences between the initial model of the IT adoption process developed from the literature and presented in Chapter 2 and the findings from the field study. By mapping the answers to the interview questions, the differences and irrelevant elements from both literature and findings can be identified. The analysis can be used to improve and revise the initial model..

We will identify factors and interaction between factors from our findings. An item by item comparison will be conducted to identify which factors or interaction is not supported by our findings. We also look at the emerging pattern or themes from data that is not in our initial model.

We will explore the difference found in gap analysis. We will try to find if the differences found in only 1 participants or it is found in other participants. We also looked at the literature to find any supporting theoretical explanations (Creswell, 2003; Miles & Huberman, 1994; Morse & Richards, 2002). If one difference could be supported by theoretical explanations or found in some of our participants we will deemed the difference significant to be analysed. More detail will be discussed in Chapter 5

4.2.3. Relating other emerging themes to relevant literature

The nature of semi-structured interviews allowed the introduction and exploration of new issues apart from the main topic during the course of the interview. There is always a chance of new themes emerging that might be directly related or relevant to the main research topic. If new themes emerge, they can be referred to the relevant literature and analysed accordingly. The identification and analysis of new themes will be undertaken in Chapter 5.

4.2.5. IT adoption process revision

Based on the gap analysis and further analysis of the differences found, the initial model of the IT adoption process can be revised. The revision and improvement must take into account the differences found in the field study. The differences would either add factors or eliminate those we proposed in the initial model, as depicted in Figure 2.6. Factors influencing the success or failure of IT adoption within Indonesian SMEs would also inform us how we should revise the initial model. We believe the success and failure exploration results can confirm whether the factors we proposed really work in Indonesian SMEs' IT adoption process. The final model will be discussed in Chapter 6.

4.3. Summary

In this chapter, we have discussed what we did in the field study (data collection) and the analysis of the field study results. In the data collection part, we have shown what we did during the field study in term of:

- Participant selection
- Interview process
- Data management

We also described the interview process we conducted with the participants and how we managed the research data in compliance with UTS HREC research ethics' requirements as stated in Section 3.5.

In the analysis section (Section 4.2), we described and discussed our data analysis stage. We started the data analysis by using open coding techniques to capture themes from the interview transcripts. We also mapped respondents' answers to the original guide questions we prepared. After identifying the emerging themes from the data we compared our findings to the initial model we formulated in Chapter 2. We also related the themes to the literature to seek theoretical explanation. Finally, we revised the initial model based on our findings. In the next chapter, we will discuss our findings and how we revised the initial model. We will also propose our suggestions based on our findings and theoretical foundations.

Chapter 5 – Indonesian SMEs IT Adoption Practice and Experience

This chapter presents a summary of all interviews with the participants. It starts with brief descriptions of participants' situations. The participants have been divided into two groups according to whether they failed or succeeded in their IT adoption. The next section contains a description of their successes and failures and the factors that might have caused them.

Section 5.1 summarises the information about the participants. We describe the reasons why they adopted IT, what they did to acquire the technology, the results of the adoption process, and their subsequent actions. In this section we classify the participants according to whether they failed or succeeded in their IT adoption effort. Failure and success were the common themes emerging from the interviews as the end result of the IT adoption. Also, as we stated in Chapter 2, the result of IT adoption could be success or failure. We believe the classification based on success and failure is appropriate as suggested by our literature review.

In Section 5.2, we present the factors influencing IT adoption within Indonesian SMEs extracted from the interview transcripts. Then in Section 5.3, we discuss the factors influencing IT adoption within Indonesian SMEs further by looking at the mode of development, the initiator, the developer, the user, type of application acquired, and the interviewees' educational background. We compare these findings with the existing literature in Chapter 6.

We identified the factors that will be discussed in Section 5.3 as a result of content analysis. From all participants, we identified the mode of development, the initiator, the developer, the user, type of application acquired, and the interviewee

educational background as factors that might influence the success or failure of IT adoption.

Extracts from the interview transcripts were translated from Indonesian into English by the researcher to represent as well as possible what the respondents said. All the quotations from the participants were directly translated from their own words to the nearest English language equivalent. All the translations were carried out by the researcher. Most of the time, direct translation of the responses (in the form of a quotation) did not result in correct English language grammatical structure because they were translations from spoken language. The original interview transcripts are mostly in Indonesian (except for R24 who insisted on being interviewed in English) and are not translated into English. Translating the transcripts from Indonesian language to English language was not deemed necessary for two reasons:

- Both the respondents and the researcher are native Indonesian speaker, therefore better understanding can be achieved using Indonesian language rather than English.
- It was important to preserve the local context of the interview.

5.1. Participants: a Brief Description

For the purpose of analysis, the participants were classified into two different groups, “failed” and “successful” groups. The reason for this classification is an emerging theme from the content analysis of the interview transcripts. The words “successful” and “failed” were found relating to the perception of the participants when asked regarding the state of their IT adoption. Within the failed group, all participants who expressed that they failed in some stage of their IT adoption are described. In contrast, within the successful groups, all participants’ experiences are briefly described. The

grouping of participants into success and failure is based on their own account of the results of their efforts to adopt IT; we later compared and verified the respondents' statements against the definition of success and failure as in Chapter 2. We believed by exploring success and failure of IT adoption we could learn how the factors influencing IT adoption actually work.

5.1.1. Failed Group

Within this group, all the participants who had failure in some stage of their IT adoption and deployment are described. We further identified there are three subgroups:

1. Participants who retried their development and eventually succeeded;
2. Participants who abandoned the systems/application but used COTS hardware/software for other purposes
3. Participants who totally abandoned their software applications and hardware.

The classification of failure into three subgroups was based on the common answers found from respondents' answers to the follow up questions regarding the aftermath of failure.

5.1.1.1. Retry the development

Three participants initially outsourced their systems development. However, the development failed. R01 and R34 experienced repeated failures, while R06 experienced one failure. After the failure, R01 and R06 developed their systems in-house, while R34 finally found a developer who could deliver the systems they wanted. The details of each participant are as follows:

R01 – inventory control systems

R01 tried to develop an inventory control application to manage inventory turnaround and provide reports for costing. On the first attempt, the owner, who is also the manager, hired a programmer to develop the application. When the application was delivered and used, the owner immediately found it was not working. The application reported that the inventory level was negative.

“My accounting staff reported that the inventory quantity was 100, my other staff said 96, but the application reported my inventory was minus.”

The owner decided to abandon the application and stick to a manual system. Next year another person offered another inventory management application to R01 owner. This time it was never delivered after almost a year.

“I was waiting for almost a year but the application was never delivered”

Finally the owner went to the USA for a business trip. While he was there he also had a short course on algorithm design and programming. When he returned to Indonesia, he immediately designed a new inventory management application and hired four students from local computer schools to build the application. This time it was a success and the application was still in use when the study was conducted. On reflection, R01’s owner believed that the main weaknesses with the previous application developer he hired and even the last four developers hired was their lack of knowledge of application analysis and design. He said that they were good in translating a design into programs but were not capable in designing the application itself.

“They were fine in transforming my design into application, but they were hopeless in algorithms and programming logic.”

R06 – ERP like systems

R06 tried to implement an ERP-like application purchased by the company. It was unclear whether the implementer also customised the package. They hired implementation consultants, acquired hardware and software to run the application, and hired a technical support team. The ERP application itself was intended to manage the whole production process from inventory acquisition to shipment of the products. The project failed.

“It was very wrong for our company’s condition”

The IT manager referred to the inability of the ERP package to cope with the frequent changes in the production process that the company had to implement.

The production process changes often due to changes in orders from their customers. Orders might need different materials and different manufacturing processes, therefore it complicated the production control. Therefore they need to change the application frequently.

“Every year since 2000, we had to change the application due to the changes in the manufacturing process.”

Since they already had hardware from the failed project, R06’s management decided to revive the idea. They asked the head of technical support to be the developer (also as IT manager) and hired the ERP consultant as a permanent employee to oversee the development. It did not stop there: the company also hired a production management consultant to redesign the whole production process. The new production process allowed variations in manufacturing process, from the inventory up to shipment. This exercise helped the company fully understand their manufacturing pattern.

“We hired a production management consultant to redesign our manufacturing process”

“In 2003, we finally had a grasp on our manufacturing pattern and were able to design systems to support it.”

R34 – accounting application

R34 was trying to renew their existing accounting information systems to accommodate the changes that had occurred since the first system was put in place. The system is an integrated accounting package that handles accounting records and creates reports (an accounting information system). The previous application was built with the assistance of an overseas developer as part of a grant.

“It was part of grant we received. The donor organisation sent an application developer to help us build the systems.”

Although the application was working well, the significant increase in workload and development in the core business required a new system. The original developer had gone and could not be contacted. R34’s management decided to replace the application and outsourced the application development to a few local developers. However, they could not find a developer that could deliver the application as required. R34’s management believed the local developers contracted were not capable enough to develop the application.

“We tried to contract a few developers but they were not good. It seemed they were not capable in their own field (programming). Maybe it was in part our fault not to choose wisely.”

Finally, the R34 manager met with a local academic who was also an application developer and asked him to help. This time, it was a success. The application developed was working as required by R34, although it was only completed about 90% at the time of interview. The R34 manager said that only needed minor refinements to make it 100%.

5.1.1.2. Adaptation.

Five participants experienced failure in their systems development and decided to abandon the idea completely and use the acquired equipment for other purposes (adaptation). Their experiences are described below.

R13 – email for communicating product design

R13 sell their product to retail customers and resellers. Their retail customers come from the surrounding area within the municipality of Gunung Kidul (part of Yogyakarta Special Province Region). Retail customers accounted for less than 5% of their annual sales. They only had one wholesale customer who accounted for up to 95% or more of their annual sales. This customer later evolved to be their business partner². R13's business partner purchased furniture and handicrafts products from all over Indonesia to be exported to overseas customers. R13 and its main customer share a close business relationship. Their business partner even provided R13 with a computer, printer, modem, and facsimile machine to assist in product design and business communication.

“It was sent by our business partner in Denpasar”

The computer equipment was meant to help R13 in product design. The original intention was that R13 would create and modify product designs on the computer, make a hardcopy of that design, and send it to the partner in Denpasar by facsimile or email. Unfortunately, although R13 had a telephone in their office, it was inadequate for data transmission. They subscribed to a wireless phone service by Indonesian telecommunication company (PT Telkom). PT Telkom did not have cable or land line

² We used the term business partner since the main customer not only purchases R13's products but are also involved in R13's business development such as providing business advice and business equipment.

networks in that area, as there were considered to be not enough customers to justify such investment. Instead, PT Telkom provided a wireless phone network³. The service was intended for voice communication only, it could not handle data communications.

“If we were lucky, on a clear day, we could send facsimile transmissions. Mostly we were lucky if we could make a decent phone call”

R13’s manager explained that the inadequate quality of the wireless telephone was also the reason why they could not optimise the computer equipment. As a result they had to make hard copies of their designs and travel to Wonosari (the capital of Gunung Kidul) to send a facsimile. Wonosari is about 60 km from R13’s office. Alternatively, when they shipped products to Denpasar they included the new designs in the containers.

R13 along with about 10 neighbouring companies have tried to apply for telephone network upgrade to PT Telkom. However, for some reason PT Telkom still did not upgrade the network.

“We have plenty of potential telephone customers here, at least there are 10 other companies along this street alone”

R13 used the computers solely for product design. The communication that was supposed to take place did not succeed. The public infrastructure was not sufficient to enable it to do so. R13 believed that the business partner’s intention to give them a computer and modem was for sending the design faster and cheaper. The design process itself did not need the computer; R13’s manager often did that manually. The computer is used sometimes for administrative purposes such as preparing business letters and for personal use.

³ Later PT Telkom developed a fixed wireless service known as Telkom Flexi to substitute fixed line telephone connections.

R19 – product design, finding new designs, accounting systems, and email

R19 produces steel furniture. R19 used a computer to design customers' orders and often reused some components from previous designs in new ones. R19's manager subscribed to a local Internet Service Provider (ISP). They used the internet to find new design examples. R19's manager was also interested in reaching out to new customers from the internet (overseas customers). Besides the internet and design, R19 also hired a consultant to improve their accounting and financial systems. The consultant developed a computerised accounting package to record all the financial information.

Unfortunately, almost all the intentions of R19 in using the computer failed to be achieved. R19's manager felt that she could not find ways to attract new customers using the internet. She admitted that her knowledge of the internet was limited to sending email and browsing for new designs. She did not have knowledge on initiating business relation with new customers. In terms of finding new designs, she felt that the collection of designs she had was sufficient to fulfil her existing customers so she did not really need to find new designs anyway. With the accounting systems, she admitted that her reluctance to use it and her lack of discipline in recording transaction details rendered the application useless. She believed that her working time was occupied fully by design and production activities so she could not engage in other activities. R19 was managed by the manager and her husband. Both of them were handling administrative details and production activities. The end result was that of all the intended uses of the computer by R19, only product design is still active, while finding new designs, accounting systems, and email communication were abandoned.

R22 – email and product design

Although R22's owner and manager held a bachelor's degree in computing sciences, he did not see any benefit in using IT, especially web applications (email,

webpage, etc). His belief was not simple prejudice. He had tried to use a computer for designing products and even tried to use a Computer Numerical Control (CNC) machine for production. He also used email to try to communicate with potential buyers from overseas. However, he totally abandoned using the computer for his company after he had bad experiences such as:

“I could not find any programs for my CNC that can fit my need.”

When asked what exactly he needed, he replied:

“I wanted software that could translate and create a 3D object from 2D pictures. So I can have my design on ordinary graphic design software and then execute it through the software so the CNC can cut or engrave a relief based on a picture (a 2-dimensional object) to the material (a 3-dimensional object).”

With email, his reason to abandon the application was simply he did not want to be bothered by email from potential customers who asked for sample products.

“I would prefer they come here and see for themselves the product, if they like it they can buy it.”

It seems to the interviewer that R22 did not need more customers since he already had more customers than he could handle.

R23 – web catalogue and order processing systems

In 1997 R23's manager was exposed to trends of using IT and internet for business. They were eager to anticipate the trend and reap the benefit, as R23's manager said:

“We were anticipating the IT era. We were not ready yet but we embraced it.”

As the idea of using IT sank in, R23 saw an opportunity to expand its market to overseas. They contracted a web developer to build a web catalogue for their product. They also bought a set of PCs and modem for maintaining the web catalogue. The web

catalogue was delivered on time as promised by the developer. The problem started when they received inquiries from overseas customer. Nobody could communicate in English language.

“We could not reply to emails from overseas due to language barrier.”

The condition was exacerbated with the inability of R23’s staff to update and maintain the web catalogue content when a new line of products was created.

“We have not been updating the website for 6 years now. There is nothing new.”

At the time of interview, although the web catalogue still existed, R23’s manager was evaluating the whole web catalogue idea. He had two options; the first was to abandon the whole idea completely and the second was to find somebody with adequate marketing, English language, and technical skills to operate and maintain the web catalogue. The PCs and modem they bought were used mainly for administrative purposes such as preparing payroll, sending and receiving facsimile, and preparing business letters.

R25 – sales systems and web catalogue

R25 sold their products to both retail and wholesale customers, either local or international. In the early stage of overseas trade, R25 used conventional mail, telephone, and facsimile to communicate with its overseas customers. In early 2000, a web developer company approached the owner (also acting as the manager) and persuaded him to build a web site containing the company’s catalogue. The owner was convinced that this might help them communicate and market their products more widely and rapidly to international markets than the existing methods. The web developer company secured an outsourcing deal that included the development of the

web catalogue, hosting services with their preferred ISP, an ISP account for R25, and hardware and software to manage the web catalogue for R25.

In reflecting on the failure, R25's owner believed the developer's lack of communication effort was to blame for failure.

“They frequently only came here for sales negotiation purposes”

The developer only visited R25 and communicated with them three times in total, twice for the sales deal and once to gather product data for the catalogue at the beginning of the project, and then the developer delivered the PC. R25 tried to keep the developer up to date by providing new product range data when available. There were no indications perceived by R25 that the developer was experiencing financial difficulties. After a while during 2001, the communication with the developer stopped completely. R25 was left with a PC and no product catalogue. In the end, the PC was used for internet access (email and web browsing) and administration (office application)-related activities. For the internet connection, R25 was forced to subscribe to another ISP. The owner/manager of R25 decided to completely dismiss the idea of a web catalogue in the foreseeable future, although many vendors later offered him to develop web catalogue systems at cheaper prices.

“We have received many attractive offers to develop a website and cheaper too, however I think we do not need it now, not before we could afford someone to exclusively handle the matter.”

5.1.1.3. Complete failure and abandonment

Both R05 and R35 tried to develop and use IT within their company, failed, and abandoned the systems completely. R05's manager developed an inventory control system and employee attendance record system himself but the staff did not like them. The staff complained directly to the owner and he overturned R05's manager's decision to use the systems. R35's manager outsourced the development of a web catalogue and

email account related to the web catalogue. The web catalogue was intended to support the new furniture business. However, the business itself failed. As a result the web catalogue was abandoned although R35's manager still paid for maintenance. The detail of each participant's case is as follows:

R05 – inventory recording systems and employee attendance recording systems

We interviewed R05's manager, who was hired by the owner directly in an effort to modernise the company. R05's owner wanted to change R05 from a family business into a formal and professional business. Previously, R05 was managed directly by the owner as a family business. Unfortunately, the staff were still in the family business mindset and the owner often interfered directly in the daily operations.

“The staff think that this (R05) is still a family business, although it is far too big to be managed as a family business.”

R05's manager tried to restructure the whole business process, starting from an attendance recording system and an inventory recording system. He changed the way inventory was recorded (both the arrival of new inventory and the use of available inventory) by setting up a structured real time inventory recording system (using an electronic spreadsheet). He demanded that every arrival or use of inventory was to be recorded immediately. He also had a new employee attendance recording system in place using a semi-computerised attendance recording system. The employees had to fill and sign an attendance record card every time they entered or left R05's premises. At the end of the week, a clerk would summarise the attendance cards into an attendance report which in turn would be the basis for salary and wage calculation. The previous system for both inventory recording and employee attendance recording systems were manual. The employee would fill in both records in a daily or weekly batch instead of in real time as it happened. R05's manager believed real time recording

would reduce errors. Unfortunately, the staff did not like either innovation, especially the attendance record system.

“I made an attendance card but nobody wanted to fill and sign it when they came and went.”

The staff went directly to the owner and the owner asked R05’s manager to stop using both systems. This is not the end of the problem. R05’s manager also felt that the owner did not seriously consider all his proposals to acquire new equipment such as a power stabiliser and a new PC. He felt that all the new business recording systems he developed required a new computer. R05’s manager said that unless the equipment had really broken down, the owner would never agree to buy new ones for whatever reason. Eventually, R05’s manager abandoned all the systems he built and was seriously considering resigning.

R35 – web catalogue and email

The owner/manager of R35 operates three different businesses, a motel, a cookware manufacturer, and a stone furniture and handicraft manufacturer. The stone furniture and handicraft business is the most recent. Initially, R35’s production capability was about 100 units per month, small compared to the average furniture and handicraft SMEs. The owner believed that there was a lucrative market, especially internationally, for the stone furniture and handicraft. In one trade exhibition, some of his colleagues advised him to build a website for his stone furniture and handicraft products range. He followed his colleagues’ advice including their recommended web developer.

R35’s web catalogue development was outsourced to the developer. The developer offered various packages of all in one web development that included web site development, hosting services, and other services. The developer also purchased a

PC (apart from the original package) and installed it at R35's premises along with an internet connection setup using a public ISP, Telkom Net. This PC was intended as a tool to manage the website once it was deployed. The PC was purchased upon the request of R35's owner. The developer was intensively in contact with R35 in developing the web catalogue, they even had their own photographer take pictures for the catalogue. The web catalogue was delivered on time and on budget. The developer then trained R35's owner to use and update the web catalogue.

The stone furniture and handicraft business did not develop as expected. The production capacity was still about 100 units per month. There were no new customers or orders for the last few months. The owner relied heavily on the web catalogue to advertise the products and made no other effort. Despite his dependence on the web catalogue, he was reluctant to use the web catalogue system and internet application. The owner could use the computer to type letters, browse the internet, and check email (using the webmail interface provided with the web catalogue), yet he could not reply to emails from potential customers. In the interview, he admitted that he had forgotten how to use email to reply and was reluctant to learn again.

"I have forgotten how to use it (the web mail facility) and to be honest I am lazy and not that smart."

The web catalogue itself seemed to function correctly and the owner believed that the web catalogue was exactly as he had expected

"I do not have a high expectation (for the web catalogue), I just want a catalogue that can be shown if I participate in a trade exhibition."

On reflection, R35's owner believed that although the web catalogue systems worked well, his inability to utilise it and his lack of exerting effort in developing the stone furniture and handicraft business rendered it useless.

"I am passive in this matter (the business) and reluctant to do it (developing the business)."

When asked if he would keep the web catalogue, he answered yes. The reason given was that he was proud that he had his own website and email and this was reflected on his business card. He did not mind paying the developer to maintain the web catalogue even though there were no benefits from it. The typical cost for such maintenance was US \$50–100 annually. The web catalogue itself was never updated since its deployment because there was no business activities related to the content of the web catalogue. Therefore there was nothing new to update the web catalogue.

5.1.2. Successful Group

This group consists of the participants who considered that they had been successful in their IT adoption. The group is classified into three different sub groups:

- Participants with dedicated internal IT development staff
- Participants who outsourced their custom made applications
- Participants who only used COTS applications.

The classification is based on the commonality found from the respondent's experience.

5.1.2.1. Internal development staff.

These four participants had staff who were able to develop their own systems. R04 had two staff who were dedicated to IT development and maintenance, while in the other three, the IT functions were assumed by the manager. Developing their own systems here is defined as designing, building, implementing, and maintaining their own systems. External parties (vendors) were only involved in supplying hardware and software necessary to build the systems. The details of each participant are discussed below.

R04 – developing accounting information systems

R04 needed a system that could support their whole operation, from controlling production, inventory, supporting marketing, to administration. R04 hired a former network administrator of a local internet café to manage and develop their systems. He eventually became R04's IT manager. He then recruited his colleague from the internet café as his staff and both of them built the systems. They shared the job and responsibilities. The IT manager built the network systems while the staff developed the applications.

“I am responsible for PC deployment and networking while his job is to develop a client/server database applications using Linux.”

R04's management delegated all the development to their two IT staff. However, all IT investment decisions must be discussed and approved by management. The systems development started with the deployment of a PC, network, and server. The applications development started with a database application, intended to hold product data from raw material, finished products, and sold products. It was intended to support purchase of materials, production/manufacturing, sales and marketing, and accounting. At the time of interview the systems were live and were running to support marketing functions.

“We have the marketing support application up, running, and stable. We started working on a merchandising support application, which is the hardest part, about two months ago.”

R30 – web catalogue

R30's IT functions were managed by its manager. The company used the computer to handle financial and administrative matters along with product design and business communication. For business communication, R30's manager used facsimile

and modem (for internet connection using a dial up account) for communicating orders, catalogues, and other documents.

Due to their limited internet connection, R30 often had to send their designs to customers in several emails. R30's manager started to develop a web catalogue, although he had no formal education in IT, let alone web development (he graduated with a literature degree).

“I believed it was more practical for us to have a web catalogue rather than sending our product designs through email. We only could send three pictures per email and we have plenty of customers. Using the website, we only need to refer them to the web catalogue. We also could update the catalogue as often as we could.”

However, R30's manager had to develop the website outside business hours since they only had one telephone line and it was quite busy during the day. He often had to go to a local internet café to work on the web catalogue. R30's manager said the aim of the web catalogue was to communicate their designs to their customers, therefore they did not need any sophisticated technology. R30's manager even said that they only used a free hosting service and simple web design.

Even though the website was still in development at the time of interview, R30's manager had asked a few customers to use it. He said that he had had positive response from the customers.

“They (the customers) said that they like it and now they could browse the web catalogue and start using it for their latest order, instead of waiting for the email.”

More recently, we noticed that the web catalogue was complete and had a customer order form

R31 – accounting information systems

R31 tried to develop an accounting information system. The developer was also their managing director. All IT investment was also handled by the managing director. He argued strongly against outsourcing the systems development to a third party.

“We had some offers, however, based on my knowledge the programmers are usually rigid and inflexible. It made our life difficult.”

“We also have better knowledge about our internal processes compared to outsiders.”

“We have slightly different conditions compared to a retailer. We had raw materials, material on process, and finished products. We also often exchange some components of one product with another.”

R31’s manager basically argued that they had a better grasp of their internal business processes than a third party. In regard to IT, he believed that they could learn how to develop a system.

R31’s manager developed an accounting information system himself, using a single-user database system and a compiler to create executable programs. He started to build the application from an inventory recording system. He believed that the inventory recording system was the most crucial for his company. As a result he believed they have managed the inventory better than the previous manual system.

“We are able to handle inventory data faster and better (less error). We know exactly the level of our inventory at any given time with minimum differences between our record and the actual inventory.”

R33 – local area network and accounting systems

R33’s managing director, who is also responsible for production and design, built their systems himself. He had been a network administrator at an internet café. R33’s manager made a case to the owner to build a new system. R33’s manager argued that they need to transfer all the data into electronic form and process it using a computer. Furthermore, they needed to be able to exchange data in real time.

R33's manager designed the network. He purchased the hardware and basic software from local computer suppliers. He and his staff installed all the equipment. He also designed a system to handle accounting data. Basically the systems used spreadsheets and word processors to process data. R33's manager seemed reluctant to go into the detail of his systems. He perhaps felt that the design of the network was a competitive advantage, like his furniture designs. It is a common practice of furniture companies in Yogyakarta to keep their designs secret until the actual product is sold.

R33 also used the computer to handle production data. Production control started with a design either from customers or their own, technical specification, and cost estimation. The complete design was forwarded to customers for approval. Communication with customers was by email.

R33's manager also told us that the working environment in R33 had improved. It was more structured and systematic with a clear schedule on when, where, and who should deliver the result.

“They (the employees) used to work in unprofessional way, on their own time. Now, everything is controllable and under a tight schedule. Everybody knows what they should handle and when.”

Although R33's manager did not reveal the details of their system, a typical automation of work document in a typical furniture company in Yogyakarta involved using an electronic spreadsheet for cost estimation, calculation, and control. The reason for success could be attributed to the flexibility of a spreadsheet to do what-if analysis for the cost of an order from a customer. They could change various costing variables and analyse the impact on the price and profit margin. The ability to exchange electronic documents via a local area network with various departments within the company accelerated the process considerably, as did the ability to communicate and negotiate the price with customers electronically.

5.1.2.2. Outsourced – custom made

In this group of participants, systems were built by a third party developer (other than the computer supplier who provided hardware and COTS software). The systems were built based on requirements expressed by participants. R08, R14, and R21 had their web catalogues built by web developers, while R11 and R24 had their order processing systems and inventory control applications built by a software developer. The details of each participants' experience are discussed below.

R08 – web catalogue

R08 used an internet application for their marketing. They used email to communicate with their mainly overseas customers. In addition to email, R08 had a web catalogue to promote their products. R08's manager argued that by using the web catalogue he could promote his products to an international audience without leaving his office. He also said that since R08 had started the web catalogue, they did not need to attend furniture promotion events as often as before.

The web catalogue development went quite well. R08 only needed to provide all the information needed to build the catalogue. The developer handled all the technical aspects. R08 was only consulted in terms of content and design of the web catalogue. Once the design was approved by R08, the developer deployed the web catalogue. Technical maintenance was handled by the developer. For the web catalogue content management system, the developer provided an easy-to-use interface for R08. Through the interface, R08 updated their product photos and descriptions as often as necessary.

R11 – inventory control application

R11 used the computer for various applications. For calculating product costs, R11's manager used a spreadsheet package, while he also used email to communicate

with customers. When the company started to grow, he was overwhelmed by the inventory management task. Since R11's products were changing rapidly, it was affecting the raw material and finished product inventory. R11 initially used manual cards to record its inventory. However, R11 manager believed it was an ineffective way to manage inventory.

R11 asked a colleague to develop an inventory control application. The developer and R11's manager were colleagues in a computer store. The application basically replaced manual cards to record inventory turnaround.

One reason for R11's manager to have a local developer create the application instead of a COTS solution was language. He said that most of the time if they used COTS solutions, which mainly used English, his staff would have difficulties in using them. Therefore, he asked the developer to use Indonesian in the application.

Although R11's manager insisted that his staff were using the computer, he thought that most of the staff still believed in doing their work manually. He reckoned that his staff were not comfortable using computers even though the instructions and menu were written in Indonesian. He believed the problem was the quality of the staff's skills. This was an unexpected assertion since at the beginning of the interview, R11 described how he recruited final year students from the local university and yet they seemed not to possess the skills to operate the applications themselves. Despite the lack of computer skills, R11's manager was still using the application. He argued that he could change his staff mindset about computers through continuous training and guidance. If all else failed, he said, the staff were replaceable because once the existing staff had finished their degrees they would find other jobs anyway. In this case the assumption is that if staff are using the application the IT adoption is considered a success.

R14 – web catalogue

R14 used an internet application for their marketing. R14 had a web catalogue for promoting their products. They also used email for communication with their mainly overseas customers.

“If we have a website, we also have to prepare to answer queries from the visitors”

R14’s manager argued that by using a web catalogue he could promote his products to an international audience without leaving his office (similar to R08). He also said that since they had the web catalogue, they did not need to attend furniture promotion events as often as before.

“If we met potential customers, we only need to give them the web address and they could access it anytime they want.”

The web catalogue development went quite well. R14 only needed to provide all the information needed to build the catalogue, as he knew that the company did not have sufficient internal capabilities to develop one on their own. The developer handled all the technical aspects of design, hosting, and technical maintenance. The developer was located in Surabaya, East Java. R14 was only consulted on the content and design of the web catalogue. Once the design had been approved by R14, the developer deployed the web catalogue. In the middle of their contract, the developer had internal problems. This made R14 decide to change to a new developer and provider in the same city. The transfer process was seamless and the web catalogue went live immediately.

As a result of this development, R14’s manager said that the web catalogue often became a starting point for business relations with new customers. He had 12 regular overseas customers and so far two had visited his premises. In terms of maintenance, he only needs to send additional content to the developer and they update the web catalogue. The content was updated about four times a year.

R21 – web catalogue

As with R08 and R14, R21 also had their web catalogue developed by an external developer since they did not have internal expertise to do it. However, R21 have one staff member who was able to carry out maintenance for all R21's computers and also to update the website content. The web catalogue was updated whenever a new product was available.

R21's manager described the process of developing the web application as quite straightforward. She had difficulties in communicating with overseas buyers. It was an expensive and cumbersome job to produce catalogues and send them to customers, either by regular mail or email. She also had difficulties updating the catalogue regularly because it was a costly exercise. She sought advice and decided to hire a web developer company to build the web catalogue. During the development process, she could not recall any difficulties. In a pretty straightforward process, R21 provided the content and the developer built the web catalogue. Once it was deployed, R21's staff only needed to update the catalogue regularly.

The web catalogue itself only displayed R21's product range and some information about R21 and contact details. Customers still need to send their order via email or facsimile. Once an order was received, R21 could calculate the cost of manufacturing and shipping the order. The process was continued until the order was shipped to the customer.

R21's manager believed that the web catalogue had increased the speed of order processing. It also became the first contact point with new customers.

“Once we received the order we could have the detail of the order and we could immediately start to manufacture the order.”

R24 – order entry processing application

R24 used an order entry application. It was built by a developer from Australia. R24's manager knew the developer personally and asked him to build the application. The software was developed 6 months after R24 was founded and began operations. Before the application, R24 used a spreadsheet package to record orders from their customers. The record was used to create job order and calculate price.

The development process took eight months to complete. During that time they found glitches in the software and the developer fixed them. The glitches were found by one of R24's staff who operated the software. Basically the software was a database application that recorded and dissected a customer's order into different product categories.

R24's manager believed that it was a good initiative and they had been using the software for about seven years. They only had to make one modification three years after the software was deployed. The modification was made by a local developer.

“We find a lot of help in Indonesia..... programmers here are very good.”

“We did not know before that there were talents here to get it written in Indonesian”

“They have gone through university or even school and have learnt about computers.”

Although R24's manager believed in his staff's ability to use computers, he did not have the same confidence in their command of the English language. The original order processing software was developed with an English interface. R24 decided to change the interface to the Indonesian language, which was why he needed an Indonesian programmer. R24's manager seemed happy with the quality of the local programmer's work.

5.1.2.3. Outsourced – COTS.

This is the most common type of IT adoption among all participants. However, within this group of 16 participants, they were using only generic/typical hardware and software available off the shelf without any bespoke systems or applications. They used a standard PC and applications (COTS) that enabled them to process documents, communicate, access the internet, and design new products. Document processing was done using the two most common office package word processors and electronic spreadsheets, while internet access and communication were done using standard internet access software that was bundled up with the operating systems. Product design was conducted using various graphics manipulation software that enabled them to create and modify the product designs.

With generic application packages, the participants tend to use them on an ad hoc basis rather than building a system. It seemed that they really did not need any custom-built application. For office applications, for example, they tend to use spreadsheets to process financial data using built-in formulas.

“I cannot use word (processor). I specialise in (Microsoft) Excel because that is what I need to do my job.” R07

The response from R07 showed a general attitude regarding IT. They just acquired, learnt to use, and used it whenever they think necessary for their job. The attitude seemed to influence the decision not to acquire custom-made applications for their business. In fact, the main reason for them to use computers instead of manual work was the computer’s ability to create, store, modify, and reuse documents in electronic form as described by some participants below:

“It is because of its effectiveness. If we used a manual typewriter, we have to retype all over again whenever we made mistakes. With computers, we can easily change whatever mistakes we made and then make a clean printout of that document.” R12

“We already have the formula in the spreadsheet, we just need to enter weekly data and in a few minutes before we actually pay the workers we already have the correct amount calculated compared to two days of manual work.” R15

“We use the computer to easily store and manipulate our product design picture” R18

“I used computers to organise my documents into one place, otherwise I would be overwhelmed by papers” R20

Typically, the participants in this group purchased the computers directly from local vendors. They have the vendors set up and install all the necessary software. Once it was installed and set up, they used it on a daily basis.

One particular participant, R32, had a different view of IT. R32’s manager believed that he could reap the benefits offered by the latest IT equipment. In fact, he was quite enthusiastic about IT. He had regular meetings with his IT vendors to discuss the latest technology and how he could use it for his business. He also said that he often produced his own electronic catalogue on a CD-ROM. R32 was the only participant who produced their own electronic catalogue. R32 went even further by producing reports to its customers in electronic form, usually on a CD-ROM. It was unusual since R32’s customers were mainly local government. Typical local customers, especially local government, were not accustomed to soft copy reports, yet R32 managed to convince his customers to accept them.

5.2. Factors affecting IT adoption within Indonesian SMEs

As described in the data analysis, by using open coding, codes extracted from interview transcripts can be grouped under different categories. One such is the factors considered by participants during the IT adoption process. The list of factors affecting the IT adoption process within Indonesian SMEs from the literature described in Chapter 2 was used to map the codes extracted from interview transcripts. The mapping process

consisted of placing the codes into the appropriate headings within the table. For example, the “*staff support*” code was placed under the staff headings. Depending on where the sentences or phrases that made up the code occurred and also in which context (answering what questions), a code could be placed under several different headings. For example, the code “IT adoption initiatives” can be found under manager, staff, customers, and IT vendors and consultant. As a reference, the table of factors influencing IT adoption from the literature is presented below (headings only). The reason for using such a table is to avoid literature-induced classification of the codes from transcripts. In other words, the placement of the code within the table should be from the interview transcripts to the appropriate criteria/headings.

| Internal Factors | External Factors |
|-------------------------|----------------------------|
| Manager | Government |
| Resources | Customers |
| Staff | Competitors |
| | IT Vendors and Consultants |

Table 5.1. Classification criteria for factors influencing IT adoption

The results of the mapping process can be seen in Table 5.2.

The factors affecting IT adoption as described by participants are discussed further in the following section and compared to the literature.

5.2.1. Internal Factors

Internal factors are associated with all the stakeholders and resources within the organisation. The internal factors are manager, staff, and resources.

1. **Manager**

- *Business process knowledge*

This refers to the SMEs' knowledge of internal business processes. The business process knowledge would determine the type of applications that SMEs developed or purchased and how they mould the IT to accommodate their business processes. In some cases it can even make or break the application.

"The programmer did not understand inventory management." R01

"The production process was changing all the time, we had a hard time to cope with it." R06

It seemed unusual for the participants to align their business processes to accommodate IT. Participants demanded IT applications to handle their business processes with minimal change to the business processes themselves.

- *Decision making process*

It seems that all the decisions are made solely by the manager with little or no input from the staff. They might ask what their staff think, but it seemed that it did not affect their decision.

"I decided and chose the equipment myself" R09

"I asked my assistant what kind of computers she need. She advised me to get a Pentium 3 but I prefer Pentium 2 since I felt that our work did not need that much power" R15

- *Future IT plan*

Future IT plan refers to whether participants had plans to expand their existing IT systems. Some of the participants did not have much in mind. They just want to keep the IT equipment they had in balance with their workloads and only upgrade or invest in new equipment whenever necessary.

“We will make new investment whenever necessary, not to find trouble (with new technology)” R01

“I have doubts for this company, I mean do we really need a new computer?” R05

However, most participants believed that there were opportunities where IT could be implemented to support their business.

“I want to have online order processing now that we have web catalogue, so we do not need to open emails and process orders manually” R08

“We still need more computers since the company is growing and we have more staff who need them.” R16

And one company’s owner was quite enthusiastic about IT; R32 consulted his friend who he believed to be an IT expert at least once a year.

‘I meet my friend who is expert in IT once a year at least. We discuss the new technology and how it could be used in my company’

- *IT adoption initiatives and ideas*

Managers often had initiated the IT adoption process from their own ideas.

“I just saw what we need to do with our manual process” R04

“Top managers observed that we have to take turns in using computers, so they decided to buy more” R03

- *Manager’s IT knowledge and experience*

The owner/manager’s knowledge is about using, designing, and building computerised solutions for the SMEs. This knowledge ranged from information about the benefits and capability of using computers for business to the ability to design and implement a complete set of IS (hardware and software). Owners and managers considered their knowledge to be favourable to their IT adoption.

“I have known computers since my university year.” R01

“I used to work for a computer vendor.” R11

Both examples show the reasons for the manager’s preference for IT-based solutions for their businesses. The initiative for adoption was driven by knowledge of what IT is capable of doing from their previous experience as a university student (R01) and a computer supplier (R11). The source of the knowledge was varied, from their previous education as in the case of R01 above, their previous work as in case of R11, inputs from staff, input from business partners, input from customers, input from suppliers, and a general knowledge of IT capability for business from their reading.

“My colleague told me that computer can be used for designing products” R10

“My staff told me that we could calculate the payroll faster if we used a computer” R15

“Our buyer demanded more reports delivered faster, they advised us to use email for communication” R29

“Our business partner taught us how to use the computer for design.” R13

Managers’ attitudes toward IT mostly were positive, which almost guarantees the acceptance of IT to support their business. All the participants already knew that IT could help them in business.

“When we founded this company, we had already thought what we need, a computer is one of them.” R09

They believed that IT could help them in business. Among other things they believed that IT could help in the following areas:

- Administrative and financial duties
- Business communication
- Product design

- Marketing and promotion

Where the owner and manager were not the same person and the owner was not directly involved with the adoption and usage of IT, their attitude toward IT influenced the IT adoption process. If the owner's view of IT was favourable (for instance, they believed that IT had benefits to offer that outweighed the cost to obtain and operate IT) they would support the idea of IT adoption.

"The owner saw that we needed tools to improve our administrative work so he decided to buy a computer for us." R17

However, if their attitude toward IT was not favourable, the procurement of an IT solution as part of IT adoption was not realised.

"The owner's view on IT and other asset is rather unique in my opinion. As long as the machine can be used, regardless of the damage, he won't pay for a service or repair, let alone buy the new one." R05

- Management support

Owners and managers dedicated significant time and resources in order to support their staff in adopting IT. Although they were not directly involved, they asked the appropriate staff to do it or even recruited new staff.

"The owner saw that with the additional personnel and workload we needed systems to help the company." R04

"The owner encouraged us to learn how to use computers" R18

- Management reaction

Management reaction refers to the management's response when IT solutions have been implemented and are being used. This was quite a rare case: only R06 mentioned what management did with their new systems.

"I did not know why information we provided was never used by management"

Unlike most of the participants who had their top manager actively involved in IT adoption, R06's IT manager built the systems as requested by top management. However, at the end they seemed to rarely use the information provided by the systems for decision making.

2. Resources

Financial resources were not an issue within Indonesian SMEs for IT adoption. They either allocated some of their budget to acquire IT, hire new staff, or train the existing staff or used financing facilities from IT vendors to obtain new equipment.

"We allocated funds to buy the computers, it was not a problem." R27

"We allocated some of our initial capital to buy computer." R28

3. Staff

- *Knowledge and ability*

Staff's knowledge is the knowledge to use computer. It varies between routine computer operations (office packages) up to maintenance and trouble shooting. Sometimes it even included the ability to develop new systems in-house.

"A minimum computer knowledge was a requirement when they applied for a job here." R03

"At least the staff we have could use office suite." R04

"I recruited him for developing database application, I knew him from when I was in an internet cafe..." R04

- *Availability*

Availability refers to the availability of staff who would use computers or build the systems in-house. Use of the computer was rarely a problem. SMEs would

hire new staff if necessary. It was rare for SMEs to hire specific staff to build the systems in house; only two SMEs did so.

“I recruited him for developing database application, I knew him from when I was in an internet cafe...” R04

“We hired the ERP consultant to develop the system in-house.” R06

- *IT adoption initiatives and ideas*

Although the decision to adopt IT was usually made by the manager, the idea often came from the staff.

“My staff asked for a computer so he could work better on administrative documents” R12

“My staff urged me to get computer, she said this cumbersome job would not be finished unless we used one” R15

- *IT experience*

Most of the staff who used computers have been through a university education where they were exposed to computer courses.

- *Reaction*

The staff reaction toward IT varies from rejection to an enthusiastic response that demanded more applications to assist them in their routine work. One participant also mentioned that the staff had two different responses: in front of management they supported the new system but in reality they refused to use it and therefore stalled the implementation.

“The staff was enthusiastic and asked for more computer applications.” R04

“In front of management they supported the system, but in reality they stalled the implementation. We had to work around this.” R06

5.2.2. External Factors

External factors are the parties external to the organisation. Usually they are beyond the organisation's control. The external factors are government, customers, competitors, and other external parties (supplier, vendor, or consultant).

1. Government

Public infrastructure was supposed to be provided and delivered by government-controlled institutions (according to the Indonesian constitution). In relation to IT adoption, infrastructure elements of concern were electricity and telecommunications. In rural areas and even in some of the prime districts of Yogyakarta, the electricity supply was unstable and potentially would damage electronic equipment. For telecommunications, the problem is the availability of land-line telephones that are good enough to support voice and data communication.

"We have a problem with unstable electricity supply." R04

"The quality of telephone lines in this area is bad." R18

2. Customers

- *Reaction*

There was no apparent reaction from customers toward the adopted IT solutions, unless it was their demand in the first place. However, some participants noted that the customers acknowledged and seemed happy with faster order processing or better business communication. Yet, there are customers who still preferred to use conventional communication tools.

"We have a customer from Lebanon that preferred using facsimile even though we had email." R18

- *IT adoption initiatives and ideas*

Customers supported or even suggested the idea of IT adoption. In the case of R13 and R17 their trading partner, who was also their major customer, even donated a computer.

3. Competitors

Some of the participants said that they were scanning their industry to see what the competitors did with IT.

“I have surveyed and asked questions on other companies who had website for marketing and order processing” R09

“I think with the advance of IT right now, it is strange if we keep using a manual typewriter” R12

However, the final decision to adopt IT was not directly or apparently influenced by what their competitors did.

4. External Parties (IT vendors and consultants)

- *Support*

Support concerns the availability of third party support for IT adoption. The support came from IT vendors or IT consultants. An IT consultant is not necessarily a formal and paid consultant, but mostly a trusted independent person (non vendor) who gave advice on IT.

“We hired a HRD consultant to prepare the staff for IT related change.” R06

“The developer offered a complete package of website.” R14

However, some technology did not have formal or adequate support to fulfil organisation requirements. Take the availability of hardware, software, or telecommunications technology to support the business, for example. SMEs usually want to know what kind of affordable system they can obtain to support their business. However, their vendor sometimes could not deliver it as in the case of R01, or it was unaffordable as in the case of R06. As an alternative, R04 used open source software (which is almost free) while R01 had to cope with the lack of technology (at that time).

“We were looking for affordable solutions and that was when we found the open source.” R04

“There was no hard drive, my application was run on an Apple II computer with four disk drives, it only had enough storage for a week.” R01

R01 had difficulties developing an application that could handle the volume of his business. He was constrained by, among other things, the capacity of hardware available at that time.

- *IT adoption initiatives and ideas*

Sometimes, participants were provoked by vendors to purchase new IT solutions. For example, R25’s management frequently received proposals and brochures containing new IT solutions from vendors. R25 admitted that sometimes he was tempted to buy, but unfortunately the financial conditions of the company prevented that.

- *Trust*

This factor emerged because some SMEs went to somebody they could trust to obtain advice and to acquire an IT solution. This could be a relative or trusted colleague.

“My brother has a computer store, so I asked him to get me a computer.” R20

“I had worked with the programmer in the past.” R11

| Internal Factors | External Factors |
|---|--|
| Manager Business process knowledge Decision making process Future IT plan IT adoption initiatives and ideas IT knowledge and experience Management’s reaction Support | Government Public infrastructure |
| Resources Financial resources availability | Customers Customers’ reaction IT adoption initiatives and ideas |
| Staff Knowledge and ability Availability IT adoption initiatives and ideas IT experience Staff reaction | Competitors Industry trend for IT usage |
| | IT Vendors and Consultants Support IT adoption initiatives and ideas Trust |

Table 5.2. Codes mapped to factors influencing IT adoption

5.3. Factors Influencing the success or failure of IT adoption

5.3.1. Developers

Table 5.3. shows the participants classified into two groups, those who failed and those who succeeded. In each group, the participants were classified based on their mode of application development: internal, outsourced custom made, and outsourced COTS (Avison & Fitzgerald, 2002; Beal, 2000; Bridge & Peel, 1999). Table 5.3 also shows the type of application acquired and for the failed groups what were the followup actions, while for the successful groups what were the impacts of IT adoption.

| Failures | | | |
|------------------------|----------------------|--|---------------------------|
| Type | Participants | Type of Apps | Follow up |
| Inhouse staff | R05 | Inventory management & attendance record | Manager wanted to resign |
| Outsource Custom made | R01 | Inventory management | Develop apps inhouse |
| | R06 | ERP | Develop apps inhouse |
| | R19 | Accounting package & email | Design only |
| | R23 | Web catalogue & order processing | Administrative tasks |
| | R25 | Web catalogue & order processing | Administrative tasks |
| | R34 | Accounting package | Outsourced development |
| | R35 | Web catalogue and email | Nothing |
| Outsourced COTS | R13 | Email for sending designs | Design only |
| | R22 | Email & CNC | Nothing |
| Successes | | | |
| Type | Participants | Type of Apps | Impact |
| Inhouse IT Staff | R04 | Accounting package & email | Supporting sales |
| | R30 | Web catalogue & COTS | Not yet visible |
| | R31 | Accounting package | Increase efficiency |
| | R33 | LAN and accounting package | Improved internal process |
| Outsourced Custom made | R08 | Web catalogue | Better marketing |
| | R11 | Inventory management | Improved internal process |
| | R14 | Web catalogue | Better marketing |
| | R21 | Web catalogue | Better marketing |
| | R24 | Order entry processing | Improved internal process |
| Outsourced COTS | R02 | PC for office and design | Increase efficiency |
| | R03 | PC for Office (COTS) and design | Improved design |
| | R07 | PC for office (COTS) | Increase efficiency |
| | R09 | PC for Office (COTS) and design | Improved design |
| | R10 | PC for Office (COTS) and design | Improved design |
| | R12 | PC for office (COTS) | Increase efficiency |
| | R15 | PC for Office (COTS) and design | Increase efficiency |
| | R16 | PC for Office (COTS) and design | Increase efficiency |
| | R17 | PC for office (COTS) | Increase efficiency |
| | R18 | PC for Office (COTS) and design | Increase efficiency |
| | R20 | PC for Office (COTS) and design | Improved design |
| | R26 | PC for office (COTS) | Increase efficiency |
| | R27 | PC for office (COTS) | Increase efficiency |
| | R28 | PC for Office (COTS) and design | Improved design |
| | R29 | PC for office (COTS) | Increase efficiency |
| R32 | PC for office (COTS) | Increase efficiency | |

Table 5.3. Findings on participants type of application acquired and the impact

The comparison between the failed and successful groups based on who developed the systems will be covered in this section. It is necessary to analyse who developed the application. External developers might have the technological skills needed, yet lack understanding of the internal business processes and dynamics of the participants' organisations. The opposite might be true for the participants, who might lack application development skills yet they presumably understood their own requirements.

5.3.1.1. Internal developers

Within the failed group, only R05 had an internally developed application, while within the successful group, R04, R30, R31, and R33 had internal development staff. Developing a custom-made application required not only technical skills but also understanding of the organisation's internal business and business requirements. Internal development staff, assuming they had the capability and knowledge to develop an application, would have the advantage of understanding the organisation's internal processes. This understanding could lead to understanding the organisation's business requirements.

R05's manager, who was also the application developer, may have believed that he had better understanding of R05's situation, and built an inventory recording application and staff attendance recording application. Apparently R05's manager failed to accommodate and take into account the staff's requirements. The staff refused to use the application and went directly to the owner. The owner intervened and stopped the application development from being continued. It was not known if the applications developed could work as intended since it was never properly used.

Within the successful group, it seems that their understanding of internal organisation conditions and dynamics were used to develop appropriate applications. The typical process of application development was the evolutionary approach. First, they defined and determined which manual activities or functions needed a computerised application.

“We looked at what we needed to develop (the application) and then we discussed it with the owner.” R04

“We did not aim at complex systems; we were a simple company with simple needs.” R31

Second, a priority list was established to guide the development and deployment process. This was deemed necessary since the participants had limited funds available for all IT-related investment.

“We started by identifying requirements, in our case it was inventory management.” R31

They even might not be able to acquire and deploy all their intended applications and IT equipment. Therefore evolutionary style development was used although the participants did not mention it explicitly; it was inferred from their description of the process followed.

The third step in the development process was acquiring and deploying the applications. Again, it depended on the financial resources' availability.

“We deployed all computers here at once, but we could not afford the wireless (network) connection needed to connect with our warehouse” R33.

“We made compromises between what I wanted and what the owner could afford” R04.

After the deployment, the participants would fine tune the applications as any bugs or problems arose during the early period. For example, R04's manager (developer) found that the application he developed was too slow. Apparently, there

was a compatibility issue as he developed the application using Linux as server and Microsoft Windows as clients. He quickly resolved the problem by updating the driver on the client side.

Depending on the company, the functional area to be computerised varied. For example, R04 focused on developing a database for recording products manufactured. The end result allowed the marketing and sales staff to use the database for order processing (such as querying if they had enough stock for a certain order and how long it would take to manufacture it). In R30's case, on the other hand, at the time of interview, the manager said that his development focus was on a web catalogue to attract new buyers and more importantly to communicate their latest products to existing customers. It was an independent project initiated by R30's manager. He developed the web catalogue whenever he had spare time and it was not even officially deployed at the time of interview. Later, when the website was deployed, R30's manager confirmed that his web catalogue was able to attract new buyers and was accepted by existing customers.

5.3.1.2. Outsourced – custom made

Within the failed group there were seven participants (R01, R06, R19, R23, R25, R34, and R35) who had their applications developed by third parties (external developers). Within the successful group there were five participants (R08, R11, R14, R21, and R24) who hired external developers. Except for R06, who tried to deploy a full ERP system, all of the participants who hired external developers had similar applications developed, namely accounting (including inventory and order processing) and web catalogues.

5.3.1.2.1. Causes of failure

Within the failed group, the interviewee was asked to reflect on what were the causes of their failure. Their responses were as follow:

- R01 had two failures and believed that the developer's lack of application development skills should be blamed. The first developer's attempt failed since the application did not work properly (it incorrectly reported negative inventory levels). The second developer's attempt failed because the application was not delivered after almost a year. R01 was able to develop and deploy the inventory application after he learned application development (he called it 'algorithm') with the help of four programmers from the local IT academy.
- R06 believed that the ERP implementer was not able to capture and accommodate their ever-changing manufacturing process, and that led to failure in the ERP implementation. R06's IT manager took over and developed the application himself, trying to mimic the functionalities and capabilities of ERP systems.
- R19 believed her lack of discipline in using the accounting application led to the failure. She acknowledged that she did not have time to use the application as intended due to her busy schedule creating designs and managing the production process. She was also unable to use email as intended, again due to her lack of time to learn and actually use the email. She concluded that she needed additional staff to handle both duties but she postponed it until the business could grow larger, which was when she would really need extra hands.
- R23, like R19, attributed failure to the lack of skills to operate a web catalogue and order processing system. R23's manager specifically mentioned English

language skills as a barrier to using the web catalogue and communicating with an international audience.

- R25 attributed the developer's lack of communication as the cause of failure. R25's IT manager seemed to blame the developer. He recounted that the developer only visited three or four times, mainly to finalise the contract rather than for development activities. It is noted that the idea of hiring the external developer came from the owner, who was not involved with the development, deployment, and usage of the application. The application developed was a web catalogue. R25 had purchased a set of PCs and a modem as suggested by the developer to enable subsequent update and maintenance of their web catalogue content. During the development, R25's IT manager, who was also their marketing manager, had tried to update the content of the web catalogue as new products became ready. It was noted that R25 was quite active in developing new products and frequently added new designs to their products portfolio. The developer, according to R25's IT manager, did not show any indication that they were having trouble accommodating the new products into the web catalogue until they suddenly abandoned it. R25's IT manager believed that the developer was unable to accommodate the change in content and therefore abandoned the project completely. The consequences of the developer's abandonment were unknown since it was handled directly by R25's owner. In the end, R25 used the PC and modem for administrative functions instead.
- R34's manager, like R01, believed that the developer's lack of skills was to blame. They had a similar experience as R01 when they tried to hire two different developers on two different occasions but both failed. R34's manager complained about the inability of those two developers to capture their requirements and build the systems accordingly. Unlike R01, R34 hired another

external developer and this time it seemed to work. By the time of interview, the application was just deployed and R34's manager believed it was working well and only needed minor adjustments.

- R35's manager believed that his lack of computing skills and reluctance to learn caused the application to fail. He was the only user for the application. R35's web catalogue was delivered on time and on budget and it seemed to work properly. Another problem with R35's web catalogue was the fact that the furniture business, for which the catalogue was built, was not running as expected. Therefore, there were two cause of failure, first the inability of R35's manager to use the web catalogue and second, R35's business represented by the web catalogue seemed not to exist.

To summarise, from the failed projects, there seemed to be two main reasons for IT adoption failure. The first reason was the inability of developers to develop applications for participants (R01, R06, R25, and R34). The second reason was the users' inability to use the application (R19, R23, and R35). It could be argued that the second reason could also be attributed to the developer. The developers might fail to properly train the users or may have developed the application in such a way that users found it hard to use. The users' readiness to use the application will be discussed later in this chapter.

R01, R06, R25 and R34 attributed their failure to the developer's lack of development skills. R01 believed that the developers he dealt with lacked basic programming skills such as algorithm design and application design. He succeeded when he designed the systems himself and the coding was done by external programmers. R34 was similar to R01. R34's manager believed the previous two application developers he hired lacked development skills. However, she did not

explicitly mention this as a cause of failure. R34's manager found that neither developers could fulfil any request for change in the applications whenever there were errors or bugs. She concluded that it was this inability that caused the application to fail or to not work properly. R06's IT manager believed that the ERP vendor was unable to define R06's manufacturing process according to the ERP requirements.

Within the successful group (R08, R11, R14, R21, and R24) the applications developed were similar to the majority in the failed group, accounting packages and web catalogue. R08, R14, and R21 used external developers to build their web catalogue. The differences with R23, R25, and R35, who also built web catalogues, are that R08, R14, and R21 only developed the web catalogue (without online order processing facilities) and they had staff who could handle the job.

The web catalogue was only used to replace a manual catalogue. R08, R14, and R21 reported significant savings by not producing manual catalogues and being able to update the web catalogue as frequently as they liked. Also, R08, R14, and R21's product development was not as active as R25's. Their product portfolio also seemed smaller than R25's⁴. With regard to online order facilities, the successful group's participants only showed their contact details (including email). New customers had to contact them directly to discuss orders, as was the case before the web catalogue. Judging by the nature of the web catalogue deployed by R08, R14, and R21, it was not difficult to build one. In Indonesia, there were plenty of web developers who offered web catalogue packages for companies with limited budgets.

R11 and R24 had their accounting application developed by external developers. It was not a full accounting package. R11's application was for inventory management,

⁴ R08, R14, and R21 sold a large portion of their products to international wholesale distributors and only small proportions to retail customers. R25 on the other hand had more retail customers than those three participants. Major furniture distributors usually requested different designs according to season, i.e. four times a year.

while R24's was for order processing. For the rest of their accounting processes, they still used electronic spreadsheets. Both R11 and R24's managers had known the developer before. R11 knew the developer while they worked at a computer store, while R24's manager had known the developer while he was still in Australia (R24's external developer was an Australian). This is probably why the developers for both R11 and R24 were able to deliver working applications.

R24 had a clear indication of what they wanted to do with the computer. They started the order process by using ordinary electronic spreadsheets and were quickly overwhelmed by the amount of paperwork. They were trying to simplify the processing by building an application. R24 described how the developer had been involved in the application development process:

R24's manager's description of their development process showed that R24 initially did not know much about what the application could do and should have. The developer complemented them in this part. The fact that they were friends helped the development process since they were able to communicate freely.

"They have a lot of input on what it should be, we did not really know what the systems could totally entail, but they have the expertise to say this is what you can do in your program and this is what you should put in your program" R24

R11 had an educational background in management and experience as a computer salesperson. He wanted an application for controlling inventory that would help him with cost calculations.

"It was like a supermarket inventory application but with an additional cost calculation module" R11

R11 had a good understanding of inventory management and also cost calculation, therefore he could clearly express his requirements to the developer.

Although both R11 and R24 had glitches in the deployment, they quickly resolved the problems with the developers. This confirmed that they had better communication with their developers than the failed group (R25 for example).

5.3.1. 3. Outsourced – COTS

Commercial off-the-shelf (COTS) applications were deployed by 16 participants out of 25 within the successful group and 2 out of 10 within the failed group. Within the successful group, all adopted standard PCs with standard COTS software installed when they purchased the PCs. They used all the software for various purposes from preparing financial reports to modifying product designs on an ad hoc basis. All of them depended on the vendors to provide the PCs, software, and maintenance if anything went wrong. They expressed their satisfaction with the products and their vendors' level of service. After all it was just standard PCs.

“We had our own repairer apart from the vendors, so anytime we had trouble we could just call him” R07

Sometimes they even acquired their equipment from multiple vendors, whoever could give them lower prices for particular products.

The failed group consists of R13 and R22. There was nothing wrong with R13's equipment. However, due to unavailability of public infrastructure, R13 was unable to use email to send their product designs to their main customer who had donated the computer for email. R22, on the other hand, was quite different. The manager disliked the idea of using computers for supporting business except for designing new products. R22's dislike of computer solutions was an unexpected statement from a person with a computer science degree.

One lesson from R13 and R22 is that using computers requires the organisation to be prepared. R13 was unable to use email because there was no public infrastructure. R22's manager seemed not ready to use computers to support his business.

5.3.2. Type of application deployed

In this section, the types of application being acquired and developed are discussed. The reason for looking at the types of application is to investigate whether acquiring inappropriate applications contributed to the failure.

5.3.2.1. Web Catalogue

We begin by looking at participants who acquired web catalogues. R23, R25, and R35 failed in their efforts to adopt and maintain web catalogues, while R08, R14, and R21 succeeded. From Table 5.3, the failed participants acquired web catalogue and integrated order processing systems. The intention was to enable customers and potential customers to browse their catalogue and place orders. All three participants' systems were similar: once the customers filled out the order form, the system would automatically send the order detail to the participant's office to be processed. The successful participants, on the other hand, only had web catalogues. When customers wanted to order, they had to contact the participants via email or other conventional methods. The contact details were posted on their web catalogue. Yet, closer examination revealed that the applications used by the failed participants were supposed to generate similar results (order documents) to the success participants. The automatic order processing systems sent the order form filled in by the customer through email to participants. In the end, both groups should have received the order from customers.

R25 failed due to the inability of the web catalogue developer to accommodate additional catalogue items. This inability was exacerbated by the lack of communication

between the R25 marketing manager (who also was their IT manager) and the developer. R25 was an example of process failure (Lyytinen & Hirschheim, 1987) where the developer and the client failed to communicate, resulting in the developer being unable to deliver the application. During the IS development process, developers and clients need to communicate in order to produce a system that fulfils the client's requirements. R25's IT manager blamed the developer since they only came and discussed the project on three occasions, mostly to close the deal rather than for application development. It is also noted that the idea to build the web catalogue originated with the owner, who did not use the application and was not involved in daily operation of the company. While during the interview R25's marketing manager never expressed any objection to the idea, he also did not show any enthusiasm or support toward the idea of building a web catalogue. In fact, R25's marketing manager seemed sceptical and did not believe that the web catalogue was a good idea in the first place.

R23 and R35 were examples of interaction failure (Lyytinen & Hirschheim, 1987). They failed because nobody within their companies could handle the systems, hence they were unable to process orders coming from the web catalogue. R23's staff, who were responsible for managing the order processing systems, did not understand English. As a result, R23 was unable to receive orders from overseas customers, which was the very reason they adopted the web catalogue and order processing systems. R35's manager could not operate computers and was reluctant to learn how, despite the developer delivering and maintaining the systems while also giving R35's manager training on how to use the applications.

R35's developer even purchased a PC on R35's manager's request so that the web catalogue could be maintained from R35's premises (R35 did not have any computer prior to the web catalogue). The application failed to be used by the user since

they did not have the capabilities needed to operate the application. R35's manager could not operate the computer to answer email from potential customers and even worse, the business venture for which the system was built did not work as expected.

R23 had different problems. First they could not communicate in English. English language proficiency is an important requirement for Indonesian SMEs who want to expand their market to overseas. It is more important for R23 since they would like to interact directly with new international customers. Many other SMEs could avoid the language barrier simply by using an intermediary to sell their products to international markets (Berry, Rodriguez & Sandee, 2001; Schiller & Martin-Schiller, 1997). The second problem was that they neither had technical capability to maintain the web catalogue nor money to pay for maintenance. The problem was, as admitted by R23's manager, that they were 'victims' of dot com hype. They were misled by the capabilities of internet.

"We anticipated the IT era, and even though we had not mastered the technology we prepared to take part." R23

They believed that it would enable them to access international markets directly. It was an example of making a decision based on incomplete and unbalanced information about the power of the internet (Porter, 2001).

Participants who succeeded in building a web catalogue had been prepared to exploit the benefit of the catalogue. They already had solid businesses where they could take orders from their customers, they already had conventional catalogues that were updated regularly. They often participated in trade shows prior to having a web catalogue. The majority of their customers were from overseas. They built the web catalogue to enable existing and new customers to receive information regarding their products. The discussion in the next paragraph covers R08, R14 and R21 since their

web catalogue had been running and had an impact on their business. R30's web catalogue was still in the testing and development phase. It will be covered later.

All three participants (R08, R14, and R21) already had a solid customer base who conducted business regularly with them. By placing their catalogue on the web, these three companies were able to reduce their marketing cost. They could reduce the cost of printing catalogues and sending them to customers, they could update the web catalogue as often as they liked, and they could reduce the frequency of attending trade shows to promote their products. All of those were on top of efficiency they had already gained by using computers (email) as the communication method of choice. R08 and R14 admitted that their existing customers were quite happy with the way they conducted business. In fact, considering the Indonesian security condition for the last five years or so, most of their customers still conducted business with them even though they had only met once or twice before. For new customers, the web catalogue becomes the starting point for further contact. If they could agree on business terms, the transaction could be continued. R08, R14, and R21 were exploring ways of promoting their web catalogue to reach a bigger audience as a way of improving their business. They did not want any additional features in their current application.

The successful participants have clearly shown that the web catalogue application is a tool of business (Porter, 2001). They already had solid businesses to work on and the web catalogue extended their promotion effort to the internet. By doing that, they could reduce their promotion expenditure while at the same time having the same or an even bigger audience.

As mentioned previously, R30 had not yet gained any benefit from its web catalogue at the time the interview was conducted. The web catalogue was still in the development and testing phase. The developer, R30's manager, had not released the

web catalogue since at that time he was busy handling orders which were close to shipping date. R30's manager developed the web catalogue himself as his own initiative and in his spare time⁵. It was not an official project of the company. R30 has similar solid business as R08, R14, and R21. The facts indicated that R30's web catalogue would give them benefit. After all it was developed as the manager's personal project without any official expenditure dedicated to it. Later observation revealed that the web catalogue had been running and according to R30's manager it did help them in communicating their latest products to their customers and helped them to promote R30's products to potential customers.

5.3.2.2. Accounting Application and ERP

R01, R05, R06, R19, and R34 failed in their efforts to acquire complete or partial accounting applications. R06 even tried to implement ERP systems for his company. On the other hand, R04, R31, R33, R11, and R24 succeeded in their adoption of similar systems. We now examine what made R04, R31, R33, R11, and R24 successful and why the others failed.

DeLone (1988) argues that a successful system is a system that is actually being used and has impact on the business. R01's first two applications could not be used. The first failed to produce proper inventory reports while the second failed to be delivered. Users in R05 refused to use the applications. R06's ERP application was unable to capture and record the ever-changing manufacturing process followed by the company. The developer or implementer failed to adapt R06's business processes to the ERP package. R19's manager failed to use the application. The manager felt that she did not have sufficient time, ability, and discipline to use the application. It was not clear

5 R30's manager's account of his development style showed that he followed an evolutionary approach. He built the web catalogue from scratch and made additional improvements whenever he had time.

whether R19's manager's attitude or inappropriate applications were causing the failure. The fact remains that the application was not used. R34 had the same difficulties as R01 in finding the right developer. They had tried a few times to hire developers but failed. All the applications delivered were unable to work properly.

In contrast, the successful groups were actually using the accounting applications. Table 5.3 shows the immediate impact of the application as felt by interviewees. Using DeLone's (1988) definition it could be concluded that these were indeed successes.

From the interviews there were no indications that the type of accounting applications used by both groups of participants were significantly different, except for R06. The ERP package acquired by R06 was inherently complex and required not only implementation but also changes in business processes. ERP implementation failure in large enterprises is quite common (e.g. Krumbholz & Maiden, 2001; Pliskin & Zarotski, 2000; Turban et al., 2006; Umble, Haft & Umble, 2002), so it is not surprising that R06 failed. It seemed that the reason for failure was not because of the type of application adopted.

5.3.2.3. COTS

This is the type of application most used by participants. In fact, all of the participants used COTS application for their companies. Recall from Section 1.1.2., COTS in this thesis is defined as any application that is publicly available in the market. Typical COTS application deployed were packages like the Office suite (word processor, spreadsheet, presentation, etc.), internet access applications (browser and email client), image processing (photo manipulation, drawing, etc), and communication applications (facsimile, dial up connection, etc). There was no evidence of any COTS accounting application being used such as MYOB, Peach Tree, or DAC Easy Accounting.

Participants acquired COTS applications as part of their computer purchase or purchased the application separately.

Of the 35 participants, 18 participants had no custom-made applications (as in Table 5.1). They were using purely COTS applications for a variety of functions within their company. The level of usage also varied, for example in R12 word processors and spreadsheets were used only for preparing business documents such as tender documents and proposals. Financial calculations were done using manual methods. In contrast to R12, R02 used spreadsheets to record employee attendance and calculate their wages. They also included within the spreadsheet tax calculations and other elements such as insurance.

Despite the different levels of usage, there was one pattern within participants with regard to COTS usage: flexibility. Since COTS applications are designed to accommodate many tasks in daily operations, it was up to the participants to exploit the applications' features. For example, a simple drawing application that came with the MS Windows operating system (MS Draw) was used by R28 to draw patterns for their products. R32 combined multiple types of documents from office application to produce reports for his customers and burned all the files on a CD. The flexibility of COTS applications features led to countless ways of using them. In fact, the flexibility of COTS applications was what made some of the participants use them.

"...we realised that with computer everything can be simplified..." R02

"I can use it to type mail, draw designs, and even play games in my spare time." R10

"We can change the documents anytime and add any type of data such as pictures, numbers, table, etc. all with one machine" R17

Despite their generic usage, two participants failed using COTS, R13 and R22. R13's failure was caused by infrastructure unavailability, while R22's manager

abandoned email due to his “anti email” view. For R13, it was beyond their control since the telecommunication infrastructure was a problem for the local area. R22’s failure was more for personal reasons rather than the application itself.

5.3.3. Users and origin of idea for adoption

Table 5.4 shows where the idea to deploy certain types of applications came from, who the developers were, and who the end users were (who actually used the applications). The reason is to see if the origin of ideas had any influence on the development and actual use of the application. Following DeLone (1988), an application deployment could be called successful if it was actually used. It is not enough for an application to be built properly, it must be used. In the previous section, the developer and type of application were discussed. In this section, the users of deployed applications are discussed.

| Failure | | | | |
|------------------------|---------------------|------------------------------------|------------------|-----------------|
| Type | Participants | Origin of idea for adoption | Developer | End User |
| Inhouse staff | R05 | Manager | Manager | Manager & Staff |
| Outsource Custom made | R01 | Manager/owner | External | Manager & Staff |
| | R06 | Manager & vendor | External | Staff |
| | R19 | Manager/owner | External | Manager |
| | R23 | Manager | External | Staff |
| | R25 | Owner & vendor | External | Staff |
| | R34 | Manager | External | Manager & Staff |
| | R35 | Business partner | External | Manager/owner |
| Outsourced COTS | R13 | Business partner | None | Manager |
| | R22 | Manager/owner | None | Manager |
| Success | | | | |
| Type | Participants | Origin of idea for adoption | Developer | End User |
| Inhouse IT Staff | R04 | Manager & staff | IT staff | Staff |
| | R30 | Manager | Manager | Manager |
| | R31 | Manager & staff | Manager | Manager & Staff |
| | R33 | Manager | Manager | Manager & Staff |
| Outsourced Custom made | R08 | Manager/owner | External | Manager & Staff |
| | R11 | Manager/owner | External | Manager |
| | R14 | Manager | External | Manager & Staff |
| | R21 | Customer | External | Staff |
| | R24 | Manager/owner & staff | External | Staff |
| Outsourced COTS | R02 | Manager/owner | None | Manager & Staff |
| | R03 | Manager & staff | None | Staff |
| | R07 | Manager & staff | None | Staff |
| | R09 | Manager/owner | External | Manager & Staff |
| | R10 | Manager/owner | None | Manager |
| | R12 | Staff | None | Staff |
| | R15 | Manager/owner, staff, colleague | None | Manager & Staff |
| | R16 | Manager & staff | None | Manager & Staff |
| | R17 | Business partner | None | Manager & Staff |
| | R18 | Manager/owner | None | Manager & Staff |
| | R20 | Manager/owner | None | Manager |
| | R26 | Manager | None | Manager & Staff |
| | R27 | Manager/owner | None | Manager & Staff |
| | R28 | Manager/owner | None | Manager |
| | R29 | Manager/owner | None | Manager & Staff |
| R32 | Manager/owner | None | Manager & Staff | |

Table 5.4. Findings on deployment idea, developers, and end user

R05 was an example where even though the system was built (presumably) by a developer who understood the internal business processes and application development,

without user support it failed. From Table 5.4, we can see who were the intended users of the application and who had the initial idea to adopt that particular application. There is a possibility that if the end user did not like the idea of using a particular application in the first place they might not support its use.

From the failed group, there were five participants (R06, R13, R23, R25, and R35) for whom the end users were not the source of the idea to adopt a particular application. R06's adoption of the ERP application was initiated by the manager and vendor of the ERP application, who R06's IT manager thought were colleagues. The manager was not involved with the deployment and use of the ERP application. The user might not like it and then did not use the application as prescribed. R06's IT manager during the interview acknowledged that one of his difficulties in developing the systems replacing the failed ERP was user support.

“In front of the top management, they seemed to support the idea. In reality when I deployed the applications they refused to use it. It was far more dangerous (to the application) than to simply say no.” R06

The staff who refused to use the applications was one of the heads of the production department; as such the person created a problem since the application was designed to integrate recording processes among departments. However, R06's IT manager managed to convince the other head of department and users to use the application. Therefore if somebody refused to use the application it would slow the whole process down and create additional workload since they received documents from the previous department in electronic form (which have to be printed out). Then they had to process the documents manually. Finally they had to transform the manually processed documents to electronic form to be forwarded to the next department in the process.

Similar to R06 is R25. R25 adopted a web catalogue and order processing application according to an idea from the owner's colleague. When the development

process was underway, it seemed that R25's marketing and IT manager did not have good communication with the developers. On the surface, as recalled by R25's marketing and IT manager, the developers only came to finalise the deal and do a brief analysis of the company. Later during the development, the developers did not maintain communication and in the end suddenly abandoned the project.

In R13's case, the idea and equipment to use for design and data communication came from R13's business partner. R13 happily accepted the donation even though later they could not use it. One could argue that R13's business partner was not fully aware of the environment where R13 operated, therefore they failed to acknowledge the lack of public infrastructure. For R13, since they did not pay for the computers they seemed happy to use them for design anyway. However, R13's manager admitted that he would like to use the computers for data communication.

R23 and R35 were similar in terms of the lack of user capabilities and availability to handle the systems. They were not ready to use the application they ordered, therefore the applications were useless. Both R13 and R35 had the idea that by using a web catalogue they could reach a bigger customer base and therefore expand their market share to the international market. However, R13 was unable to communicate in English, which is one of the requirements in international business communication and R13 did not have staff who could maintain the web catalogue nor did they have money to pay for maintenance. R35's manager was reluctant to learn the computer skills necessary to operate the application and reluctant to properly manage the business.

We now examine the group with successful IT adoptions. We examine if there is any differences with the failed group in terms of who had the idea and who were the end users. How did the differences influence the acceptance of the applications? In all the

successful participants (except for R21) the person who proposed or had the idea to adopt IT also used the IT on a daily basis. Therefore, they were involved, understood what was needed and were able to acquire appropriate solutions. Only R21 took the idea to use IT from their customers. Customers did not actually force other participants to use computers. However, there were some difficulties if they did not use computers. For example, if they did not use email to communicate with customers they had to use facsimile or conventional mail. Facsimile is expensive (especially international facsimile) and the quality is poor. Conventional mail is too slow and often unreliable.

5.3.4. Manager's educational background

Table 5.5 shows each interviewee's educational background. The purpose of this table is to see whether educational background has any influence on the successful adoption of IT. It has been claimed in the literature that a manager's IT knowledge contributes to the success of adoption (Cragg & King, 1993; Fink, 1998; Utomo & Dodgson, 2001)

| Failure | | | |
|------------------------|---------------------|---------------------------------|---|
| Type | Participants | Interviewee | Education |
| Inhouse staff | R05 | Manager | Undergraduate Industrial Engineering |
| Outsource | R01 | Owner/manager | Undergraduate Mechanical Engineering |
| Custom made | R06 | IT Manager | Undergraduate Informatics |
| | R19 | Owner/manager | Undergraduate Architecture |
| | R23 | Manager | Undergraduate Agriculture |
| | R25 | IT/Marketing Manager | Diploma Foreign Language |
| | R34 | Manager | Undergraduate Economics |
| | R35 | Owner/manager | Undergraduate Management |
| Outsourced COTS | R13 | Owner/manager | Year 9 |
| | R22 | Owner/manager | Undergraduate Computer Sciences |
| Success | | | |
| Type | Participants | Interviewee | Education |
| Inhouse IT Staff | R04 | Manager | Undergraduate Economics |
| | R30 | Manager | Undergraduate Literature studies |
| | R31 | Manager | Undergraduate Social & Political Sciences |
| | R33 | Manager | Undergraduate Architecture |
| Outsourced Custom made | R08 | Owner/manager | Undergraduate Architecture |
| | R11 | Owner/manager | Undergraduate Management |
| | R14 | Manager | Undergraduate Literature studies |
| | R21 | Manager | Undergraduate Education |
| | R24 | Owner/manager | High School |
| Outsourced COTS | R02 | Owner/manager | Master of Management |
| | R03 | Manager | Diploma Secretary |
| | R07 | Manager | High School |
| | R09 | Owner/manager | Architecture student |
| | R10 | Owner/manager | Undergraduate Fine Art |
| | R12 | Owner/manager | Master of Management |
| | R15 | Owner/manager | Undergraduate Management |
| | R16 | Manager | Undergraduate Social & Political Sciences |
| | R17 | Manager | Undergraduate Management |
| | R18 | Manager | Undergraduate Literature studies |
| | R20 | Owner/manager | Undergraduate Social & Political Sciences |
| | R26 | Manager | Undergraduate Architecture |
| | R27 | Owner/manager | Master of Management |
| | R28 | Manager | High School |
| R29 | Owner/manager | Undergraduate Law | |
| R32 | Owner/manager | Undergraduate Civil Engineering | |

Table 5.5. Findings on managers' education background

Table 5.5 does not indicate that formal IT education will influence the success of adoption. Even the manager of R22, who holds an undergraduate degree in computing

sciences, did not like the idea of electronic communication. On the contrary, many managers with non-IT background were enthusiastic about the prospect of using IT for their businesses. In fact, none of the success participants had any formal IT education. It is noted however, that management and economic formal education are more frequently found than IT education. A management and economic education background accounts for seven interviewees from the success group and two from the failed group compared to two with IT education in the failed group and none in the success group.

5.3.5. Reasons for adoption and actual applications deployed

By looking at the initial reasons for adoption and comparing them to the actual application being adopted, we can check the consistency of participants' assertions. We can examine whether their initial reasons for adopting IT were coherent with their choice of application being adopted. There were various reasons to adopt IT, therefore the Table 5.6 shows multiple columns.

| Failure | | | | | | | | | |
|---------------|------|-----------------------|-----|-----|-------|------|-----|-------|--|
| Type | Part | Reason for deployment | | | | | | | Type of Apps |
| | | Adm | Dsg | Com | Sales | Mgmt | Eff | Trend | |
| Inhouse staff | R05 | | X | | | X | | | Inventory management & attendance record |
| Outsource | R01 | | | | | X | | | Inventory management |
| Custom made | R06 | | | X | | X | X | | ERP |
| | R19 | X | X | X | | | | | Accounting package & email |
| | R23 | X | | X | X | | | X | Web catalogue & order processing |
| | R25 | X | | | X | | | | Web catalogue & order processing |
| | R34 | X | | | | | X | X | Accounting package |
| | R35 | | | | X | | | | Web catalogue and email |
| Outsourced | R13 | | X | X | | | | | Email for sending design |
| COTS | R22 | | X | X | | X | | | Email & CNC |
| Success | | | | | | | | | |
| Type | Part | Reason for deployment | | | | | | | Type of Apps |
| | | Adm | Dsg | Com | Sales | Mgmt | Eff | Trend | |
| Inhouse | R04 | X | | X | | | | | Accounting package & email |
| IT Staff | R30 | X | X | | X | | X | | Web catalogue & COTS |
| | R31 | | | X | | | X | | Accounting package |
| | R33 | | X | X | | X | | | LAN and accounting package |
| Outsourced | R08 | X | | X | X | | | | Web catalogue |
| Custom made | R11 | X | X | X | | | | | Inventory management |
| | R14 | X | | X | X | | | | Web catalogue |
| | R21 | | | | X | | | | Web catalogue |
| | R24 | X | X | X | | X | X | | Order entry processing |
| Outsourced | R02 | X | | X | X | | X | | PC for office and design |
| COTS | R03 | | X | X | | | | | PC for Office (COTS) and design |
| | R07 | X | | | | | X | | PC for office (COTS) |
| | R09 | X | X | X | | | | | PC for Office (COTS) and design |
| | R10 | | X | | | | | | PC for Office (COTS) and design |
| | R12 | X | | | | | X | X | PC for office (COTS) |
| | R15 | X | | | | | | | PC for Office (COTS) and design |
| | R16 | X | | X | X | | X | | PC for Office (COTS) and design |
| | R17 | X | | | | | | | PC for office (COTS) |
| | R18 | X | X | X | | | | | PC for Office (COTS) and design |
| | R20 | X | | X | | | | | PC for Office (COTS) and design |
| | R26 | X | | | | | | | PC for office (COTS) |
| | R27 | | | | | | X | | PC for office (COTS) |
| | R28 | X | X | X | X | | X | | PC for Office (COTS) and design |
| | R29 | X | | | | | | | PC for office (COTS) |
| | R32 | X | | | | | X | X | PC for office (COTS) |

Table 5.6. Findings on reasons for adoption and actual application deployed

The definitions of reasons in Table 5.6 are:

- **Adm:** all administrative and clerical needs such as creating business documents and reports.
- **Dsg:** product design
- **Com:** business communication including using email and facsimile
- **Sales:** marketing and promotional activities.
- **Mgmt:** all management activities including accounting, finance, and control of inventory, production and manufacturing management.
- **Eff:** increased efficiency of operations compared to manual operations. This reason includes factors such as reducing cost, decreasing manual/human error, and ease of document management.
- **Trend:** the participants believed that using IT in business was a trend and therefore they were following the trend.

The first reason to discuss is trend. Trend means that the participants adopted IT because we are in an information era. It is currently as common to use computers for business as it once was to use typewriters to create documents. Only four participants mentioned trend as one of their reasons to adopt IT and they were equally split between successes and failures. R23 and R34 failed adopting custom-made applications, while R12 and R32 adopted generic applications (COTS). With a custom-made application, once its development failed (R34) or it was not used (R23), the failure was immediately obvious. With COTS applications such as office packages and internet access application, failure was less obvious. As mentioned earlier, participants who used COTS applications tended to use them in quite fluid and flexible ways, and on an ad hoc basis. R12 and R32 managers immediately mentioned trend when asked about their

reasons to use computers. Later, R12's manager revealed that he purchased a PC with office software to be used for administrative tasks such as preparing tender documents, official company letters, and manual invoices. R32 had similar IT investment to R12 but they acquired about 10 PCs.

The rest of the participants both from the failed and successful groups did not show any inconsistency between their reasons to adopt IT with the type of application adopted. However, cases similar to R12 and R32 might occur with participants who adopted COTS applications and used them on an ad hoc basis.

5.4. Failure and recovery

The acceptance of an innovation (in this thesis the innovation is IT) could be associated with the success of IS and rejection could be associated with failure of IS. We looked into the factors influencing their IT adoption, we could consider whether those factors indeed influence IT adoption. We looked at the efforts and actions of those who failed. Any failed investment in an SME might have significant consequences to the SME's financial condition. We examined what the failed participants did with the failed investment. The participants who failed showed three different responses to cope with their failure: retry the development process until they succeed (R01, R06, and R34); use the hardware and software for other purposes (R13, R19, R22, R23, and R25); or totally abandon the application (R05 and R35).

R01, R06, and R34 believed that using computers to support their business was vital. They just needed the right application for their specific needs. Therefore, despite the failure they tried again. R01 after two failures decided to learn how to develop an application on his business trip to USA. He eventually succeeded in building an inventory application.

R06's IT manager was left with unused computers and COTS applications after the failure of the ERP implementation. He decided to build the application himself from scratch. The first priority was to support the manufacturing process. He built an application to record and manage raw material inventory, products in process, and finished products.

R34 previously had their accounting application developed by an overseas volunteer worker. The aging application was unable to cope with the company's growth. R34's manager decided to build a new one. They tried two developers but failed. Finally they found a developer who could build the application.

The second group (R13, R19, R22, R23, and R25) did not want to retry developing their application for various reasons, such as:

"There is no telephone line here." R13

"I was not disciplined enough to use the application for recording our accounting data" R19

"I do not like people bothering me with their email" R22

"We do not have staff to handle international customers' inquiries and maintain the web catalogue" R23

"I believe the web catalogue is inefficient for us" R25

These participants had invested some money on computers to run the application. After the failure they used the computers for other purposes within their company. For example R13 used the computer for product design, while R25 used it for administrative work. For R22, there was no indication that he continued using computers since he seemed reluctant to discuss it further.

R05 and R35 decided to abandon the application and computers all together. R05's manager, who was also the developer and sole user of the application, was considering resigning. He felt that the owner did not support him as manager of the

company. R35's owner and manager, on the other hand, was reluctant to use computers or the web catalogue. He was unable to operate the applications even though the developer had purchased computers on his request and trained him. He also did not seem to have a serious intention to manage the furniture business. He used the computers for his personal business, while he still paid for the web catalogue maintenance.

5.5. Summary

In Chapter 5 we discussed the findings from the semi-structured interview analysis. We grouped the participants into those who failed and those who succeeded. Within each group, we briefly described their IT adoption experiences, and classified the participants into different groups based on the commonalities identified from the data. We also discussed the actual factors influencing IT adoption within Indonesian SMEs. Finally, we discussed the factors that we identified as causes of success or failure in IT adoption and the recovery done by those SMEs within failed groups. In the next chapter we will discuss how the differences affect the initial model of IT adoption we proposed in Chapter 2 which lead to the refined model of IT adoption process within Indonesian SMEs.

Chapter 6 – The IT Adoption Process within Indonesian SMEs

This chapter discusses the findings presented in Chapter 5 and compares them to what has been documented in the relevant research literature. It starts with the findings on the factors that actually influence IT adoption within Indonesian SMEs, followed by discussions on the failure faced by participants in their IT adoption and how they cope and recover afterward. The next section discusses the differences between failure participants and success participants, what factors make the adoption a success in one group and a failure in other group. The last section discusses the refinement of the proposed model from Chapter 2 based on the findings from participants' experience.

6.1. Factors affecting IT adoption within Indonesian SMEs

As proposed in Chapter 2, the IT adoption process is defined as a three-stage process (decision, adoption/implementation, and evaluation). The semi-structured interview used the IT adoption process above to elicit participants' experiences during the three stages. Initially, as described in the data analysis section, we extracted and assigned codes to participants' responses that have similar themes. All the participants' responses were also mapped to the semi-structured interview guide questions to identify and classify factors affecting their decision during the whole IT adoption process. We now revisit those factors and summarise the findings with respect to those factors. We begin with the internal factors and then continue with the external factors.

6.1.1. Internal Factors

Internal factors influencing IT adoption within Indonesian SMEs as proposed in the model depicted in Figure 2.6 consist of all the factors within the SME itself: manager, resources, and staff. The following three sections will discuss each factor individually.

6.1.1.1. Manager

The study found differences between participants' responses and what the literature suggested as factors in management perception toward IT. In the literature, management's perceptions, as they related to IT adoption, focussed on perceived benefit, perceived cost, and risk (Cragg & King, 1993; Fink, 1998; Ihlstrom et al., 2003; Thong & Yap, 1996). The perceptions of our participants were mostly oriented toward future uses of IT rather than cost and risk. This attitude toward IT may come from their previous education or from information on the benefit of IT obtained from external sources (Chau, 1995; Ihlstrom et al., 2003). They could see the areas where IT could help their business. They may have had a low perception of risk because they themselves often initiated the IT adoption, had a realistic expectation of the result, were personally involved in the project, and conceived future plans to adopt more IT innovations. Realistic expectation refers to the condition where the manager has an adequate understanding of what IT can do for their business and what their business required from IT.

“Before I built this company, I thought of what we needed in terms of facilities; a computer was one of them” R09

“We intend to develop a bar coding system for our inventory next year” R24.

All the decisions within participants' organisation were made solely by the manager with minimal or no input from the staff. This might be due to the centralistic style of management common in Asian countries (Elliot, 1996) as well as being a

common feature of SMEs (Rule & Attewell, 1989). This decision making style might make the IT adoption easier, since all the decisions were made and enforced on the staff by the manager.

6.1.1.2. Resources

Within the participants' organisations, resources were not a problem. The participants were able to finance their IT adoption by allocating some of their capital, payment by instalments facility from the IT vendors, or donation from the participant's family members. This is somewhat different from the literature, where it is stated that SMEs would find a lack of financial resources as one of the barriers to IT adoption (Chau, 1995; Fink, 1998; Ihlstrom et al., 2003). This fact is also different from what we believed at the beginning of the study when we proposed assumption A2. This difference is probably due to the fact that the prices of basic IT hardware in Indonesia are relatively low (there is also anecdotal evidence and self observation that software piracy is a big problem in Indonesia leading to availability of cheaper illegal software). In any case, hardware prices worldwide are lower than they would have been in some of the earlier studies. Other resources such as supplies and software developers were also not a problem since the participants could acquire them if necessary.

“When we need computers we only need to make a proposal to the owner” R07

“We allocated some of our capital to purchase computers” R09.

“There are plenty of good programmers here in Indonesia” R24.

6.1.1.3. Staff

Within the staff category, staff acceptance of IT adoption was not a problem despite suggestions in the literature (Fink, 1998; Ihlstrom et al., 2003). Once the manager decided, the staff would usually comply or they would be moved to other sections

which were not affected by the newly adopted IT. In other words, the manager imposed the adoption and assumed that the staff would support it unreservedly.

“The sales force just accepted it” R25

“If they don’t like it, that is alright. I will assign them to another job that does not use computers” R24

Some participants even recalled that their staff were the ones who proposed the use of computers to solve their problems. This eventually led to the acceptance of the IT adoption.

“One of my staff, who communicates with our overseas client frequently, asked me to buy computers and subscribe to the Internet” R15

“We had computers, I think, in two of the departments and the rest of the staff indicated that they would probably work more effectively using computers, so actually it came from them as well” R24

However, R05’s situation was different. The staff did not comply with the manager’s order to use the new systems built by the manager himself. In fact they turned to the owner and asked him to veto the application. R05’s employees did not like the system and they turned to the highest authority within R05, which is the owner. It appears that the R05’s staff behaviour differs from our initial assumption that the staff would comply with the employer’s order (A1). The problem was that the owner hired somebody else to be the manager. The manager reformed the way R05 conducted business but the staff did not like it. In staff’s eyes, the owner is still the manager and they did not accept the “real” manager.

Most of the participants’ staff who operate computers were university graduates or required to be university graduates. As a result, computer literacy is not a major issue as suggested in the literature (Ihlstrom et al., 2003; Walczuch, Braven & Lundgren, 2000). After all, they only operate basic computer applications. This fact led to a self study learning style, where the staff would learn by themselves how to use the computer

applications. Again, the data did not support our initial assumption (A2) regarding the difficulties in acquiring knowledge of computer usage.

6.1.2. External Factors

External factors influencing IT adoption within Indonesian SMEs as proposed in the model depicted in Figure 2.6 consist of all factors outside the SME itself: government, customers, competitors, and IT vendors and consultants. The following three sections will discuss each factor individually.

6.1.2.1. Government

The participants' only concern with the government was the lack of public infrastructure availability and quality. The perceived government role contradicts our initial assumption that the Indonesian government was supposed to support IT adoption (A4). The public infrastructures of concern were telecommunications, especially access to the internet. Utomo and Dodgson (2001) suggested that this problem might have been solved by now, but new government-supported infrastructure projects have not eventuated. In Europe, there appears to be more government support for IT infrastructure (Dutta & Evrard, 1999).

“We have difficulties in accessing the internet. It is slow and expensive due to the poor telephone cable” R18.

“There is no telephone/internet line here. We can't send our designs” R13.

Most participants were not aware of any government regulations or subsidies that might have helped them in IT adoption. One of the participants even believed, from previous experience, that typical training and workshops provided by the government might not meet their requirements, since they were too general to be applicable. This confirms what Dutta & Evrard (1999) found in their study of European SMEs.

“I am not aware of any computer training from the government” R14.

“The previous training had too much theory and was inapplicable” R29

The government seemed to have little influence on Indonesian SMEs’ IT adoption process.

6.1.2.2. Customers

There are no differences between the findings from our field study and the literature with respect to customers. The findings confirm that customers can initiate IT adoption by applying pressure to the participants (Drew, 2003; Fink, 1998). The major customers for all the participants were overseas customers who made up more than 90% of their annual sales and most of these customers prefer to do business by email.

6.1.2.3. Competitors

Competitors apparently had insignificant influence on the participants’ IT adoption decisions. We could not find any supporting data for our initial assumption regarding the Indonesian SMEs’ decision to adopt IT based on what their competitor already did (A3). Only one participant mentioned that he observed the trend of building websites for promotional purposes by other SMEs, yet he did not want to follow since his company’s production capability might not be able to meet the increase in orders. Another participant said that he had evaluated a proposal for a company website, but had not adopted it and would not reconsider it in the foreseeable future. This is in contrast to the literature’s suggestion that competitive pressure may force SMEs to adopt IT (Cragg & King, 1993; Drew, 2003; Fink, 1998). We speculate that the market for exported furniture is quite big and although there are many exporting furniture companies (including SMEs) in Indonesia, the international market is still too big to be filled by the existing companies. In our past experience dealing with SMEs, we often

noticed that the SMEs had difficulties in fulfilling a sudden increase in orders from customers; they were often forced to outsource the manufacturing outside the company. Some companies (for example R24, R04, and R06) had long term contracts with their overseas customers. We conclude that the participants were using their production capacity fully and were still unable to fulfil the international needs for furniture, let alone pay attention to or be influenced by competitors.

6.1.2.4. IT Vendors and Consultants

IT vendors and consultants were perceived as a necessary element of IT adoption by the participants, not only for their support but also as a source of information on the availability of IT solutions that fitted their needs, as suggested by the literature (Cragg & King, 1993; Fink, 1998; Schiller & Martin-Schiller, 1997). The participants believed that support from IT vendors and consultants would be critical during the deployment of IT solutions due to the lack of technical knowledge within the participants' organisations. However, our study found that IT vendors and consultants also often gave the idea indirectly to the participants to adopt IT as a result of marketing efforts. Referring to Rogers's IDPM model (1995) in Figure 2.2, IT vendors' and consultants' marketing efforts might influence SMEs in the knowledge and persuasion stage before they continue to the decision stage.

6.2. Comparison of findings about factors

From the comparison between the results of the field study and the literature, it was found that there were some similarities and some differences. The Indonesian managers agreed on the importance of public infrastructure availability, customers influencing IT adoption decision, that external consultant and vendor support was important, and that

success relied on staff readiness and IT experience (although among the companies investigated in Indonesia this was almost always present).

The most apparent differences among the external factors concerned the government and competitors. The participants' only concern with the Indonesian Government was the lack of public infrastructure provided; there was little hope of government subsidies or training, and government regulations had no impact. While the pressure of competition seemed irrelevant to the IT adoption decision, managers did observe trends in IT use among their competitors. Among the internal factors, internal resources, especially financial resources, were not a problem. This is different from what the literature suggested earlier (Fink, 1998; Ihlstrom et al., 2003). Probably with IT products becoming cheaper the acquisition of IT products was not a financial burden any more. As for staff acceptance, it was found that this was almost guaranteed, probably due to the centralistic management style (Elliot, 1996). Staff readiness again was not a problem since most staff were university graduates and had experience in using basic IT applications. Managers' general attitudes towards IT were not much different in our study, since all were quite positive towards IT. In reality, their perceptions were more focussed on the benefits they could foresee from particular IT applications. The centralistic management style also proved favourable in IT adoption. There was no rejection from the staff once the manager decided, since there was a threat of being assigned to other functions if the IT adoption was rejected.

As noted, these conclusions differ somewhat from previous studies, including that of Utomo and Dodgson (2001) which was also conducted in Indonesia. It may be that our semi-structured interviews gave more scope for open-ended replies, and therefore allowed the participants to introduce factors different from those included in the mainly questionnaire-based models in the literature.

6.3. Failure and recovery

From the theoretical perspectives on IS failure (Ewusi-Mensah, 1997; Ewusi-Mensah & Przasnyski, 1994; Ewusi-Mensah & Przasnyski, 1995; Lyytinen, 1988; Lyytinen & Hirschheim, 1987), all the companies within the failed groups can be seen as cases of IS failure. For all the failed participants (R01, R05, R06, R13, R19, R22, R23, R25, R34, and R35), the IS failed to meet stakeholders' expectations in the development stage (Lyytinen, 1988; Lyytinen & Hirschheim, 1987) with total abandonment of the project by the developer (Ewusi-Mensah & Przasnyski, 1994). From a different viewpoint, the supporters (in case of R01, R06, R34, R25, R35, and R05) ceased their support for project organisations (the developer) because the project organisations failed to provide an innovation (in this case by providing web catalogue) and therefore the IS failed to deliver a service (Sauer, 1993). It can be concluded that, except in R35's case, the innovation process failed due to the lack of communication between the supporter and the project organisation (the developer).

The case for R35 was different. According to Sauer's model (Sauer, 1993), it was not a failure since the supporter (R35) still supported the project organisation (the web developer) to maintain the IS (the web catalogue), even though R35's business itself was stagnant. R35's owner still perceived that he was served adequately, at least superficially, by the IS (web catalogue). In contrast to Sauer's model, we may conclude R35's system can indeed be considered as a failure. More specifically, this could be considered as an Interaction Failure (Lyytinen, 1988; Lyytinen & Hirschheim, 1987) although the system itself was delivered on time and on budget satisfying the requirements (Ewusi-Mensah & Przasnyski, 1994). R35 hardly ever used the web catalogue for what it was intended for, that is, for marketing purposes. The only active

subsystem occasionally used was the webmail system for the R35 owner's personal activities.

Not only defining if a company had IS failure problems, but also what did they do and what they should have done in coping and recovering from the failure is important too. There are three different reactions: retry the development as in the cases of R01, R06, and R34, abandon or postpone the development and use the hardware for other purposes as in the cases of R25 and R35, or completely abandon the systems as in the cases of R35 and R05.

IS failure can be seen as an opportunity to learn from mistakes for the future by conducting a post-mortem analysis (Ewusi-Mensah, 1997; Ewusi-Mensah & Przasnyski, 1995; Irani, Sharif & Love, 2001). A post-mortem analysis is expected to extract critical factors leading to failure that need to be avoided in the future IS developments (Yeo, 2002). Informally, all the companies seem to have conducted some form of post mortem analysis.

The lack of developer's ability to analyse the business processes of the companies seemed to be main cause of failure in the case of R01, R06, and R34. However, R25 perceived that the lack of communication between his company and the developer was the main reason for the failure. The developer seemed unable to gain a reasonable understanding of the complexity and nature of R25's products. As a result, they were unable to deliver a web catalogue that could accommodate R01's rapid product changes. Although R25 put the idea of a web catalogue on hold for the foreseeable future, it is believed that in order for them to be able to handle the web catalogue, they need to hire someone to handle it exclusively.

"The website need a dedicated person to handle it (to be successful)."

In contrast to R25, the developers for R23 and R35 seemed to have done their homework. They interacted regularly with R35 in developing the web catalogue and the developers were able to deliver the systems in time and within budget and to the project sponsor's apparent satisfaction. The web catalogue was operational and usable. In the case of R23, the manager expressed his view on the failure of R23's web catalogue as caused by the unavailability of staff to manage the web catalogue. In R35's case, it was the business that could not expand and operate. After all, the web catalogue was intended as a promotional tool; if the business being promoted was stagnant then the web catalogue could not contribute anything. R35 should have questioned the original objective of developing a web catalogue system (Lees & Lees, 1987). It seems that this is a matter of Business-IT Alignment, where the business itself failed to perform and as a result the IT could not support it properly (Cragg, King & Hussin, 2002; Tallon, Kraemer & Gurbaxani, 2000). Business-IT alignment is a research area that is currently of interest in the IS community but beyond the scope of this thesis. Finally, R05's manager seemed unable to change the the staff's mindset of being in a family business. It was exacerbated by the owner's lack of support for the manager. The staff could see this and whenever they did not like the manager's decision they went to the owner, who would veto the manager's decision.

6.4. Comparison between failed and successful participants

In Chapter 5, the participants were classified according to the failure or success of their IT deployment. Furthermore within each group, the participants were classified according to the applications deployed, whether they were developed by in-house staff, custom developed by external developer, or COTS applications. Both groups have been compared and analysed to see why some of the participants failed while others

succeeded. The comparison and analysis considered who developed the applications, the type of application deployed, the users and their idea of adoption, the managers' educational background, and the reason for adoption paired with the applications actually deployed.

- ***Developers***

Looking at who developed the applications, it seems that whether the developers were internal or external (Avison & Fitzgerald, 2002; Beal, 2000; Bridge & Peel, 1999; Turban et al., 2006) was irrelevant. Participants who failed showed that neither internally developed, externally developed, nor COTS packages would be successful if the organisation was not ready.

R05 failed because the staff did not accept the application built by the manager. This was traced back to the lack of owner's support for the role of R05's manager in general (not only for IT). As for the application, it was not known whether it would work or not since it had not been tried by the staff. Management support has been long attributed to successful deployment of an information systems (Raymond, 1985)

R01, R06, and R34 failed to properly outsource their application development on the first attempt. Their subsequent development (internally for R01 and R06 and externally for R34) confirmed that the development of an application did not depend on who the developers were. Instead, for R01, R06, and R34, the ability to develop applications that matched the client's requirements is more important (Kotonya & Sommerville, 1998).

R19, R23, R25, and R35 failed to use their externally developed applications because their organisations were not ready to use them. R19 lacked time (and

staff) to operate the application. R23 did not have staff who could operate and maintain the web catalogue, nor did they have staff who could communicate in English to answer potential international customers' inquiries. R25 failed to find appropriate developers and then after the failure used the computers for other purposes (similar to other COTS application users). R35 did not have sufficient technical skills to operate and maintain the web catalogue and the manager (who was also the sole user) was reluctant to learn. R35's business also did not grow as expected.

With COTS applications, R13 and R22 also failed to use the applications. R13 failed due to unavailability of the telephone infrastructure needed. R22's manager, although graduated with a computer science degree, did not like using email.

- ***Type of application deployed***

Similar to the developers, the type of application did not have any effect on the success of adoption. The failure groups have participants who deployed an ERP package or simple COTS solutions. However, the ERP package seemed too complicated for SMEs. R06, who tried to deploy an ERP package, failed because they were unable to change their manufacturing process to suit the package. SMEs have less formal structure and business processes than larger enterprises (Kotey, 1999; Kotey & Slade, 2005; Wilkinson, 1999). ERP packages often fail in larger enterprises and probably would be worse for SMEs (Hanseth, Ciborra & Braa, 2001; Turban et al., 2006; Umble, Haft & Umble, 2002).

One lesson learned from the participants is that the organisation must be prepared to operate and maintain the applications. The maintenance could be

outsourced to the original external developers (as in the case of the web catalogue for R08, R14, and R21), to other external developers/vendors (as in the case of R24 who hired local programmer), or even by the internal staff (as in the case of R04, R31, and R33). Using the application required either the staff or the manager to have adequate knowledge to do so. Examples are R23 and R35, where the designated users failed to use the applications as intended due to lack of skills and knowledge.

R13 gave different lessons. Despite its simple computer usage and the manager's readiness to use it, they could not use the computers for communication (i.e. sending their design to customers) due to public infrastructure unavailability. Although it was beyond R13's control and the computer was donated by their customer/business partner, they would have been better if they have known this beforehand.

- ***User and idea of adoption***

If the idea of deploying a certain application was not from the user and the user did not like it, they probably would not support it or be willing to use the application (Duxbury, Decady & Tse, 2002; Elliot, 1996). This is clear from the cases of R05, R06, R13, R23, R25, and R35. The idea of using the computer did not come from the users. The user could refuse to use the application (like R05), did not support the development (like R25), did not understand the infrastructure needed (R13), and did not understand the skills requirements and consequences of using such applications (R23 and R35).

However, ideas which did not come from the user were not always a bad thing. R21's customers offered the idea of using the computer for their business. The customers suggested using a web catalogue for displaying R21's latest designs.

Since the customers who gave them the idea also accounts for their biggest sales, R21 seriously committed to develop the web catalogue in order to satisfy that customer.

- ***Manager's educational background***

Although IT knowledge and skills are attributed to successful adoption (Gagnon, Sicotte & Posada, 2000; Sharma & Rai, 2003), IT formal education did not seem to influence success or failure. Even with formal IT education (bachelor in computing sciences), R22's manager did not like the idea of using the computer for business communications, restricting it to product design. Most of the successful groups have managers with either economics or management education. This is probably a weak indication that adoption issues are more managerial rather than technical.

- ***Reasons for adoption and actual applications deployed***

If the reason for adopting IT is not for supporting the business but rather for the company's image, it is likely to fail (Chakravorti, 2004; DeLone, 1988; Raymond, 1985; Whittaker, 1999). Only four participants mentioned trends as one of their reasons to adopt IT and they were equally split between the success and failure. The difference was that R23 and R34 failed with adopted custom-made applications, while R12 and R32 adopted generic applications (COTS). With custom-made applications, once development failed (R34) or the application was not used (R23), failure was immediately obvious. With COTS applications such as office packages and internet access applications, failure or success were less obvious. As mentioned earlier, participants who used COTS applications tended to use them in quite fluid and flexible ways, and on an ad hoc basis. R12 and R32's managers immediately mentioned trends when asked

about their reasons to use computers. Later, R12's manager revealed that he purchased a PC with office software to be used for administrative tasks such as preparing tender documents, official company letters, and manual invoices. R32 had a similar IT investment to R12 but they acquired about 10 PCs.

The rest of the participants from both the failed and successful groups did not show any inconsistency between their reasons to adopt IT with the type of application adopted. However, similar cases to R12 and R32 might have occurred with participants who adopted COTS applications and used them on ad hoc basis.

It seemed from the result that the combination of good managerial skills, availability of resources, and external support might increase the chance of being successful in adopting IT. A good manager would be able to define the organisation's IT requirements and allocate resources (sourcing) and coordinate efforts to fulfil such requirements.

6.5. Revised model of IT adoption process within Indonesian SMEs

Gap analysis of the factors influencing IT adoption between the literature and the field study have provided a base to refine the initial model. First, the gap analysis confirmed that the factors influencing IT adoption originated from within and outside organisation. It also confirmed the existence of all the proposed factors (i.e. internal factors are manager, staff, and resources). However, the details of each component were different, as discussed in the previous section. The following figures summarise graphically what the Indonesian SMEs actually did in their IT adoption process. It shows where they got

the ideas, how they made the decision to adopt, how they deployed the technology, who was involved in the deployment, and how they used and evaluated the technology. The revised model in Figures 6.1 to 6.3 was derived from the initial model in Chapter 2 with government and competitors external factors omitted to reflect the absence of those factors in participants' experience.

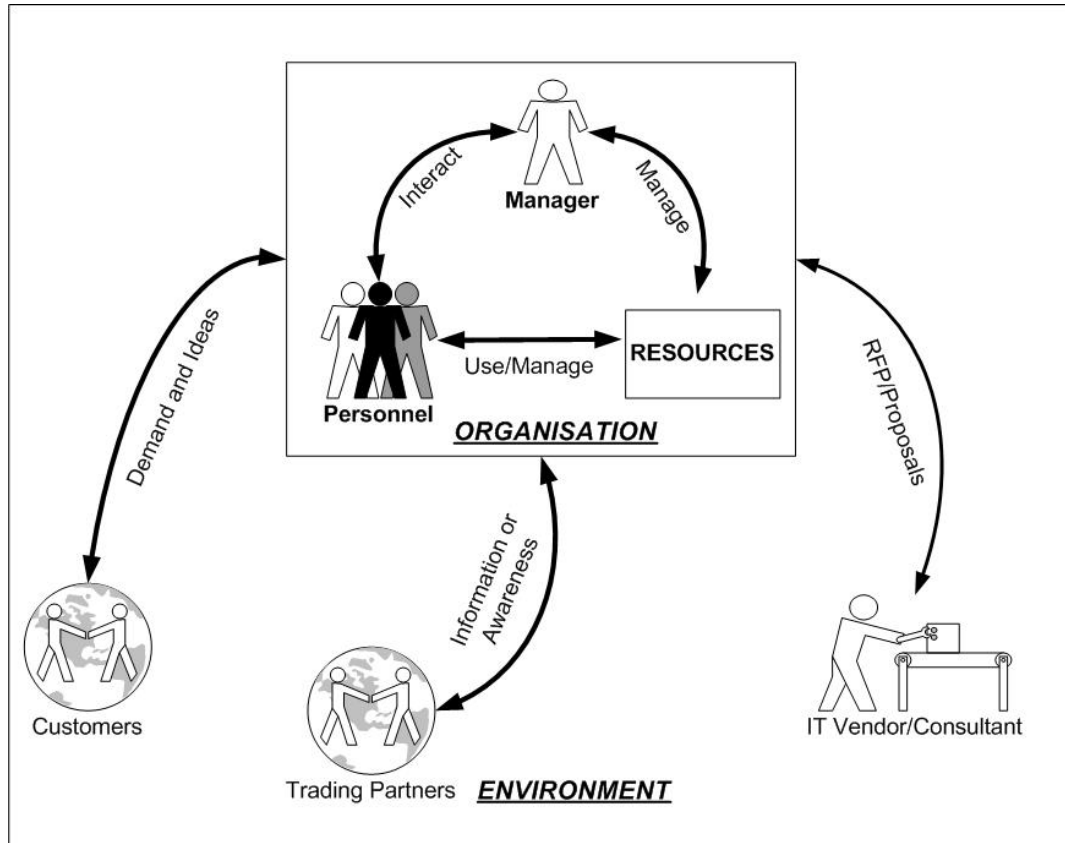


Figure 6.1. Indonesian SMEs' decision stage of IT adoption

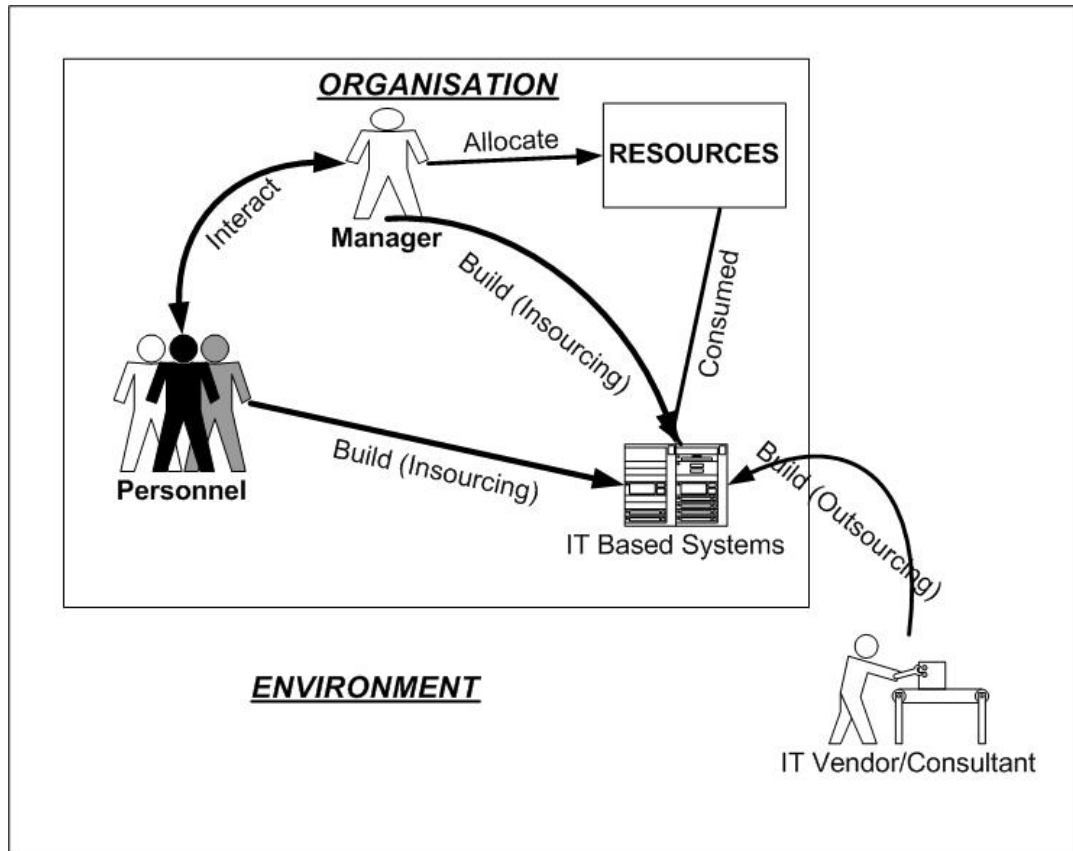


Figure 6.2. Indonesian SMEs' implementation stage of IT adoption

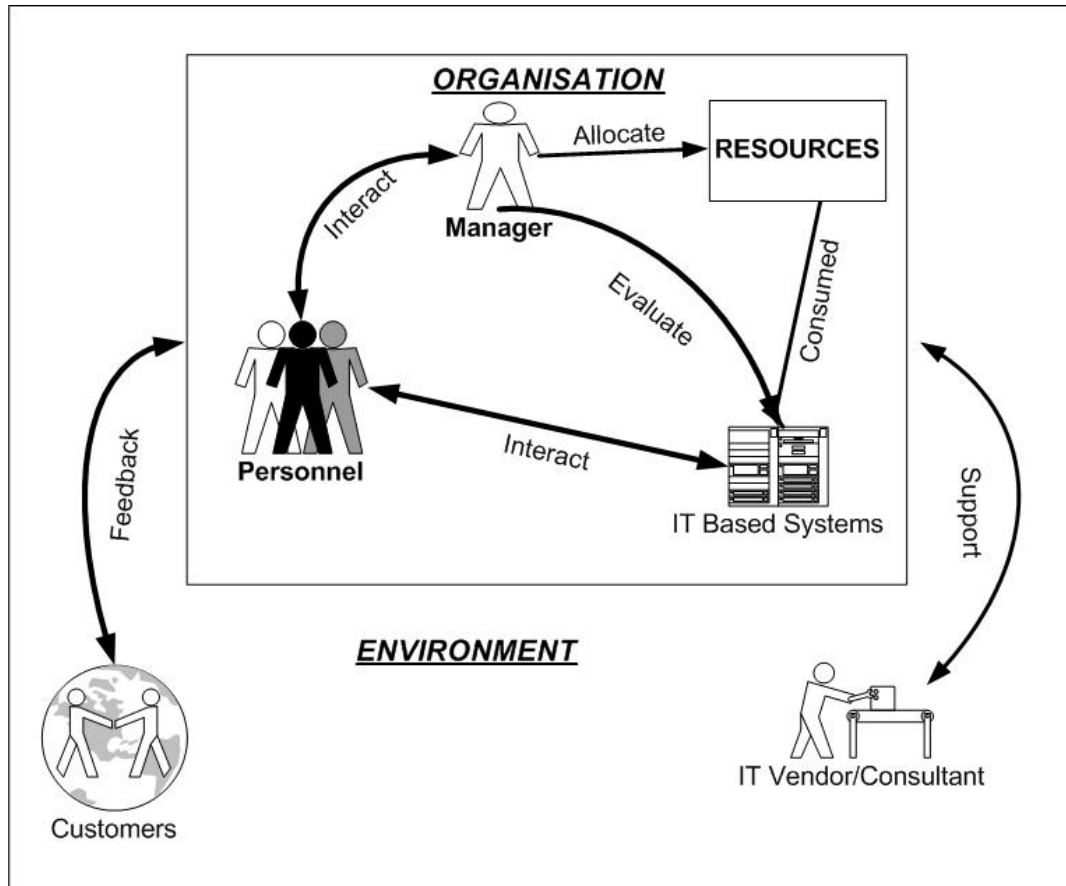


Figure 6.3. Indonesian SMEs' evaluation stage of IT adoption

It is apparent from Figures 6.1 to 6.3 that internally, Indonesian SMEs' IT adoption was influenced by elements that made up the organisation, which are individuals and organisational resources. With external elements, only those that have direct and tangible relationships with the organisation influenced IT adoption, namely customers, trading partners, and IT vendors or consultants. Government and competitors, on the other hand, did not seem to have any influences on the process. The process will be discussed in detail in the following sections.

6.5.1. Decision stage

In the decision stage, the idea of IT adoption was found to originate from the manager, staff initiatives, pressure from customers, and advice from trading partners. Within an

organisation, the idea developed and the subsequent decision was made as a result of interaction between manager and staff. The interaction often appears as a process of discussion to reach a decision on IT adoption, although the final decision was made by the manager as expressed by the following two participants:

“...so basically the decision was predominantly from us with some input from staff who wanted computers for their jobs”, R24

“We discussed and negotiated the requirements from each department and then I decided what to buy...”, R18

Customers, especially international customers, often imposed email as the preferred communication method. Since most of the participants were export-oriented companies, customers' wishes became their command. It is also noted that some of the participants initiated the Internet technology adoption into their organisation in order to gain international customers. Either way, electronic communication with international customers was often a deciding factor for participants to adopt IT in the first place.

As noted in Figures 6.1 to 6.3, government and competitors seemed to have no influence. In fact, government was not seen as an important factor in IT adoption. Most government initiatives were aimed mostly for SMEs in their early years of business, and included working capital, basic management training, and basic accounting training. Neither did competitors appear to be a significant consideration for IT adoption. In other words, participants adopted IT to cope with their own business rather than to stay competitive.

6.5.2. Implementation stage

In the implementation stage, participants had to put the IT to use. The activities involved in this stage were, among others: acquiring hardware and software, installation, customisation, and training. Software acquisition could be done through in-

house development or outsourcing. Only six participants developed their software in-house, and the rest of them outsourced their software.

“I developed the production integration application myself along with the rest of the IT staff....” R06.

Mostly, the outsourced-software was in the form of Commercial Off-The-Shelf products (COTS). ASP is not a viable options for Indonesian SMEs since most ASP are delivered through Internet or private network. Internet access is a problem in Indonesia as stated by some participants. Delivering and managing applications through the Internet would be costly for Indonesian SMEs.

In the implementation stage, IT vendors and consultant were introduced into the adoption process by SMEs to assist with the technical implementation. IT vendors and consultant could be classified as trading partners in the decision stage model. However, since they have a special interaction with the organisation, they have been represented as a separate party in Figures 6.2 and 6.3.

During the implementation, the role of IT vendors and consultants became more apparent as they were responsible for acquisition, installation, and training for the manager and staff to use the systems.

*“The application was made in three weeks and then the programmer was visiting us daily to resolve any issues that arose during the first week.”
R11*

6.5.3. Evaluation stage

In this stage, the manager would make an informal evaluation. There were no similarities found on the extent and depth of evaluation. Some participants were quite happy to see the application working; others were looking further to the next improvement, and there were also participants who failed in their implementation stage and tried to figure out what went wrong and how to deal with the failure. There were

two different reactions toward failure: one acknowledged the failure and tried to recover from it by using all the hardware and software investment for other functions; and the other was to let the systems alone and keep the maintenance for self-image reasons.

During this stage, the staff would also give feedback and reaction. In one extreme case, the staff of R05 did not like the attendance record and inventory systems built by the manager at all and went straight to the owner. The owner agreed and asked the manager to terminate the systems. The manager considered resigning.

In general, except for R05, the overall reaction from the participants after the implementation was positive; they were pleased with the result. Some of the participants felt that they had dedicated enough time and resources to adopting IT and would not engage in any IT investment for foreseeable future.

“I won’t invest in IT again, unless it is absolutely necessary.” R01

Other participants said that they were looking forward to developing new applications to support their business.

“We would like to improve our inventory management by moving it to computerised systems too” R17

And one participant, R32’s manager, was eager to learn of the current trends in IT and then try to implement it into his company.

“I have a habit of discussing the new IT trends with my suppliers at least once a year and see if I can use anything here.” R32

Evaluation of the IT adoption process is less visible in the failed participants group. They were probably wondering why they failed, however we did not find any indication of this in our interview. We did not specifically ask them if they did an evaluation. We did ask them why they failed and what they did to cope and recover, as discussed in Section 6.3.

6.6. Summary

In this chapter we have discussed the results from the data analysis from Chapter 5 and compared them to the existing literature discussed in Chapter 2. We have presented the actual factors influencing the IT adoption within Indonesian SMEs. We have also presented an analysis of the success and failure of the participants and how those who failed coped with the failure. Finally, we have presented the refinement of our initial IT adoption process model reflecting the differences we found. In the next chapter, we will present our conclusion and discuss future work.

Chapter 7 – Conclusions

In this thesis we investigated the IT adoption experiences of 35 Indonesian SMEs in the furniture and handicraft industry. We argued that adoption of IT can be better explained using an interactive process model rather than looking at factors influencing the adoption. Adoption of IT not only involves the acceptance of IT as a tool to support the business but also involves the actual implementation and usage of the IT components. In the first section of this chapter, we summarise the thesis. In the second section, our main findings and contributions are discussed. In the third section we discuss the limitations of our research. We finish the chapter by suggesting areas of further research.

7.1. Overview of the thesis

In Chapter 1, we reviewed the problems of IT adoption within Indonesian SMEs. We identified a few problems. First, most of the previous research in IT adoption has been conducted within the following contexts:

- SMEs in developed countries
- SMEs in less developed countries
- less-developed countries but not specific to SMEs
- developed countries but not specific to SMEs

There is only one study that specifically deals with Indonesian SMEs and it only looked at the diffusion of IT innovations (Utomo and Dodgson, (2001). Our personal observations and experiences prior to this study suggested that there is a need for a more thorough investigation. That was the motivation for this study. We used a qualitative

approach with semi-structured interviews as the data collection tool. The use of a qualitative approach was considered suitable for understanding a complex phenomenon such as IT adoption.

The literature review in Chapter 2 showed that understanding such complex phenomena required a more comprehensive view. It is not enough to understand the factors influencing IT adoption; we must also know how these factors interact. Furthermore, little was known about IT adoption within Indonesian SMEs. Utomo and Dodgson's (2001) approach tends to look from the diffusion perspective. They were looking at how IT as innovation was diffused to the general population (Indonesian SMEs) rather than how it was introduced, deployed, and used within an organisation.

Our literature review also identified Slappendel's (1996) framework as a tool to view IT adoption as an interactive process. This framework provides three different perspectives on IT adoption: individualist, structuralist, and interactive process. We argued that the interactive process perspective is more appropriate to understanding IT adoption phenomena. From the interactive process perspective, an organisation consists of manager, staff, and resources, and is situated within its environment. The organisation's components and environment, in all its activities, interact with each other. This is also true for IT adoption, where a new piece of technology is introduced that influences the interactions within the organisation and between the organisation and its environment. However, we also acknowledge that within the interactive process there are elements or individuals whose actions influence the adoption process. Research literature using individualist and structuralist perspectives has provided a theoretical foundation for us to recognise and define those elements. In this thesis, we called these elements "factors".

Based on the literature which has shown factors influencing IT adoption, SME elements, and the interactive process model, we developed an initial model of the IT adoption process. The model considered the SME as an organisation with manager, staff and resources, situated within its environment. The environment consists of government, suppliers, customers, and competitors, who interact or influence the SME in its business activities.

Chapters 3 and 4 were concerned with the research design and actual data collection and analysis. We described the underlying qualitative approach used and the design of the semi-structured interview based on the initial theoretical model in Chapter 2. We also described participant selection, the interview process, and our data management. In chapter 3, we articulated four major assumptions that we had held prior to undertaking this research. These assumptions will be revisited in this chapter when the findings of the research are summarised. At the end of Chapter 4 we described how the interview transcripts were analysed. Our research approach corresponds to Slappendel's suggestions for the preferred research method within the interactive process perspective (Slappendel, 1996).

In Chapter 5, we described the participants' accounts of their experience in adopting and deploying IT. We found that 10 participants faced failure at some stage of their IT deployment. We classified the participants' data accordingly. We divided participants into failed and successful groups. Within each group we classified the participants based on their development type (in-house, outsourcing custom made, and outsourcing COTS). We then analysed factors that might influence failure or success in deploying IT. We also identified factors that influenced participants in adopting IT. The failure cases which came up as a new theme, were analysed to see what was done by participants to cope with and recover from their failures.

In Chapter 6, the differences between previous study findings and our findings were discussed. We looked at the differences between factors influencing IT adoption from the literature compared to our findings, followed by a discussion of failure and recovery. We also discussed the factors causing failure and success in participants' IT deployment. Finally, we discussed the revised model of the IT adoption process based on our findings. In the next two sections we will discuss our findings and relate them to our research questions posed in chapter 1. RQ1, RQ2, RQ4, and RQ5 will be discussed in Section 7.2, RQ 3 will be discussed in Section 7.3, and RQ6 will be discussed in Section 7.3.5

7.2. Findings - Factors for IT adoption within Indonesian SMEs

Our findings have enabled us to answer the research questions formulated in Chapter 1. The following are the research questions immediately followed by the answers formulated as the result of this study.

RQ1: “What factors as identified in the literature influence the adoption process of IT within SMEs?”. The Table 2.2 in Chapter 2 shows all the factors compiled from the literature as factors influencing IT adoption within SMEs. We have answered the first research question with Table 2.2.

We found that some studies used the words “drivers” and “barriers” instead of “factors”. However, we found that drivers and barriers are actually similar. A factor could be a driver or a barrier depending on its interaction between the adopter and the factor. For example, government support as a factor could be a driver if the government support the IT adoption, but becomes a barrier if the government did not support the IT adoption.

RQ2: “What factors are actually considered in practice that influence the adoption process of IT within Indonesian SMEs?”. In our interviews with participants, they expressed various factors that they believed had influenced their IT adoption. The factors are summarised in Table 7.1.

| Internal Factors | External Factors |
|---|--|
| Manager Business process knowledge Decision making process Future IT plan IT adoption initiatives and ideas IT knowledge and experience Management’s reaction Support | Government Public infrastructure |
| Resources Financial resources availability | Customers Customer reaction IT adoption initiatives and ideas |
| Staff Knowledge and ability Availability IT adoption, initiatives and ideas IT experience Staff reaction | Competitors Industry trend for IT usage |
| | IT Vendors and Consultants Support IT adoption initiatives and ideas Trust |

Table 7.1. Factors influencing participants’ IT adoption

We also found that some of the findings contradicted our initial assumptions. The differences will be discussed in the answer to RQ4.

RQ4: “Are there any differences in factors influencing the IT adoption process within Indonesian SMEs compared to the factors reported in the literature?”. This question is answered as follows:

1. From the comparison between the results of the field study and the literature, it was found that there were some similarities and some differences. The Indonesian managers agreed on the importance of public infrastructure

availability, that pressure for adoption often came from customers, that external consultant and vendor support was important, and that success relied on staff readiness and IT experience (although in Indonesia this was almost always present). The managers have similar views as our assumption (A4 in page 68), that government should provide much-needed public infrastructure.

2. The most apparent differences among the external factors concerned the government and competitors. The participants' only concern with the Indonesian Government was the lack of public infrastructure provided; there was little hope of government subsidies or training, and government regulations had no impact. This result is different from what Utomo and Dodgson (2001) suggested: that infrastructure problems should be resolved by now. Utomo and Dodgson suggested the N21⁶ project would provide infrastructure to support the telecommunications needs of Indonesian SMEs. Our assumption (A4 page 68) is not supported by our findings. The Indonesian government could not provide sufficient support in terms of telecommunications infrastructure. N21 was never realised, while the sole telecommunication company, PT Telkom, monopolised the landline telephone network. PT Telkom is a privately owned company therefore the government could not force them. However, recently new wireless telephone services are rapidly rolled out by a few operators. These not only provided voice communication but also data communication. The Indonesian government is acting as a regulator, which is in line with Dutta and Evrard's (1999) findings, that government should be acting as a regulatory body and should not be involved with operations.

⁶ The N21 project was the equivalent of the Information Superhighway in the USA or the Multimedia Super Corridor in Malaysia, which were launched in 1995-1996. N21 was never realised, mainly due to the 1997 economic crisis.

3. While the pressure of competition seemed irrelevant to the IT adoption decision, managers did observe trends in IT use among their competitors. Our assumption (A3 page 68) is not supported by our findings. We conclude that the participants had used their production capacity fully and were still unable to fulfil the international need for furniture, let alone pay attention to or be influenced by competitors.
4. Among the internal factors, internal resources, especially financial resources, were not a problem. This is different from what the literature suggested (Fink, 1998; Ihlstrom et al., 2003). Probably with the price of IT products becoming cheaper the acquisition of IT products was no longer a financial burden. We found that our assumption (A2 page 68) was not supported by our findings. Computers are not luxury items anymore.
5. As for staff acceptance, it was found that this was almost guaranteed, probably due to the centralistic management style (Elliot, 1996). Staff readiness again was not a problem since most staff were university graduates and had experience in using basic IT applications. Yet when we looked more closely at some cases, there was evidence that the staff had rejected the manager's decision either openly or silently. In one SME, the staff rejected the manager's decision to adopt IT and went to the owner and asked him to override the manager's decision. In this case, our assumption (A1 page 67) is supported by our findings. The staff obeyed the highest authority in the organisation, which was coincidentally not the manager. In other SMEs, however, the staff (marketing and IT manager) accepted the web catalogue idea. It could be deduced (from our data analysis) that the staff at one company (R25) silently sabotaged the project by flooding the developer with more data than was actually needed. For R25 case, our A1 assumption is not supported.

6. Managers' general attitudes towards IT were similar in our study, since all were quite positive towards IT. In reality, their perceptions were more focussed on the benefits they could foresee from particular IT applications. The centralistic management style also proved favourable to IT adoption. There was no rejection from the staff once the manager decided, since they would be assigned to other functions if they rejected the IT adoption.

As noted, these conclusions differ somewhat from previous studies, including that of Utomo and Dodgson (2001), which was also conducted in Indonesia. It may be that our semi-structured interviews gave more scope for open-ended replies, and therefore allowed the participants to introduce factors different from those included in the mainly questionnaire-based models in the literature.

RQ5: "What are the factors that influence the success and failure of IT adoption within Indonesian SMEs?". Based on the comparison between those who failed and those who succeeded, the following factors are irrelevant to the success of IT adoption:

- Who developed the application (the developer)
- The type of application developed and deployed,
- The origin of the idea,
- The reasons for adoption
- Manager's educational background

We conclude that the combination of good managerial skills, availability of resources, and external support are likely to increase the chances of success. We will discuss these issues further in Section 7.4.

7.3. Findings – IT adoption process within Indonesian SMEs, failure and recovery

In the previous section, the factors influencing IT adoption within SMEs reflect a static view of how IT was adopted. It does not explain how those factors are involved in or influence IT adoption. RQ3 asked the question “What process is followed by Indonesian SMEs in their IT adoption?”. The answer is a refined model of the IT adoption process within Indonesian SMEs that is explained below.

7.3.1. Decision stage

In the decision stage, the idea of IT adoption was found to originate from the manager, staff initiatives, pressure from customers, or advice from trading partners. Figure 6.1 in chapter 6 shows the model of decision stage. Within the organisation, the idea arose and the subsequent decision was made as a result of interaction between manager and staff. The interaction often appears as a process of discussion to reach a decision on IT adoption, although the final decision was made by the manager.

Customers, especially international customers, often imposed email as the preferred communication method. Since most of the participants were export-oriented companies, the customers’ wish became their command. It is also noted that some of the participants initiated Internet technology adoption into their organisation in order to gain international customers.

Government was not seen as an important factor considered for IT adoption. Most government initiatives were aimed at SMEs in their early years of business and included working capital, basic management training, and basic accounting training. Neither did competitors appear to be a significant consideration for IT adoption.

7.3.2. Implementation stage

In the implementation stage (depicted in figure 6.2), participants had to put the IT to use. The activities involved in this stage, among others, were acquiring hardware and software, installation, customisation, and training. Software acquisition could be done through in-house development or outsourcing. Only six participants developed the software in-house, and the rest of them outsourced their software.

Mostly, the outsourced-software was in the form of Commercial Off-The-Shelf products (COTS). During the implementation stage, IT vendors and consultants were introduced into the adoption process by SMEs to assist with the technical implementation. IT vendors and consultants could be classified as trading partners in the decision stage model. However, since they have a special interaction with the organisation, they have been represented as a separate party in Figures 7.1 and 7.3.

During the implementation, the role of IT vendors and consultants became more apparent as they were responsible for acquisition, installation, and training for the manager and staff to use the systems.

7.3.3. Evaluation stage

In this stage, the manager may make an informal evaluation. The implementation stage is depicted in Figure 6.3. There were no similarities found on the extent and depth of evaluation. Some participants were quite happy to see that the application working, others were looking further to the next improvement, and there were also participants who failed in their implementation stage and tried to figure out what went wrong and how to deal with the failure. There were three different reactions toward failure:

- One group acknowledged their failure and stopped the development

- One group acknowledged their failure and tried to recover from it by using all the hardware and software investment for other functions;
- One manager left the system alone and maintained the system for self-image reasons.

During this stage, the staff may also give feedback and reaction. In one extreme case, the staff did not like the attendance record and inventory systems build by the manager and went straight to the owner. The owner agreed and asked the manager to terminate the systems. The manager considered resigning.

7.3.4. Findings – IS Failure and Recovery

We found that 10 of our participants had failed in some stage of their IT deployment. The analysis of those who failed has produced the answer to RQ6, “How do Indonesian SMEs cope with failure?”. The participants who failed showed three different responses: some retried the development process until they succeeded; others used the hardware and software for other purposes; and two totally abandoned the application.

SMEs who retried their development effort believed that using computers to support their business was vital. They just needed the right applications for their specific needs. Therefore, despite the failure they tried again. Even after two failures, one SME’s manager decided to learn how to develop an application on his business trip to USA. He eventually succeeded in building an inventory application.

Another company’s IT manager, who after the failure of his ERP implementation was left with unused computers and COTS applications, decided to build the application himself from scratch. The first priority was to support the manufacturing process. He built an application to record and manage raw material inventory, products in process, and finished products.

Another company previously had their accounting application developed by an overseas volunteer worker. The aging application was unable to cope with the company's growth. The manager decided to build a new one. They tried two developers but failed. Finally they found a developer who could build the application.

The second failed group did not want to retry developing their application for various reasons. These participants had invested some money on computers to run the application. After the failure they used the computers for other purposes within their company. One company used the computer for product design, while another used the computer for administrative work. One company showed no indication that they continued using computers and seemed reluctant to discuss it further.

Two companies decided to abandon the application and computers all together. One company's manager who was also the developer and sole user of the application was considering resigning. He felt that the owner did not support him as manager of the company. The other company's owner and manager, on the other hand, was reluctant to use computers or a web catalogue. He was unable to operate the applications even though the developer had purchased computers on his request and trained him. He did not seem to have a serious intention to manage the furniture business. He used the computers for his personal business, while still paying for the web catalogue maintenance.

One participant seems to have failed according to the concept of expectation failure (Lyytinen, 1988; Lyytinen & Hirschheim, 1987). However he can not be considered as a failure according to Sauer's concept of failure (Sauer, 1993). We noted in Chapter 2 that Sauer's model of IS failure is narrower than expectation failure. We believe that expectation failure is more appropriate to be used for judging whether an IS project has failed or succeeded. It is also in line with our definition of IT adoption,

where the IT should be used to support the business and not only for pride and self-image.

7.3.5. Discussion

Although this study was conducted in Indonesia, we believe some aspects of our findings can be applied to other contexts. Our initial model of the IT adoption process consists of factors derived from previous studies. We believe they could also be applied in other parts of the world. However, our findings show that local condition might make some factors inapplicable or irrelevant. For example, public infrastructure in the Indonesian case was problematic since the sole telecommunication provider has monopoly power. Competition might eliminate public infrastructure problems, as shown in European Union countries.

The staff–manager relationship in Indonesian SMEs is mostly characterised by the staff’s obedience. This might be true for Asian countries, but not necessarily for Western countries (Hofstede, 1997). Yet we found that staff sometime silently disobey their leader, and even on rare occasions openly disobey the manager.

Resources to support IT adoption was not a problem. Financial and human resources to acquire, deploy, and operate IT applications was not a problem. However, in less developed countries such as sub-Saharan Africa, those factors might be a problem due to lack of resources which might be worse than the situation in Indonesia.

We found that competition did not have any effect. We conclude that the participants were still unable to fulfil the international needs for furniture. Our focus was on competitors inside Indonesia, not international competitors. We did not count recent developments in the world furniture industries in which the People’s Republic of China and Vietnam have emerged as new sources for furniture.

7.4. Implications on theory

In our exploration of the IT adoption process within Indonesian SMEs, we have found many models in the research literature. In the field of SME management we have found different definitions of SMEs. Mostly, SMEs are defined by a combination of number of employees and total assets. However, the Indonesian government uses a combination of total assets and total annual sales to define SMEs. The use of number of employees as an SME criterion might be important if we used the individualist and structuralist perspectives (Slappendel, 1996). However, we used a combination of individualist, structuralist, and interactive process perspectives, so we believed that our Indonesian definition of SMEs may not cause a significant problem.

In terms of the definition of adoption, we found three different definitions. In this thesis we decided that the definition of Thong and Yap (1995) was the most appropriate. We argued that it is not enough to define the adoption of IT as accepting the idea of IT. IT applications need to be acquired, deployed, and used to be described as successful adoption.

In finding the most appropriate model of adoption of innovation, we found three different theoretical perspectives. The individualist perspective consists of theories that examine factors at the level of adoption of innovation by the individual, such as perceptions of the individual and the individual's capability. The structuralist perspective consists of theories that examine the adoption of innovation at the group level, such as the size and structure of the organisation. The interactive process perspective consists of theories that examine the adoption of innovation as interactions between individuals within the organisation, between the individual and the organisation, and between the organisation and its environment.

We used a combination of those three perspectives. Individualist and structuralist perspectives have been used to study IT adoption within SMEs. Those studies developed factors influencing IT adoption at the individual and organisational levels. We needed to recognise those factors before we could explore and examine how they interact in the IT adoption process (interactive process). We used the combination to propose the initial model in Chapter 2 and then to refine the model in Chapter 6.

Literature revealed that TAM was able to explain about 40% of IT acceptance in Japan (Legris, Ingham & Collette, 2003). Statistically speaking, it means that variables tested using TAM questionnaires are influencing Japan's acceptance by 40%; the other 60% is influenced by other variables that are not observed (Gujarati, 2003; Hill, Griffiths & Judge, 2001). TAM was formulated in western countries, therefore there are some variables that might not influence technological acceptance in non-western countries. There is also a possibility that most of the theoretical basis for adoption of innovation formulated in a western country's context might not work equally as well in its entirety within a non-western country's context.

We have also examined the success and failure of IT adoption. Most previous studies of IT adoption did not specifically discuss success and failure. We found that only ANT (Callon, 1999; Latour, 1987; Law, 1999) actually dealt with the idea of adoption of innovation with the results being either a success or a failure. We did not use ANT; however, the notions of success and failure have guided us to explore the concepts further.

In examining success and failure, we studied two different concepts of failure: expectation failure (Lyytinen, 1988; Lyytinen & Hirschheim, 1987); and Sauer's model (Sauer, 1993). Using Sauer's model we found one participant did not fail in that the IS still exists for self-image purposes. In line with our definition of IT adoption, using IS

for self image purposes is not an appropriate use. Therefore, we concluded that expectation failure is conceptually more meaningful in the study of IT adoption.

7.5. Implications for practice

We have presented our findings based on the analysis of collected data. We have refined the model and confirmed the factors that influence the IT adoption process within Indonesian SMEs. We believe that this model will assist Indonesian SMEs in their IT adoption. First, SME' managers could use the model to inform them of the factors they need to consider in relation to the kinds of IT application they want to acquire and deploy. For example, if the SME would like to deploy a web catalogue system, they should evaluate their own organisation for issues like:

- A web catalogue will expose them to the international market. They must ask themselves if they are ready for increases in production volume and product variations, complying to the international standards, and so on.
- International customers mostly communicate in English. Do they have resources to communicate in English? Although Indonesian students have learnt English since year 7 or earlier, it does not guarantee English language proficiency.
- Could they sustain and support the web catalogue, not only financially but also its content (i.e. updating the web catalogue content regularly, answering customers' inquiries immediately)? Maintaining the web catalogue is probably the most mundane work that was not anticipated by most Indonesian SMEs., not to mention the related technical difficulties.
- Is there any technical support available either from within the organisation (i.e. staff) or externally (vendors)?

The following factors should be carefully considered by Indonesian SMEs, if they want to minimise the risk of failure in their IT adoption:

- They must understand the systems and business requirements before developing any applications. In our findings, the developer's inability to understand the requirements has contributed to failure. It does not matter if the developers are internal staff or external experts.
- The SME should prepare to implement the application. This preparation covers areas such as financial support, staff readiness and infrastructure availability.
- Staff involvement is important in relation to understanding the business and systems requirements and also in preparing for the new system. After all, the staff are usually the ones who have to deal with the system on a daily basis. This corresponds closely with the conventional wisdom of 'user involvement' in a software development project being an essential contributor to successful software products.

7.6. Limitations and Future Work

7.6.1. Limitations

This research involves Indonesian SMEs, and therefore it may not apply to SMEs in other countries. As in the previous discussion, we should further investigate to find any factors that are unique to the Indonesian context. This would be reflected in the IT adoption process model formulated. Therefore it may be inappropriate for SMEs in other countries to use this model in its entirety to examine their IT adoption.

The next limitation is the research approach and tools used in this study. The qualitative approach has been shown to be able to explore a phenomenon with all its

complexity. However, the results of the study cannot be generalised and made applicable in other contexts. The result is unique to the context of the 35 participants involved with this study. Having said that, the analysis of factors influencing IT adoption within SMEs have shown similarity with and confirm previous studies.

Another limitation of our approach is the use of semi-structured interview. All the data were derived from participants' accounts of their experiences. Their descriptions are subjective, based on what they perceived as compared to what actually happened. Interviews should be treated as perceptions rather than facts (Leedy & Ormrod, 2005). Despite this limitation, the results are considered valid because we have designed the semi-structured interview to include confirmatory questions and during the interview we sought confirmation on conflicting facts. The second reason in support of our approach is that a person's perceptions will influence the person's actions, as suggested by TAM, TRA, and TPB (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1975). We believe that even though participants' views expressed during the interviews were their perceptions, they would act on them. The data were collected from different participants and analysis showed some similarities among participants. We also explored participants' experiences independently without any suggestions from the interviewer.

Lastly, there might be issues with the research was conducted with Indonesian participants, while this thesis was written in English. The main researcher is Indonesian and therefore speaks Indonesian language natively. We also intentionally did not translate original data (interview transcripts) into English to avoid losing contextual meaning. We also have checked with the participants to confirm our result.

We have identified factors that actually influence IT adoption within Indonesian SMEs. However, with only 35 participants, our study could not be considered as truly

representative of all Indonesian SMEs. Furthermore, the targeted furniture and handicraft industry may pose some unique problems that may not be found in other industries.

7.6.2. Future work

Our study of IT adoption within Indonesian SMEs has provided some basis for further studies. We have identified a model of the IT adoption process within Indonesian SMEs. Exploration of IT adoption as a process has enabled us to see IT adoption and the factors that might influence IT adoption. The model could be tested in other industries or other countries to see if it is appropriate to be applied in different contexts. Since we only interviewed managers, we are also interested in obtaining data from other participants within our models, such as employees, government officials, and vendors and consultants.

We have identified successes and failures in IT adoption within Indonesian SMEs. We have discovered how Indonesian SMEs cope with and recover from failure. Unfortunately, the view of success and failure only came from the manager which may not reflect the actual conditions. We are interested in obtaining other stakeholders' viewpoints regarding success or failure.

In general, our qualitative approach has provided an in-depth look into IT adoption within Indonesian SMEs. However, we believe that more studies need to be carried out to gain a substantial and more complete picture of IT adoption within Indonesian SMEs. The studies need to explore other stakeholders of Indonesian SMEs and not only the managers.

Future study could involve more participants to give a more complete picture of IT adoption phenomena within Indonesian SMEs. Such a study could be cross-sectional, involving SMEs from different industries, or longitudinal, involving SMEs in the

furniture and handicraft industry, possibly from other regions. A really ambitious project would involve a longitudinal study of SMEs across different industries such as hospitality, steel industries, ceramics and pottery, etc. The use of a quantitative approach can give broader and more generalisable results now that the IT adoption process has been explored with all its complexity.

We are also interested in examining how the newly emerging countries in the furniture industry such as the People's Republic of China and Vietnam influence the adoption of IT in Indonesia. This influence might not be directly apparent. We speculate that Indonesian SMEs might look more seriously into exploiting their IT investment in the future.

In this study, we have shown how a complex phenomenon such as Indonesian SMEs IT adoption can be explored using a qualitative approach. Using a qualitative approach could not be claimed to represent the general population, it can provide a more in-depth understanding. Exploring IT adoption by taking into account the interactive process has enabled us to reveal how Indonesian SMEs deal with adopting IT. The qualitative approach using semi-structured interviews has enabled us to reveal not only problems associated with IT adoption for Indonesian SMEs but also how they cope with and recover from failure.

Bibliography

- Adams, D.A., Nelson, R.R. & Todd, P.A. 1992, "Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication", *MIS Quarterly*, vol. 16, no. 2, pp. 227-247.
- Aiken, M., Bacharach, S.B. & French, J.L. 1980, "Organizational Structure, Work Process, and Proposal Making in Administrative Bureaucracies", *Academy of Management Journal*, vol. 23, no. 4, pp. 631-652.
- Ajzen, I. 1988, *Attitudes, Personality, and Behavior*, Open University Press, Milton-Keynes.
- Ajzen, I. 1991, "The Theory of Planned Behavior", *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179-211.
- Akkeren, J.V. & Harker, D. 2002, "Mobile Data Technologies and Small Business Adoption and Diffusion: An Empirical Study of Barriers and Facilitators", in B. Mennecke & T. Strader (eds), *Mobile Commerce: Technology, Theory, and Applications*, IDEA Group Publishing, Hershey, pp. 218-244.
- Al-Gahtani, S.S. 2003, "Computer Technology Adoption in Saudi Arabia: Correlates of Perceived Innovation Attributes", *Information Technology for Development*, vol. 10, no. 1, pp. 57-69.
- Al-Gahtani, S.S. 2004, "Computer Technology Acceptance Success Factors in Saudi Arabia: An Exploratory Study", *Journal of Global Information Technology Management*, vol. 7, no. 1, pp. 5-29.
- Anandarajan, M., Igbaria, M. & Anakwe, U.P. 2002, "IT Acceptance in a Less-developed Country: a Motivational Factor Perspective", *International Journal of Information Management*, vol. 22, no. 1, pp. 47-65.
- Andrews, M.R. & Papp, R. 2000, "The Application of IT for Competitive Advantage at Keane, Inc." in M. Khosrowpour (ed.), *Organizational Achievement and Failure in Information Technology Management*, IDEA Group Publishing, Hershey, pp. 214-232.
- Angeles, R., Corritore, C.L., Basu, S.C. & Nath, R. 2001, "Success Factors for Domestic and International Electronic Data Interchange (EDI) Implementation for US Firms", *International Journal of Information Management*, vol. 21, no. 5, pp. 329-347.
- Aragon-Sanchez, A. & Sanchez-Marin, G. 2005, "Strategic Orientation, Management Characteristics, and Performance: A Study of Spanish SMEs", *Journal of Small Business Management*, vol. 43, no. 3, pp. 287-308.
- Attewell, P. 1992, "Technology Diffusion and Organizational Learning: The Case of Business Computing", *Organization Science*, vol. 3, no. 1, pp. 1-19.

- Avison, D. & Myers, M. 2005, "Qualitative Research", in D. Avison & J. Pries-Heje (eds), *Research in Information Systems: A Handbook for Research Supervisors and Their Students*, Elsevier, Amsterdam, pp. 239-253.
- Avison, D.E. & Fitzgerald, G. 2002, *Information Systems Development: Methodologies, Techniques and Tools*, 3rd edn, McGraw-Hill, London.
- Bagchi, K., Hart, P. & Peterson, M.F. 2004, "National Culture and Information Technology Adoption", *Journal of Global Information Technology Management*, vol. 7, no. 4, pp. 29-46.
- Bajaj, A. 2000, "A Study of Senior Information Systems Manager's Decision Models in Adopting New Computing Architectures", *Journal of The Association for Information Systems*, vol. 1, no. 4, pp. 1-56.
- Bardini, T. 1997, "Journal of Computer-Mediated Communication", *Bridging the Gulfs: From Hypertext to Cyberspace*, viewed 12 June 2004
<<http://www.ascusc.org/jcmc/vol3/issue2/bardini.html>>.
- Basu, S. 1996, *The Conceptual Difference Between Incomplete Information and Asymmetric Information: A Study of Business Behaviour in The Presence of Uncertainty*, Macquarie University, Sydney.
- Bazerman, M.H. 2002, *Judgment in Managerial Decision Making*, 5th edn, John Wiley & Sons, New York.
- Beal, T. 2000, "SMEs and the World Wide Web: Opportunities and Prospects", in M.A. Abdullah & M.I.B. Bakar (eds), *Small and Medium Enterprises in Asia Pacific Countries*, Nova Science Publishers Inc, Huntington, pp. 123-137.
- Benham, H.C. & Raymond, B.C. 1996, "Information Technology Adoption: Evidence from a Voice Mail Introduction", *Computer Personnel*, vol. 17, no. 1, pp. 3-25.
- Berry, A., Rodriguez, E. & Sandee, H. 2001, "Small and Medium Enterprises Dynamics in Indonesia", *Bulletin of Indonesian Economic Studies*, vol. 37, no. 3, pp. 363-384.
- Beynon-Davies, P. 1999, "Human Error and Information Systems Failure: The Case of The London Ambulance Service Computer-aided Despatch System Project", *Interacting with Computers*, vol. 11, no. 6, pp. 699-720.
- Boar, B.H. 1997, *Strategic Thinking for Information Technology*, John Wiley & Sons, New York.
- Bøving, K.B. & Bøker, K. 2003, "Where is The Innovation?" *Proceedings of The Diffusion and Adoption of Networked Information Technologies*, eds J. Damsgaard & H.Z. Henriksen, Kluwer Academic Publishers, Copenhagen, pp. 39-52.
- Boyatzis, R.E. 1998, *Transforming Qualitative Information: Thematic Analysis and Code Development*, Sage Publications, Thousand Oaks.

- Brabander, S. & Thiers, G. 1984, "Successful Information Systems Development in Relation to Situational Factors which Affect Effective Communication Between MIS-Users and EDP-Specialists", *Management Science*, vol. 30, no. 2, pp. 137-155.
- Bridge, J. & Peel, M.J. 1999, "Research Note: A Study of Computer Usage and Strategic Planning in the SME Sector", *International Small Business Journal*, vol. 17, no. 4, pp. 82-87.
- Broadbent, M., Weill, P. & Clair, D.S. 1999, "The Implications of Information Technology Infrastructure for Business Process Redesign", *MIS Quarterly*, vol. 23, no. 2, pp. 159-182.
- Brown, L.A. 1981, *Innovation Diffusion: A New Perspective*, Methuen, London.
- Caldeira, M.M. & Ward, J.M. 2002, "Understanding The Successful Adoption and Use of IS/IT in SMEs: An Explanation from Portuguese Manufacturing Industries", *Information System Journal*, vol. 12, no. 2, pp. 121-152.
- Callon, M. 1986, "Some Elements of Sociology of Translation: Domestication of The Scallops and The Fishermen of St Brieue Bay", in J. Law (ed.), *Power, Action, Belief: A New Sociology of Knowledge*, Routledge & Kegan Paul, London, pp. 196-233.
- Callon, M. 1999, "Actor-network Theory - the Market Test", in J. Law & J. Hassard (eds), *Actor Network Theory and After*, Blackwell Publishers, Oxford, pp. 181-195.
- Chakravorti, B. 2004, "The Role of Adoption Networks in The Success of Innovations: A Strategic Perspective", *Technology in Society*, vol. 26, no. 2-3, pp. 469-482.
- Chau, P.Y.K. 1995, "Factors Used in the Selection of Packaged Software in Small Businesses: Views of Owners and Managers", *Information & Management*, vol. 29, no. 2, pp. 71-78.
- Chau, P.Y.K. 2001, "Inhibitors to EDI Adoption in Small Businesses: An Empirical Investigation", *Journal of Electronic Commerce Research*, vol. 2, no. 2, pp. 78-88.
- Chau, S.B. & Turner, P. 2002, "An Exploration of Factors that Influence the Ability of Small and Medium Sized Enterprises to Engage in Electronic Commerce: Preliminary Findings from 34 Australian Case Studies", *Proceedings of The 13th Australasian Conference on Information Systems*, Melbourne, pp. 209-217.
- Chen, L.-D. & Tan, J. 2004, "Technology Adaptation in E-Commerce: Key Determinants of Virtual Stores Acceptance", *European Management Journal*, vol. 22, no. 1, pp. 74-86.
- Chen, M. 2003, "Factors Affecting The Adoption and Diffusion of XML and Web Services Standards for E-Business Systems", *International Journal of Human-Computer Studies*, vol. 58, no. 3, pp. 259-279.

- Chen, Y.-S., Chong, P.P. & Chen, J.C.-H. 2000, "Small Business Management: An IT-Based Approach", *Journal of Computer Information Systems*, vol. 41, no. 2, pp. 40-47.
- Chesher, M. & Skok, W. 2000, "Roadmap for Successful Information Technology Transfer for Small Businesses", *Proceedings of the 2000 ACM SIGCPR Conference on Computer Personnel Research*, Chicago, pp. 16-22.
- Chin, W.W. & Marcolin, B.L. 2001, "The Future of Diffusion Research", *The Data Base for Advances in Information Systems*, vol. 32, no. 3, pp. 7-12.
- Ciborra, C.U. & Hanseth, O. 1998a, "From Tool to Gestell Agendas for Managing The Information Infrastructure", *Information Technology and People*, vol. 11, no. 4, pp. 305-327.
- Ciborra, C.U. & Hanseth, O. 1998b, "Toward A Contingency View of Infrastructure and Knowledge: An Exploratory Study", *Proceedings of The 19th International Conference on Information Systems*, Helsinki, Finland, pp. 263-272.
- Ciborra, C.U. & Patriotta, G. 1998, "Groupware and Teamwork in R&D: Limits to Learning and Innovation", *R&D Management*, vol. 28, no. 1, pp. 43-52.
- Clapham, R. 1985, *Small and Medium Entrepreneurs in Southeast Asia*, Institute of Southeast Asian Studies, Singapore.
- Cooper, D.R. & Schindler, P.S. 1998, *Business Research Methods*, 6th edn, Irwin/McGraw-Hill, Boston.
- Cragg, P. 2002, "Benchmarking Information Technology Practice in Small Firms", *European Journal of Information Systems*, vol. 11, no. 4, pp. 267-282.
- Cragg, P., King, M. & Hussin, H. 2002, "IT Alignment and Firm Performance in Small Manufacturing Firms", *The Journal of Strategic Information Systems*, vol. 11, no. 2, pp. 109-132.
- Cragg, P.B. & King, M. 1993, "Small-firm Computing: Motivators and Inhibitors", *MIS Quarterly*, vol. 17, no. 1, pp. 47-59.
- Crano, W.D. & Brewer, M.B. 2002, *Principles and Methods of Social Research*, 2nd edn, Lawrence Erlbaum Associates, Mahwah.
- Creswell, J.W. 2003, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 2nd edn, Sage Publications, Thousand Oaks.
- Crotty, M. 1998, *The Foundations of Social Research: Meaning and Perspective in The Research Process*, Allen & Unwin, St Leonards.
- Damanpour, F. 1987, "The Adoption of Technological, Administrative, and Ancillary Innovations: Impact of Organizational Factors", *Journal of Management*, vol. 13, no. 4, pp. 675-688.

- Damanpour, F. & Evan, W.M. 1984, "Organizational Innovation and Performance: The Problem of "Organizational Lag"", *Administrative Science Quarterly*, vol. 29, no. 3, pp. 392-409.
- Damian, D.E. & Zowghi, D. 2002, "The Impact of Stakeholders' Geographical Distribution on Managing Requirements in A Multi-Site Organisation", *Proceedings IEEE 11th Joint International Conference on Requirements Engineering*, Essen, Germany, pp. 319-328.
- Davis, F.D. 1989, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology", *MIS Quarterly*, vol. 13, no. 3, pp. 319 - 340.
- Davis, F.D. 1993, "User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioral Impacts", *International Journal Man-Machine Studies*, vol. 38, no. 3, pp. 475-487.
- Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. 1989, "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models", *Management Science*, vol. 35, no. 8, pp. 982-1003.
- Davis, F.D. & Venkatesh, V. 1996, "A Critical Assessment of Potential Measurement Biases in The Technology Acceptance Model: Three Experiments", *International Journal Human-Computer Studies*, vol. 45, no. 1, pp. 19-45.
- Delone, W. & McLean, E. 1992, "Information Systems Success: The Quest for The Dependent Variable", *Information Systems Research*, vol. 3, no. 1, pp. 60-95.
- DeLone, W.H. 1988, "Determinants of Success for Computer Usage in Small Business", *MIS Quarterly*, vol. 12, no. 1, pp. 50-61.
- Diermen, P.V. 1997, *Small Business in Indonesia*, Avebury, Aldershot, Hants, England; Brookfield, Vt.
- Drew, S. 2003, "Strategic Uses of E-Commerce by SMEs in The East of England", *European Management Journal*, vol. 21, no. 1, pp. 79-88.
- Duncan, R.B. 1972, "Characteristics of Organizational Environments and Perceived Environmental Uncertainty", *Administrative Science Quarterly*, vol. 17, no. 3, pp. 313-327.
- Dutta, S. & Evrard, P. 1999, "Information Technology and Organisation within European Small Enterprises", *European Management Journal*, vol. 17, no. 3, pp. 239-251.
- Duxbury, L., Decady, Y. & Tse, A. 2002, "Adoption and Use of Computer Technology in Canadian Small Businesses: A Comparative Study", in S. Burgess (ed.), *Managing Information Technology in Small Business: Challenges and Solutions*, IDEA Group Publishing, Hershey, pp. 19-47.
- Elliot, S.R. 1996, "Adoption and Implementation of IT: An Evaluation of the Applicability of Western Strategic Models to Chinese Firms", in K. Kautz & J. Pries-Heje (eds), *Diffusion and Adoption of Information Technology*, Chapman & Hall, London, pp. 3-31.

- Elsammani, Z.A., Hackney, R. & Scown, P. 2003, "SMEs Adoption and Implementation Process of Websites in The Presence of Change Agents", in A.-Q. Nabeel A.Y (ed.), *Electronic Commerce in Small to Medium-sized Enterprises: Frameworks, Issues, and Implications*, IDEA Group Publishing, Hershey, pp. 146-163.
- Eppen, G.D., Gould, F.J., Schmidt, C.P., Moore, J.H. & Weatherford, L.R. 1998, *Introductory Management Science: Decision Modeling with Spreadsheets*, 5th edn, Prentice Hall, Upper Saddle River.
- Evan, W.M. & Black, G. 1967, "Innovation in Business Organizations: Some Factors Associated with Success or Failure of Staff Proposals", *Journal of Business*, vol. 40, no. 4, pp. 519-530.
- Everdingen, Y.V. & Wierenga, B. 2002, "Intra-firm Adoption Decisions: Role of Inter-firm and Intra-firm Variables", *European Management Journal*, vol. 20, no. 6, pp. 649-663.
- Ewusi-Mensah, K. 1997, "Critical Issues in Abandoned Information Systems Development Projects", *Communications of the ACM*, vol. 40, no. 9, pp. 74-80.
- Ewusi-Mensah, K. & Przasnyski, Z.H. 1994, "Factors Contributing to The Abandonment of Information Systems Development Projects", *Journal of Information Technology*, vol. 9, no. 3, pp. 185-201.
- Ewusi-Mensah, K. & Przasnyski, Z.H. 1995, "Learning from Abandoned Information Systems Development Projects", *Journal of Information Technology*, vol. 10, no. 1, pp. 3-14.
- Feltham, T.S., Feltham, G. & Barnett, J.J. 2005, "The Dependence of Family Businesses on a Single Decision Maker", *Journal of Small Business Management*, vol. 43, no. 1, pp. 1-15.
- Fichman, R.G. & Kemerer, C.F. 1993, "Adoption of Software Engineering Process Innovations: The Case of Object Orientation", *Sloan Management Review*, vol. 32, no. 4, pp. 7-22.
- Fink, D. 1998, "Guidelines for The Successful Adoption of Information Technology in Small and Medium Enterprises", *International Journal of Information Management*, vol. 18, no. 4, pp. 243-253.
- Fishbein, M. & Ajzen, I. 1975, *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Addison-Wesley, Reading, MA.
- Flett, R., Alpass, F., Humphries, S., Massey, C., Morriss, S. & Long, N. 2004, "The Technology Acceptance Model and Use of Technology in New Zealand Dairy Farming", *Agricultural Systems*, vol. 80, no. 2, pp. 199-211.
- Foong, S.-Y. 1999, "Effect of End-User Personal and Systems Attribute on Computer-Based Information System Success in Malaysian SMEs", *Journal of Small Business Management*, vol. 37, no. 3, pp. 81-87.

- Gagnon, Y.-C., Sicotte, H. & Posada, E. 2000, "Impact of SME Manager's Behavior on The Adoption of Technology", *Entrepreneurship: Theory & Practice*, vol. 25, no. 2, pp. 43-57.
- Gefen, D., Rose, G.M., Warkentin, M. & Pavlou, P.A. 2005, "Cultural Diversity and Trust in IT Adoption: A Comparison of Potential e-Voters in The USA and South Africa", *Journal of Global Information Technology Management*, vol. 13, no. 1, pp. 54-78.
- Gibbs, G.R. 2002, *Qualitative Data Analysis: Explorations with NVivo*, Open University Press, Buckingham.
- Gillham, B. 2000a, *Case Study Research Methods*, Continuum, London.
- Gillham, B. 2000b, *The Research Interview*, Continuum, London.
- Grandon, E.E. & Peter P. Mykytyn, J. 2004, "Theory-Based Instrumentation to Measure The Intention to Use Electronic Commerce in Small and Medium Sized Businesses", *The Journal of Computer Information Systems*, vol. 44, no. 3, pp. 44-57.
- Guinea, A.O.D., Kelley, H. & Hunter, M.G. 2005, "Information Systems Effectiveness in Small Businesses: Extending A Singaporean Model in Canada", *Journal of Global Information Management*, vol. 13, no. 3, pp. 55-79.
- Gujarati, D.N. 2003, *Basic Econometrics*, 4th edn, McGraw-Hill, Boston.
- Gutter, M.S. & Saleem, T. 2005, "Financial Vulnerability of Small Business Owner", *Financial Services Review*, vol. 14, no. 2, pp. 133-147.
- Hambali, S.J. 1990, "An Investigation Into Failing Small Businesses in Bandung, West Java Province, Indonesia", Thesis M. Com.(Hons) thesis, University of Wollongong, Wollongong.
- Hanseth, O., Ciborra, C.U. & Braa, K. 2001, "The Control Devolution: ERP and The Side Effects of Globalization", *Database for Advances in Information Systems*, vol. 32, no. 4, pp. 34-46.
- Hart, C. 1998, *Doing A Literature Review: Releasing The Social Science Research Imagination*, Sage Publications, London.
- Henderson, R. & Divett, M.J. 2003, "Perceived Usefulness, Ease of Use, and Electronic Supermarket Use", *International Journal Human-Computer Studies*, vol. 59, no. 3, pp. 383-395.
- Hill, H. 1995, "Small-medium Enterprise and Rapid Industrialisation: The ASEAN Experience", *Journal of Asian Business*, vol. 11, no. 2, pp. 1-31.
- Hill, H. 2001, "Small and Medium Enterprises in Indonesia: Old Policy Challenges for A New Administration", *Asian Survey*, vol. 41, no. 2, pp. 248-270.
- Hill, R.C., Griffiths, W.E. & Judge, g.E. 2001, *Undergraduate Econometrics*, 2nd edn, John Wiley & Sons, New York.

- Hofstede, G. 1997, *Cultures and Organizations: Software of the Mind*, McGraw-Hill, New York.
- Hollander, A.S., Cherrington, J.O. & Denna, E.L. 2000, *Accounting, Information Technology, and Business Solutions*, 2nd edn, Irwin/McGraw-Hill, Boston.
- Hung, S.-Y., Ku, C.-K. & Chang, C.-M. 2003, "Critical Factors of WAP Services Adoption: An Empirical Study", *Electronic Commerce Research and Application*, vol. 2, no. 1, pp. 42-60.
- Hunter, M.G. 2004, "Information Systems & Small Business: Research Issues", *Journal of Global Information Management*, vol. 12, no. 4, pp. I-V.
- Hwang, H.-G., Ku, C.-Y., Yen, D.C. & Cheng, C.-C. 2004, "Critical Factors Influencing The Adoption of Data Warehouse Technology: A Study of The Banking Industry in Taiwan", *Decision Support Systems*, vol. 37, no. 1, pp. 1-21.
- Iacovou, C.L., Benbasat, I. & Dexter, A.S. 1995, "Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology", *MIS Quarterly*, vol. 19, no. 4, pp. 465-485.
- IFG 2002, *SME Definition*, International Finance Group - The World Bank Group, viewed 12 September 2002
<http://www.ifc.org/sme/html/sme_definitions.html>.
- Ihlstrom, C., Magnusson, M., Scupola, A. & KristiinaTuunainen, V. 2003, "SME Barriers to Electronic Commerce Adoption: Nothing Changes - Everything is New", in G. Gingrich (ed.), *Managing IT in Government, Business & Communities*, IDEA Group Publishing, Hershey, pp. 147-163.
- Indonesia 1995, *Undang-Undang Republik Indonesia Tentang Usaha Kecil*.
- Irani, Z., Sharif, A. & Love, P. 2001, "Transforming Failure into Success through Organisational Learning: An Analysis of a Manufacturing Information System", *European Journal of Information Systems*, vol. 10, no. 1, pp. 55-66.
- Ives, B., Olson, M. & Baroudi, J. 1983, "The Measurement of User Information Satisfaction", *Communications of the ACM*, vol. 26, no. 10, p. 785-793.
- Jaakkola, H. 1996, "Comparison and Analysis of Diffusion Models", in K. Kautz & J. Pries-Heje (eds), *Diffusion and Adoption of Information Technology*, Chapman & Hall, New York, pp. 65-82.
- Jiang, J.J., Klein, G., Balloun, J.L. & Crampton, S.M. 1999, "Systems Analysts' Orientations and Perceptions of System Failure", *Information and Software Technology*, vol. 41, no. 2, pp. 101-106.
- Jimenez-Martinez, J. & Polo-Redondo, Y. 2004, "The Influence of EDI Adoption Over Its Perceived Benefits", *Technovation*, vol. 24, no. 1, pp. 73-79.
- Karahanna, E. & Straub, D.W. 1999, "The Psychological Origins of Perceived Usefulness and Ease-of-use", *Information & Management*, vol. 35, no. 4, pp. 237-250.

- Kautz, K. 2004, "The Enactment of Methodology: The Case of Developing a Multimedia Information Systems", *Proceedings The 25th International Conference on Information Systems*.
- Kautz, K. 2005, "Definition of Adoption", personal communication, 31 March 2005, Sydney.
- Kautz, K. & Nielsen, P.A. 2004, "Understanding The Implementation of Software Process Improvement Innovations in Software Organizations", *Information Systems Journal*, vol. 14, no. 1, pp. 3-22.
- Keil, M., Wallace, L., Turk, D., Dixon-Randall, G. & Nulden, U. 2000, "An Investigation of Risk Perception and Risk Propensity on The Decision to Continue A Software Development Project", *The Journal of Systems and Software*, vol. 53, no. 2, pp. 145-157.
- Khalfan, A.M. & Alshawaf, A. 2004, "Adoption and Implementation Problems of E-Banking: A Study of The Managerial Perspective of The Banking Industry in Oman", *Journal of Global Information Technology Management*, vol. 7, no. 1, pp. 47-64.
- King, N. 1990, "Innovation at Work: The Research Literature", in M.A. West & J.L. Farr (eds), *Innovation and Creativity at Work: Psychological and Organizational Strategies*, Wiley, Chichester, pp. 15-80.
- Knol, W.H.C. & Stroeken, J.H.M. 2001, "The Diffusion and Adoption of Information Technology in Small and Medium-sized Enterprises through IT Scenarios", *Technology Analysis & Strategic Management*, vol. 13, no. 2, pp. 227-246.
- Kotey, B. 1999, "Human Resource Management Practices of Sunshine Coast Small Firms with Reference to Prescribed Models", *International Journal of Employment Studies*, vol. 7, no. 1, pp. 79-104.
- Kotey, B. & Slade, P. 2005, "Formal Human Resources Management Practices in Small Growing Firms", *Journal of Small Business Management*, vol. 43, no. 1, pp. 16-40.
- Kotonya, G. & Sommerville, I. 1998, *Requirements Engineering: Processes and Techniques*, John Wiley, New York.
- Krumbholz, M. & Maiden, N. 2001, "The Implementation of Enterprise Resource Planning Packages in Different Organisational and National Cultures", *Information Systems*, vol. 26, no. 3, pp. 185-204.
- Kuan, K.K.Y. & Chau, P.Y.K. 2001, "A Perception-based Model for EDI Adoption in Small Businesses Using A Technology-organization-environment Framework", *Information & Management*, vol. 38, no. 8, pp. 507-521.
- Latour, B. 1987, *Science in Action*, Open University Press, Milton Keynes.
- Latour, B. 1988, *The Pasteurization of France*, Harvard University Press, Cambridge.

- Latour, B. 1999, "On Recalling ANT", in J. Law & J. Hassard (eds), *Actor Network Theory and After*, Blackwell Publishers, Oxford, pp. 15-25.
- Laudon, K.C. & Laudon, J.P. 2000, *Management Information Systems: Organization and Technology in The Networked Enterprise*, 6th edn, Prentice Hall, Upper Saddle River.
- Laudon, K.C. & Laudon, J.P. 2006, *Management Information Systems: Managing The Digital Firm*, 9th edn, Pearson Education, Upper Saddle River.
- Law, J. 1999, "After ANT: Complexity, Naming, and Topology", in J. Law & J. Hassard (eds), *Actor Network Theory and After*, Blackwell Publishers, Oxford, pp. 1-14.
- Lawrence, K. 2002, "Factors Inhibiting the Collaborative Adoption of Electronic Commerce Among Australian SMEs", in S. Burgess (ed.), *Managing Information Technology in Small Business: Challenges and Solutions*, IDEA Group Publishing, Hershey, pp. 178-192.
- Lederer, A.L., Maupin, D.J., Sena, M.P. & Zhuang, Y. 2000, "The Technology Acceptance Model and The World Wide Web", *Decision Support Systems*, vol. 29, no. 3, pp. 269-282.
- Lee, J. & Runge, J. 2001, "Adoption of Information Technology in Small Business: Testing Drivers of Adoption for Entrepreneurs", *Journal of Computer Information Systems*, vol. 42, no. 1, pp. 44-57.
- Leedy, P.D. & Ormrod, J.E. 2005, *Practical Research: Planning and Design*, 8th edn, Pearson, Upper Saddle River.
- Lees, J.D. & Lees, D.D. 1987, "Realities of Small Business Information System Implementation", *Journal of Systems Management*, vol. 38, no. 1, pp. 6-13.
- Legris, P., Ingham, J. & Collette, P. 2003, "Why Do People Use Information Technology? A Critical Review of The Technology Acceptance Model", *Information & Management*, vol. 40, no. 3, pp. 191-204.
- Levy, M. & Powell, P. 2005, *Strategies for Growth in SMEs: The Role of Information and Information Systems*, Elsevier Butterworth and Heinemann, Amsterdam.
- Lewis, R. & Cockrill, A. 2002, "Going Global - Remaining Local: The Impact of E-Commerce on Small Retail Firms in Wales", *International Journal of Information Management*, vol. 22, no. 3, pp. 195-209.
- Lyytinen, K. 1988, "Expectation Failure Concept and Systems Analysts' View of Information System Failure: Results of an Exploratory Study", *Information & Management*, vol. 14, no. 1, pp. 45-56.
- Lyytinen, K. & Hirschheim, R.A. 1987, "Information Systems Failure: A Survey and Classification of The Empirical Literature", in P.I. Zorkoczy (ed.), *Oxford Surveys in Information Technology*, vol. 4, Oxford University Press, Oxford, pp. 257-309.

- Mako, C. 2005, "Training and Competence Development in The SME Sector: The Hungarian Case", *Journal for East European Management Studies*, vol. 10, no. 2, pp. 156-185.
- McMaster, T. 2001, "The Illusion of Diffusion in Information Systems Research", in M. Ardis & B. Marcolin (eds), *Diffusing Software Products and Process Innovations*, Kluwer Academic Publishers, Boston, pp. 67-85.
- McMaster, T. & Kautz, K. 2002, "A Short History of Diffusion", *Proceedings of IFIP WG 8.6 5th International Working Conference on Diffusion, Adoption, and Implementation of Information Technology*, eds D. Bunker, D. Wilson & S. Elliot, IFIP, Sydney, pp. 10-22.
- McMaster, T., Vidgen, R.T. & Wastell, D.G. 1997, "Technology Transfer -- Diffusion or Translation?" in T. McMaster, E. Mumford, E.B. Swanson, B. Warboys & D. Wastell (eds), *Facilitating Technology Transfer Through Partnership - Learning from Practice and Research*, Chapman and Hall, London, pp. 64-75.
- Mehrtens, J., Cragg, P.B. & Mills, A.M. 2001, "A Model of Internet Adoption by SMEs", *Information & Management*, vol. 39, no. 3, pp. 165-176.
- Miles, M.B. & Huberman, A.M. 1994, *Qualitative Data Analysis: An Expanded Sourcebook*, 2nd edn, Sage Publications, Thousand Oaks.
- Mirchandani, D.A. & Motwani, J. 2001, "Understanding Small Business Electronic Commerce Adoption: An Empirical Analysis", *Journal of Computer Information Systems*, vol. 41, no. 3, pp. 70-73.
- Mitev, N. 2000, "Toward Social Constructivist Understanding of IS Success and Failure: Introducing A New Computerized Reservation System", *Proceedings of The 21st International Conference on Information Systems*, eds S. Ang, H. Krcmar, W. Orlikowski, P. Weill & J.I. DeGross, Brisbane, Australia, pp. 84-93.
- Moon, J.-W. & Kim, Y.-G. 2001, "Extending The TAM for A World-Wide-Web Context", *Information & Management*, vol. 38, no. 4, pp. 217-230.
- Morse, J.M. & Richards, L. 2002, *Readme First for A User's Guide to Qualitative Methods*, Sage Publications, Thousand Oaks.
- Myers, M.D. & Avison, D.E. 2002, "An Introduction to Qualitative Research in Information Systems", in M.D. Myers & D. Avison (eds), *Qualitative Research in Information Systems: A Reader*, Sage Publications, London, pp. 3-12.
- Neuendorf, K.A. 2002, *The Content Analysis Guidebook*, Sage Publications, Thousand Oaks.
- NOIE 2000, *Taking the Plunge 2000: Sink or Swim? Small Business Attitudes to Electronic Commerce*, National Office for the Information Economy, viewed 16 September 2002 2002
<http://www.noie.gov.au/publications/NOIE/SME/SinkorSwim2000.pdf>.
- O'Regan, N. & Ghobadiah, A. 2004, "Short-and Long-term Performance in Manufacturing SMEs: Different Target, Different Drivers", *International*

Journal of Productivity and Performance Management, vol. 53, no. 5, pp. 405-424.

- Orlikowski, W.J. & Baroudi, J.J. 2002, "Studying Information Technology in Organizations: Research Approaches and Assumptions", in M.D. Myers & D. Avison (eds), *Qualitative Research in Information Systems: A Reader*, Sage Publications, London, pp. 51-77.
- Palen, L. & Grudin, J. 2003, "Discretionary Adoption of Group Support Software: Lessons from Calendar Applications", in B.E. Munkvold (ed.), *Implementing Collaboration Technologies in Industry: Case Examples and Lessons Learned*, Springer-Verlag, London, pp. 159-180.
- Peterson, D.K., Kim, C., Kim, J.H. & Tamura, T. 2002, "The Perception of Information Systems Designers from The United States, Japan, and Korea on Success and Failure Factors", *International Journal of Information Management*, vol. 22, no. 6, pp. 421-439.
- Pliskin, N. & Zarotski, M. 2000, "Big-Bang ERP Implementation at A Global Company", in M. Khosrowpour (ed.), *Organizational Achievement and Failure in Information Technology Management*, IDEA Group Publishing, Hershey, pp. 233-248.
- Poon, P. & Wagner, C. 2001, "Critical Success Factors Revisited: Success and Failure Cases of Information Systems for Senior Executives", *Decision Support Systems*, vol. 30, no. 4, pp. 393-418.
- Porter, B. 2001, *The Net Effect*, Intellect Books, Bristol.
- Premkumar, G. & Ramamurthy, K. 1995, "The Role of Interorganizational and Organizational Factors on the Decision Mode for Adoption of Interorganizational Systems", *Decision Sciences*, vol. 26, no. 3, pp. 303-336.
- Premkumar, G. & Roberts, M. 1999, "Adoption of New Information Technologies in Rural Small Businesses", *Omega The International Journal of Management Science*, vol. 27, no. 4, pp. 467-484.
- Putranto, K., Stewart, D., Moore, G. & Diatmoko, R. 2003, "Implementing A Technology Strategy in Developing Countries: The Experience of The Indonesian Rolling Stock Industry", *Technological Forecasting and Social Change*, vol. 70, no. 2, pp. 163-176.
- Raymond, L. 1985, "Organizational Characteristics and MIS Success in the Context of Small Business", *MIS Quarterly*, vol. 9, no. 1, pp. 37-52.
- Raymond, L. 1990, "Organisational Context and Information Systems Success: A Contingency Approach", *Journal of Management Information Systems*, vol. 6, no. 4, pp. 5-20.
- Richards, L. 2005, *Handling Qualitative Data: A Practical Guide*, Sage Publications, London.

- Riemenschneider, C.K., Harrison, D.A. & Mykytyn, P.P. 2003, "Understanding IT Adoption Decision in Small Business: Integrating Current Theories", *Information & Management*, vol. 40, no. 4, pp. 269-285.
- Robbins, S.P. 2003, *Organizational Behavior*, 10th edn, Prentice Hall, Upper Saddle River.
- Roberts, P. & Henderson, R. 2000, "Information Technology Acceptance in A Sample of Government Employees: A Test of The Technology Acceptance Model", *Interacting with Computers*, vol. 12, no. 5, pp. 427-443.
- Robertson, M., Swan, J. & Newell, S. 1996, "The Role of Networks in The Diffusion of Technological Innovation", *Journal of Management Studies*, vol. 33, no. 3, pp. 333-359.
- Rogers, E.M. 1995, *Diffusion of Innovations*, 4th edn, Free Press, New York.
- Rogoff, E.G., Lee, M.-S. & Sub, D.-C. 2004, ""Who Done It?" Attributions by Entrepreneurs and Experts of The Factors that Cause and Impede Small Business Success", *Journal of Small Business Management*, vol. 42, no. 4, pp. 364-376.
- Rooks, G. & Snijders, C. 2001, "The Purchase of Information Technology Products by Dutch SMEs: Problem Resolution", *The Journal of Supply Chain Management*, vol. 37, no. 4, pp. 34-42.
- Rotchanakitumnuai, S. & Speece, M. 2003, "Barriers to Internet Banking Adoption: A Qualitative Study Among Corporate Customers in Thailand", *International Journal of Bank Marketing*, vol. 21, no. 6-7, pp. 312-323.
- Rothwell, R. & Zegveld, W. 1982, *Innovation and the Small and Medium Sized Firm: Their Role in Employment and in Economic Change*, Frances Pinter, London.
- Rule, J. & Attewell, P. 1989, "Computing and the Transformation of Business Decision-Making", *Proceedings of International Working Conference on Shaping Organisations, Shaping Technology, SOST 89*, Terrigal, NSW.
- Russell, D.M. & Hoag, A.M. 2004, "People and Information Technology in the Supply Chain: Social and Organizational Influences on Adoption", *International Journal of Physical Distribution & Logistics Management*, vol. 34, no. 2, pp. 102-122.
- Sadowski, B.M., Maitland, C. & Dongen, J.v. 2002, "Strategic Use of The Internet by Small- and Medium-sized Companies: An Exploratory Study", *Information Economics and Policy*, vol. 14, no. 1, pp. 75-93.
- Sandee, H. & Rietveld, P. 2001, "Upgrading Traditional Technologies in Small-Scale Industry Clusters: Collaboration and Innovation Adoption in Indonesia", *The Journal of Development Studies*, vol. 37, no. 4, pp. 150-172.
- Sarkar, M.E. & Sawy, O.A.E. 2003, "The Four Tigers of Global E-Business Infrastructure: Strategies and Implications for Emerging Economies",

- Communications of The Association for Information Systems*, vol. 12, no. 2003, pp. 1-22.
- Sauer, C. 1993, *Why Information Systems Fail: A Case Study Approach*, Alfred Waller, Henley-on-Thames.
- Schiller, J. & Martin-Schiller, B. 1997, "Market, Culture, and State in the Emergence of an Indonesian Export Furniture Industry", *Journal of Asian Business*, vol. 13, no. 1, pp. 1-23.
- Schon, D.A. 1971, *Beyond Stable State*, The Norton Library, New York.
- Scupola, A. 2002, "Adoption Issues of Business-to-Business Internet Commerce in European SMEs", *Proceedings of the 35th Hawaii International Conference on Systems Sciences*, Hawaii, pp. 1-10.
- Sekaran, U. 2000, *Research Methods for Business: A Skill-building Approach*, 3rd edn, John Wiley & Sons, New York.
- Seligman, L. 2000, "Adoption as Sensemaking: Toward an Adopter-Centered Process Model of IT Adoption", *Proceeding of The 21st International Conference on Information Systems*, Brisbane, pp. 361-370.
- Sharma, S. & Rai, A. 2003, "An Assessment of The Relationship Between ISD Leadership Characteristics and IS Innovation Adoption in Organizations", *Information & Management*, vol. 40, no. 5, pp. 391-401.
- Sidle, C.C. & Warzynski, C.C. 2003, "A New Mission for Business Schools: The Development of Actor-Network Leaders", *Journal of Education for Business*, vol. 79, no. 1, pp. 40-45.
- Singh, M. 2002, "Electronic Commerce Opportunities, Challenges and Organizational Issues for Australian SMEs", in S. Burgess (ed.), *Managing Information Technology in Small Business: Challenges and Solutions*, IDEA Group Publishing, Hershey, pp. 316-333.
- Sismondo, S. 2004, *An Introduction to Science and Technology Studies*, Blackwell Publishing, Malden.
- Slappendel, C. 1996, "Perspectives on Innovation in Organizations", *Organization Studies*, vol. 17, no. 1, pp. 107-129.
- SMIDEC 1998a, *APEC: Integrated Plan of Action for SME Development (SPAN)*, Small and Medium Industries Development Corporation (SMIDEC) for Asia-Pacific Economic Cooperation (APEC) Secretariat, Kuala Lumpur.
- SMIDEC 1998b, *Profile of SMEs in APEC Economies*, Small and Medium Industries Development Corporation, Kuala Lumpur.
- Soliman, K.S. & Janz, B.D. 2004, "An Exploratory Study to Identify the Critical Factors Affecting the Decision to Establish Internet-based Interorganizational Information Systems", *Information & Management*, vol. 41, no. 6, pp. 697-706.

- Southon, G., Sauer, C. & Dampney, K. 1999, "Lessons from a Failed Information Systems Initiatives: Issues for Complex Organisations", *International Journal of Medical Informatics*, vol. 55, no. 1, pp. 33-46.
- Straub, D., Keil, M. & Brenner, W. 1997, "Testing the Technology Acceptance Model Across Culture: A Three Country Study", *Information & Management*, vol. 33, no. 1, pp. 1-11.
- Tallon, P.P., Kraemer, K.L. & Gurbaxani, V. 2000, "Executives' Perceptions of The Business Value of Information Technology: A Process-oriented Approach", *Journal of Management Information Systems*, vol. 16, no. 4, pp. 145-173.
- Tambunan, T. 2005, "Promoting Small and Medium Enterprises with a Clustering Approach: A Policy Experience from Indonesia", *Journal of Small Business Management*, vol. 43, no. 2, pp. 138-154.
- Tarafdar, M. & Vaidya, S.D. 2005, "Adoption and Implementation of IT in Developing Nations: Experiences from Two Public Sector Enterprises in India", *Journal of Cases on Information Technology*, vol. 7, no. 1, pp. 111-135.
- Tatnall, A. & Burgess, S. 2004, "Using Actor-Network Theory to Identify Factors Affecting the Adoption of E-Commerce in SMEs", in M. Singh (ed.), *E-Business Innovation and Change Management*, IDEA Group Publishing, Hershey, pp. 152-169.
- Tatnall, A. & Lepa, J. 2003, "The Internet, E-Commerce, and Older People: An Actor Network Approach to Researching Reasons for Adoption and Use", *Logistics Information Management*, vol. 16, no. 1, pp. 56-63.
- Teng, J.T.C., Grover, V. & Guttler, W. 2002, "Information Technology Innovations: General Diffusion Patterns and Its Relationship to Innovation Characteristics", *IEEE Transactions on Engineering Management*, vol. 49, no. 1, pp. 13-27.
- Teo, T.S.H. & Pian, Y. 2003, "A Contingency Perspective on Internet Adoption and Competitive Advantage", *European Journal of Information Systems*, vol. 12, no. 2, pp. 78-92.
- Thong, J.Y.L. 1999, "An Integrated Model of Information Systems Adoption in Small Businesses", *Journal of Management Information Systems*, vol. 15, no. 4, pp. 187-214.
- Thong, J.Y.L. 2001, "Resource Constraints and Information Systems Implementation in Singaporean Small Businesses", *Omega The International Journal of Management Science*, vol. 29, no. 2, pp. 143-156.
- Thong, J.Y.L., Yap, C. & Raman, K. 1996, "Top Management Support, External Expertise and Information Systems Implementations in Small Businesses", *Information Systems Research*, vol. 7, no. 2, pp. 248-267.
- Thong, J.Y.L. & Yap, C.S. 1995, "CEO Characteristics, Organizational Characteristics and Information Technology Adoption in Small Businesses", *Omega The International Journal of Management Science*, vol. 23, no. 4, pp. 429-442.

- Thong, J.Y.L. & Yap, C.S. 1996, "Information Technology Adoption by Small Business: An Empirical Study", in K. Kautz & J. Pries-Heje (eds), *Diffusion and Adoption of Information Technology*, Chapman & Hall, London, pp. 160-175.
- Turban, E., Leidner, D., MacLean, E. & Wetherbe, J. 2006, *Information Technology for Management: Transforming Business in the Digital Economy*, 5th edn, John Wiley & Sons, New York.
- Turban, E., MacLean, E. & Wetherbe, J. 2002, *Information Technology for Management: Transforming Business in The Digital Economy*, 3rd edn, John Wiley & Sons, New York.
- Umble, E.J., Haft, R.R. & Umble, M.M. 2002, "Enterprise Resource Planning: Implementation Procedures and Critical Success Factors", *European Journal of Operational Research*, vol. 146, no. 2, pp. 241-257.
- Utomo, H. & Dodgson, M. 2001, "Contributing Factors to The Diffusion of IT Within Small and Medium-sized Firms in Indonesia." *Journal of Global Information Technology Management*, vol. 4, no. 2, pp. 22-37.
- Venkatesh, V. & Davis, F.D. 1996, "A Model of the Antecedents of Perceived Ease of Use: Development and Test", *Decision Sciences*, vol. 27, no. 3, pp. 451-481.
- Venkatesh, V. & Davis, F.D. 2000, "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies", *Management Science*, vol. 46, no. 2, pp. 186-204.
- Waarnts, E., Everdingen, Y.V. & Hillegersberg, J.V. 2002, "The Dynamics of Factors Affecting the Adoption of Innovations", *The Journal of Products Innovation Management*, vol. 19, no. 6, pp. 412-423.
- Walczuch, R., Braven, G.V. & Lundgren, H. 2000, "Internet Adoption Barriers for Small Firms in The Netherlands", *European Management Journal*, vol. 18, no. 5, pp. 561-572.
- Weber, R.P. 1985, *Basic Content Analysis*, Sage Publications, Newbury Park.
- Welsh, J.A. & White, J.F. 1981, "A Small Business Is Not a Little Big Business", *Harvard Business Review*, vol. 59, no. 4, pp. 18-32.
- Werner, P. 2004, "Reasoned Action and Planned Behavior", in S.J. Peterson & T.S. Bredow (eds), *Middle range Theories: Application to Nursing Research*, Lippincott Williams & Wilkins, Philadelphia, pp. 125-147.
- Whittaker, B. 1999, "What Went Wrong? Unsuccessful Information Technology Projects", *Information Management & Computer Security*, vol. 7, no. 1, pp. 23-29.
- Wilkinson, A. 1999, "Employment Relations in SMEs", *Employee Relations*, vol. 21, no. 3, pp. 206-217.
- Willcocks, L. & Lester, S. 1996, "Beyond the IT Productivity Paradox", *European Management Journal*, vol. 14, no. 3, pp. 279-290.

- Wilson, M. & Howcroft, D. 2002, "Re-conceptualising Failure: Social Shaping Meets IS Research", *European Journal of Information Systems*, vol. 11, no. 4, pp. 236-250.
- Winston, E.R. & Dologite, D.G. 1999, "Achieving IT Infusion: A Conceptual Model for Small Businesses", *Information Resources Management Journal*, vol. 12, no. 1, pp. 26-38.
- Wolfe, R.A. 1994, "Organizational Innovation: Review, Critique and Suggested Research Directions", *Journal of Management Studies*, vol. 31, no. 3, pp. 405-431.
- Wong, P.-K. 2003, "Global and National Factors Affecting E-Commerce Diffusion in Singapore", *The Information Society*, vol. 19, no. 1, pp. 19-32.
- Yao, J.E., Xu, X., Liu, C. & Lu, J. 2003, "Organizational Size: A Significant Predictor of IT Innovation Adoption", *Journal of Computer Information Systems*, vol. 43, no. 2, pp. 76-82.
- Yeo, K.T. 2002, "Critical Failure Factors in Information Systems Projects", *International Journal of Project Management*, vol. 20, no. 3, pp. 241-246.
- Yi, M.Y. & Hwang, Y. 2003, "Predicting the Use of Web-based Information Systems: Self-efficacy, Enjoyment, Learning Goal Orientation, and the Technology Acceptance Model", *International Journal Human-Computer Studies*, vol. 59, no. 4, pp. 431-449.
- Yin, R.K. 2003, *Case Study Research: Design and Methods*, 3rd edn, Sage Publications, Thousand Oaks.
- Zaltman, G., Duncan, R. & Holbek, J. 1973, *Innovations and Organizations*, Wiley, New York.

Appendix 1 Semi-Structured interview guide questions

Demographic Questions

- Name of participants :
- Position :
- Company name :
- Number of computers used :
- Type of applications used :

Decision making

These are the questions for the period before the adoption process started until the decision to adopt has been made.

- What was the type of IT solution considered for adoption?
- Who initiated or proposed the idea to adopt IT for your organisation?
- What were the reasons for the adoption of IT?
- What were the factors considered for adoption of IT?
- Who were involved in the decision making process?
- What were the supporting factors for IT adoption?
- What were the factors that considered having negative influence for IT adoption?

Implementation

These are the questions for the period during the adoption process after the decision to adopt IT has been made until the implementation of IT solution completed.

- How was the selection process to select the needed IT solution carried out?
- Who were involved?
- Could you describe the role of each party involved?
- Could you describe the implementation process?
- What were the supporting factors for implementation?
- What were the factors that were considered to have negative influence for implementation?

Evaluation

These are the questions for the period after the adoption process was completed.

- What were the impacts of IT adoption to your business?
- What were the impacts of IT adoption to your organisation?
- Do you feel it was a success? Why?
- Would you consider adopting new IT in the future?
- What were the supporting factors for IT adoption?
- What were the factors that considered to have negative influence for IT adoption?

Appendix 2 Invitation to participate

Indonesian:

Kepada:

Yth. Pimpinan

Dengan hormat.

Saya adalah staff pengajar di Program Studi Akuntansi, Fakultas Ekonomi, Universitas Atma Jaya Yogyakarta (bisa dilihat di http://www.uajy.ac.id/fe_staf.asp). Saat ini saya sedang mengambil program S3 di University of Technology, Sydney, Australia dalam bidang teknologi informasi (bisa dilihat di <http://www-staff.it.uts.edu.au/~samiaji>). Berkaitan dengan itu, saya saat ini sedang melakukan penelitian yang membutuhkan pengumpulan data mengenai praktek penggunaan komputer pada perusahaan meubel dan kerajinan di Indonesia. Saya ingin mengajukan permohonan untuk bisa melakukan penelitian di perusahaan Bapak/Ibu yaitu.....

Manfaat penelitian ini nantinya adalah untuk membantu perusahaan seperti untuk lebih tepat dalam memilih dan menggunakan komputer dalam rangka menunjang usaha. Hal ini berarti penghematan yang besar. Bentuk penelitian yang akan dilakukan adalah wawancara dengan Bapak/Ibu atau staff yang bertanggung jawab dalam penggunaan komputer dan ikut terlibat semenjak awal dalam proses pemanfaatan komputer dalam menunjang usaha. Wawancara akan menggali sejarah dan proses pemanfaatan komputer di perusahaan Bapak/Ibu tersebut. Wawancara akan direkam, kemudian dituangkan dalam bentuk tertulis (transkrip). Perusahaan Bapak/Ibu dan staff yang berwenang bisa mendengarkan ulang dan membaca transkrip hasil wawancara untuk kepentingan klarifikasi dan koreksi bilamana diperlukan. Identitas

pribadi maupun perusahaan bersifat rahasia (tidak akan dibuka kepada siapapun) dan tidak akan bisa dikenali dalam laporan penelitian. Saya pribadi dan juga pihak University of Technology, Sydney, Australia menjamin kerahasiaan tersebut. Penelitian ini telah mendapatkan ijin dari Komite Etika Penelitian UTS dengan Nomor UTS HREC 03/103A. Keikutsertaan perusahaan Bapak/Ibu bersifat sukarela dan bilamana dirasa perlu bisa menarik diri dan tidak akan saya ikutkan dalam penelitian ini.

Besar harapan saya Bapak/Ibu bisa memenuhi permohonan saya tersebut. Jika ada yang kurang jelas bisa menghubungi saya melalui telepon ataupun email. Mohon maaf jika ada kesalahan atau hal yang kurang berkenan.

Hormat saya

Samiaji Sarosa
Kandidat Doktor
Faculty of Information Technology
University of Technology, Sydney
Ph (02 [REDACTED])
HP [REDACTED]
Email samiaji@it.uts.edu.au
URL <http://www-staff.it.uts.edu.au/~samiaji>

English Translation:

The Manager of

Dear Sir or Mdam.

I am academic staff at Accounting Department, Faculty of Economics, Atma Jaya Yogyakarta University (http://www.uajy.ac.id/fe_staf.asp). I am studying at doctoral level at the University of Technology, Sydney, Australia in the field of information technology (<http://www-staff.it.uts.edu.au/~samiaji>). I am in the middle of my research, for which I need to collect data regarding the adoption of IT within Indonesian SMEs. I would like to ask for your permission to conduct my research at your company,

The result of this research could assist companies like yours to select and use computers to support their business appropriately. It might mean significant savings. The form of my research is interview the person who responsible for IT and involved with the use of IT since the beginning. The interview will seek the history and process of IT adoption within your company. The interview will be recorded and then transcribed. You could opt for replaying the record and reading the transcripts for clarification and correction. Personal and company identities will be kept secret and unidentified in the research report. I and the University of Technology, Sydney, Australia guarantee confidentiality. This research has obtained UTS HREC approval number UTS HREC 03/103A. Your participation is voluntary and you could withdraw from this research anytime you want. I would be grateful if you could participate in this research. You can find my contacts detail below.

Sincerely

Samiaji Sarosa
PhD candidate
Faculty of Information Technology
University of Technology, Sydney
Ph (02 [REDACTED])
Mobile [REDACTED]
Email samiaji@it.uts.edu.au
URL <http://www-staff.it.uts.edu.au/~samiaji>

Indonesian:

Deskripsi Penelitian

Penelitian ini berfokus pada praktek adopsi teknologi informasi yang terjadi pada perusahaan skala kecil dan menengah di Indonesia. Penelitian ini akan menyelidiki perbedaan antara apa yang telah didokumentasikan dari penelitian sebelumnya, yang sebagian besar di dunia barat, dengan praktek sesungguhnya di Indonesia. Dengan memahami praktek adopsi teknologi informasi di Indonesia dengan lebih menyeluruh, sebuah kerangka kerja untuk adopsi teknologi informasi dapat dikembangkan untuk membantu pengusaha skala kecil dan menengah di Indonesia lebih berhasil dalam mengadopsi teknologi informasi.

Hasil utama dari penelitian ini adalah strategi untuk mengadopsi teknologi informasi yang disesuaikan untuk pengusaha skala kecil dan menengah di Indonesia. Model tersebut akan berisi factor pendukung dan penghambat adopsi teknologi informasi yang khas dan unik untuk situasi di Indonesia.

Dengan menggunakan strategi yang tepat dalam mengadopsi teknologi informasi, pengusaha skala kecil dan menengah di Indonesia dapat menghindari resiko kegagalan. Mengurangi resiko kegagalan dalam mengadopsi teknologi informasi dapat membuat investasi teknologi informasi pada pengusaha skala kecil dan menengah lebih efektif dan efisien, yang dapat membuat pengusaha skala kecil dan menengah di Indonesia lebih berkonsentrasi pada usaha utamanya.

Partisipasi anda dalam penelitian ini melibatkan wawancara anatar 1-2 jam. Data penelitian yang terkumpul akan diperlakukan sebagai rahasia dan tidak akan dibuka kepada pihak yang tidak berwenang. Hasil penelitian ini mungkin akan dipublikasikan dalam bentuk yang sedemikian rupa sehingga menjaga kerahasiaan responden.

English:

Research Description

This research focuses on IT adoption practice within Indonesian SMEs. This research will investigate the difference between literature and the actual practice of IT adoption in Indonesia. By understanding the IT adoption practice, a framework for IT adoption could be developed for assisting Indonesian SMEs adopting IT successfully.

The main result of this research is strategy for adopting IT suitable for Indonesian. The model will consist of factors influencing IT adoption, which are unique to Indonesian context.

By using the appropriate strategy, Indonesian SMEs could avoid failure. Avoiding failure means more efficient and effective IT investments. It also means Indonesian SMEs could concentrate more on their core business.

Your participation will involve interview about 1-2 hours. Collected research data will be treated as strictly confidential and will never be revealed to unauthorised personnel. We will keep the secrecy of all participants.

Appendix 3 Sample of coding process

R24 Original Transcripts (the interviewee insisted on being interviewed in English since he had graduated from an Australian School).

R24 with Managing Director/Co-Owner (Q= Interviewer, A=Interviewee)

Q: The first group of questions are regarding your decision to use the computer in the first place. First of all why you considered to use computer?

A: We used computer because the time saving

Q: Is it just because time saving or because you are forced to used computer...like I don't know for example taxation purpose or government regulation or else?

A: We just used basically for our internal management here so also we put in them in because the time save and to save any manual error mistake. We do things manually we may make mistake. We start of with a simple order entry system which have been a model to what we have done.

Q: Have you ever considered not to use computer before? I mean during your decision time to use or not to use computer. Do you considered not to use computer at that time?

A: No, we always consider to use computer.

Q: Ok, so basically you use computer because of time saving and error saving. Is there any other incentives or positive result you expected from using computer

A: Through communication, like email, is one of the I think when we started of using email our computer systems, email was not a big deal. But today is a, like in current situation, has been a big help and ease to do business and communication between like one country and another country to communicate through e-business like email has been a big thing.

Q: When is it happened? I mean did you first start using computer?

A: We, in our business we started on day one which is around 1996.

Q: During your decision to use computer I mean on the day one do you have any support or any parties who..

A: No we had no training we just used basic what was already on the computer programs.

Q: No training, no incentive from the government for example?

A: No incentives from the government!

Q: Just so basically everything is come from you?

A: Yeah

Q: So, you decided that computer is a good thing for your business?

A: Yeah!

Q: Do you have any hesitation, in that time? To use computer, I mean....

A: No, it is not

Q: What if we failed, what if we can't use this?

A: No, we have no hesitation, probably we were limited by a... the types of programs we have access to or what we actually can do with the computer but were not hesitate, we actually want to learn more about how far we can take like with the computers. We weren't hesitant about it.

Q: So you feel confidence about the decision?

A: Feel confidence

Q: Ok, a..... do you consider a... your own company strength and weaknesses to use computer, I mean like ...when you decided to use computer, do you consider do we have the human resource (needed), do we have the financial, do we have the technical support from vendor for example?

A: ehm...we thought we had a enough support through the people a.... here.... a just that was a main thing about moulding the computer into our business was more of difficult process. Once we mould the computer to work with us like what we are doing on our business we found that we find a success with that. I mean when we started even with what design on computer work out a lot better than manual.

Q: Design of product?

A: Design of product (affirmation)

That came from one of our staff member who wanted. We started with a manual design and he said he can use computer to design it and in a lot faster and designing product a lot better. So that came from actually from within our staffs as well as from us as well.

Q: During your decision to use computer, who was involve in the process.

A: In the computer?

Q: Yes

A: Basically, my self and Lloyd. We decided to use computer and then ... so basically predominantly us and then we had a some input from the staffs on what they also can use the computer for.

Q: Do your staff support this decision, I mean,....

A: 98% of staff

Q: 98%...(confirmation)

A: Yes.

Q: Have you ever asked them their opinion before you decided...let's use computer?

A: ahm... We have computer, I think, in two of the departments and the rest of the staff indicated that they probably work more effectively using computer, so actually came from them as well. So on that a.. like for accounting purposes, payroll purposes, they sort of like to use a computing to help what they were doing rather than doing it on manual systems. So actually came as working together type of thing.

Q: Ok. so there is no....you force them to use computer

A: No, no forces to use computer, actually came up as it evolve.

Q: hmm...that is good

Have you ever consider financial is an issue in using computer?

A: Using computers? ahm it is an issue for a what type of computer you buy but it is not an issue whether you buy a computer or not buy a computer. Its what type of programming you buy, what type of equipment you buy, it can be a little bit of an issue like the new scanner and new a.. equipment to the computer...new digital cameras....a.... it is an issue on price, but whereas to have a computer is not a financial decision. We need to have computer

Q: You need to have computer (Confirmation).

Do you have problem within the human resource area ...mean do you need to have special training on your...

A: Anymore you need have a special training because of mainly people have ... they have gone through university or even school have learn about computers. So I think it is more like older staff that have problems a... learning about computers... but mainly more of the youngest staff there is no problem.

Q: So they are ready for that?

A: They are ready.

Q: Did you involve anybody from outside this company in this process? I mean using... in decision to use computer.

A: Not in decision to use computers...a... we had help writing a program our order entry program..... from an Australian computer. Wrote a program for us to use with a computer, he actually and then.

Q: So, basically everything within the decision to use computer is up to you. Nobody influence you?

A: No

Q: The vendor said this is good product for you

A: No

Q: The following question is regarding the process when you implement the computer/IT solutions you've selected. When you first acquire the first computer for the company, what type of computer you get?

A: It was a laptop...a.... Toshiba laptop I forget the model

Q: That is Ok, do not mention the brand please Laptop for order entry is it?

A: Actually that was come about 6 months after, we begin using just like an excel spreadsheet type and then I think 6 months into our business we got program written on order entry that we still use now.

Q: So, in what area you use computer?

A: What area? We use in marketing, accounting, cost, we use it in wood planning, and production planning.

Q: Why did you consider the order entry program and then the excel spreadsheet in the first place? Why did you decided to use that? Not the other type of software

A: I think it was available, when we first started using the spreadsheet it was we were just making documents clear. There were hundreds of document, so we were just manually entering in data hmmm... when we decided to use we got a order entry systems made up to suit our business. So that was when we decided to use that we made the program focus directly on our business.

Q: So basically it was just see where the areas of business need it.

A: Yes

Q: How long was the duration for you know ... you build and you made order entry program and then you actually get the order entry program?

A: Untill the success of the program took I think a around 8 months for it to be completed. We had ... we put it in and then we had glitch in the system. We send it back to be reviewed then we put it back in so it was about 8 months process before we got it to be a... user friendly.

Q: Ok, about the order entry program... why you select this... I mean How did you select this?

A: We selected the idea of order entry through reading books about how other company had run their business and got the idea to that fit in our business because we running thing from a code and then we can get all the other documentation for net offer...so it was through reading.

Q: Ok, I mean then how did you select the programmer?

A: The person who actually made it? it was a friend of ours in Australia

Q: So it because he's your friend?

A: Yes

Q: So you personally know this person?

A: Yes

Q: So basically, it was only you and people who developed the software involve in this?

A: Yeah

Q: Is this person who made the software have any input on your company I mean when you ordered him the order entry program then he said 'Well order entry should be this..this....and this'?

A: Yea they have a lot of input on what it should be, we didn't really know what the systems could totally entail. But they have the expertise to say this is what you can do in your program and this is what you should put in your program.

Q: Did you consider the difference between their experience in Australia and your experience in Indonesia might be different so their program will not suitable?

A: Not really, because we told them our business model here in Indonesia and what we needed and then it was pretty easy for them to design the product around that. I don't think there was a cultural difference between the programming in the computer.

Q: Ok. Have you ever hesitated to use this order entry program?

A: Hesitated to use it? No. I think it is one of the best things we have ever done and we use it now for 6 or 7 years without changing the program.

Q: During the implementation of this program, do you just installed it or do you get any help from the vendor?

A: They helped us out to install it, we installed it, we had the data entry and then we found the glitches in it and then we send it back and they help us out to. So they, give help.

Q: Do you find during the implementation that they were helpful?

A: Yes, they were helpful

Q: Do you find any other help, I mean....beside the programmer himself

A: Yes, we find a lot of help in Indonesia from a computer technician in Indonesia and a programmer here are very good. That's a lot of knowledge here for the guys.

Q: Why did you involve the local programmer?

A: The local programmer we involve after I think about 2 or 3 years past the when our program was written. We involved the local programmers probably because we didn't know before there were the talent here to get it written in Indonesia and then so we found there was a tap of talent here and we started to use the local programmers.

Q: What do you think about their quality?

A: I think Indonesian programmers are very good.

Q: During that time, I mean during the implementation, have you get any inputs, comments, or opinion from your staff?

A: Not from our staffs.

Q: So you give them?

A: This is the program. We have some inputs just on the glitch. They said this could be better and we find out that problem. We move on from there, but they didn't really have any idea to guide the program in different way

Q: Ok

A: And now the last group of questions is about the effect of this program to your business

Q: What is the impact of this program?

A: The Impact was... when we first implemented into our business it made a dramatic improvement. It cleared up paperwork, manual errors, delivered manifest and all the necessary document we needed. So, it made a great difference, it may cut down a lot of extra work that has been done. And then the errors that being made in production were eliminated.

Q: Do you feel it a success?

A: That program has been a success in our business. The other departments that mainly used an excel program, I think that has been successful fro them as well. As a work tool.

Q: So, with all this experience, will you consider to computerised other aspect of you business?

A: Yeah, I always interested in computerising the business.

Q: What type of ... what area of business?

A: Stock take, stock output, -- inventory, purchasing.....we like to get.... I think that the main areas.

Q: Ok. During after you used the software, after the 8 months period, do you have any other technical problems?

A: Yeah, we have some technical problems, when we were change...updating the systems a little bit when we were using the program for one purpose and we move to another purpose we did find some technical problems.

Q: Who helped you in this?

A: Indonesian

Q: Do you have any non technical problems, like your staff refuse to use that software?

A: Hmm, the software was pretty easy to trained people of so, once I think it took around 3 weeks to train on that software. And then after that it was very easy to use so...

Q: Why do you think your staff did not refuse to use it, because in many cases, even with the computer literate person they could refuse to use it?

A: Refuse to use it? I think that is a problem in many cases when the computer seen as doing additional work. Hmm...we were very lucky with our computer systems have been seen as time saver. So people on that particular program it cuts down the workhours by almost a quarter than doing it manually. So people actually enjoy to use it rather than doing it manually. I think as well in the other department people can see it saves their time and makes the job easier to do. So, we had no backpressures saying the computers are additional work or the computers are just double work for the manual. So we find it better, we have been lucky that our staffs embrace it
We never have an instance of someone saying ‘ we can do it faster manually’.

Q: Ok. That is good. Do you think you can improve the way your company use the computer?

A: Definitely, I think.

Q: How?

A: I think the technology is changing all the time. But, anyone can't really keep up with. But I think our technology that we are using here is maybe around 4 or 5 years old. I think we could update our processes and our computer process to keep up with new programs, new technology, and new email systems. So, I think with computers and IT it is on going update systems. If you just keep on what you were doing in the past. I think... you always to be get updated.

R24's answers mapped to questions

Decision making

These are the questions for the period before the adoption process started until the decision to adopt has been made.

- ***What was the type of IT solution considered for adoption?***

A: We just used basically for our internal management here so also we put in them in because the time save and to save any manual error mistake. We do things manually we may make mistake. We start of with a simple order entry system which have been a model to what we have done.

A: Design of product (affirmation)

That came from one of our staff member who wanted. We started with a manual design and he said he can use computer to design it and in a lot faster and designing product a lot better. So that came from actually from within our staffs as well as from us as well.

A: It was a laptop...a.... Toshiba laptop I forget the model

A: Actually that was come about 6 months after, we begin using just like an excel spreadsheet type and then I think 6 months into our business we got program written on order entry that we still use now.

A: What area? We use in marketing, accounting, cost, we use it in wood planning, and production planning.

A: I think it was available, when we first started using the spreadsheet it was we were just making documents clear. There were hundreds of document, so we were just manually entering in data hmmm... when we decided to use we got a order entry systems made up to suit our business. So that was when we decided to use that we made the program focus directly on our business.

- ***Who was initiated or proposed the idea to adopt IT for your organisation?***

That came from one of our staff member who wanted

A: Basically, my self and co-owner. We decided to use computer and then ... so basically predominantly us and then we had a some input from the staffs on what they also can use the computer for.

- ***What were the reasons for the adoption of IT?***

A: We used computer because the time saving

Q: So, you decided that computer is a good thing for your business?

A: Yeah!

- ***What were the factors considered for adoption of IT?***

A: Through communication, like email, is one of the I think when we started of using email our computer systems, email was not a big deal. But today is a, like in current situation, has been a big help and ease to do business and communication between like one country and another country to communicate through e-business like email has been a big thing.

A: No we had no training we just used basic what was already on the computer programs.

A: No incentives from the government!

A: ehm...we thought we had a enough support through the people a.... here.... a just that was a main thing about moulding the computer into our business was more of difficult process. Once we mould the computer to work with us like what we are doing on our business we found that we find a success with that. I mean when we started even with what design on computer work out a lot better than manual.

A: No, no forces to use computer, actually came up as it evolve.

- ***Who were involved the decision making process?***

That came from one of our staff member who wanted

A: Basically, my self and co-owner. We decided to use computer and then ... so basically predominantly us and then we had a some input from the staffs on what they also can use the computer for.

A: Not in decision to use computers...a... we had help writing a program our order entry program..... from an Australian computer. Wrote a program for us to use with a computer, he actually and then.

A: No incentives from the government!

- ***What were the supporting factors for IT adoption?***

A: 98% of staff

A: ahm... We have computer, I think, in two of the departments and the rest of the staff indicated that they probably work more effectively using computer, so actually came from them as well. So on that a.. like for accounting purposes, payroll purposes, they sort of like to use a computing to help what they were doing rather than doing it on manual systems. So actually came as working together type of thing.

A: Using computers? ahm it is an issue for a what type of computer you buy but it is not an issue whether you buy a computer or not buy a computer. Its what type of programming you buy, what type of equipment you buy, it can be a little bit of an issue like the new scanner and new a.. equipment to the computer...new digital cameras....a.... it is an issue on price, but whereas to have a computer is not a financial decision. We need to have computer

A: Anymore you need have a special training because of mainly people have ... they have gone through university or even school have learn about computers. So I think it is

more like older staff that have problems a... learning about computers... but mainly more of the youngest staff there is no problem.

Q: So they are ready for that?

A: They are ready.

- ***What were the factors that considered have negative influence for IT adoption?***

None

Implementation

These are the questions for the period during the adoption process started from after the decision to adopt IT has been made until the implementation of IT solution completed.

- ***How was the selection process to select IT solution needed carried out?***

A: Untill the success of the program took I think a around 8 months for it to be completed. We had ... we put it in and then we had glitch in the system. We send it back to be reviewed then we put it back in so it was about 8 months process before we got it to be a... user friendly.

A: We selected the idea of order entry through reading books about how other company had run their business and got the idea to that fit in our business because we running thing from a code and then we can get all the other documentation for net offer...so it was through reading.

A: The person who actually made it? it was a friend of ours in Australia

A: Not really, because we told them our business model here in Indonesia and what we needed and then it was pretty easy for them to design the product around that. I don;t think there was a cultural difference between the programming in the computer.

A: Hesitated to use it? No. I think it is one of the best thing we have ever done and we use it now for 6 or 7 years without changing the program.

- ***Who were involved?***

A: The person who actually made it? it was a friend of ours in Australia

- ***Could you describe the role of each party involved?***

A: Yea they have a lot of input on what it should be, we didn't really know what the systems could totally entail. But the have the expertise to say this is what you can do in your program and this is what you should put in your program.

A: They helped us out to install it, we install it, we had the data entry and then we found the glitches in it and then we send it back and they help us out to. So they, give help.

- ***Could you describe the implementation process?***

A: Untill the success of the program took I think a around 8 months for it to be completed. We had ... we put it in and then we had glitch in the system. We send it back

to be reviewed then we put it back in so it was about 8 months process before we got it to be a... user friendly.

A: They helped us out to install it, we install it, we had the data entry and then we found the glitches in it and then we send it back and they help us out to. So they, give help.

A: This is the program. We have some inputs just on the glitch. They said this could be better and we find out that problem. We move on from there, but they didn't really have any idea to guide the program in different way

- **What were the supporting factors for implementation?**

A: Yes, they were helpful

A: Not from our staffs.

A: Hmm, the software was pretty easy to trained people of so, once I think it took around 3 weeks to train on that software. And then after that it was very easy to use so...

- **What were the factors that considered have negative influence for implementation?**

Evaluation

These are the questions for the period after the adoption process completed.

- **What were the impacts of IT adoption to your business?**

A: The Impact was... when we first implemented into our business it made a dramatic improvement. It cleared up paperwork, manual errors, delivered manifest and all the necessary document we needed. So, it made a great difference, it may cut down a lot of extra work that has been done. And then the errors that being made in production were eliminated.

A: That program has been a success in our business. The other departments that mainly used an excel program, I think that has been successful fro them as well. As a work tool.

- **What were the impacts of IT adoption to your organisation?**

A: Refuse to use it? I think that is a problem in many cases when the computer seen as doing additional work. Hmm...we were very lucky with our computer systems have been seen as time saver. So people on that particular program it cuts down the wrokhours by almost a quarter than doing it manually. So people actually enjoy to use it rather than doing it manually. I think as well in the other department people can see it saves their time and makes the job easier to do. So, we had no backpressures saying the computers are additional work or the computers are just double work for the manual. So we find it better, we have been lucky that our staffs embrace it
We never have an instance of someone saying ' we can do it faster manually '.

- **Do you feel it was a success? Why?**

A: That program has been a success in our business. The other departments that mainly used an excel program, I think that has been successful for them as well. As a work tool.

- ***Would you consider adopting new IT in the future?***

A: Yeah, I always interested in computerising the business.

A: I think the technology is changing all the time. But, anyone can't really keep up with. But I think our technology that we are using here is maybe around 4 or 5 years old. I think we could update our processes and our computer process to keep up with new programs, new technology, and new email systems. So, I think with computers and IT it is on going update systems. If you just keep on what you were doing in the past. I think... you always to be get updated.

A: Definitely, I think.

- ***What were the supporting factors for IT adoption?***

A: Yes, we find a lot of help in Indonesia from a the computer technician in Indonesia and a programmer here are very good. That's a lot of knowledge here for the guys.

A: The local programmer we involve after I think about 2 or 3 years past the when our program was written. We involved the local programmers probably because we didn't know before there were the talent here to get it written in Indonesia and then so we found there was a tap of talent here and we started to use the local programmers.

A: I think Indonesian programmers are very good.

A: Yeah, we have some technical problems, when we were change...updating the systems a little bit when we were using the program for one purpose and we move to another purpose we did find some technical problems.

Q: Who helped you in this?

A: Indonesian

- ***What were the factors that considered have negative influence for IT adoption?***

None

Free Codes extracted from R24's interview

1. Reason for using computers

A: We used computer because the time saving

Q: So, you decided that computer is a good thing for your business?

A: Yeah!

2. Idea for IT adoption

A: That came from one of our staff member who wanted

A: Basically, my self and co-owner. We decided to use computer and then ... so basically predominantly us and then we had a some input from the staffs on what they also can use the computer for.

3. Type of applications adopted

A: We just used basically for our internal management here so also we put in them in because the time save and to save any manual error mistake. We do things manually we may make mistake. We start of with a simple order entry system which have been a model to what we have done.

A: Design of product (affirmation)

That came from one of our staff member who wanted. We started with a manual design and he said he can use computer to design it and in a lot faster and designing product a lot better. So that came from actually from within our staffs as well as from us as well.

A: It was a laptop...a.... Toshiba laptop I forget the model

A: Actually that was come about 6 months after, we begin using just like an excel spreadsheet type and then I think 6 months into our business we got program written on order entry that we still use now.

A: What area? We use in marketing, accounting, cost, we use it in wood planning, and production planning.

A: I think it was available, when we first started using the spreadsheet it was we were just making documents clear. There were hundreds of document, so we were just manually entering in data hmmm... when we decided to use we got a order entry systems made up to suit our business. So that was when we decided to use that we made the program focus directly on our business.

4. Persons involved in the decision making

A. That came from one of our staff member who wanted

A: Basically, my self and co-owner. We decided to use computer and then ... so basically predominantly us and then we had a some input from the staffs on what they also can use the computer for.

A: Not in decision to use computers...a... we had help writing a program our order entry program..... from an Australian computer. Wrote a program for us to use with a computer, he actually and then.

A: No incentives from the government!

5. Supporting factors for implementation

A: 98% of staff

A: ahm... We have computer, I think, in two of the departments and the rest of the staff indicated that they probably work more effectively using computer, so actually came from them as well. So on that a.. like for accounting purposes, payroll purposes, they sort of like to use a computing to help what they were doing rather than doing it on manual systems. So actually came as working

together type of thing.

A: Using computers? ahm it is an issue for a what type of computer you buy but it is not an issue whether you buy a computer or not buy a computer. Its what type of programming you buy, what type of equipment you buy, it can be a little bit of an issue like the new scanner and new a.. equipment to the computer...new digital cameras....a.... it is an issue on price, but whereas to have a computer is not a financial decision. We need to have computer

A: Anymore you need have a special training because of mainly people have ... they have gone through university or even school have learn about computers. So I think it is more like older staff that have problems a... learning about computers... but mainly more of the youngest staff there is no problem.

Q: So they are ready for that?

A: They are ready.

6. Factors considered during adoption

A: Through communication, like email, is one of the I think when we started of using email our computer systems, email was not a big deal. But today is a, like in current situation, has been a big help and ease to do business and communication between like one country and another country to communicate through e-business like email has been a big thing.

A: No we had no training we just used basic what was already on the computer programs.

A: No incentives from the government!

A: ehm...we thought we had a enough support through the people a.... here.... a just that was a main thing about moulding the computer into our business was more of difficult process. Once we mould the computer to work with us like what we are doing on our business we found that we find a success with that. I mean when we started even with what design on computer work out a lot better than manual.

A: No, no forces to use computer, actually came up as it evolve.

7. Alternative IT solutions selection process

A: Untill the success of the program took I think a around 8 months for it to be completed. We had ... we put it in and then we had glitch in the system. We send it back to be reviewed then we put it back in so it was about 8 months process before we got it to be a... user friendly.

A: We selected the idea of order entry through reading books about how other company had run their business and got the idea to that fit in our business because we running thing from a code and then we can get all the other documentation for net offer...so it was through reading.

A: The person who actually made it? it was a friend of ours in Australia

A: Not really, because we told them our business model here in Indonesia and what we needed and then it was pretty easy for them to design the product around that. I don;t think there was a cultural difference between the programming in the computer.

A: Hesitated to use it? No. I think it is one of the best thing we have ever done and we use it now for 6 or 7 years without changing the program.

8. Persons involved during implementation process

A: The person who actually made it? it was a friend of ours in Australia

A: Yea they have a lot of input on what it should be, we didn 't really know what the systems could totally entail. But the have the expertise to say this is what you

can do in your program and this is what you should put in your program.

A: They helped us out to install it, we install it, we had the data entry and then we found the glitches in it and then we send it back and they help us out to. So they, give help.

9. Implementation process

A: Untill the success of the program took I think a around 8 months for it to be completed. We had ... we put it in and then we had glitch in the system. We send it back to be reviewed then we put it back in so it was about 8 months process before we got it to be a... user friendly.

A: They helped us out to install it, we install it, we had the data entry and then we found the glitches in it and then we send it back and they help us out to. So they, give help.

A: This is the program. We have some inputs just on the glitch. They said this could be better and we find out that problem. We move on from there, but they didn't really have any idea to guide the program in different way

10. Supporting factors in implementation

A: Yes, they were helpful

A: Not from our staffs.

A: Hmm, the software was pretty easy to trained people of so, once I think it took around 3 weeks to train on that software. And then after that it was very easy to use so...

11. Impact of IT

A: The Impact was... when we first implemented into our business it made a dramatic improvement. It cleared up paperwork, manual errors, delivered manifest and all the necessary document we needed. So, it made a great difference, it may cut down a lot of extra work that has been done. And then the errors that being made in production were eliminated.

A: That program has been a success in our business. The other departments that mainly used an excel program, I think that has been successful fro them as well. As a work tool.

A: Refuse to use it? I think that is a problem in many cases when the computer seen as doing additional work. Hmm...we were very lucky with our computer systems have been seen as time saver. So people on that particular program it cuts down the wrokhours by almost a quarter than doing it manually. So people actually enjoy to use it rather than doing it manually. I think as well in the other department people can see it saves their time and makes the job easier to do. So, we had no backpressures saying the computers are additional work or the computers are just double work for the manual. So we find it better, we have been lucky that our staffs embrace it

We never have an instance of someone saying 'we can do it faster manually'.

12. Success or failure

A: That program has been a success in our business. The other departments that mainly used an excel program, I think that has been successful fro them as well. As a work tool.

13. Future Plans

A: Yeah, I always interested in computerising the business.

A: I think the technology is changing all the time. But, anyone can't really keep up with. But I think our technology that we are using here is maybe around 4 or 5 years old. I think we could update our processes and our computer process to keep up with new programs, new technology, and new email systems. So, I think with computers and IT it is on going update systems. If you just keep on what you were doing in the past. I think... you always to be get updated.

A: Definitely, I think.

From R24's interview we extracted 13 free codes, which are:

1. Reason for using computers
 - a. Time savings
 - b. Good for business
2. Idea for IT adoption
 - a. Staff
 - b. Owner/manager
3. Type of applications adopted
 - a. Order/entry systems
 - b. Product design
 - c. Production planning
 - d. Accounting and cost control
 - e. Marketing
4. Persons involved in the decision making
 - a. Staff
 - b. Owner/manager
 - c. An Australian programmer
 - d. No government
5. Supporting factors for implementation
 - a. Skilled Staff
 - b. Staff readiness
6. Factors considered during adoption
 - a. Email for communication
 - b. Using whatever exist
 - c. No incentives from government
 - d. Own need
7. Alternative IT solutions selection process
 - a. 8 months
 - b. Assisted by colleague from Australia
 - c. Read books regarding business process
8. Persons involved during implementation process
 - a. An Australian colleague/programmer
9. Implementation process
 - a. 8 months
 - b. Assisted by the programmer
10. Supporting factors in implementation
 - a. Easy to use
 - b. Indonesian programmer
11. Impact of IT
 - a. Cleared paper works
 - b. Reduce error

- c. Cut cost and times
- 12. Success or failure
- 13. Future Plans
 - a. More adoption

The codes were classified according to the initial model as in Table 2.3. titled Factors affecting SMEs' IT adoption, as follow:

| Internal | | External | |
|--|----------------|---|--------------|
| Factors in literature | Codes Number | Factors | Codes Number |
| Manager Perception toward IT such as benefit, cost, risks IT experience IT knowledge Perceived alignment with business strategy | 1,2,4,6, 12,13 | Government Public infrastructure availability Policy and regulation Subsidies Training | 4, 6 |
| Resources Financial resources availability Internal IT infrastructure availability Operational cost | | Customers Initiatives or pressure for IT adoption | |
| Staff Staff readiness IT experience Staff acceptance for IT adoption | 2, 4, 5 | Competitors Competitive pressure | |
| | | IT Vendors, Consultants Information, support | 4, 7, |

The process was done for all the interview transcripts. The end result is Table 5.7. Codes mapped to factors influencing IT adoption.

Appendix 4 UTS HREC Ethics Approval

11 November 2003

Dr Didar Zowghi
Faculty of Information Technology
Level 4, Building 10
Broadway Campus

Dear Didar,

**UTS HREC UTS HREC 03/103 - ZOWGHI, Dr Didar (for SAROSA, Mr Samiaji - PhD student)
– ‘Information technology adoption within Indonesian small and medium enterprises’**

At its meeting held on 11 November 2003, the UTS Human Research Ethics Committee considered the above application, and I am pleased to inform you that ethics approval has been granted. The Committee commented that it was well prepared and thorough. They did however ask that you amend the consent form to include the use of electronic recording, correct it for typographical errors, and forward the amended copy to the HREC Secretariat. They also asked that you provide information as to whether or not the recruitment process would take place in work time and location.

Your approval number is UTS HREC 03/103A

Please note that the ethical conduct of research is an on-going process. The *National Statement on Ethical Conduct in Research Involving Humans* requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. The attached report form must be completed at least annually, and at the end of the project (if it takes more than a year), or in the event of any changes to the research as referred to above, in which case the HREC Secretariat should be contacted beforehand.

I also refer you to the AVCC guidelines relating to the storage of data. The University requires that, wherever possible, original research data be stored in the academic unit in which they were generated. Should you submit any manuscript for publication, you will need to complete the attached *Statement of Authorship, Location of Data, Conflict of Interest* form, which should be retained in the School, Faculty or Centre, in a place determined by the Dean or Director.

Please complete the attached (green) report form at the appropriate time and return to the HREC Secretariat in the Research and Development Office, Broadway. In the meantime, if you have any queries please do not hesitate to contact either myself, or the Research Ethics Officer, Ms Louise Abrams on 02 9514 9615.

Yours sincerely,

Associate Professor Jane Stein-Parbury
Chairperson, UTS Human Research Ethics Committee

Appendix 5 List of Publications

The following papers have been published from this research project

1. Sarosa, S. & D. Zowghi (2005) 'Information Technology Adoption Process within Indonesian SMEs: An Empirical Study', in *The Proceedings of The 16th Australasian Conference on Information Systems (ACIS2005)*, Manly, Australia, 30 November - 2 December 2005.
2. Sarosa, S. & J. Underwood (2005) 'Factors Affecting IT Adoption within Indonesian SMEs: Manager's Perspective', in *The Proceedings of The 9th Pacific Asia Conference on Information Systems (PACIS 2005)*, Bangkok, Thailand, 7-10 July 2005.
3. Sarosa, S. & D. Zowghi (2005) 'Recover from Information Systems Failure: An Indonesian Case Study', in *The Proceedings of The 2nd European and Mediterranean Conference on Information Systems (EMCIS 2005)*, Cairo, Egypt, 7-8 June 2005.
4. Sarosa, S. & D. Zowghi (2003) 'A Strategy for Adopting Information Technology for SMEs: Experience in Adopting Email within An Indonesian Furniture Company', *Electronic Journal of Information Systems Evaluation*, **6**(2), pp. 165-176. Available online at <http://www.ejise.com/volume6-issue2/issue2-art18.htm>
5. Sarosa, S. & D. Zowghi (2003) 'A Strategy for Adopting Information Technology for SMEs', in *The Proceedings The 10th European Conference on Information Technology Evaluation (ECITE 2003)*, Madrid, Spain, 25-26 September 2003.