Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Massey University
Library

Help Desk Support Models

A thesis presented in partial fulfilment

of the requirements for the degree of Masters of Information Systems

At Massey University, Palmerston North

New Zealand

Dora A.Y. Yap

2005

MASSEY UNIVERSITY LIBRARY
1061777790

ABSTRACT

In the early 1980s some clerical workers, engineers and a few so-called "leading edge" managers and professionals started to use computers in their daily jobs. This is in contrast to today's office environment where the computer is the standard desktop equipment in most offices. In response to the increasing demand for support of this desktop equipment, Help Desks were formed. Help Desks have since become an important function of the organisation and have been the subject of much research on topics such as the ratio of Help Desk staff to users, the prescriptions and functions of Help Desks, and user satisfaction with Help Desk support.

This research investigates the efficiency of the Second Level Help Desk Support Models, and user satisfaction rates for these models. This study focused on surveying a large financial organisation in New Zealand in order to find out if the In-house Help Desk Support Model has a higher level of user satisfaction or is more efficient than the Outsourced Help Desk Support Model.

Overall, the results of the survey showed that there is no difference between the In-house and the Outsourced Help Desk Support Model in end user satisfaction and efficiency. Both statistical and qualitative studies supported these conclusions.

As this survey was exploratory in nature, there is opportunity for researchers to explore and expand this research to cover a wider group of end users across different industry types, ranging from large corporations to small or medium-sized companies.

ACKNOWLEDGEMENTS

I wish to give my heartfelt thanks to the following people for their help, support and encouragement that has been shown to me in completing this thesis.

To Peter Blakey, my supervisor, for your guidance, advice, inspiration and wisdom throughout this journey. For your meticulous, reliable and prompt attention to my many queries and your patience and careful editing of many drafts of my thesis is greatly appreciated.

To the Information Systems Department, Student Learning Services and staff at Massey University for their assistance in statistical analysis and venue bookings.

To the organisation I am employed with for sponsoring and participating in the study. To all the users who participated and provided the data on which this survey was based.

To Lennie Kuah, my husband for his constant encouragement, understanding and support, without you, this thesis would not have been completed.

Finally, to my little sunshine, Shannon Kuah for your constant smiles, love and understanding when mummy had to study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 INTRODUCTION

This chapter first describes the importance of Help Desk Support and provides the justification for this research. It then states the research objectives and briefly describes the limitations of this study and the research question. Finally it introduces the organisation of this thesis.

1.1 The importance of Help Desk Support

Govindarajulu (2002) states that Help Desks have long been the standard source of support for End-User Computing (EUC). Even though they are also known as Information Centres (ICs), Call Centres, and PC support centres, their primary function is to help users help themselves (Govindarajulu, 2002).

According to Lamb and Davidson (2000, p. 259), EUC has emerged as an "insurgent, grass roots action, resited by the Information Systems (IS) department". As a result, support structures have started to emerge, which are the ICs staffed by users and IS personnel. ICs are a framework that facilitates and manages the computing capabilities of end users. They are fundamentally consulting and service facilities that allow end users to access their own data. They also provide training and guidance for end users to achieve the right mix of hardware and software.

Govindarajulu and Lippert (2002) claim that research has indicated that there are five main support sources available to end users today:

- Help Desks (also known as Information Centres or PC support centres)
- Local MIS staff
- Informal assistance from friends and colleagues
- Online assistance (i.e. the Internet and its various search engines and support groups, e.g. MSDN for Microsoft operating systems, Google and Yahoo search engines).
- Vendor or third party support

A common business decision today is for organisations to outsource either part or all of their IC to a third party vendor as a means of effectively managing their EUC support functions. Selecting an appropriate vendor and preparing a detailed contract (together with a well defined Support Service Level Agreement) are keys to forming a cost-effective and productive partnership that gives both the organisation and the vendor a competitive edge.

1.2 Justification of Research

EUC technology has permeated all aspects of organisations' operations and has a profound impact on the ways that businesses are conducted. In today's corporate world where the personal computer is the standard office equipment and end users are more aware and knowledgeable of computing technologies, the basic support provided by an IC is limiting. According to Wu, Chen and Lin (2004), in today's working environment, knowledge workers are increasingly using more sophisticated tools to develop their own information systems in order to manage their work effectively. EUC acceptance has become one of the critical success factors in achieving business success and advantage; it has become a fundamental part of most organisational plans. EUC therefore deserves to be supported and its success is beneficial to an organisation.

Rivard (1987) supports the principle that users should be made responsible for justifying their consumption of EUC tools and services. As cited by Harris (1992), Gunton (1988) argues that end users should be given full responsibility for justifying their systems and that it is the end users who should advertise the benefits that they have enjoyed in order to continue receiving support for their EUC activities. The IC too should play an active role in this support activity.

As expenditure is channelled into EUC by means of hardware, software, and personnel investments, organisations should ensure that the expenditure does result in worthwhile returns on investment and that the returns are measurable (Harris, 1992). Therefore, the measurement of end user satisfaction is a key concern for management that has authorised and is accountable for the expenditure. Some

researchers have consistently pointed out users' dissatisfaction with the services provided by the ICs (Bergeron, Rivard and Serre, 1990; Rainer and Carr, 1992).

Harris (1992) states that *end user satisfaction* is still a useful instrument for measuring IC effectiveness. Previous researchers have used it, and successive refinements to the instruments often provide more reliable and improved results. It is relatively easy to measure, takes into account intangible returns, and it appeals to a common-sense view of effectiveness. However, end user satisfaction relies on individuals' perceptions that may be flawed or limited, and it does not provide a single yardstick against which different users' experiences can be measured. Yet in the absence of a more reliable means of measuring intangible benefits, end user satisfaction remains a practical measure of IC success.

1.3 Research Objectives

The objective of this research project was to determine if there is a difference in user satisfaction in the In-house Help Desk Support Model and the Outsourced Help Desk support Model. The research project surveyed an organisation in New Zealand where both Help Desk Support Models are used.

1.4 Limitations of the Study

As mentioned previously, in the absence of a more reliable method of measuring Help Desk success, end user satisfaction is by far the most common and practical measure of Help Desk success.

Doll and Torkzadeh (1988) have developed an instrument to measure the "computing satisfaction" of an end user with a specific application. However, as with Mirani and King (1994a), this research project adopted a more general instrument with the intent to measure end users' overall satisfaction with their Help Desk. The survey questionnaire measured the overall success and some factors that may have an impact on the overall success. The list was not exhaustive, and it was only what was deemed appropriate to the organisation that was being surveyed.

The sample size for this study was relatively low. Due to management issues, this survey was narrowed down to study only Second-level support. Hence, the test results from the First-level of support were not analysed, as the First-level of support was outsourced. The majority of the respondents were end users, hence a selection of other categories of end users such as middle management and more senior management would have been beneficial to the study as this may have provided a different view on the Help Desk's effectiveness and its support services.

1.5 Research Question

The research question was to investigate whether an In-house Help Desk Support Model is more effective than an Outsourced Help Desk Support Model in its support services. This was measured using a user satisfaction instrument.

1.6 Organisation of the Thesis

This first chapter of this thesis has introduced the project objectives, and will be followed by the literature review in Chapter 2. The research methodology and design will be detailed in Chapter 3, leading on to Chapter 4 which presents and discusses the results after analysis. Chapter 5, the final chapter, describes the conclusions drawn from the study. It also discusses its implications and gives suggestions for future research.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

With the wide proliferation of EUC, providing effective EUC support to end users is very important and cannot be overemphasised. EUC Support has received much attention in recent years (Chau, 1997; Govindarajulu and Reithel, 1998; Guimaraes, 1996; Guimaraes, Gupta and Rainer, 1999) and has been long considered one of the critical success factors of successful EUC (Nilsen and Sein, 2004). How best to provide such support, or what constitutes effective support, still remain very much unanswered questions. A variety of very innovative approaches have been used with different degrees of success. Among them are ICs (Brown and Bostrom, 1994; Rivard and Huff, 1988), centralised Help Desk (Poltnick, 1999), and using end users themselves to provide the first line of help to fellow colleagues (Nilsen and Sein, 2004). While the term "EUC Support Group" varies from organisation to organisation, common terms such as "IC" are widely recognised. The term "IC" stands for a separate organisational unit that provides support for a wide variety of tasks (Guimaraes, 1996). The IC is a physical facility where end users can access hardware and software, receive assistance in application development and obtain training (Sprague and McNurlin, 1986; Watson and Carr, 1987).

The advancement of telecommunications technologies has caused the management of EUC to become increasingly important in most organisations (To, 2002). The establishment of an EUC support group helps organisations to minimise risks and maximise gains for EUC activities (To, 2002; Govindarajulu, Reithel and Sethi, 2000). Several authors have acknowledged that the expansion of EUC activities requires substantial investment in personnel and support facilities (Guimaraes, 1996; Igbaria, Guimaraes and Davis, 1995; Van Kirk, 1995). Given the importance of support and management of EUC, the ability to assess the performance level of IC deserves careful management attention (Magal, 1991, Chau, 1997). In order to understand the importance of managing EUC support, the origins of the IC need to be understood and, as well as how it influenced the formation of the Help Desk. The first section of this chapter introduces the concept and origins of the IC. The next section describes trends in ICs, how the Help Desk was formed, and the more recent

outsourcing of the Help Desk. Finally the last section reviews past literature on the critical success factors of EUC Success, IC or Help Desk success and End User Satisfaction.

2.2 Information Centres and their origins

This section provides a definition of ICs, and describes the origins and objectives of the IC. It will also discuss some of the benefits, risks and issues faced by an IC.

2.2.1 Information Centres Definition

Hammond (1982) describes the IC concept as a portion of the IS Department, being organised and dedicated to support end users in activities such as report generation and modification, data manipulation and analysis, and inquiries.

Other researchers have defined an IC as a centrally located group of personnel, distinct from the rest of the Information Technology (IT) staff, to whom users can come for guidance and support concerning the selection and use of appropriate hardware, software, and data (Gerrity and Rockart, 1986; Yip, To and Ma, 1993).

According to Yip et al. (1993), in response to the importance of EUC, many organisations have created ICs that are called "PC Support Groups" or "Office Automation Support" as a means for formal support and facilitation of EUC.

2.2.2 *Origins of Information Centres*

In 1974, IBM-Canada introduced the IC concept as an attempt to address the industry-wide IS development backlog. Like many other organisations, IBM discovered that the MIS organisation was unable to respond to a large number of requests for new systems. ICs were installed at IBM and other organisations to support EUC (Carr, 1987).

After its internal success with the concept, in 1979 IBM started to present the idea to its customers, initially in Canada and then in the United States (Carr, 1987).

The following figure (Figure 2.1) depicts the IBM/Hammond model of the IC, which includes specific areas of support premises, Data Processing (DP) options, management issues and benefits. Hammond (1982) provided a prescription for IC supporting services, staffing ratios, job descriptions, control policies/procedures and organisational design guidelines.

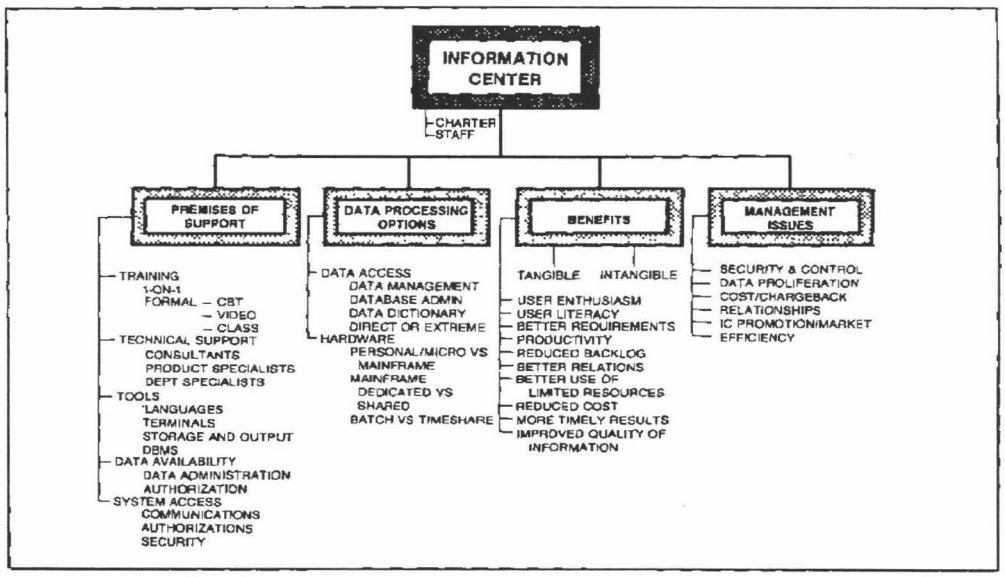

Figure 2.1 IBM/Hammond IC Model (Carr, 1987, p 327)

After its inception, the IC concept became popular and widespread among organisations (Govindarajulu and Reithel, 1998). This was because the IC was seen as an important response to the need to support EUC in most organisations (Crwth Computer Courseware, 1985; Guimaraes, 1996).

2.2.3 Objectives of Information Centres

The fundamental objective of an IC was to help users help themselves (Govindarajulu and Reithel, 1998; Leitheiser and Wetherbe, 1985). Hammond (1982) states that the fundamental premise of ICs was that if proper education, technical support, usable tools, data availability, and convenient access to the systems were provided, users might directly satisfy a part of their business area requirements.

According to Brancheau, Vogel and Wetherbe (1985) and Sumner (1985), IC responsibilities and services include:

- Training
- Consulting
- Technical support
- Hotline/Help Desk
- Newsletter
- Data administration
- Software evaluation
- Debugging assistance
- IC clearing house
- Support for prototype development and data dictionary
- Documentation support for user application

As Nunamaker, Konsynski, Chen, Vinze, Chen and Heltne (1988) point out, the IC concept can be interpreted differently by different organisations. Carr (1987) states that the objectives of an IC are: more competent users, better information, an enhanced view of DP and enhanced computer literacy among users.

Nunamaker, et al. (1988) grouped the various definitions and perspectives into three main areas:

1. Consultation: IC personnel worked with end users to help them analyse their problems and clarify their computing needs. In particular, assistance was provided for the selection of hardware and software to perform a given task.

2. Distribution: The IC functioned as a centre for controlled distribution of end user tools (this includes both hardware and software). This distribution control allowed ICs to monitor tool usage and to respond better to the needs of the end user community. The distribution of software by the IC facilitated the management of new releases of software and ensured the use of legal versions of the software.

3. Help Service: Users approached the IC with specific problems and the IC provided them with troubleshooting expertise. Ongoing support was also provided to users to help them learn hardware and software using tutorials and other training programs conducted by the IC.

Research had indicated that the help service (i.e. the Help Desk or technical support provided by ICs) was perceived by users as the most important function of an IC (Brancheau et al., 1985). Carr and Rainer's (1993) survey of 126 ICs also confirmed this. The help services expected from ICs were diverse and included both hardware and software related questions. The difficulty of providing these services to users was that the expertise had to be "on-call". This was, however, not always possible, and was becoming increasingly difficult as the ICs supported more users (Gerrity and Rockart, 1986; Watson and Carr, 1987). To overcome this, Canning (1981) suggested implementing telephone "hotline" assistance.

2.2.4 Benefits of Information Centres

Carr (1987) describes the advantages of having an IC as including improving the relationship between the users and the IS organisation, and insulating the programmers and analysts from any unscheduled development work. EUC has many benefits including increased user productivity and user satisfaction, and decreased information systems backlogs (Brancheau et al., 1985; Lee, 1986; Leitheiser and Wetherbe, 1986; Rivard and Huff, 1984). A number of authors have reported that the establishments of ICs can alleviate some EUC problems (Guimaraes, 1996; Guimaraes and Igbaria, 1994; White and Christy, 1987; Cheney, Mann and Amoroso, 1986).

Guimaraes (1996) examined companies with EUC support groups and found six different IC forms:

1. Each user department with their own support group
2. Support group was attached to one or more user department
3. IC was attached to the IS department
4. The IS department provided support without a separate unit
5. Support was outsourced
6. IC was a separate organisational unit

Guimaraes et al.'s (1999) study shows that as EUC continues to expand (i.e. based on LAN, client-server configuration, internet and intranet applications), most organisations are increasing their budgets to support and manage EUC. In addition, the study also illustrates that having some type of support group is better than no support, and such support is generally cost effective.

McLean and Kappelman (1992-93) concluded that firstly, the convention of defining EUC in terms of specific applications is fast becoming obsolete. EUC is rapidly becoming a direct extension of corporate computing, undifferentiated by hardware or software considerations, only distinguishable by its reporting relationship within the organisation. Any application or activity where it is outside the direct control of the information systems function is EUC. Secondly, McLean and Kappelman conclude

that information system executives see EUC as converging with corporate computing from the opposite direction. Corporate data processing began with transaction processing and structured computing activities, progressed through time-sharing and ICs, then moved to support more unstructured activities, and is now becoming more routine and even transaction-related. Hence, EUC seems to be the "mirror image" of corporate computing. Thirdly, they conclude that these developments in EUC definitely contribute to the success of their organisations, and that this contribution will most likely grow in the future.

Despite all the abovementioned benefits, ICs were faced with issues and risks, which are discussed in the next section.

2.2.5 Risks and Issues

EUC had precipitated a number of critical issues such as data management, education of end users, evaluation, justification, chargeback of end user developed applications, and coordination and control of end user activities and planning for EUC (Benson, 1983; Henderson and Treacy, 1986; Sprague and McNurlin, 1986; Guimaraes and Igbaria, 1992).

According to Gerrity and Rockart (1986), although both support and control were important, there were several weaknesses of the usual IC implementation. Guimaraes et al. (1999) share the view that EUC entails risks and controls, namely in the areas of control of purchasing policies and procedures, sharing of resources and the quality of systems and information. Others such as Igbaria et al. (1995), and Sherman (1994) claimed end user support was a critical area of concern. Large organisations' expenditures on technology, and the expanding role of EUC as a component of departmental and corporate-wide IS activities had forced organisations to control costs and ensure that existing resources were used effectively.

Gerrity and Rockart (1986) summarised the risks as:

- The IC was usually structured as a centralised organisation. However, users preferred and needed localised support.

- Even though the IC was strong on technological and software product knowledge, most IC personnel often did not have functional or applications knowledge, which were the end user's primary concern.

- The IC was part of the central IS department. Any user influence on its design, procedures and services could only be minimal. In addition, it might not have the full support of IS management and therefore might be viewed as an experimental soothing of user demands.

- Often the IC represented only one or two of the four major EUC technologies: time sharing, communications networking, personal computers, and office systems. For effective end user support, all four must be managed in coordination.

- The IC was often seen as reactive to user needs, even though the Information Era technology presented many opportunities that might not be recognised by technologically unsophisticated users. Proactive management efforts to identify and rank high payoff opportunities had been useful in organisations.

- More importantly, the IC was a solution expressed in terms of organisational structure, and this structure should have reflected strategy. Sadly, as observed by Gerrity and Rockart (1986), most organisations neglected the first step, which was the development of a strategic direction for the exploitation of Third Era technology where end users' capabilities were focused on information, problem-solving, and communication needs for an organisation's decision makers.

2.3 Trends in Information Centres

This section describes trends in ICs from the early years to the most recent, including the creation of Help Desks and the Outsourcing of Help Desks in organisations in an attempt to reduce costs and concentrate on "core" business.

2.3.1 The early years

Although ICs could be traced back to the 1970s, Panko (1988) believes that the first EUC applications appeared in the 1960s and perhaps even in the 1950s. With few exceptions, Panko surmises that problems in the past were very similar to those of today's end users.

2.3.2 1970s era

In the 1970s, a number of line and staff managers began using computers. The falling cost of the computer made "inefficient" development and execution somewhat more acceptable to the DP department, so end users were allowed to write some small programs. Service bureaus started to offer time-shared hosts, which provided much easier application development than the batch processing hosts that were then used in most organisations. In addition, many organisations had started to introduce time-shared host computers by the end of the 1970s. Fourth Generation Language tools such as report generators allowed users to develop small applications with only an average amount of training. By the late 1970s, many application packages such as financial and statistical analysis programs and graphics programs joined the earlier fourth-generation language tools. The DP department was unable to keep up with the stream of job requests from the users, and a large backlog of requests appeared in nearly every organisation (Panko, 1988).

As mentioned previously, in the early 1970s, IBM-Canada introduced an "IC" to cater for its internal needs. The concept was so successful that IBM began promoting the IC to its client base, firstly in Canada and then subsequently in the United States (Panko, 1988).

2.3.3 1980s era

Technological Changes

In the 1980s, the rapidly changing end user technological environment caused an overall lack of EUC support services in organisations. Although Personal Computers (PCs) had been on the picture since the mid 1970s, their processing power was somewhat low, and their role in corporate life was also limited. However, when IBM introduced the IBM Personal Computer (PC) in 1981, the first of a new generation of machines that broke the traditional 64KB barrier for internal memory, it therefore facilitated the creation of powerful and easy-to-use software. The combination of the IBM brand and new processing power soon produced a flood of personal computers in organisations (Panko, 1988).

The centralised IS department was quickly numbed by the shock of integrating hundreds of these small machines which soon required large amounts of technical competence for proper selection, setup and maintenance. This need was complicated by the vast amount of hardware and software options on these machines. Training and consulting needs were growing enormously because most users were complete novices. Even when these users had achieved working competence, they were constantly moving up to new levels of skills that required new training and consulting (Panko, 1988).

Organisations were then faced with the problems of time-shared host computing and the large number of PCs, compounded by support issues and the diversity of PC options. Few organisations had time to do more than basic support for PC users. Brancheau and Brown (1993) in their review of the 1980s literature highlight the overall lack of support services for EUC that existed in organisations. A survey conducted by the University of Minnesota in 1983 found that management of EUC was ranked the second most important issue behind IS planning (Dickson, Leitheiser, Wetherbe and Nechis, 1984). This growth of interest was translated into action by many large organisations. By 1985, researchers had shown that at least half of all large organisations had already formed an IC (American Management Association, 1985; Crwth Computer Coursewares, 1985; Guimaraes, 1984; Leitheiser and Wetherbe, 1985).

In many organisations, the IC became the focal point for supporting all managerial and professional applications. This included both decision support systems (DSSs) and executive information systems (EISs), as they required more sophisticated programming beyond the capabilities of most end users. DSSs were typically developed for a specific problem and EISs were designed to provide specific information for senior management to make informed decisions. Spreadsheet programs were general-purpose modeling and analysis tools that were used to support DSSs and EISs. Office Automation (OA), such as word processing for writing a document, distribution of documents through electronic mail, or placing documents in a work group document base or repository for later retrieval, also joined the list of support services provided by the IC. Hammond (1982) provided prescriptions for IC support services, staff ratios, job descriptions, control policies/procedures and organisation design guidelines. One of its most important tasks was to maintain a balance between support and control.

Help Desk

By the middle of the 1980s, support had grown to include Help Desks, training, personal computer libraries, and to a lesser extent, user groups (Benson, 1983; Guimaraes and Vsaudevan, 1986). In the late 1980s, computer vendors such as IBM and Digital Equipment drove the formalisation of the Help Desk when they announced maintenance discounts for any company that would channel all end user problems through a central problem management group (Kendall, 2002).

2.3.4 1990s era

EUC had gone through phenomenal growth and change. Benjamin (1982) reported that in 1981, Xerox Corporation estimated that 25% of the company's computer resources were dedicated to EUC and that the percentage would triple by 1991. Rockart and Flannery (1983) further reported that EUC would consume between 40% and 50% of the computing resources in several companies surveyed and that it

was growing at a rate of between 50% and 90% per year. Similar results were reported by Benson (1983).

In the study by Doll and Torkzadeh (1988), 75% of the users used mini or mainframe computers and 25% used microcomputers. By 1991, Amoroso and Cheney (1991) reported that 12% of users used mainframes, only 1% used minicomputers and 32% used microcomputers. Igbaria et al.'s study (1995) concentrated on microcomputers only. In the study of EUC satisfaction by Etezadi-Amoli and Farhoomand (1996), 85% used microcomputers. Annual shipments of PCs grew by 100% in the mid-1980s, and by 1995 they had reached 48 million (Strassman, 1997). EUC had entered a new era and was now dominated by the PC (Harris, 2000).

As depicted in figure 2.2, in 1985 the American Management Association estimated that 40% of all organisations had established an IC. However, since then the percentage of organisations with an IC had grown to 58% in 1991 (Crwth Computer Courseware, 1990) and to 78% in 1996 (Guimaraes, 1996).

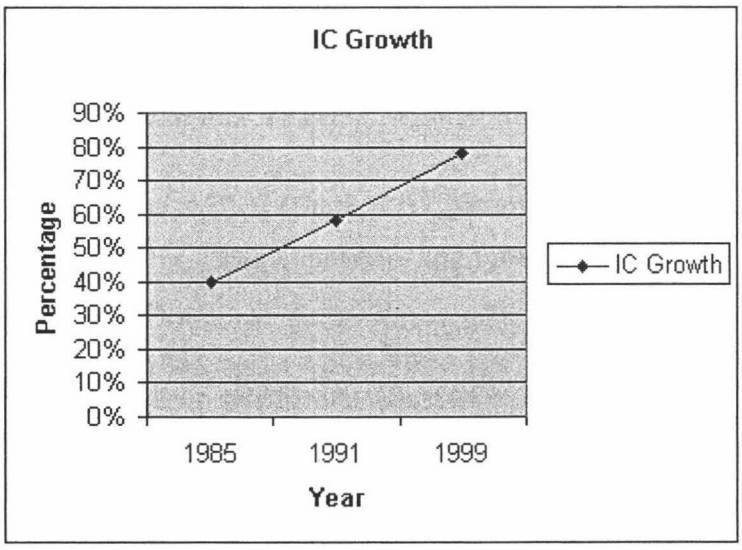

Figure 2.2 EUC Growth

McLean, Kappelman and Thompson (1993) concluded that EUC was evolving, it was becoming more successful, it would contribute even more to the success of the overall organisation in the future, and its domain was expected to continue to expand.

Guimaraes (1996) confirmed that EUC had become more pervasive in organisations, its diversity growing along different dimensions.

According to Guimaraes (1996), while the title of the EUC support group varied in organisations, the term "IC" had become widely recognised. The term IC stood for an EUC support group, performing a wide variety of tasks, and was organised as a separate organisation unit or located within an MIS or user department. Such a diverse range of IC deployment alternatives implied the difficulty in supporting EUC activities and the complicated nature of ICs (To, 2002). Other support issues raised were the overall lack of support services (Brancheau and Brown, 1993), the continuous need for ICs to provide support for end users (Guimaraes, 1997; Guimaraes and Igbaria, 1994), and as in the trend carried from the 1980s, IC support functions were still not meeting end user needs, which might vary depending on the end user and IC maturity (Mirani and King, 1994a, Rainer and Carr, 1992), and the various services and support provided by ICs (Carr, Young and Rainer, 1990; Khan, 1992).

Cale (1994) reported that 60% of managers viewed EUC support as inadequate even though there was documentation to prove the necessity of support and proper management of EUC as being essential for:

- effective EUC (Clark, 1992; Garavan and McCracken, 1993a, Guimaraes and Igbaria, 1996; Guimaraes and Igbaria, 1997; Marcolin, Munro and Campbell, 1997)

- end user satisfaction (Buyukkut andVass, 1993; Lane, Palko and Cronan, 1994)

- a smooth transition to a global organisation (Bento, 1995; Bryan, McLean, Smits and Burn, 1995; Igbaria and Zviran, 1996; Yellen, 1997).

Moreover, researchers were also noting that some types of support might be better than others and that the "one size fits all" approach to EUC support might not work given the diversity of needs and abilities of end users and/or the needs of the organisation itself (Aggarwal, 1994; Bowman, Grupe, Lund and Moore, 1993; Govindarajulu and Reithel, 1998, Munro, Huff, Marcolin and Compeau, 1997; Speier

and Brown 1997). A primary method of providing support for end users had been through training, and several researchers stated the importance of training for end user productivity and EUC success (Abdul-Gader, 1992; Lundgren and Lundgren, 1996; Zinatelli, Cragg and Cavaye, 1996). However, even the effectiveness of the training was being questioned. For instance, the need for more training and its advantages and disadvantages were examined (Chidambaram, 1999; Garavan and McCracken, 1993b). Only Nord and Nord (1994) survey reported that 75% of respondents did receive training for EUC.

Help Desks

Govindarajulu (2002) claims that Help Desks had long been the standard source for EUC support and were also known as ICs, call centres or PC support centres. Their primary function was to help users help themselves.

Powell and Moore (2002) inferred that some organisations might be dissolving ICs but retaining IC functions under other IS units such as Help Desks and training groups. Guimaraes (1996) reported that there was a shift of EUC support functions from ICs to other IS units or to outside vendors.

According to Kendall (2002), the Help Desk industry was much more mature in the 1990s and was now playing a very significant role in many businesses. Technology was part of every business, often indispensable, and sometimes even part of the product, even in non-technology companies. The early 1990s were the Help Desk boom time, the era where Help Desks became common and were also known as customer support, network support, production control or client services. Help Desks were starting to influence alongside the spread of PCs in businesses (Kendall, 2002).

Figure 2.3 shows the basic evolutionary steps of the Help Desk from the days of simple call logging to becoming a business productivity enhancement driven operation.

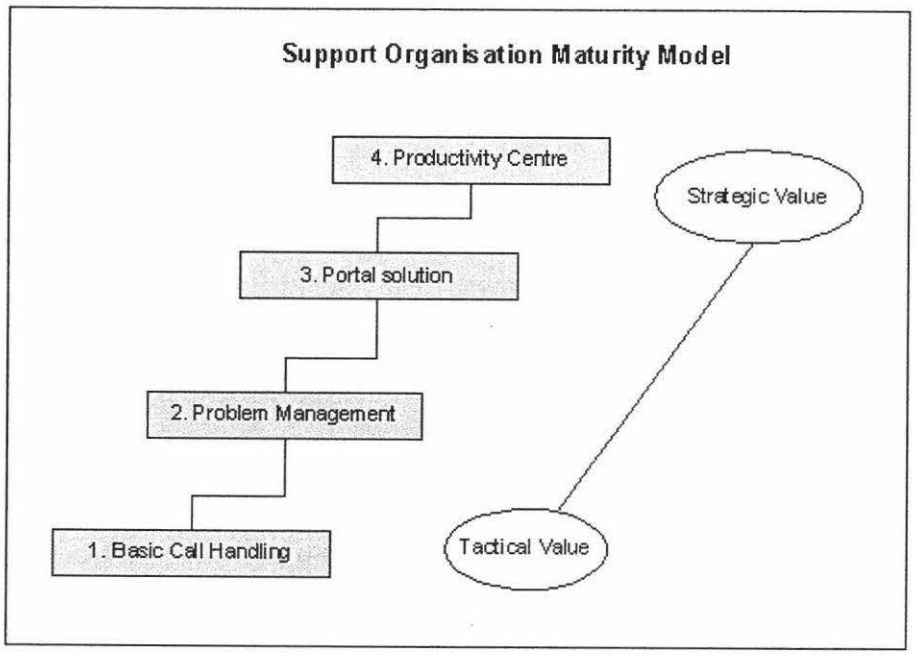

Figure 2.3 Support Organisation Maturity Model (Kendall, 2002, p 8)

In the early years of Help Desk Support (Stage One), most Help Desks performed very basic call handling. In the early 1990s a number of software products helped improve the automation of incident tracking and problem management, and this became known as Stage Two of the Help Desk Support Management maturation (Kendall, 2002). Stage Three saw support organisations having a more strategic value as they started to learn to use new tools to manage the support functions. Kendall saw the mid to late 1990s as a consolidation period for Help Desks where there was a wider focus on service in business. This set a trend towards the final stages that led to much of today's more sophisticated IT service and support desks. The late 1990s period also saw the rise of the first outsourcing of support operations alongside the general move to outsource IT as a "non-core" business. Many of the outsourcing Help Desk companies were formed in the 1990s. Organisations such as EDS, IBM and Computacenter started to drive much of the support thinking for IT businesses. Help Desks were starting to merge together, realising that the process

was the same and savings of scale could be made through combining units of support (Kendall, 2002).

Levine (1997) describes the Help Desk of the 1990s as one that did not merely record and monitor the problem but one that had problem management and resolution capabilities. The Help Desk was also being used by other IS support personnel, IS management, end user peer-support staff, power users and third-party service providers. Hence, Help Desks were becoming strategic ICs often incorporated into corporate intranets.

Levine (1997) also mentions that beyond internal needs, many organisations had extended their Help Desk services to customers and clients to improve service and support. Their mission was to:

- Solve problems
- Increase the first-call success rate
- Leverage organisational knowledge
- Leverage staff
- Offer greater flexibility in staffing skills
- Improve quality and consistency of support
- Transfer resource allocation to high-value activities
- Determine end user training requirements

2.3.5 2000s era

The Help Desk industry was now mature and played an important role in many organisations. Technology was part of every business and was quite often part of the product, even in non-technology organisations. Support, alongside remote help, control and self service, and support software availability had started to rise to the top of business agendas after the "Year 2000" issue and the dotcom boom and crash, which had given the whole industry a difficult time over the last few years (Kendall, 2002).

Help Technology Gets More Sophisticated

According to META Group (META Trends 2004/05 - Operational Strategies, 2004), a leading USA-based provider of information technology research, advisory services and strategic consulting, although 80% of IT Help Desks will reach maturity as full service centres in 2004, the adoption of multiple interaction channels will continue to evolve slowly, with the implementation of important alternative services and support channels occurring in less than 10% of Help Desks. META Group further predict that through 2005/06, support demands will continue to grow (20% annually), driven by common infrastructure and application support, embracing larger business process support requirements. Sustained growth and requirements for low-cost resources will drive IT service and support centres to embrace and evolve delivery processes and methods, leveraging of automation and service-enabled infrastructures, by 2007 (META Trends 2004/05 - Operational Strategies, 2004). As organisations try to cut down on Help Desk costs, a number of "measures" have been developed. One example is the deployment of BellSouth's Fast Access digital subscriber line group that utilises tools that analyse and help repair customer machines without a technical support person having to "walk" the customer through the procedure. It deploys "self-healing" software from Support.com Inc. that resides on the customer's desktop and resolves any connectivity problems. If a customer has a slow connection speed, the software will first look at the desktop and download the necessary drivers before moving on to search for any problems in the network. Another solution is to allow technicians to spend more time fixing computers and less time traveling to those

computers, which is achieved using remote diagnostic and repair technology that is able to work on increasingly complex problems. An example of such an implementation is at the Regional Centre at Memphis where software from Magic Solutions is able to reach out to computers on the Tennessee medical centre's network, analyse problems and create fixes for computer-based problems. It is claimed that more than three-quarters of the medical centre's support calls are now resolved on the telephone in about 15 minutes, which previously would have required a visit from the technician, often taking as much as two hours of a technician's time. This time difference is critical in an environment such as a hospital (Sweat, 2001).

Outsourcing

A growing trend in recent years has been to outsource either the Help Desk function individually, or the whole IT operation inclusive of the Help Desk. Outsourcing is a contractual agreement for the provision of services and goods by one or more suppliers for activities and/or processes that were previously in-house. It may involve the transfer or sale of certain assets and the assignment of personnel.

Reasons for Outsourcing

Since the introduction of IT outsourcing a decade ago, there had been much research completed in the area of outsourcing. Among the more common investigations are the reasons why companies outsource, the types of outsourcing contract and the ingredients of a successful outsourcing arrangement. The commonly cited reasons by Lacity and Willcock (1998) and Casale (2001) for IT outsourcing are:

- Cost Reduction
- Improve quality, service and delivery
- Improve organisation focus
- Increase flexibility
- Facilitate changes in problem areas
- Access to specialised skills and technology

Although organisations outsource for a variety of reasons, industry watchers generally attribute the growth of IT outsourcing to two primary phenomena: a shift in business strategy to concentrate on core business, and the unclear value delivered by IT. For instance, senior executives in many organisations view IT as an overhead – an essential cost but nevertheless one to be minimised (Hirschheim and Dibbern, 2002).

Help Desk Outsourcing

Grupe (1997) describes some of the reasons for outsourcing the Help Desk:

- Business Size and Needs
- Performance
- Cost accounting
- Service demands

Business size and needs

Grupe (1997) noted that some businesses were just too small to provide adequate staff support, and in instances like these, outsourcing offered a range of service options that may not be cost-effective to be installed in small businesses. Another reason for outsourcing is to avoid the necessity of staffing and managing the unit, thus saving a considerable amount of time in scheduling, training, hiring and coordination of the department.

Performance

Outsourcing could sometimes be viewed, as an alternative to what are perceived as ineffective, unresponsive IS departments. Help Desks are often faced with problems such as poorly trained staff, improperly motivated staff and staff recruitment and retention problems (Grupe, 1997).

Cost Accounting

In-house Help Desks were quite often budgeted as a general expense overhead, which did not encourage judicious use of Help Desk resources. An outsourcing arrangement would cause most organisations to focus their attention on the essential services (Grupe, 1997).

Service Demands

Some organisations used outsourcing vendors to provide specific services for the in-house Help Desk, including specialty areas (i.e. hardware or software acquisition), coverage during peak periods (i.e. Christmas season) and/or non-business hours (Grupe, 1997).

This might not be appropriate for all organisations, but it did bring measurable benefits to some. The major areas of benefit were related to economies of scale and the advantages of utilising a specialist and focused provider. However, it was important that there was no illusion with respect to Help Desk management: ultimate responsibility for the Help Desk was retained. Poor Help Desk provision would adversely affect the Help Desk provider, not only the outsourcing firm. As the running of the Help Desk was still of substantial importance even when it was outsourced, appropriate management structures and agreements still had to be firmly in place. This process was critical; it could not be overlooked, and there was no scope for short cuts. The outsourcing arrangement had to be properly documented and controlled. The service had to be strictly defined, and a formal service level agreement had to be in place, with of course a legal contract. Equally, the operation had to be carefully planned, with a formal transition plan. Full audit capabilities also had to be available.

Outsourcing Trends

Mc Neil (2004) in his Giga Research reports that the desktop outsourcing market will be influenced by the following trends:

- An increase in the number of vendors offering bundled outsourcing services for desktop, Help Desk, server and local area network (LAN) management.
- The growth of standardisation of service offerings within the market and the increase in the use of internal service catalogs to make comparisons between internal and external sourcing more easily.
- An acceleration in vendor consolidation.

McNeil's report also predicts a compound growth rate of 5% in 2004 in the desktop outsourcing market. With the increased attention of IBM, EDS and HP pushing for "workplace on demand" messaging, this will further drive organisations to consider desktop management as a candidate for outsourcing. Market growth in Europe will most likely be similar to the United States in the desktop outsourcing market even though there has been a drop of 20% in the past 18 to 24 months.

McNeil (2004) reported that service-level agreement (SLA) standards are rising as a result of increased competition, improved systems management tools, standardisaton and commoditisation and customer demands for high quality. As outsourcing providers face increased pricing pressures from customers, they will be bundling higher-margin services, such as LAN management, server management, Help Desk and asset management into their desktop outsourcing offerings, providing prospective customers with a very rich set of service offerings to choose from (McNeil, 2004).

Vendors such as Dell and EDS have partnered to offer a standard desktop outsourcing package that is below US$100 per seat per month. As outsourcing vendors come under pressure to reduce costs, many are shifting low-margin processors to third parties. Examples of these are IBM Global Services, CSC and

EDS who are increasingly subcontracting lower-end offerings such as break/fix and on-site install, move, add, and change services to companies such as CompuCom, Getronics, Unisys and BancTec. The increased number of vendor offerings will drive lower pricing and reduced margins (McNeil, 2004).

New Zealand Trends

IDC New Zealand (2003) reported that in 2002 the IT outsourcing market had been flat and reported a 5.5% growth in 2003. IDC New Zealand predicts a moderate growth for the New Zealand IT services market over the next five years (2002 to 2007). IDC forecasts that the New Zealand IT services market will increase to $2.5 billion at a 6.1% compound annual growth rate (CAGR) over the full five-year period ending in 2007. Economic and geopolitical concerns will ensure that businesses will continue a conservative approach to IT spending.

Key trends in the IT services market as reported by IDC New Zealand (2003) include the following:

- Outsourcing of all types is becoming a driver of industry growth as organisations continue to hand off an increasing portion of their IT responsibilities to external providers.
- A shift in corporate budgets from internal to external IT spending will drive growth across all IT service segments more than any increase in aggregate spending on IT.
- Organisations are only willing to make large IT investments after understanding and clearly defining the return on investment.
- IT services remain focused on either optimising prior investments or reducing operating costs in the current IT environment.
- There is a lack of compelling new technology to drive growth.

2.4 Critical Success Factors

This section discusses the Critical Success Factors (CSFs) that influence the success of EUC and IC. The majority of the research conducted on the success of EUC and IC is in the area of end user satisfaction.

CSFs are critical business areas that management must constantly monitor to ensure that the business flourishes (Rockart, 1979; Magal, Carr and Watson, 1988; Guimaraes et al., 1999). Therefore, if organisations manage their IC according to their CSFs then IC performance should improve and the organisation should derive better benefits from EUC (Magal et al., 1988; Guimaraes, 1996).

In order to monitor these areas appropriately, performance information is needed. Therefore, identifying these few areas would lead to identifying the key information needs of management (Magal et al., 1988). Research has indicated that CSFs appear to be widely used; Leitheiser and Wetherbe (1985) investigated IC successes, failures and CSFs. Leitheiser and Wetherbe (1986) also proposed an organised approach for effectively managing EUC based on service support levels. Research based studies such as Sumner (1985) have identified several CSFs applicable to IC. Brancheau et al. (1985) investigated ICs from the end users' perspective, requesting them to identify CSFs. Evidence from other CSFs applicable to ICs exists in the form of anecdotal reports in trade journals. Magal et al.'s (1988) study identified a total of twenty-six CSFs relevant to ICs. Guimaraes et al.'s (1999) study assessed the impact of the IC CSFs as proposed by Magal et al. (1988). Munro and Wheeler (1980) used CSFs to determine the information requirements for management control. Meadors and Mezger (1984) applied CSFs to develop a set of priorities for the required features of an end user language. Shank, Boynton and Zmud (1985) used CSFs to identify corporate information needs for developing a corporate information systems plan.

Several researchers have explored CSFs for IC managers, however they have yet to consider whether these CSFs are equally important or relevant to all ICs. Moreover, just as there was an appeal to a stage theory for the evolution of MIS/DP (Nolan, 1979), it seems logical that ICs go through various stages of growth (Lucas and Sutton, 1977) and that the CSFs at one stage might differ from those at another stage.

Hence, understanding the CSFs at various stages is important to all IC managers, especially those that were evolving from one stage to another.

Brancheau and Brown (1993) reported that in the 1980s, research on ICs evaluating CSFs had documented positive correlations between IC support and end user satisfaction, and negative correlations between IC control and end user satisfaction. This suggested the existence of an IC life cycle, and hinted at the eventual demise of the IC in organisations. Brancheau and Brown (1993) also reported that the majority of research in the 1980s regarding EUC outcomes focused on individual-level or application-level outcomes, with a primary emphasis on the outcome of end user satisfaction. Although end user satisfaction had remained a primary focus in the 1990s, higher-level outcomes such as success of EUC and IC success have started to emerge as areas of investigation. Powell and Moore (2002) identify three primary themes of 1990s EUC: EUC success, IC success and end user satisfaction.

2.4.1 EUC Success

Harris (2000) analyses sixteen researches into causal factors of EUC success. Three distinct schools of thoughts emerge from his analysis:

1. Research based on the contribution towards EUC success made by the individual behaviour.
2. Characteristics of an EUC application.
3. Characteristics of the organisation in which EUC occurs.

Several studies in the 1990s addressed EUC success. Shayo, Guthrie and Igbaria (1999) reviewed literature on EUC success measurements. Several success antecedents have been identified such as EUC training, computer literacy (Bergeron, Rivard and Raymond, 1993), top management involvement (Abdul-Gader, 1992), positive IS-user relationships (Guimaraes and Igbaria, 1996; McLean and Kappelman, 1992-3), end user tasks and motivations (Blili, Raymond and Rivard, 1998), end user satisfaction (Shayo et al., 1999), and EUC effectiveness (Guimaraes,

1996; Guimaraes, 1997). There were several suggestions on improving EUC productivity in conceptual themes (Hsieh, Lu and Lin., 1994; Lin and Chung, 1991; Salchenberger, 1993; Tayntor, 1994) and empirical studies (Palvia, 1991: Boyer, 1990).

Research into EUC Success Factors

Harris (2000) selected sixteen EUC studies and examined the conditions that contributed towards successful EUC. Most of the studies had featured EUC satisfaction as a key determinant of EUC success. Harris (2000) on examination of the studies has identified the following five groups:

- Individual Characteristics Group
- Information Characteristics Group
- Organisational Influences Group
- Disconfirmed Desires Group
- Technology Acceptance Model Group

Individual Characteristics Group

This group was represented by the research reported by Igbaria (1990), Igbaria and Nachman (1990), Igbaria and Zviran (1991), Igbaria and Toraskar (1994) and Lane et al. (1994), which all emphasised the influence of users' characteristics on user satisfaction with EUC. These characteristics included demographic variables, attitudes, training and education, involvement with systems development, expectations for EUC and computer anxiety. Other constructs related to aspects of the organisations, such as management and resource adequacy and the complexity of users' tasks and uncertainty.

Information Characteristics Group of Studies

This group emphasised the influence of application characteristics on user satisfaction with EUC, and included the Doll and Torkzadeh (1988) and Etezadi-Amoli and Farhoomand (1996) models. These characteristics include content, accuracy, format, ease of use, timeliness, security, quality of output, functionality and documentation. EUC satisfaction was again used as a surrogate measure for EUC success although in the Etezadi-Amoli and Farhoomand (1996) model, satisfaction was equated with the performance of the individual user. The Doll and Torkzadeh (1988) study was not designed to elicit users' general satisfaction with EUC, but with a single system.

Organisational Influences Group

This group was represented by the research reports of Rivard and Huff (1988), Amoroso and Cheney (1991) and Mirani and King (1994a). They were grouped together because of their emphasis on the influence of organisation characteristics on user satisfaction with EUC. These characteristics included departmental readiness for change, degree of DP push (promotion of EUC) and goodness of fit between concepts that were labelled user push (demand for EUC) and DP push. In addition, user satisfaction with independence from DP was included as well as user satisfaction with the environmental set up.

Rivard and Huff (1988) tested a model of EUC success that emphasised the role of the DP department within EUC and found moderate support for the importance of the DP function. Amoroso and Cheney's (1991) study found that organisational support influenced end user satisfaction.

Disconfirmed Desires Group

This group represented a single conceptual model of EUC success and it displayed sufficient differences from the others to warrant a classification of its own. The model of Suh, Kim and Lee (1994) was derived from consumer satisfaction with a product or service that was a result of performance exceeding prior expectations.

Technology Acceptance Model (TAM)

TAM was an adaptation of the Theory of Reasoned Action (TRA) where belief (i.e. an individual subjective probability of the consequence of a particular behaviour) influences attitude (i.e. an individual's positive and negative feelings about a particular behaviour), which in turn shapes behavioural attention (Hsu and Lu, 2004). The Igbaria study (1993) provided moderate support for the TAM in explaining user acceptance of microcomputer technology. Out of that study, computer anxiety was found to have a strong negative effect on perceived usefulness and behavioural intentions. Behavioural intentions were found to be the determinants of user acceptance of microcomputer technology, and Zinatelli (1994) found that users' beliefs of perceived usefulness and ease of use of systems had a direct effect on all of the three measures of EUC: EUC satisfaction, computer usage and utilisation.

On an individual level, Moore (1997) and Hellman (1992) addressed the importance of end user knowledge and skill levels, and Lee, Kim and Lee (1995) examined crucial factors in designing an EUC training program. Lastly, variables influencing increased system use by end users were considered by Guimaraes and Igbaria (1997), Robey and Zmud (1992) and Carr et al. (1990).

2.4.2 IC Success

Prior studies had identified various methods of measuring information system success, including measures of economic impacts such as cost/benefit, return on investment (ROI), systems utilisation and user satisfaction (To, 2002; Magal, 1991). However, as pointed out by Galletta and Lederer (1989), economic variables are difficult to operationalise and measure. System utilisation was limited to measuring only the number of times a system had been used, and it ignored qualitative aspects of systems (Melone, 1990). Hence, user satisfaction had received greater attention. The most commonly used instruments for measuring user satisfaction were those proposed by Ives, Olson and Baroudi (1983), Venkartranam and Rajamanujam (1987), Doll and Torkzadeh (1988), Carr and Rainer (1993) and Mirani and King (1994a). The following is a brief description of each of the instruments.

Ives, Olson and Baroudi's Instrument or The Ives et al. Instrument

Ives, Olson and Baroudi (1983) developed a standard short form instrument for use when only an overall assessment of information satisfaction was required and when the survey time was limited. It was based on Pearson's findings and reinforced by subjecting the instrument to further validity tests.

Venkartranam and Rajamanujam's Instrument

Venkatranam and Rajamanujam (1987) used an operational model for measuring "planning" system success. It used two interrelated dimensions, which were improvements to the capabilities of the planning systems and the extent of fulfilment of the key planning objectives. Guimaraes (1996) used Venkatranam and Rajamanujam's (1987) ends/means framework to measure end user success. "Ends" represented the extent of fulfilment of key objectives and "means" reflected the extent of EUC help in improving the key capabilities of the organisation. Guimaraes calls it "company payoff from EUC". In To's (2002) study, company payoff from EUC was used to measure IC success from an IC manager's perspective.

Doll and Torkzadeh's Instrument

The Doll and Torkzadeh instrument emerged most commonly in studies assessing end user satisfaction; it provided a foundation necessary to accumulate a body of knowledge regarding factors that influenced end user satisfaction (Powell and Moore, 2002). It used a twelve-item survey instrument that was a synthesis of the Ives et al. (1984) method for measuring user satisfaction, a generalised instrument that was also widely used and validated (Igbaria, 1990; Somers, Nelson and Karimi, 2003; Magal, 1991). Doll and Torkzadeh's instrument measures "computing satisfaction" of an end user with a specific application (Doll and Torkzadeh, 1988). In particular, End User Computing Satisfaction (EUCS) was a multifaceted construct that required subjective self-reports of five subscales that measure end user satisfaction with the content, accuracy, format, timeliness and ease of use of a computer application and a single overall second order construct called EUCS. The first four scales assess product usefulness, while ease of use evaluates the user friendliness of the application. The second-level structure comprises the original structure of content, accuracy, format, ease of use and timeliness (Chin and Newsted, 1995; Magal, 1991; Doll, Xia and Torkzadeh, 1994). Previous research had demonstrated instrument validity (i.e. content validity, construct validity and reliability) (Straub, 1989), as well as internal validity and statistical validity (Doll and Xia, 1997; Doll et al., 1994; Hendrickson, Glorfeld, and Cronan, 1994; Hendrickson, Massey and Cronan, 1993; McHaney and Cronan, 1998; McHaney, Hightower and White, 1999).

Chin and Lee's study was based on the Doll and Torkzadeh model with a view that satisfaction is the gap between post hoc perceptions of the system and a prior standard (Chin and Lee, 2000). There are a number of studies that have attempted to capture the overall post hoc evaluation that end users have in regard to the use of an IS system (i.e. satisfaction) as well as the most immediate antecedent factors that form this satisfaction (Doll and Torkzadeh, 1988; Henry and Stone, 1994; Torkzadeh and Doll 1991).

Carr and Rainer's Instrument

Carr and Rainer (1993) produced a list of thirty-five IC support services grouped into six categories: hardware support, software support, data support, functional support, training and education, and miscellaneous support. The goals of Carr and Rainer study were to develop a comprehensive list of IC Services and to establish future demands for overall IC services in the coming years – the next two and five years time.

Mirani and King's Instrument

Mirani and King's (1994a) instrument was developed by firstly identifying items to be included by searching through EUC literature. The instrument was validated by administering the questionnaire to more than a hundred ICs across the United States. The instrument served as a basis for deciding on the mix of support services that were to be offered to end users and might be used to survey the progress attained by end users and support staff in their respective roles over time. Such surveys would assess the long-term effectiveness of the IC.

2.4.3 End User Satisfaction

With the rapid growth of EUC, researchers found ways to measure its success. The most widely accepted measure was user satisfaction (Melone, 1990; Igbaria, 1990; Mirani and King, 1994a), even though no single conceptual model of either user satisfaction or success had emerged as a standard.

End user satisfaction has long been used as an important surrogate for measuring end user information system success (Doll and Torkzadeh, 1988; Torkzadeh and Doll, 1993; Mirani and King, 1994a; Seddon, 1997; Blili et al., 1998; Shaw, Niedermann and De Lone, 2002; Rivard and Huff, 1988).

End user satisfaction is a subjective measure of system success. It serves as a substitute for objective determinants of information systems effectiveness (Ives et al., 1983).

Chin and Lee define end user satisfaction with an information system as:

> "the overall affective evaluation an end user has regarding their experience related with the information system" (Chin and Lee, 2000, p2).

The term "experience" encompasses different aspects related to an information system such as computing, training, development or selection.

Systems utilisation and user satisfaction were the two most widely used measures (Galetta and Lederer, 1989). Of these, user satisfaction was preferred. Even though the reasons for this preference are unclear, possible rationales are

1. The operationalisation of utilisation in terms of the number of times a record, file or program had been used ignored the context of how the information was utilised or how work was accomplished (Melone, 1990).
2. System utilisation was only valid when use was voluntary, which might not be appropriate all the time (Galetta and Lederer, 1989; Melone, 1990).
3. Utilisation was not an appropriate measure of performance as it was only one of many variables that could affect performance. Also, success leads to utilisation and not vice versa (Baroudi, Olson and Ives, 1986).

Galleta and Lederer (1989) identify three critical reasons for the importance of user satisfaction:

1. Management might have limited direct measures of IS success.
2. User satisfaction might improve the quality of work life.
3. Voluntary use of information systems increases with user satisfaction.

Factors affecting EUC success

A number of variables have been examined to determine their relationship with an end user's satisfaction with EUC. These variables include:

- Training (Zinatelli et al., 1996)
- System utilisation (Kim, Kunsoom and Lee, 1998)
- Quality of documentation (Torkzadeh and Doll, 1993)
- Task structure (Guimaraes and Igbaria, 1997)
- Support (Govindarajulu and Reithel, 1998; Mirani and King, 1994b) and
- Policies (Bergeron and Berube, 1990).

Buyukkurt and Vass (1993) provide additional empirical evidence that several of these same factors contribute to overall satisfaction in EUC. In addition, Tafti and Shirani (1997) contend that end user satisfactions expectations were continuously raised as needs were met. There were several articles that were also published in the 1990s on the establishment of an instrument to measure end user satisfaction. The majority of the satisfaction instrument studies in the EUC literature reported on development, critiques and additional testing of the Doll and Torkzadeh (1988) satisfaction instrument within the EUC context (Chin and Newsted, 1995; Doll and Torkzadeh, 1991; Hendrickson et al., 1994; Torkzadeh and Doll, 1991). Glorfeld and Cronan (1993) utilised the Ives et al. (1983) satisfaction instrument in conjunction with the Doll and Torkzadeh instrument.

However, what was unclear was which particular support factors correlate to end user satisfaction. A review of numerous studies revealed that over thirty end user support factors have been tested for correlation with end user satisfaction. Of these, there was no support factor that correlates with satisfaction in the studies. End user support factor correlation with user satisfaction may be contextual for both the importance and performance of particular support factors, hence the gap between them would vary among organisations. It would therefore be possible that the studies

would only show general tendencies for some factors to be particularly influential in affecting user satisfaction, and each organisation would have to perform its own studies to identify the support factors for its own environment (Shaw et al., 2002). The services provided by IC staff might be the most visible and significant function of an IC. A number of studies have highlighted the importance of IC support users (Brancheau and Wetherbe, 1988; Magal et al., 1988; Rockart and Flannery, 1983). Rivard (1987) and Rivard and Huff (1988) found that user satisfaction with support for EUC activities was one of the two most important factors influencing overall user satisfaction. Support activities such as training, tool selection and design, as well as other factors involving quality of support such as knowledge of software and understanding of user applications. Hence, the IC staff/services measure was considered as an essential component of user satisfaction for the IC.

Other studies using user satisfaction as a measure indicate that EUC support and policy are correlated with satisfaction (Bergeron and Berube, 1988), and that users are more satisfied with microcomputers than mainframes (Glorfeld and Cronan, 1993). Evidence has also linked satisfaction to information quality (Doll and Torkzadeh, 1988), user skill (Glorfeld and Cronan, 1993) and motivation (Igbaria, Parasuraman and Baroudi, 1996).

Govindarajulu and Reithel (1998) report that there are mixed findings with regards to user satisfaction and the support sources. Bergeron and Berube (1988) reported that users were more satisfied when an IC existed, and it had been rated as the most important source of support by end users. However, other studies had indicated otherwise, such as Mirani and King (1994a), who reported differences between support expectations in different end user groups and the support services they received from an IC. Nord and Nord (1994) reported similar findings that a significant percentage of end users were less than pleased with the support provided by an IC. Bowman et al. (1993) reported that users preferred informal sources to formal sources of support.

Dissatisfaction of end users

Many researchers have consistently pointed out users' dissatisfaction with the support and services provided by ICs (Bergeron et al., 1990; Rainer and Carr, 1992). Govindarajulu (2002) claims that the dissatisfaction of end users had driven end users to obtain support from other sources, including local MIS staff, friends and the Internet. Govindarajulu sought to identify the support services offered by Help Desks and determine whether end users actually use these services (Govindarajulu 2002).

Shaw, Lee-Partridge and Ang's (2003) research was to examine the different views or technological frames and perspectives of the individuals in an organisation towards EUC and EUC support, and how these views could affect end user satisfaction.

The results from end user satisfaction studies are quite inconsistent; some studies support the influence of one factor while others found little or no support for the same variable.

2.5 Summary

Help Desks have been the standard source of EUC support, even though they are also called ICs, call centres, and PC support centres. Their primary function to support and help users to help themselves has not changed through the years. In the early years of PC computing, i.e. the late 1970s and early 1980s, end users viewed Help Desks as a godsend. However, today that attitude seems to have changed, as computing enters the new millennium (Govindarajulu, 2002). Academic studies have consistently indicated that end users are dissatisfied with Help Desk support (Govindarujulu, 1996). Researchers have sought to develop appropriate measures of EUC success, IC success and business-wide benefits attributed to EUC (Guimaraes, 1997; Guimaraes, 1996; Guimaraes and Igbaria, 1994; Chau, 1997).

Even though user satisfaction is less than ideal, it is a widely accepted surrogate for measuring overall IS effectiveness. Hence, the provision of end user support appears to be critical to overall IS and organisational effectiveness. Given the importance of end user support, it is therefore essential for IS researchers to study the causes of variations among the support needs of end users so that these needs can be better understood, predicted and fulfilled (Mirani and King, 1994a). In end user satisfaction studies, it has been shown that multiple end user support variables tend to influence user satisfaction in various IS development settings. Descriptive studies have identified that EUC has a lot of benefits, however if it is ill-managed, it could have an adverse impact on the organisation.

This study examines the Help Desk support models from the end user's perspective, and the factors that could possibly affect end user satisfaction. These factors are discussed in the next chapter.

CHAPTER 3 METHODOLOGY AND DESIGN

3.1 Introduction

This chapter describes the purpose of this research and the research method that was used. The first section discussed the various levels of help desk support followed by the help desk support framework used to conduct this study. The fourth section proposes a single hypothesis for this research. The chapter also examines the construct validity and reliability, and ethical considerations of this study. It describes the procedures involved in conducting the study and finishes by describing the data collection methods.

3.2 Help Desk Support Levels

In many organisations, the support group provides full support for the user's needs and problems and will continue to work with the user until the problem is resolved (Munro, Huff and Moore, 1987-88). According to Czegel (1999), the structure of a Help Desk is a reflection of the organisation's focus.

The following figure (Figure 3.1) shows the structure of a typical Help Desk and the levels within it.

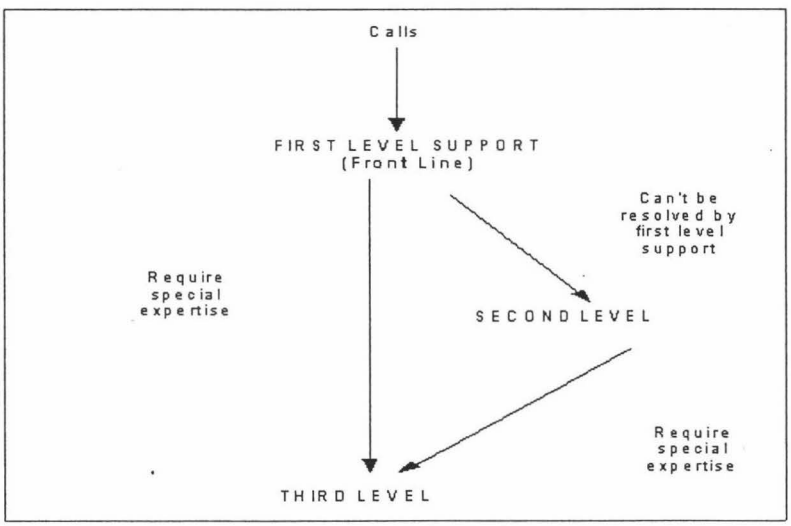

Figure 3.1 Typical Structure of a Help Desk (Czegel, 1999, p 64)

Calls come into the First-level of support, also known as the "Front Line". If the Help Desk analysts are unable to resolve the call, the call is passed on to the second or third level of support, which might be a specialised area such as hardware maintenance. If the Second-level is unable to resolve the call, or if the call requires specialised skills, the call will be passed on to the Third-level, which is typically another IT area or an external area to the organisation such as a vendor's support department (Czegel, 1999).

3.2.1 First-level support (Front Line)

First-level support is a centralised support centre or call centre where all support calls are recorded and where Help Desk analysts support end users who have short, immediate problems. Examples of these are basic networking, logon or desktop problems (Leitheiser and Wetherbe, 1986). Munro et al. (1987-88) report in their research that 68% of their respondents provided a hotline for users. A hotline is installed with a special telephone number that is staffed during core working hours by a group of analysts who either field the user's questions directly or farm it out to Second-level support. Subsequently, with today's technology, an electronic mail (e-mail) address is also set up to allow users to e-mail their requests for support or assistance. The First-level support analyst will record the problem incident and allocate a reference number, problem severity and priority for the Second-level support analyst if the problem cannot be resolved in the first instance.

Czegel (1999) emphasises that the structure of First-level support is critical to the overall success of the Help Desk as it is the point of first contact with the customer, i.e. the first opportunity to help the customer. First-level support is usually structured as either "Despatch", in which the calls are answered and then despatched to the Second-level, or "Resolve" in which the Help Desk personnel tries to resolve the calls and only passes on calls that cannot be resolved within a certain amount of time. A "Resolve" First-level support may despatch calls that require specialised support, such as hardware maintenance. Personnel in First-level support will try to resolve each call that comes in as they have a reasonable knowledge of the products

they are supporting, and quite often they have tools such as remote control software or knowledge databases to help resolve problems quickly.

According to Czegel (1999), the benefits of having First-level support are:

- Resolution time – a call that is resolved at point of call (while the customer is still on the phone) will have a much shorter resolution time than a call that is passed on to someone else.

- First-level support should have higher customer satisfaction as the customers generally talk to the actual problem solvers and do not have to repeat their problems again to someone else unless the First-level support analyst is unable to resolve the call. However, even if the call has to be passed on, responsibility typically sits with the person who initially took the call, hence there is less chance of the problem being passed on to someone who sits on it forever. Now, there are at least two people looking out for the welfare of the caller.

One of the potential weaknesses of First-level support is the escalation process. There is high possibility of spending too much time on the phone trying to resolve one problem, which may be good for that customer, but not so for the other customers who are waiting to get through to the Help Desk. An organisation's profitability could be negatively impacted if too much time is spent with each customer. This is where SLA will come in place, for there will be standards for each call duration.

3.2.2 Second-level support

The Second-level of support usually consists of Help Desk personnel who are also performing other responsibilities apart from resolving problems passed on by the First-level of support. Help desk improvement or call elimination initiatives are normally carried out by the Second-level of support (Czegel, 1999). A common approach is providing the EUC support with a "key contact" assigned to assist the EUC Support group (Munro et al., 1987-88). The key contact will assign the user problem to a group of analysts who are normally power users or "experts" in the

applications software and hence are able to support the First-level support analysts in resolving the problems.

3.2.3 Third-level support

Czegel (1999) describes a Third-level of support analysts, whose jobs are those of technical support, database administration, program development and network administration. Depending on the organisation set-up, the third level of support may reside within the Help Desk. It may also include third parties who are providing services such as hardware maintenance to Help Desks as well as vendors of Help Desk tools and products that a Help Desk's customers use.

3.3 Research Model

Figure 3.2 presents the research model that has been constructed using a Help Desk Support Framework, its effectiveness and end user satisfaction. The framework comprises of the Help Desk Support Models, the types of end users and the support services provided. Its purpose is to determine if the types of end users and the support services offered will influence the end user satisfaction. The interaction between the types of end users and the support services may also influence the end user satisfaction as the type of support services offered should correspond the services expected by the end users.

The framework is also used to measure the effectiveness of the Help Desk Support Model by using end user satisfaction as a surrogate. For example, staff availability and timely response from the Help Desk staff may have an impact on the effectiveness of the Help Desk Support Model and consequently, the end user satisfaction of the Help Desk Support Model. Similarly, the type of support services provided by the Help Desk may contribute to the effectiveness of the Help Desk Support Model and hence influence the end user satisfaction. This is because end users may be satisfied or dissatisfied with the existing support services.

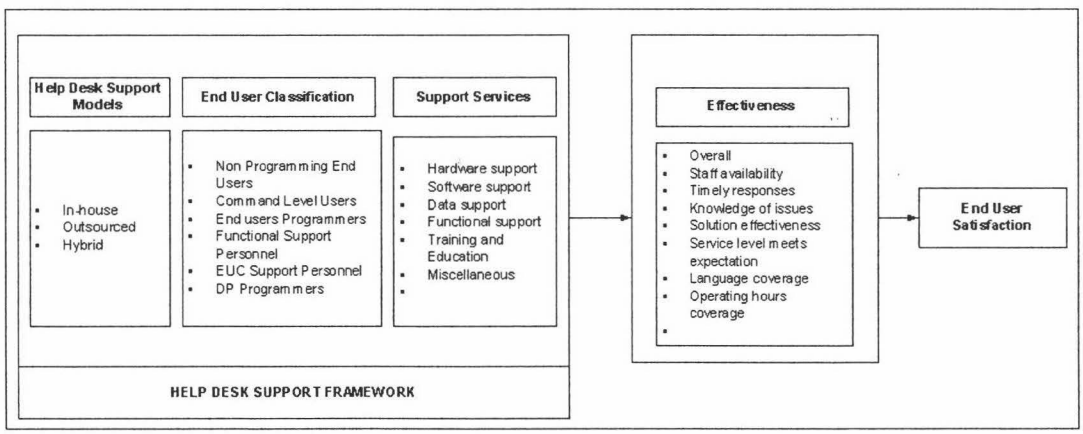

Figure 3.2 Help Desk Support Framework

3.3.1 Help Desk Support Models

As mentioned previously, some organisations have outsourced either all or part of their Help Desk to a third party vendor as a means to effectively manage their Help Desk. There has been very little research done in the area of outsourced Help Desk support. This research is focussed on finding out which of the Help Desk support models are the most effective and which models yield the highest end user satisfaction rate.

For the purpose of this research, Help Desk Support is defined as the support services that the Help Desk analysts provide to the end users of the organisation using computerised information resources. The Help Desk supports EUC by facilitating and coordinating activities such as training, user assistance and consulting, usage planning, product evaluation, security and access logons, hardware and software maintenance and telecommunications maintenance. In many organisations, the support group is there to provide full support for the user's needs and problems and will continue to work with the user until the problem is resolved (Munro et al., 1987-88). In this study, the Third-level support job functions are within those carried out by the Second-level support. Therefore, only two groups, First and Second-level support, are used in this study.

In order to find out which Help Desk support model is the most effective, the following criteria have been adapted from Grupe's (1997) outsourcing options:

- An In-house Help Desk where the Help Desk personnel are employees of the organisation.
- An Outsourced Help Desk where a firm provides all the Help Desk support services.
- A Hybrid Help Desk where the organisation provides some of the services and the outsourcing organisation provides others.

3.3.2 End User Classification

As EUC becomes pervasive in most organisations, its diversity grows along various dimensions, one of which is the type of end users. Two studies (Rainer & Harrison, 1993; Mirani & King, 1994a) noted that categories of end users differ in types of applications they use, their levels of computer skills and computer literacy and their need for support. Contrary to early expectations, end users do not become independent but rather as their sophistication increases, their demand increases – for better equipment, training, coaching, consulting and technical support (Guimaraes, 1996; Guimaraes & Igbaria, 1994; Rainer & Harrison, 1993). Rockart and Flannery's (1983) end user classification has been adopted for this study. The end user classification is divided into six categories, namely:

- Non Programming End Users are a group of users who access computerised data through a limited, menu-driven environment or a strictly followed set of procedures, and use software provided by others.
- Command Level Users are users that perform inquiries and simple calculations and generate unique reports for themselves. They understand the available databases and are to specify, access and manipulate information.
- End users Programmers are users who use both command and programming languages directly for their own personal information needs. They can develop applications for their own use and for others.
- Functional Support Personnel are the market researchers, financial analysts, whose primary task is providing tools to access and analyse data. They become skill in end user languages and informal centres of system design and programming expertise. Hence, they are able to support other end users within the functional area.
- EUC Support Personnel are the end users who are most often located in a central support organisation such as a Help Desk.
- DP Programmers who are very similar to the traditional COBOL shop programmers except that they program in end user languages.

3.3.3 Support services

This study replicated previous work by Carr and Rainer (1993) who produced a list of 35 support services grouped into the following six support categories:

- Hardware support
- Software support
- Data support
- Functional support
- Training and Education
- Miscellaneous

Refer to the Questionnaire in Appendix A for the services in each category.

3.3.4 End user satisfaction

End user satisfaction is the most popular and commonly used method for measuring system effectiveness (Doll and Torkzadeh, 1988; Govindarajulu et al., 2000; Henderson and Treacy, 1986; Walls and Turban, 1991; Rivard and Huff, 1988). From the end users' perspective, technical skills, business understanding, communication skills and service orientation are all critical success factors related to Help Desk staff competence. Other critical success factors include timeliness of service, provision of adequate training, provision of appropriate equipment and software, continuous research on new products, and management support (Brancheau et al., 1985). To measure effectiveness, the following variables have been used in this study:

- Help Desk: service level expectation, language and operating hours coverage.
- Help Desk personnel: availability, responsiveness, timeliness, solution effectiveness.

Doll and Torkzadeh (1988) have developed an instrument to measure the "computing satisfaction" of an end user with a specific application. However, as with Mirani and King (1994a), a more general instrument has been adopted with the intent to measure

end users' overall satisfaction with their Help Desk (refer to the Questionnaire in Appendix A).

3.4 Hypothesis

The purpose of this study was to determine if there is a difference in end user satisfaction between the In-house Help Desk Support Model and the Outsourced Help Desk Support Model. Hence, the null hypothesis is that *there is no difference in end user satisfaction between the In-house Help Desk Support Model and the Outsourced Help Desk Support Model.*

3.5 Instrument

3.5.1 Mail Survey

Self-administered questionnaire has been selected as the research method. Cooper and Schindler (2001) note that mail surveys typically cost less than personal interviews. It allows contact with otherwise inaccessible respondents such as senior executives, or respondents residing in different geographical locations. A mail survey can be conducted by one person and hence it is possibly one of the research methods with the lowest cost. The respondent is able to take more time (to collect facts, talk to others or consider replies at length) than is possible with a telephone or personal interview. Mail surveys can be perceived as more impersonal, hence providing more anonymity than the other communication modes (Cooper and Schindler, 2001).

However, the major weakness of the mail survey is non-response error. Many studies have shown that better-educated respondents and those who are more interested in the topic will respond to the survey. Wallace (1954) as cited by Cooper and Schindler (2001) concludes that a high percentage of those who reply to a given survey are the ones that usually reply to others, while a large proportion who do not respond are habitual non-respondents. A mail response rate of about 30% is often considered satisfactory, but there may be instances of response rate exceeding 70% (Dillman, 1972). In either case, there are many non-respondents, and it is impossible

to know how the responses of those who do not answer would differ from the responses of those who do answer. The second major limitation of mail survey is concerned with the type and amount of information that can be secured. It is normally expected not to obtain large amounts of information and there is a lack of means to probe deeply into questions. Respondents will generally refuse to cooperate with long and/or complex questionnaires unless there is a perceived benefit. Cooper and Schindler (2001) suggest that the respondent should be able to answer the questionnaire in no more than 10 minutes. To improve the return rate, it has been suggested that follow-ups or reminders are to be administered. There is also evidence that advance notification, particularly by telephone, is effective in increasing response rate.

Having considered all the advantages and disadvantages of mail survey, it was considered the most appropriate method because mail survey is one of the most cost effective ways of conducting a research study.

3.5.2 Questionnaire

A multi-part questionnaire was used to conduct this study. The first part of the questionnaire gathered demographic data on each respondent including the type of end user. The second part, named "Help Desk Service Offering", asked respondents whether each of the 35 services was currently being offered, had previously been offered, was outsourced to third party, or was not applicable. The third part of the survey recorded the "Help Desk Experience" of an end user by asking respondents how satisfied they were by the services provided by the Help Desk using a Likert-type scale:

- VS = Very Satisfied
- S = Satisfied
- SS = Somewhat Satisfied
- N = No opinion
- SD = Somewhat Dissatisfied
- D = Dissatisfied
- VD = Very Dissatisfied
- NA = Not applicable

Respondents were encouraged to comment on different parts of the questionnaire.

The independent variable for the questionnaire was the Help Desk Support Model (In-house or Outsourced) and the dependent variable was the end user satisfaction.

3.5.3 Survey Population

Two organisations were approached to participated in the survey. Both organisations have indicated in the past that they would like to participate in such a survey. The results will be beneficial to them, as they wanted some indication of whether their Support Models are effective. Organisation 1 is a financial institution and organisation 2 is a medical insurance society. Both organisations have offices throughout New Zealand. They have an internal as well as an outsourced Help Desk who provided first and second level of support. The difference is that the first level of Help Desk support in Organisation 1 is outsourced in comparison to Organisation 2 where the first level of Help Desk support is manned internally.

3.5.4 Pilot Study

A pilot study was conducted to ensure that the questionnaire did not have missing elements. A sample size comprising of two senior managers, three subject matter experts from the business and two Second-level support personnel, was selected for the pilot study. There were minor changes to the questionnaire. The changes were to customise the questionnaire to the terminology that was commonly used and understood by the staff of the organisation.

3.5.5 Sample Size

In order to select a sample size that will reflect all 4 combination of the first and second levels of support, the following grouping were formulated, as shown in Table 3.1.

Table 3.1 Grouping of support level services

Group	First-level of Support	Second-level of Support	Organisation
1	Outsourced	In-house	1
2	Outsourced	Outsourced	1
3	In-house	In-house	2
4	In-house	Outsourced	2

A sample size of 50 participants from each survey group were selected, which is approximately 0.33% of the total population of Organisation 1 and 10% of the total population of organisation 2. The selection of the participants was random and the participants were representatives of the organisation from line managers and their teams. No executives or their personal assistants were included in this survey.

3.6 Validity and Reliability

A characteristic of a good measurement tool is that it should be an indicator of what is to be measured. Two of the major criteria for an effective measuring tool are validity and reliability. Validity refers to the extent to which a test measures that measure. There are a number of forms of validity; for the purpose of this study, three of the major forms: construct validity, internal validity and external validity are discussed.

Construct validity

Construct validity is an assessment of how well theories are translated into actual measurements by an instrument. According to Trochim (2002), to establish construct validity, the following conditions must be met:

- Set the construct to be operationalised within a meaning
- Show evidence of control over the operationalisation of the construct
- Show evidence that the data supports the theoretical view of the relations among the constructs

In this research, a pilot study has been conducted with members of the senior management team, subject matter experts and Second-level support personnel to ensure that all test conditions are met and that the questionnaire is not missing any elements. The study was conducted in a closed environment within Organisation 1.

Internal and external validity

An experiment is considered to be internally valid to the extent to which it shows a cause-effect relationship between the independent and dependent variables (Athabasca University, 1998). It refers to how well the study was run in terms of research design, operational definitions used and how variables were measured – what was and was not measured, and how the change in the dependent variable was produced solely by the independent variable, and not by extraneous variables. In descriptive studies such as this, internal validity refers to the accuracy or quality of the study (Huitt, Hummel and Kaeck, 1999).

According to Trochim (2002), external validity is related to generalising. It is the extent to which a study's results (regardless of whether the study is descriptive or experimental) can be applied to other people or settings. Typically in a group, research employing randomisation will initially possess higher external validity than will case studies and single-subject experimental studies that do not use random selection/assignment (Huitt et al., 1999). This study can be generalised to any population; it is not limited by the type of industry or the size of any organisation. In

this study, the participants have been randomly selected by the Team Leaders of both groups, i.e. Groups 1 and 2.

Reliability

Reliability in most contexts means that there is a concept of consistency. A measure is reliable to the degree that it supplies consistent results, and it is a necessary contributor to validity; however, it is not a sufficient condition for validity. Reliability is concerned with the estimate of the degree to which a measurement is free of random errors (Cooper and Schindler, 2001). This study has been designed to use a more general instrument to measure the end users' overall satisfaction with EUC. As it is a general instrument, it can therefore be easily adapted and used in any organisation regardless of size, industry or Help Desk support models.

3.7 Ethical Consideration

This proposal is prepared as part of a research study under the guidance of Massey University. Massey University is overseeing the proposal to ensure that strict adherence to the policies and standards of Massey University are maintained. Consent was obtained verbally and in correspondence from senior executives of both organisations. Massey University will also ensure that no organisation or its employees will be subjected to any harm or adverse consequences as a result of this research. All data collected will be strictly confidential and the anonymity of the participating organisations is assured in any published documents. Any publication will be of statistical totals of the organisations.

The individual participants are employees of the organisations participating in the research and their participation is completely voluntary and encouraged by the organisations. The participants' rights regarding participation and the aim of the research were clearly explained. The assured anonymity of the individual participants was important to address sensitive details such as job titles or age.

3.8 Procedures

Pre-survey telephone calls were made to the Help Desk Support Managers of both organisations. Permission was sought and granted by the senior executives of both organisations to conduct the survey. The survey was prepared as a mail survey pack comprising of the following documents:

- A covering letter explaining the purpose of the survey/questionnaire, the date when the questionnaire is due
- The questionnaire itself
- A stamped self-addressed envelope

The mail survey pack can be found in Appendix A.

Organisation 1 – Groups 1 and 2.

100 copies of the survey pack were handed to the respective Team Leaders of Groups 1 and 2, who then nominated the participants of the survey. The Team Leaders were requested to select the participants randomly.

Both groups were given five business days to complete and return the survey as there was a perception that the participants might not respond if too much time was given, which would further delay this study. A total of 35 surveys were received by the due date, 22 responses from Group 1 and 13 responses from Group 2.

A reminder was e-mailed two business days prior to the due date to the Team Leaders of both groups to remind their teams about the due date of the survey, in the hope of increasing the response rate. 3 respondents requested an extension of two days from the due date; hence the reminder has only increased the number of respondents by 3 for Group 2.

Organisation 2 – Groups 3 and 4.

An electronic version of the survey pack was e-mailed to the Team Leaders for Groups 3 and 4. Again, the Team Leaders were requested to select the participants in these groups randomly.

Both groups were given five business days to complete and return the survey by e-mail. A reminder was e-mailed two business days prior to the due date to the Team Leaders of the 2 groups to remind their teams about the due date of the survey, in the hope of increasing the response rate.

However, Group 3 and 4's surveys were delayed by two months due to the organisation's internal restructure. Another reminder was e-mailed to Groups 3 and 4, two days before the due date. Unfortunately, this e-mail caused some concerns to the participants and was escalated to senior executives of Organisation 2 who decided to cancel the survey.

As a result, this research study has been reduced to Groups 1 and 2, with a total expected sample size of one hundred instead of the planned of two hundred. This research has been reduced to only survey Second-level support instead of the intended First and Second-level support.

3.9 Data Collection

Data collection is the gathering of data. It can range from a simple observation at one location to a grandiose survey of international corporations at various sites in different parts of the world. The research method will determine how the data are collected. Questionnaires, standardised tests, observations, laboratory notes and instrument calibration logs are some of the devices used to record raw data. Raw data are the facts presented to the researcher in the study's environment (Coopers and Schindler, 2001).

Management's expectations of this study have resulted in the selection of a research methodology that encompasses both quantitative and qualitative data. Quantitative data were measured by specific questions that required the respondents to tick one of the 7-points on the Likert scale, ranging from "Very Satisfied" to "Very Unsatisfied", (or "Not Applicable" for respondents who were unable to answer questions for some reason). The next sections discuss and identify the data collection methods used for this study.

3.9.1 Quantitative Data

The questionnaires from Groups 1 and 2 were returned in the envelope enclosed in the survey pack via internal mail. The day after the closing date of the questionnaires the questionnaires were opened and sorted into Groups 1 and 2. Data were prepared, edited and coded before they were entered into Statistical Package for Social Sciences (SPSS). Only 1 incomplete questionnaire was invalidated.

3.9.2 Qualitative Data

Apart from the demographic part, the questionnaire was designed to capture any additional comments that a respondent might have. This provided an opportunity for the respondent to comment or expand on the questions asked. It served the purpose of providing a better understanding of the environment of the respondent.

3.10 Summary

Research design plays an important role in a research study. This chapter has described the hypothesis for this research and has identified and discussed various aspects in designing research. Firstly, an appropriate research method has been selected. The objectives of the research guided the construction of the multi-part questionnaire that covers aspects of Help Desk support levels, Help Desk support models, end user classifications, support services and end user satisfaction. By using a pilot study in a closed environment, construct validity was tested to ensure that all test conditions were met and that the questionnaire was not missing any elements. Randomised selection of participants was employed to ensure internal and external validity of this study. As the questionnaire has been designed to measure the overall end users' satisfaction with the Help Desk, it can be easily adapted and used in any organisation.

The original plan was to conduct the survey with 4 groups, but due to one organisation's internal concerns, only two groups were surveyed – Groups 1 and 2 of Organisation 1. The results for these two groups will be discussed in the next chapter.

CHAPTER 4 RESULTS AND DISCUSSION

4.1 Introduction

This chapter describes the data analyses that were performed in this study. Average, standard deviation and median are calculated for the data set. Results of the hypothesis using non-parametric statistical tests are discussed. The data from the Level 1 support were not analysed as a result of the unsuccessful mail out of Groups 3 and 4. The important results in this study are the end user satisfaction level and the Help Desk Support Models. End user satisfaction is used to measure the effectiveness of the Help Desk Support Model. Other results include the end user categories and the support services provided. End users categories will provide information on the type of respondents that participated in this study and if there were any distinct demands for support services that were required by the respondents. Qualitative analysis was performed based on the additional feedback that was provided by the respondents.

4.2 Study Analysis

4.2.1 Demographics

This study involved a large New Zealand financial organisation with over 6,000 staff and total assets of $1.2 billion. It has 200 offices throughout the North and South Islands. It has been established since 1861 and has a large IT department managing the support of its networks, systems and applications. In the year 2000, it outsourced its support function to a global support service provider, where First-level Help Desk support was established.

The population of this study consists of two groups (Group 1 – Second Level In-house Support Model, Group 2 – Second-level Outsourced Support Model). A total of 22 respondents completed the questionnaire from Group 1, giving a response rate of 44%, and 16 respondents completed the questionnaires from Group 2, giving a response rate of 32%. A response rate of more than 30% is considered satisfactory for a mail survey (Cooper and Schindler, 2001).

Table 4.1 Count and Percentage of Total Respondents

Groups	Total Respondents	Total Mail Out	Percentage
Group 1 - In-house	22	50	44%
Group 2 - Outsourced	16	50	32%
Total	38	100	38%

The participants from Group 1 were predominately females (86%) and 14% were males as compared to the participants from Group 2 were predominately males (63%) and 38% females.

Table 4.2 Respondents by Gender

Gender	Group 1- In-house		Group 2- Outsourced	
	Count	Percentage	Count	Percentage
Male	3	14%	10	63%
Female	19	86%	6	38%
Total	22	100%	16	100%

The ages of the participants in Group 1 ranges from 18 years to over 50. There are 7 respondents in both age bands 31 to 40, 41 to 50 in Group 1. The ages of the participant in Group 2 are younger, ranging from 18 years to 50 years old.

Table 4.3 Respondents by Age band

Age band	Group 1- In-house		Group 2- Outsourced	
	Count	Percentage	Count	Percentage
18 to 30	4	18%	3	19%
31 to 40	7	32%	8	50%
41 to 50	7	32%	5	31%
Over 50	3	13%	0	0%
Not Available	1	5%	0	0%
Total	22	100%	16	100%

4.2.2 End User Classification

Using Rockart and Flannery's (1983) end user classification, this study has replicated the same categories and the results are tabulated in Table 4.4. It is important for Help Desk personnel to understand who they are supporting as it will assist them in determining and meeting the support service needs of the personnel they support, thereby producing more satisfied end users.

Majority of the users from both groups were "Non-Programming End Users". Group 1 has 3 "Command Level Users" as compared to Group who has only 2 "Command Level Users". Group 1 has 1 "EUC Support Personnel" and 1 "DP Programmer". Group 2 has 1 "End User Programmer" but no "Support Personnel" or "DP Programmer". One participant from Group 1 did not complete the questionnaire in its entirety and hence was excluded from the data set for the study.

As the majority of the respondents in this study for both groups were "Non-programming End Users" who only access computer-stored data through software provided by others in a menu-driven environment; no further detail analysis was performed.

Table 4.4 User Categories by Sample Groups

	Group 1- In-house		Group 2- Outsourced	
User Category	**Count**	**Percentage**	**Count**	**Percentage**
Non-Programming End User	16	76%	10	63%
Command Level Users	3	14%	2	12%
End Users Programmers	0	0%	1	6%
Functional Support Personnel	0	0%	3	19%
EUC Support Personnel	1	5%	0	0%
DP Programmers	1	5%	0	0%
Total	21	100%	16	100%

4.2.3 Support Services

Part of this study replicated the previous work by Carr and Rainer (1993). Its purpose was to study the types of support services offered by the Help Desk Support Models and if there were any distinct support service requirements based on the user categories.

Unfortunately, the results of the support services for Group 1 indicated that the majority of the support services are either "Not Applicable" or "Never Offered". Similar results are reported for Group 2 where respondents perceived that the majority of the support services are "Not Applicable" or "Never Offered". Most respondents have indicated that the hardware and software support services were outsourced. All the other support services such as Data, Functional Support, Training, and Miscellaneous support services were considered to be "Not Applicable". (Refer to Tables 4.5 and 4.6 for a consolidated view of the support services.)

Table 4.5 Hardware Support Services

	Group 1- In-house Percentages	Group 2- Outsourced Percentages
Now Offered	9%	19%
Never Offered	21%	21%
Prev Offered	10%	6%
Outsourced	11%	42%
Not applicable	46%	12%
Don't Know	3%	0%
Total	100%	100%

Table 4.6 Software Support Services

	Group 1- In-house Percentages	Group 2- Outsourced Percentages
Now Offered	10%	19%
Never Offered	22%	30%
Prev Offered	12%	0%
Outsourced	5%	24%
Not applicable	47%	27%
Don't Know	4%	0%
Total	100%	100%

The following could be the reasons why the results for this part of the questionnaire were inconclusive:

- It is possible that the respondents did not fully understand the questions, even though the questionnaire was pre-tested with a pilot group consisting of "Non Programming End Users", Management and Support staff.
- The pilot group was given a five-minute briefing on the objectives of the survey. The same briefing was given to the Team Leaders of the survey groups. It is possible that the Team Leaders have not conveyed the message adequately to the participants of the survey.
- As the majority of the respondents are "Non Programming End Users", their support requirements are limited to running the applications alone. Therefore, they may not appreciate that occasionally they may need support for their hardware or software.

Due to the somewhat limited use of the support services and the type of users, no further detail analysis were performed.

4.2.4 Help Desk Support Level

The results in Table 4.7 show that the majority of the respondents have indicated that they use a Hybrid Help Desk, where some of the services are provided in-house and some are outsourced. This information would have been useful in determining which support level is the most efficient in terms of end user satisfaction if the mail out to Groups 3 and 4 had been successful.

Table 4.7 Help Desk Staff

Help Desk Staff		Group 1- In-house	Group 2- Outsourced	Group 1- In-house	Group 2- Outsourced
1	Internally staffed	11	50%	1	6%
2	Outsourced	5	23%	5	31%
3	Other	0	0%	10	63%
4	Unknown	6	27%	0	0%
	Total	22	100%	16	100%

The next section describes the statistical tests that were used to test the hypothesis.

4.3 Hypothesis Testing

The objective of this research was to determine if the hypothesis that *there is a difference in end user satisfaction between the In-house Help Desk Support Model and the Outsourced Help Desk Support Model.* The Mann-Whitney Test was selected to test the hypothesis because of the small and unequal sample size. One incomplete survey from Group 2 was excluded from all statistical analyses.

4.3.1 Mann-Whitney Test

The results of the Mann-Whitney Test showed that there is no significant difference in end user satisfaction between Group 1 (mean rank = 20.09) and Group 2 (mean rank = 17.40), $U = 141.000$, $z = -1.16$. Therefore, the null hypothesis cannot be rejected, as the *p-value* is .246 for a two-tailed test as highlighted in Table 4.9.

Table 4.8 Ranks for Overall Satisfaction of the Sample Groups

	Survey Groups	N	Mean Rank	Sum of Ranks
Overall Satisfaction	Group 1 - In-house	22	20.09	442.00
	Group 2 - Outsourced	15	17.40	261.00
	Total	37		

Table 4.9 Mann-Whitney U and Wilcoxon W tests for Overall Satisfaction of the Sample Group

	Overall Satisfaction
Mann-Whitney U	141.000
Wilcoxon W	261.000
Z	-1.160
Asymp. Sig. (2-tailed)	**.246**
Exact Sig. [2*(1-tailed Sig.)]	.472

[a] Not corrected for ties.
[b]. Grouping Variable: Survey Group

Further statistical tests have been run on the remaining dependent variables to investigate if there are other significant variables that might have contributed to the

Overall End User Satisfaction of the Help Desk Support Models. Table 4.10 is a summary of the results of conducting the statistics tests.

Table 4.10 Summary statistics for ranks

SURVEY GROUPS		N	MEAN RANK	SUM OF RANKS
Staff Availability	Group 1 – In-house	22	20.14	442.00
	Group 2 – Outsourced	15	17.33	221.00
	Total	37		
Response Time	Group 1 – In-house	22	20.77	443.00
	Group 2 – Outsourced	15	16.40	260.00
	Total	37		
Knowledge	Group 1 – In-house	22	21.18	457.00
	Group 2 – Outsourced	15	15.80	246.00
	Total	37		
Solution	Group 1 – In-house	22	19.43	427.50
	Group 2 – Outsourced	15	18.37	257.50
	Total	37		
SLA	Group 1 – In-house	22	20.43	449.50
	Group 2 – Outsourced	15	16.90	253.50
	Total	36		
Language	Group 1 – In-house	22	18.18	422.00
	Group 2 – Outsourced	15	18.73	281.00
	Total	37		
Hours of Coverage	Group 1 – In-house	22	18.34	403.50
	Group 2 – Outsourced	15	19.97	299.50
	Total	37		

The results of the other variables were not significant between the groups. Table 4.11 shows that the *p-values* for all the variables are greater than .005.

Table 4.11 Results of Mann-Whitney U and Wilcoxon W tests

	Mann-Whitney U	Wilcoxon W	Z	Asymp Sig. (2-Tailed)	Exact Sig. [2* (1-Tailed Sig)]
Staff Availability	140.00	260.000	-1.029	.303	.453[a]
Response Time	126.000	246.000	-1.606	.108	.237[a]
Knowledge	117.000	237.000	-1.906	.057	.143[a]
Solution	155.500	275.500	-.431	.667	.772[a]
SLA	133.500	253.500	-1.248	.212	.334[a]
Language	161.000	281.000	-.146	.884	.915[a]
Hours of Coverage	150.500	403.500	-.500	.617	.658[a]

a. Not corrected for ties
b. Grouping Variable: Survey Group

4.3.2 Overall End User Satisfaction

The objective of this study was to determine if there is a difference in end user satisfaction between the two groups. Figure 4.1 shows the differences between the overall satisfactions of the two groups:

- Group 1 – In-house
- Group 2 – Outsourced

Overall, the end users were generally satisfied with the services that are provided. The In-house Help Desk Support Model has slightly less "Very Satisfied" end users and majority of the end users are "Satisfied" with the services provided, however there are a very small number of end users who are "Very Dissatisfied". The Outsourced Help Desk Support Model has a higher number of "Very Satisfied" end users, a high proportion of "Satisfied" end users and no reported dissatisfaction with the services provided.

Figure 4.1 shows that overall there is no significant differences in users satisfaction. This result was also supported in the hypothesis testing using the Mann-Whitney test; the results show that there is no difference in the overall end user satisfaction between the Support Models.

Figure 4.1 Overall end user satisfaction

4.4 Qualitative Analysis

4.4.1 End Users' Feedback

The questionnaire was designed to capture additional comments that a respondent might have. This provided an opportunity for the respondent to comment or expand on the questions asked. It served the purposes of providing a better understanding of the environment of the respondent.

Even though the end user satisfaction results were similar between groups. The groups do not share the same "view" on the Help Desk Services provided. Comments made were quite different between the groups and Table 4.12 illustrates the major themes derived from the comments that were made in the questionnaire.

Table 4.12 Themes/Comments for improvements

Themes	Group 1 Number of respondents	Group 2 Number of respondents
Response time and problem prioritisation	7	2
Increase staff numbers	1	
Increased knowledge	2	5
Empathy for dealing with customers with problems.	1	
Follow up	3	
New staff logons	2	
Hours of Operation		3
Systems Test		1
Document Problem Resolution		1
Knowledge sharing		1

Suggested improvements

Group 1's end users felt that the Help Desk personnel needed to resolve problems in a timelier manner and that the problem prioritisation is less than desirable, as it does not reflect the urgency of the end users. End users from Group 1 felt that the Help Desk personnel could improve on their follow-up skills and stream-line the requests for new staff logons, as the entire process can take up to a maximum of two weeks.

The Help Desk personnel in Group 1 are quite often not available for support as support is only deemed to be 10% of their role, as in turn most of the Help Desk personnel are also involved in project work. Consideration might be given to provide dedicated support staff that would be available during the business hours and therefore be available to provide better support.

Group 2 Help Desk personnel are perceived to be lacking in knowledge of the application systems that they support, and the Help Desk consultants do not document the resolution of problems. Hence, the end users felt that knowledge is not shared. One respondent from Group 2 felt that the hours of operation are not suitable as Group 2 Help Desk personnel reside in Australia and the hours of operation are based on Australian times and not New Zealand time.

Positive feedback

Group 2 had two respondents that have found that the Help Desk has generally a good availability in terms of hours of operation, and that the Help Desk does provide timely responses to fixing their problems.

4.5 Summary of Statistical Analysis

Details of the completed data returned from each group were tabulated and entered into SPSS. Due to the small sample sizes, the analysis of each group provided was both descriptive and comparative. SPSS was used to provide descriptive statistics such as mean, standard deviation and median (refer to Table B.1 in Appendix B). Variables that were measured and analysed in this study were identified based on previous studies conducted by researchers. This study was based on an exploratory analysis on the different types of support models in a New Zealand financial organisation. This chapter has outlined the various parametric and non-parametric tests that were used to analyse the data gathered from this survey. The respondents in this study were primarily "Non-Programming End Users" and the support services provided are minimal as the results suggested.

Overall, the end users seem to be satisfied with the services provided. Testing of the hypothesis using the Mann-Whitney U test showed that *there is no difference in end user satisfaction between the In-house Help Desk Support Model and the Outsourced Help Desk Support Model.*

Both groups had high end user satisfaction. Figure 4.1 confirms this result, as the end user satisfaction levels between the two groups are almost the same. There was 8% dissatisfaction in Group 1 while Group 2 reported no dissatisfaction with the services provided.

Qualitative data collected from end user feedback was also gathered and the results are summarised into various themes in Section 4.4.1. The Qualitative data suggested that there were difference of opinions between the groups. The major themes from the end user feedback were the response time, problem prioritisation and problem resolution of the Group 1 Help Desk personnel. Group 1 Help Desk personnel have been perceived as being slow in responding to end user needs, due to the fact that support is only 10% of the scheduled workload of Group 1 Help Desk personnel.

Group 2 Help Desk personnel, though lacking the knowledge to support the application systems and not providing hours of coverage to match New Zealand time, have received positive feedback on their availability in terms of hours of operation and timely response to fixing end user problems.

In summary, it would appear to support the null hypothesis that *there is no difference in end user satisfaction between the In-house Help Desk Support Model and the Outsourced Help Desk Support Model.*

CHAPTER 5 CONCLUSIONS, IMPLICATIONS AND FURTHER RESEARCH

5.1 Introduction

The success of a Help Desk is determined by the support services it provides (Vijayraman and Ramakrishna, 1990), and this support contributes to end user satisfaction (Mirani and King, 1994b; Buyukkut and Vass, 1993). The significance of providing effective support to end users cannot be over-emphasised. Together with effective training, user support has been long considered among the CSFs of end user computing (Nilsen and Sein, 2002). Hence, if organisations were to manage Help Desks according to the CSFs then Help Desk performance should improve and the organisation should benefit from better performance (Magal et al, 1988; Guimaraes, 1996). In order to monitor these areas appropriately, performance information is needed. Hence, identifying these few areas leads to identifying the key information needs of management (Magal et al, 1988). Research has indicated that a CSF such as end user satisfaction appears to be an extensively used surrogate for measuring IS effectiveness (Mirani and King, 1994a), even though there appears to be mixed findings with respect to Help Desk Support Services and EUC success. Bergeron and Berube (1988) report that end users were more satisfied when a Help Desk existed. However, more recent studies have revealed an interesting pattern. Mirani and King (1994b) have reported differences in the support expectations of end users and the support they received through a Help Desk. Nord and Nord (1994) have found that a significant percentage of end users were less than pleased with the support provided by Help Desks.

This study surveyed two of the Help Desk support models in New Zealand to determine if end users are more satisfied with one of the two Help Desk support models: the In-House and Outsourced Help Desk Support Models. Results as described in Chapter 4 have shown that overall, both support groups performed very well. This chapter describes the implications of this study. The value and limitations of this research project together with suggestions for further research are also discussed. This chapter will conclude with a summary of the findings of this project.

5.2 Implications

The main objective of this study was to determine if there is any difference in end user satisfaction in both groups i.e. the In-house Help Desk Support Model and Outsourced Help Desk Support Model.

Results have shown than the end users in both Help Desk Support Models are generally satisfied with the support services that were provided. There was only 1 "Very Dissatisfied" end user from the In-house Help Desk Support Model. The statistical results of the study supports the null hypothesis that *there is no difference in end user satisfaction between the In-house Help Desk Support Model and the Outsourced Help Desk Support Model.* This could be due to the very small sample size, which has produced an insignificant result in the end user satisfaction.

The qualitative aspects of this study also support the null hypothesis, as the respondents were generally satisfied with the support they received, regardless of the Help Desk Support Models. There were some compliments for the Outsourced Help Desk Support Model and a number of suggestions from the end users of both groups on how to improve the services provided.

Other Survey Results

For both groups, the results of the survey related to support services indicates that the majority of the support services are either "Not Applicable" or "Never Offered". These results could be due to the mismatch between the services requested by end users and those offered. The trend towards end user support has evolved over the years, as most of the popular services during the early days of end user support such as application development support, standards and guidelines and post-development support are no longer offered. Other categories such as operational support, post-development support and variety of software supported also seem to be low-priority offerings among the surveyed Help Desks. This gap between availability and demand could be due to the transformation end users have undergone as personal computers have become the standard desktop for end users (Govindarajulu 2002). Moreover, end users also tend to use the Help Desk minimally, possibly due to the existence of

local support staff in each department supporting only users of that department (Govindarajulu 2002). Many Help Desks do not view application development support as critical. Many also ignore other support services related to application developments - this could be due to role transformations by end users, i.e. end users becoming "knowledge workers" (McLeod and Schell, 2001) or as for this study, majority of the end users are "Non Programming End Users" whose job functions are limited to accessing software that are provided by others via a limited menu-driven applications or a prescribed list of procedures.

5.3 Value of the Research

The result of this research has indicated for "Non Programming End Users", there is no difference whether the Help Desk Support Model is in-house or outsourced. This result may be beneficial to small organisations when evaluating their support needs, presenting them with both options to choose from.

This research project has provided a framework that can be used to measure the overall end user satisfaction with any Help Desk Support model, regardless of the model, i.e. In-house, Outsourced or Hybrid. The questionnaire in this study is generic in that it can be used in both academic and commercial environments. This framework as described in Section 3.3 can be used as a base unit on its own or it can be combined with other frameworks to produce a new framework. For example, if the purpose is to survey end user satisfaction, then only the box for end user satisfaction can be selected and implemented. Additionally, the framework could be used as a Delphi survey to determine the importance of the support services of a department or organisation. For practitioners, the framework can help to create optimal support models to maximise support service benefits, or it can serve as a basis for deciding on the mix of support services to be offered to end users. For researchers, using the framework can help them to understand the dynamics of Help Desks – to conceptualise, model and study end user satisfaction. It can also be used to assess the long-term effectiveness of a Help Desk.

5.4 Limitations of the Research

This study was subject to certain limitations. The number of responses from colleagues was low (38 out of a potential 100 respondents). A higher response rate would have been more desirable. As a result of the failed attempt to mail out to the other "In-house" category of First-level support (i.e. Groups 3 and 4), this study has been narrowed down to study only Second-level support. Hence, the test results from the First-level of support were not analysed, as the First-level of support was outsourced in both Groups 1 and 2. Further studies should be conducted to retest the validity of the instrument using alternative support services (i.e. the support services provided for Groups 3 and 4) that were abandoned due to management issues. Different categories of end users such as middle management and more senior management may have a different view on the Help Desk's effectiveness and support services. The level of support from the two groups (Group 1 and 2) was similar. The similar results may have been due to the low number of respondents. There was some confusion amongst the respondents as they misunderstood the phrases "Not Applicable" and "Never Offered", and a number of respondents introduced a new scale, "Don't Know".

5.5 Suggestions for further research

The importance of the Help Desk to many organisations will not diminish. Therefore research that provides pertinent usable information to facilitate improvements to Help Desks and the services they provide will be beneficial to many organisations. Further research that is suggested can be grouped into two main areas: firstly, to replicate the whole study, and secondly to use sections of this study to investigate issues in greater detail, such as to determine the importance of the support services.

It would be interesting to survey the top five hundred organisations in New Zealand, across different industry types. The purpose would be to find out if their Help Desks are providing the support services that their end users need, and how satisfied these end users are. The study should also include the Help Desk support models that are currently in place.

Similar studies to the above could be conducted in small to medium organisations in New Zealand, across different industry types. As above, the purpose would be to find if the support services provided to end users meet their needs and how satisfied the end users are with the support services provided. The study should include the Help Desk support models that are currently in place.

If both of these types of studies were carried out, it would be possible to find out if there are any similarities between the support needs of end users in large, medium or small organisations, or the end users in particular types of industry, or the effectiveness of Help Desk support models.

The other important aspect that could be beneficial to the New Zealand organisations could be to understand if outsourcing the Help Desk is only effective for large organisations or whether there is a market for small to medium organisations to take advantage of the outsourcing vendor environment. Grupe (1997) suggests that there are some organisations that are just too small to provide adequate staff support, even though they may deploy a wide variety of systems, software packages and networks. In instances like this, outsourcing offers these businesses a range of service options. An outsourcer who specialises in Help Desk operations can acquire and implement

expensive support tools that facilitate end user support but are not cost-effective to be implemented by small companies. Many organisations outsource the Help Desk function to avoid the necessity of staffing and managing the unit, saving a considerable amount of time in scheduling, training, hiring and coordination of the department.

With the increasing trend of the outsourcing of Help Desk Support services to third parties, it would be beneficial to carry out studies that are able to provide organisations with information on the trends of the Help Desk support models, the support services provided and end user satisfaction with the support services for each model. Organisations could use the information to select a Help Desk support model that would be suitable for their organisation, and to measure and improve the satisfaction and the effectiveness of their Help Desk support models.

5.6 Conclusion

User satisfaction has been recognised as a key measurement of Help Desk success. Various researchers have noted that user satisfaction is considerably enhanced when end users are provided with appropriate types and levels of support (Lederer and Spencer, 1988; Rivard, 1987; Rivard and Huff, 1984). Therefore, the provision of end user support appears to be critical to overall organisational effectiveness.

The results of this study indicated that *there is no difference in end user satisfaction between the In-house Help Desk Support Model and the Outsourced Help Desk Support Model.* This could be as a result of a very small and unequal sample size. Both Support Models had almost the same level of end user satisfaction, except for the In-house Support Model where there was 1 "Very Dissatisfied" end user.
The respondents were primarily "Non Programming End Users" who do not require much in terms of the support services that were detailed in the questionnaire. Perhaps it was the case as suggested by Govindarajulu (1996) where most end users use alternate sources of support including informal and local support staff, or it could be the case that the respondents did not understand the questions.

The result of this study may benefit the small organisations with "Non Programming End Users" as it indicated that there is no difference in end user satisfaction between the in-house or the outsourced model. It presents them with both options when evaluating their support needs and in selecting a Help Desk support model.

This study has provided lessons for the organisation in educating its employees about the roles of the Help Desk as well as increasing the body of knowledge concerning providing Help Desk Support Services.

REFERENCES

Abdul-Gader, A. (1992). End user computing success factors: Further evidence from a developing nation. *Journal of End User Computing, 4(3),* 4-13.

Aggarwal, A.K. (1994). Trends in end user computing: A professional's perspective. *Journal of End User Computing*, 6(3), 32-33.

American Management Association (1985). *The 1985 AMA Report on Information Centres*, New York. 1985.

Amoroso, D.L. & Cheney, P.H. (1991). Testing a Causal Model of End user Application Effectiveness. *Journal of Management Information Systems. 8(1),* 63-89.

Athabasca University (1998). *Psychology 404 Experimental Psychology*. Retrieved on September 2.

Baroudi, J.J.; Olson, M.H. and Ives, B. (1986). An empirical study of the impact of user involvement on system usage and information satisfaction. *Communications of the ACM, 29,3*, 232-238.

Benjamin, R.I. (1982). Information Technology in the 1990's: A Long Range Planning Scenarios, *MIS Quarterly*, 11-31.

Benson, D.H. (1983). A Field Study of End User Computing: Findings and Issues. *MIS Quarterly*, 35-45.

Bento, R. (1995). Cross-Cultural teamwork in end user computing: A theoretical model. *Journal of End User Computing, 5(2),* 18-25.

Bergeron, F. and Berube, C. (1988). The management of end user computing environment: An empirical investigation, *Information and Management 14(3),* 107-113.

Bergeron, F. and Berube, C. (1990). End users talk computer policy. *Journal of Systems Management, 41(12)*, 14-16.

Bergeron, F.; Rivard, S. and Raymond, L. (1993). Assessment of end user computing from an organisational perspective. *Information Resource Management Journal, (6:1),* 14-25.

Bergeron, F.; Rivard, S. and Serre, L.D. (1990). Investigating the support role of the information centre. *MIS Quarterly 14(3)*, 247-260.

Blili, S.; Raymond, L. and Rviard, S. (1998). Impact of task uncertainty, end user involvement and competence on the success of end user computing. *Information and Management, 33(3)*, 137-153.

Bowman, B.; Grupe, F.H.; Lund, D and Moore, W.D. (1993). An examination of sources of support preferred by end user computing personnel. *Journal of End User Computing, 5(4)*, 4-11.

Boyer, G. (1990). Ten facts of end user computing for every system manager. *Journal of Systems Management, 41(6),* 14.

Brancheau, J. and Wetherbe, J. (1988). Higher and Lower Rated Information: Exploring the Differences. *Journal of Information Management, 9:1,* 53-70.

Brancheau, J.C. and Brown, C.V. (1993). The Management of End user Computing: Status and Directions, *ACM Computing Surveys, 23.*

Brancheau, J.C.; Vogel, D.R. and Wetherbe, J.C. (1985). An Investigation of the Information Centre from the User's Perspective. *Database*, 4-17.

Brown, C.V. and Bostrom, R.P. (1994). Organisation designs for the management of end user computing: Re-examining the contingencies. *Journal of MIS 10(4),* 183-211.

Bryan, N.; McLean, E.; Smits, S. and Burn, J. (1995). Work perceptions among Hong Kong and United States I/S workers: A cross-cultural comparison. *Journal of End User computing, 7(4),* 22-29.

Buyukkurt, M. and Vass, E. (1993). An investigation of factors contributing to satisfaction with end user computing process. *Canadian Journal of Administrative Sciences, 10(3),* 212-228.

Cale, E. (1994). Quality issues for end user developed software. *Journal of Systems Management, 45(1),* 36-39.

Canning, R.G. (1981). Supporting End User Programmer. *EDP Analyser, (19:6).*

Carr, H.; Young, D. and Rainer, R. (1990). MIS's role in determining information centre services. *Journal of Systems Management, 7(2),* 33-40.

Carr, H.H. (1987). Information Centre: The IBM Model versus Practice. *MIS Quarterly, 11:3*, 324-338.

Carr, H.H. and Rainer Jr., R. K. (1993). The State of Information Centres, *Information Systems Management, (10:1).*

Casale, F. (2001). IT Index 2001. *The Outsourcing Institute*. Retrieved March 23, 2002, from http://www.outsourcing.com/content.asp?page=02i/other/_sungard/ITIndex2001.pdf

Chau, P.Y.K. (1997). Re-examining a model for evaluating information centre success using a structural equation modelling approach. *Decision Sciences, 8(2),* 309-334.

Cheney, P.; Mann, R. and Amoroso, D.L. (1986). Organisational factors affecting the success of end user computing. *Journal of Management Information Systems, (3:1),* 65-80.

Chidambaram, L. (1999). Knowledge transfer in conceptual modelling by end users. *Journal of End User Computing, (11:1),* 40-51.

Chin, W.W. and Lee, M.K.O. (2000). A Proposed Model and Measurement Instrument for the Formation of IS Satisfaction: The Case of End user Computing Satisfaction. *Proceedings of the Twenty-first International conference on Information Systems*, 553-563.

Chin, W.W. and Newsted, P.R. (1995). The importance of specification in causal modelling: The case of end user computing satisfaction. *Information Systems Research, 6(1),* 73-81.

Clark, T. D. (1992). Corporate systems management: An overview and research perspective. *Communications of the ACM, 35(2),* 60-75.

Cooper, D.S. and Schindler, P.S. (2001). *Business Research Me*thods (7th ed.). Singapore: McGraw-Hill Irwin.

Crwth Computer Coursewares (1985). The Second Crwth Information Centre Survey. *Crwth News for Better Training, (3:1).*

Crwth Computer Coursewares (1990). *Trend in end user computing.*

Czegel, B. (1999). *Help Desk Practitioner's Handbook*: New York: John Wiley.

Dickson, G.W.; Leitheiser, R.L.; Wetherbe, J.C. and Nechis, M. (1984). Key Information Systems Issues for the 1980s. *MIS Quarterly*, 135-147.

Dillman, D.A. (1972). Increasing Mail Questionnaire Response in Large Samples of the General Public. *Public Opinion Quarterly*, Summer 1972, 254-257.

Doll, W. J. and Torkazdeh, G. (1988). The Measurement of End user Computing Satisfaction. *MIS Quarterly. 12(2),* 259-274.

Doll, W. J. and Torkzadeh, G. (1991). The measurement of end user computing satisfaction: Theoretical and methodological issues. *MIS Quarterly, 15(1),* 5-10.

Doll, W. J. and Xia, W. (1997). A confirmatory factor analysis of the end user computing satisfaction instrument: A replication. *Journal of End User Computing, 9(2),* 24-30.

Doll, W. J.; Xia, W. and Torkzadeh, G. (1994). A confirmatory factor analysis of the end user computing satisfaction instrument. *MIS Quarterly, 18(4),* 357-369.

Etezadi-Amoli, J. and Farhoomand, A. (1996). A structural model of EUC satisfaction and User Performance. *Information and Management.* 30, 65-73.

Galletta, D.F. and Lederer, A.L. (1989). Some Cautions on the Measurement of UIS, *Decision Sciences, (20:3),* 41-438.

Garavan, T. and McCracken, C. (1993a). Introducing end user computing: The implications of training and development – part 1. *Industrial and Commercial Training. 25(7),* 8-14.

Garavan, T. and McCracken, C. (1993b). Introducing end user computing: The implications of training and development – part 2. *Industrial and Commercial Training. 25(9),* 8-16.

Gerrity, T.P. and Rockart, J.F. (1986). End user Computing: Are You a Leader or a Laggard? *Sloan Management Review*, 25-34.

Glorfeld, K. and Cronan, T. (1993). Computer information satisfaction: A longitudinal study of computing systems and EUC in a public organization. *Journal of End User Computing, 5(1),* 27-36.

Govindarajulu, C. (1996). End user computing support: Status and directions. In *Proceedings of the 1996 Southwest Decision Sciences* (San Antonio, TX).

Govindarajulu, C. and Lippert, S.K. (2002). The Status of End-User Computing Support: An Exploratory Study. *Informing Science*, 581-585.

Govindarajulu, C. and Reithel, B. (1998). Beyond the Information Centre: An Instrument To Measure End User Computing Support from Multiple Sources, *Information and Management, 33*, 241-250.

Govindarajulu, C., (2002). The Status of Helpdesk Support. *Communications of the ACM, (45:1),* 97-100.

Govindarajulu, C.; Reithel, B.J. and Sethi, V. (2000). A Model of end user attitudes and intentions toward alternative sources of support. *Information and Mangement 37*, 77-86.

Grupe, F.H. (1997). Outsourcing the Help Desk Function. *Information Systems Management, Volume 14, Issue 2.*

Guimaraes, T. (1984). The Evolution of Information Centre. *Datamation*, 127-130.

Guimaraes, T. (1996). Assessing the Impact of Information Centres on End user Computing and Company Performance. *Information Resources Management Journal, (9:1),* 6-15.

Guimaraes, T. (1997). The support and management of end user computing in the 1990s. *International Journal of Technology Management, 14(6-8),* 766-788.

Guimaraes, T. and Igbaria, M. (1992). Determinants of turnover intentions: Comparing IC and IS personnel. *Information Systems Research*, 3(3), 273-303.

Guimaraes, T. and Igbaria, M. (1994). Exploring the relationship between information centre success and company performance. *Information and Management, 26.* 133-141.

Guimaraes, T. and Igbaria, M. (1996). Exploring the relationship between EUC problems and success. *Information Resources Management Journal*, 9(2), 5-15.

Guimaraes, T. and Igbaria, M. (1997). Assessing user computing effectiveness. An integrated model. *Journal of End User Computing, 9(2),* 3-14.

Guimaraes, T. and Vsaudevan, R. (1986). Personal Computing Trends and Problems: An Empirical Study. *MIS Quarterly, (10:2),* 179-187.

Guimaraes, T.; Gupta, Y. and Rainer, R.K. (1999). Empirically Testing the Relationship between End user Computing Problems and Information Centre Success Factors, *Decision Sciences, (30:2),* 393-413.

Gunton, T. (1988). *Business Information Technology Series, End User Focus.* Prentice Hall International Ltd.

Hammond, L.W. (1982). Management considerations for an information centre, *IBM Systems Journal* 21(2), 131-161.

Harris, R.W. (1992). Management Control of End-User Computing: A description of Research in Progress. *ACM*, 33-40.

Harris, R.W. (2000). Schools of thoughts in research into end user computing success. *Journal of End user Computing (12:1).*

Hellman, R. (1992). Comprehensive user education for successful end user computing. *Information and Technology and People, 6(1),* 65-84.

Henderson, J. and Treacy, M.(1986). Managing end user computing for competitive advantage. *Sloan management Review, 30, 2,* 3-14.

Hendrickson, A.R.; Glorfeld, K. and Cronan, T.P. (1994). On the repeated test-retest reliability of the end user computing satisfaction instrument: A comment. *Decision Sciences, 25(4),* 655-667.

Hendrickson, A.R.; Massey, P.D. and Cronan, T.P. (1993). On the test-retest reliability of perceived usefulness and perceived ease of use scales. *MIS Quarterly, 17(2),* 227-230.

Henry, J. and Stone, R. (1994). A Structural Equation Model of End user Satisfaction with a Computer Based Medical Information System. *Information Resource Management Journal, 7(3),* 21-34.

Hirschheim, R. and Dibbern, J. (2002). *Information Systems Outsourcing in the New Economy – An Introduction.* Springer, New York, 2002.

Hsieh, C.; Lu, M. and Lin, E. (1994). Consistency in human-computer interfaces for end users. *Journal of End User Computing, 6(2),* 3-9.

Hsu, C. and Lu, H. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. *Information and Management, (41.7),* 853-858.

Huitt, W.; Hummel, J. and Kaeck, D. (1999). *Internal and External Validity – General Issues.* Retrieved on September 10, 2004 from http://chiron.valdosta.edu/whuitt/col/intro/valdgn.html

IDC New Zealand (2003). *New Zealand Business Enablement*: IT Services. Retrieved on 2 August 2004 from http://www.idcresearch.co.nz/market/services.html

Igbaria, M. and Zviran, M. (1991). End-User Effectiveness. A Cross-Cultural Examination. *Omega International Journal of Management Science.* 19(5), 1-13.

Igbaria, M. and Zviran, M. (1996). Comparison of end user computing characteristics in the US, Israel and Taiwan. *Information and Management, 30(1),* 1-13.

Igbaria, M. (1990). End user Computing Effectiveness: A structural equation model. Omega, *International Journal of Management Science, 18(6),* 637-652.

Igbaria, M. (1993). User Acceptance of Microcomputer Technology: An Empirical Test. *Omega International Journal of Management Science, 21 (1),* 73-80.

Igbaria, M. and Nachman, S.A. (1990). Correlates of end user satisfaction with end user computing: An exploratory study. *Information and Management, 19(2),* 73-82.

Igbaria, M. and Toraskar, K. (1994). Impact of end user computing on the individual: An integrated model. *Information Technology and People, (6:4),* 271-292.

Igbaria, M.; Guimaraes, T. and Davis, G.B. (1995). Testing the Determinants of Microcomputer Usage via a Structural Equation Model. *Journal of Management Information Systems. 11(4),* 87-114.

Igbaria, M.; Parasuraman, S. and Baroudi, J.J. (1996). A motivational Model of Microcomputer. *Journal of Management Information Systems, 13(1),* 127-143.

Ives, B., Olson, M., and Baroudi, S. (1983). The Measurement of User Information Satisfaction, *Communications of the ACM, (26:10),* 785-793.

Kendall, H. (2002). Prehistoric Helpdesk! *Supportworld.* Oct-Nov 2002. Retrieved February, 2, 2004, from http://www.hdi-europe.com/supportworld/archives/supportworld07.pdf

Khan, E. (1992). The effects of Information centres on the growth of end user computing. *Information and Management. 23(5),* 279-289.

Kim, C.; Kunsoom, S. and Lee, J. (1998). Utilisation and user satisfaction in end user computing. A task contingent model. *Information Resources Management Journal, 11(4),* 11-24.

Lacity, M.C. and Wilcocoks, L.P. (1998). An Empirical Investigarion of Information Technology Sourcing Practices: Lessons from Experience. *MIS Quarterly,* 223.

Lamb, R. and Davidson, E. (2000). *The New Computing Archipelago: Intranet Islands of Practice, in Organizational and Social Perspectives on Information Technology.* Baskerville, R., Stage J and DeGross, J. (eds), Kluwer, 255-276.

Lane, P.; Palko, J. and Cronan, T. (1994). Key issues in the MIS implementation process: An update using end user computing satisfaction. *Journal of End User Computing, 6(4),* 3-13.

Lederer, A. and Spencer, V. (1988). The Effective Information Centre: Targeting the Individual User for Success, *Journal of Systems Management, (39:1),* 22-27.

Lee, D.M.S. (1986) Usage Patterns and Sources of Assistance for Personal Computer Users. *MIS Quarterly, 10(4),* 313-325.

Lee, S.; Kim, V. and Lee, J. (1995). An empirical study of the relationships among end user information systems acceptance, training and effectiveness. *Journal of Management Information Systems, 12(2),* 189-202.

Leitheiser, R.L. and Wetherbe, J.C. (1985) *A Survey of Information Centres: Services, Decisions, Problems, and Successes.* Management Information System Research Center, School of Management, University of Minnesota, Minneapolis, Minnesota.

Leitheiser, R.L. and Wetherbe, J.C. (1986). Service Support Levels: An Organised Approach to End user Computing. *MIS Quarterly,* 337-349.

Levine, P. (1997). Help Desks Get Strategic Role. *CommunicationsWeek,* 1997, January, 1997. Issue 645. Retrieved on July 4, 2004, from http://static.highbeam.com/c/communicationsweek/january131997/helpdesksgetstrategicrole/

Lin, C. and Chung, C. (1991). End user computing in a CASE environment. *Journal of Information Systems Management, 8(2),* 17-21.

Lowry, R. (1999). *Subchapter 3b.Rank-Order Correlation.* Retrieved on 28 September 2004 from http://faculty.vassar.edu/lowry/ch3b.html

Lucas, H.C. and Sutton, J.A. (1977). The Stage Hypothesis S-Curve: Some Contradictory Evidence. *Communications of the ACM (20:4),* April 1977. 254-259.

Lundgren, T. and Lundgren, C. (1996). Computer use patterns. *Journal of End User Computing, (8:3),* 11-14.

Magal, S.R. (1991). A Model of Evaluating Information Centre Success. *Journal of Management Information Systems, (8:1),* 91-106.

Magal, S.R.; Carr, H.H. and Watson, H.J. (1988). Critical Success Factors for Information Centre Managers. *MIS Quarterly*, Sept 1988, 413-425.

Marcolin, B.; Munro, M. and Campbell, K. (1997). End user ability: Impact of job and individual differences. *Journal of End User Computing*, 8(1), 4-11.

McHaney, R. and Cronan, T.P. (1998). Computer simulator success: On the use of the end user computing satisfaction instrument: A comment. *Decision Sciences, 29(2),* 525-534.

McHaney, R.; Hightower, R. and White, D. (1999). EUCS test-retest reliability in representational model decision support systems. *Information and Management, 36*, 109-119.

McLean, E. and Kappelman, L. (1992-1993). The convergence of organisational and end user computing. *Journal of Management Information Systems, 9(3),* 145-155.

McLean, E., Kappelman, L. and Thompson, J. (1993). Converging end user and corporate computing. *Communications of the ACM, 36(12),* 79-92.

McLeod R. and Schell, G. (2001) *Management Information Systems*. (8th ed.). Upper Saddle River: Prentice-Hall.

McNeil, R. (2004). *IT Trends 2004*: The Evolving Outsourced Workplace, Giga Research, a wholly owned subsdiary of Forreseter Research, Inc. RPA-012004-00009. January 8, 2004.

Meaders, C.L. and Mezger, R.A. (1984). Selecting an end user programming language for DSS development. *MIS Quarterly, (8:4)*, 267-281.

Melone, N.P. (1990). A Theoretical Assessment of the User Satisfaction Construct in Information Systems Research. *Management Science, (36:1),* 76-91.

META Trends 2004/05, Operational Strategies. Retrieved on July 4, 2004, from http://www.metagroup.com/cgi-bin2/download.cgi/trend2062.pdf

Mirani, R. and King, W.R. (1994a) The development of a measure for end user computing support. *Decision Sciences 25(4),* 481-498.

Mirani, R. and King, W.R. (1994b). Impact of End user and Information Centre Characteristics on End user Computing support. *Journal of Management Information Systems*, 141-166.

Moore, J. (1997). The application of job rotation in end user computing: Toward a model of research and practice. *Journal of End User Computing, 9(1),* 4-13.

Munro, M.; Huff, S.; Marcolin, B. and Compeau, D. (1997). Understanding and measuring user competence. *Information and Management. 33(1*), 45-57.

Munro, M.C. and Wheeler, B.R. (1980). Planning, critical success factors, and management's information requirements, *MIS Quarterly, (4:4),* 27-38.

Munro, M.C.; Huff, S.L. and Moore, G. (1987-88). Expansion and control of end-uers computing, *Journal of Management Information Systems, 4(3),* 5-27.

Nilsen, H. and Sein, M. (2002). Determinants of User Satisfaction with the Support Function. *Proceedings of the 2002 ACMSIGCPR Conference*, May 2002. 47-51.

Nilsen, H. and Sein, M. (2004). What is Really Important in Supporting End users? *Communications of the ACM. SIGMIS 2004*, 48-54.

Nolan, R.L. (1979). Managing the Crisis in Data Processing. *Harvard Business Review (57:2),* 115-126.

Nord, G. and Nord, J. (1994). Perceptions and attitudes of end users on technology issues. *Journal of Systems Management, 45(11),* 12-15.

Nunamaker, J.F. Jr.; Konsynski, B.R.; Chen, M.; Vinze, A.S.; Chen, Y.I.L. and Heltne, M.M. (1988). Knowledge-Based Systems Support for Information Centres. *Proceedings of the Twenty-First Annual Hawaii International Conference, 3*, 96-105.

Palvia, S. (1991). On end user computing productivity: Results of controlled experiments. *Information and Management, 21(4),* 217-224.

Panko, R.R. (1988). *End user Computing Management, Applications and Technology*. John Wiley and Sons, New York.

Poltnick, N. (1999). *IT Professional's Guide to Managing Systems, Vendors and End Users*. Osborne/McGraw Hill, 1999.

Powell, A. and Moore, J.E. (2002). The focus of research in end user computing: where have we come since the 1980s? *Journal of End User Computing. (14:1),* 3-23.

Rainer, R. and Carr, H. (1992). Are information centres responsive to end user needs? *Information and Management*, 22, 113-121.

Rivard, S. (1987). Successful implementation of end user computing. *Interfaces, 17,3*, 25-33.

Rivard, S. and Huff, S. (1988). Factors of Success for End user Computing. *Communications of the ACM, 31(5),* 552-561.

Rivard, S. and Huff, S.L. (1984). User Developed Applications: Evaluation of Success from the DP Department Perspective. *MIS Quarterly, 8(1),* 39-49.

Robey, D. and Zmud, R. (1992). Research on the organisation of end user computing: Theoretical perspectives from organisation science. *Information Technology and People, 6(1),* 11-27.

Rockart, J.F. (1979). Chief Executive Define Their Own Data Needs. *Harvard Business Review, (57:2),* 81-93.

Rockart, J.F. and Flannery, L. (1983). The Management of End user Computing. *Communications of the ACM 26,* 776-784.

Salchenberger, L. (1993). Structured development techniques for user-developed systems. *Information and Management, 24(1),* 41-50.

Seddon, P. (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information Systems Research, 8(3),* 240-253.

Shank, M.E.; Boynton, A.C. and Zmud, R.W. (1985). Critical Success Factor Analysis as a Methodology for MIS planning. *MIS Quarterly, 9,2*, 121-129.

Shaw, N.; Lee-Partridge, J.E. and Ang, J. (2003). Technological Frames and End user Computing. *Journal of End User Computing, (15:2).*

Shaw, N.; Niedermann, F. and DeLone, W (2002). An empirical Study of Success Factors in End user Support. *The Database for Advances in Information Systems. (33:2),* 41-56.

Shayo, C.; Guthrie, R. and Igbaria, M. (1999). Exploring the measurement of end user computing success. *Journal of End User Computing, 11(1),* 5-14.

Sherman, S. (1994). How I bought my computer. *Fortune, 129(1),* 76-82.

Sheskin, D. (2004). *Handbook of Parametric and Nonparametric Statistical Procedure* (3 ed).Washington D.C. Chapman and Hall/CRC.

Somers, T.M.; Nelson, K. and Karimi, J. (2003). Confirmatory Factor Analysis of the End user Computing Satisfaction Instrument: Replication within an ERP Domain. *Decision Sciences, (34:3).*

Speier, C. and Brown, C.V. (1997). Differences in End user Computing Support and Control across User Departments. *Information and Management, 32,* 85-99.

Sprague, R.H. and McNurlin, B.C. (eds) (1986). *Information Systems Management in Practice*, Prentice-Hall, Engleswood Cliffs, NJ, 1986.

Strassman, P.A., (1997). The Squandered Computer: Evaluating the Business Alignment of Information Technologies. *The Information Economics Press.* New Canaan.

Straub, D. W. (1989). Validating instruments in MIS research. *MIS Quarterly, 13(2),* 147-166.

Suh, K.; Kim, S. and Lee, J. (1994). End user's Disconfirmed Expectations and the Success of Information Systems. *Information Resources Management Journal. 17(4),* 30-39.

Sumner, M. (1985). Organisation and Management of Information Centre. *Journal of Systems Management (36:11*), 10-15.

Sweat, J. (2001). Help Technology Gets More Sophisticated. *Information Week,* Retrieved on July 17, 2004, from http://www.informationweek.com/story/IWK20011011S0020

Tafti, M. and Shirani, A. (1997). Hierarchy of end user computing needs. An empirical investigation. *Journal of End User Computing, 9(4),* 29-35.

Tayntor, C. (1994). Partners in excellence: Metrics and productivity programs. *Information Systems Management, 11(1),* 81-83.

To, P.L. (2002). The Support Role of Information Centres: The Perceptions of IC Managers and End Users. Jun 2002, *International Journal of Management, (19:2, Part I),* 238-247.

Torkzadeh, G. and Doll, W. (1991). Test-retest reliability of the end user computing satisfaction instrument. *Decision Sciences, 22(1),* 26-37.

Torkzadeh, G. and Doll, W. (1993). The place and value of documentation in end user computing. *Information and Management, 24(3),* 147-158.

Trochim, W.M.K. (2002). *Idea of Contruct Validity*. Retrieved on September 2, 2004 from http://www.socialresearchmethods.net/kb/considea.htm

Udo G.G., (2000). Using Analytic Hierarchy Process To Analyse The Information Technology Outsourcing Decision, *Industrial Management and Data Systems*, 100/9.

Van Kirk, D. (1995). Poor asset management is breaking the bank. *INFOWORLD.* January 23, 1995.

Venkatraman, N. and Ramanjam, V. (1987). Planning System Success: A conceptualisation and an Operational Model. *Management Science, (33, 6)* 687-705.

Vijaraman, B.S. and Ramakrishna, H.V. (1990). A Comparative Analysis of Successful and Unsuccessful Information Centres. *Information and Management, 19,* 199-209.

Wallace, D. (1954). A Case for and against Mail Questionnaire. *Public Opinion Quarterly,* Spring 1954, 40-52.

Walls, J. and Turban, E. (1991). Information Centre Management Control Measures:A Survey and Comparison. *IEEE Transactions on Engineering Mangement, Vol. 38, No. 4,* 336-343.

Watson, H.J. and Carr, H.H. (1987). Organising for Decision Support System Support: The End user Services Alternative. *Journal of Management Information Systems. (4:1),* 83-95.

White, C.E., Jr. and Christy, D.P. (1987). The information centre concept: A normative model and a study of six installations. *MIS Quarterly, 11,4,* 451-458.

Wu, J.; Chen, Y. and Lin, L. (2004). Empirical evaluation of the revised end user computing acceptance model. *Computers in Human Behaviour,* 1-15.

Yellen, R. (1997). End user computing in a global environment. *Journal of End User Computing, 9(2),* 33-34.

Yip, W.; To, C.W. and Ma, L.C.K. (1993). Critical Success Factors for the Implementation of Information Centre in Hong Kong's Banking Industry. December 1993 *Proceedings of the Conference on Organisational Computing Systems,* 78-89.

Zinatelli, N. (1994). *A Case Study and Survey of Factors Affecting EUC Success in Small Firms in New Zealand.* Unpublished Ph.D. Thesis, University of Canterbury, New Zealand.

Zinatelli, N. Cragg, P. and Cavaye, A. (1996). End-user computing sophistication and success in small firms. *European Journal of Information Systems, (5:3),* 171-181.

APPENDIX A – MAIL SURVEY PACK

The Mail Survey Pack comprises:

1. Covering Letter
2. Questionnaire
3. Stamped Self-addressed envelope

Covering Letter

Date:

<<name>>
<<Job Title>>
<< Company Name>>
<<Address Line 1>>
<<Address Line 2>>
<<Address Line 3>>

Dear <<so and so>> eg. Mr/Mrs/Ms/Dr Joe Smith

I am a student at Massey University completing a Masters in Information Systems degree.
The purpose of this research project is to identify which help desk Support Model is the most effective, as in today's environment; support can either be outsourced or internally staffed.
The information you provide in this questionnaire will be strictly confidential and anonymity will be assured by using a coding system for all questionnaires; no material that could identify you personally will be used in any verbal or written report.
Statistical analysis will be performed, the results and conclusion will be drawn from the data supplied and all response materials will be destroyed at the conclusion of the study. A copy of the results and findings of this research project can be obtained from the Department of Information Systems at Massey University, Palmerston North.
Please complete the questionnaire and post it back by **<<due date>>** using the stamped self-addressed envelope supplied with this questionnaire. Should you be unable to complete this questionnaire, I would be much obliged if you could pass it to a team member who is able to.
If you have any questions please contact the researcher or the supervisor below.
Thank you for taking time to participate in this questionnaire.

Yours sincerely

Dora Yap
Massey Masters Information Systems Student

	Researcher:	Supervisor:
	Dora Yap	Peter Blakey
Telephone	[redacted]	[redacted]
	[redacted]	
E-mail:	[redacted]	P.Blakey@massey.ac.nz
Address:	[redacted] Auckland	[redacted] Massey University Private Bag 11222 Palmerston North

Help Desk Support Questionnaire

INTRODUCTION

I am a student at Massey University completing a Master in Information Systems degree. I am studying the efficiency and effectiveness of Help Desk Support Models and would appreciate your assistance in my research.

The purpose of this research project is to identify which help desk Support Model is the most effective, as in today's environment support can either be outsourced or internally staffed.

The information in this questionnaire will be strictly confidential and anonymity will be assured by using a coding system for all questionnaires; no material that could identify you personally will be used in any verbal or written report.

Statistical analysis will be performed and the results and conclusion will be drawn from the data supplied and all response materials will be destroyed at the conclusion of the study. A copy of the results and findings of this research project can be obtained from the Department of Information Systems at Massey University, Palmerston North.

Please complete the questionnaire and post it back by **<<due date>>** using the self-addressed envelope supplied with this questionnaire. If you are unable to complete this questionnaire, I would be much obliged if you could please pass it to a team member who is able to.

If you have any questions please contact the researcher or the supervisor below.

Thank you for taking time to participate in this questionnaire.

	Researcher:	Supervisor:
	Dora Yap	Peter Blakey
Telephone	[redacted]	(06) 3505799 extn 2682
Mobile	[redacted]	
E-mail:	[redacted]	P.Blakey@massey.ac.nz
Address:	[redacted] Auckland	Department of Information Systems Massey University Private Bag 11222 Palmerston North

2004 Help Desk Support Questionnaire

Organisation Information:

Organisation name: _____

Organisation Address: _____

_____

_____

_____

Title/Position: _____

Department: _____

Please check ☒ Only one of the boxes.

What is your gender?

☐ Male

☐ Female

What is your age group?

☐ 18 – 24 years

☐ 25 – 30 years

☐ 31 – 34 years

☐ 35 – 40 years

☐ 41 – 44 years

☐ 45 – 50 years

☐ Over 50 years

What is your present job?

☐ IT Management

☐ IT Group/Project Leader

☐ IT Analyst/Consultant/Developer

☐ Business Executive

☐ Business Management

☐ Business Department - Project/Team Leader

☐ Business Analyst/Consultant

☐ Business Department – Customer Service Representative

☐ Other, please specify _____

Please check ☒ the relevant boxes.

What do you consider yourself to be?

☐ Non-Programming End Users
Group of users who access computerised data through a limited, menu-driven environment or a strictly followed set of procedures, and use software provided by others.

☐ Command Level Users
Users that perform inquiries and simple calculations and generate unique reports for themselves. They understand the available databases and are to specify, access and manipulate information.

☐ End Users Programmers
Users who use both command and programming languages directly for their own personal information needs. They can develop applications for their own use and for others.

☐ Functional Support Personnel
The market researchers, financial analysts, whose primary task is providing tools to access and analyse data. They become skill in end user languages and informal centres of system design and programming expertise. Hence, they are able to support other end users within the functional area.

☐ End User Computing Support Personnel
The end users who are most often located in a central support organisation such as an information centre.

☐ DP Programmers
who are very similar to the traditional COBOL shop programmers except that they program in end user languages.

How many years have you worked for your current employer?

☐ Less than 1 year

☐ 1- 5 years

☐ 6 - 10 years

☐ More than 10 years

How many years have you worked in the information systems/technology field?

☐ Less than 1 year

☐ 1- 5 years

☐ 6 - 10 years

☐ More than 10 years

What industry is your company in?

- ☐ Agriculture, forestry and fishing
- ☐ Building construction
- ☐ Energy (Gas, Petrol, Electricity/power)
- ☐ Financial (Banking, Insurance)
- ☐ Health
- ☐ Government Departments
- ☐ Gaming
- ☐ Import and Export
- ☐ Manufacturing and production
- ☐ Retail and wholesale
- ☐ Tourism (including accommodation, transportation)
- ☐ Telecommunication
- ☐ Other, please specify _____

What is your company's Gross annual revenue?

- ☐ Less than $250,000
- ☐ $250,001 - $500,000
- ☐ $500,001 – $1 Million
- ☐ More than $1 Million

Approximately, how many full-time employees work at your firm?

- ☐ Less than 50
- ☐ 51 - 100
- ☐ 101 - 150
- ☐ 151 - 200
- ☐ More than 200

Approximately, how many full-time employees work in your IS/IT department?

- ☐ Less than 50
- ☐ 51 - 100
- ☐ 101 - 150
- ☐ 151 - 200
- ☐ More than 200

What type of Help desk environment is set up in your organisation?

- ☐ In-house Help Desk where the help desk staff are employees of the organisation.
- ☐ Outsourced Help Desk where a firm provides all the help desk support services
- ☐ Hybrid Help Desks where the organisation provides some of the services and the outsourcing organisation provides others.

Please check ☒ the relevant boxes, you may check more than one.

What are the support levels that your organisation has?

- ☐ First level support is where a centralised support or Help Desk area that will records all support calls and where the help desk analysts will support end users who have short, immediate problems. eg. Basic networking, logons or desktop problems
- ☐ Second level support is where the user problem is handed over to a group of analysts who are normally power users or 'experts' in the applications software and hence are able to support the Help Desk analysts in resolving the problems
- ☐ Other, please specify _____

Help Desk Service Offerings

This section determines the services that have been offered by your Help Desk.

For each of the following questions, please check ☒ **only one** of the appropriate boxes.

A = Now offered
B = Never offered
C = Previously Offered
D = Outsourced to Third Party
E = Not applicable

1. Hardware Support

	A	B	C	D	E
• Evaluating hardware	☐	☐	☐	☐	☐
• Demonstrating hardware	☐	☐	☐	☐	☐
• Assisting users in selection of hardware	☐	☐	☐	☐	☐
• Installing and supporting hardware	☐	☐	☐	☐	☐
• Dealing with technical hardware problems	☐	☐	☐	☐	☐
• Hardware maintenance	☐	☐	☐	☐	☐

☐ Other services that you would like to see included in the Hardware Support:

_____

_____

_____

_____

2. Software Support

	A	B	C	D	E
• Evaluating software packages	☐	☐	☐	☐	☐
• Demonstrating software	☐	☐	☐	☐	☐
• Assisting users in selection of software	☐	☐	☐	☐	☐
• Installing and supporting software	☐	☐	☐	☐	☐
• Assisting with application maintenance	☐	☐	☐	☐	☐

☐ Other services that you would like to see included in the Software Support:

_____

_____

_____

_____

3. Data Support

	A	B	C	D	E
• Maintaining a catalogue of available data (Data Dictionary)	☐	☐	☐	☐	☐
• Assisting users in locating the data they need	☐	☐	☐	☐	☐
• Assisting with data extraction, transfers	☐	☐	☐	☐	☐
• Providing backup, recovery and archiving of data data	☐	☐	☐	☐	☐

☐ Other services that you would like to see included in the Data Support:

_____

_____

_____

_____

4. Functional Support

	A	B	C	D	E
• Assisting users in problem specification	☐	☐	☐	☐	☐
• Determining if proposed application is suitable for end-user development or if application should be developed by IS	☐	☐	☐	☐	☐
• Assisting users in application design	☐	☐	☐	☐	☐
• Assisting users in choosing techniques for a given application	☐	☐	☐	☐	☐
• Assisting users in the selection of software for an application	☐	☐	☐	☐	☐
• Consulting on user problems	☐	☐	☐	☐	☐
• Developing applications for or with users	☐	☐	☐	☐	☐
• Generating prototypes	☐	☐	☐	☐	☐

☐ Other services that you would like to see included in the Functional Support:

_____

_____

_____

_____

_____

5. Training and Education

	A	B	C	D	E
• Providing users with basic training	☐	☐	☐	☐	☐
• Providing users with advance training	☐	☐	☐	☐	☐
• Providing scheduled training seminars	☐	☐	☐	☐	☐
• Providing training in data transfer	☐	☐	☐	☐	☐
• Raise security awareness eg. Virus protection	☐	☐	☐	☐	☐

☐ Other services that you would like to see included in the Training and Education Support:

_____

_____

_____

_____

6. Miscellaneous Support

	A	B	C	D	E
• Maintaining a catalogue of available software and applications	☐	☐	☐	☐	☐
• Coordinating applications development to prevent redundancy	☐	☐	☐	☐	☐
• Conducting user-group meetings	☐	☐	☐	☐	☐
• Publishing newsletter	☐	☐	☐	☐	☐
• Providing hot-line (telephone) and e-mail assistance	☐	☐	☐	☐	☐
• Supporting telecommunications hardware	☐	☐	☐	☐	☐
• Supporting telecommunications software	☐	☐	☐	☐	☐

☐ Other services that you would like to see included in the Miscellaneous Support:

_____

_____

_____

_____

7. Any other comments?

_____

_____

_____

_____

Help Desk/First Level Support Experience

First level support is where a centralised support or Help Desk area where all support calls are recorded and where help desk analysts will support end users who have short, immediate problems. eg. Basic networking, logons or desktop problems

This section is to survey your experience when you last contacted the Help Desk or the First Level Support.

Note: Please check ☒ Only one of the appropriate boxes unless indicated otherwise.

1. How often do you contact the Help Desk for assistance?
   - ☐ Everyday
   - ☐ Two to three times a week
   - ☐ Once a week
   - ☐ Once every two weeks
   - ☐ Once a month
   - ☐ Less than once a month

2. Is your help desk
   - ☐ Internally staffed?
   - ☐ Outsourced?
   - ☐ Other, please specify_____

For the following questions, please check ☒ **only one** of the appropriate boxes.
VS = Very Satisfied
S = Satisfied
SS = Somewhat Satisfied
N = No opinion
SD = Somewhat Dissatisfied
D = Dissatisfied
VD = Very Dissatisfied
NA = Not applicable

3. How satisfied are you with the following service attributes of the Help Desk team?

	VS	S	SS	N	SD	D	VD	NA
• Overall	☐	☐	☐	☐	☐	☐	☐	☐
• Staff availability (answering phone calls)	☐	☐	☐	☐	☐	☐	☐	☐
• Timely responses	☐	☐	☐	☐	☐	☐	☐	☐
• Knowledge of issues	☐	☐	☐	☐	☐	☐	☐	☐
• Solution effectiveness (accuracy and clarity)	☐	☐	☐	☐	☐	☐	☐	☐
• Service level meets expectation	☐	☐	☐	☐	☐	☐	☐	☐
• Language coverage	☐	☐	☐	☐	☐	☐	☐	☐
• Operating hours coverage	☐	☐	☐	☐	☐	☐	☐	☐

4. What could the Help Desk Team do to increase your level of satisfaction with their services?

_____

_____

_____

_____

5. What did the Help Desk team do especially well or badly?

_____

_____

_____

_____

Second Level Support Experience

Second level support is where the user problem is handed over to a group of analysts who are normally power users or 'experts' in the applications software and hence are able to support the Help Desk analysts in resolving the problems.

This section is to survey your experience when you last contacted the Second Level Support.

Note: Please check ☒ Only one of the appropriate boxes unless indicated otherwise.

1. Is your Second Level Support comprised of?
   - ☐ Internally staffed
   - ☐ Outsourced
   - ☐ Other, please specify_____

For the following questions, please check ☒ **only one** of the appropriate boxes.
VS = Very Satisfied
S = Satisfied
SS = Somewhat Satisfied
N = No opinion
SD = Somewhat Dissatisfied
D = Dissatisfied
VD = Very Dissatisfied
NA = Not applicable

2. How satisfied are you with the following service attributes of the Second Level Support team?

	VS	S	SS	N	SD	D	VD	NA
• Overall	☐	☐	☐	☐	☐	☐	☐	☐
• Staff availability (answering phone calls)	☐	☐	☐	☐	☐	☐	☐	☐
• Timely responses	☐	☐	☐	☐	☐	☐	☐	☐
• Knowledge of issues	☐	☐	☐	☐	☐	☐	☐	☐
• Solution effectiveness (accuracy and clarity)	☐	☐	☐	☐	☐	☐	☐	☐
• Service level meets expectation	☐	☐	☐	☐	☐	☐	☐	☐
• Language coverage	☐	☐	☐	☐	☐	☐	☐	☐
• Operating hours coverage	☐	☐	☐	☐	☐	☐	☐	☐

3. What could the Second Level Support Team do to increase your level of satisfaction with their services?

_____

_____

_____

_____

4. What did the Second Level support team do especially well or badly?

_____

_____

_____

_____

Once again, **thank you** for taking the time to participate in this research project.

2

APPENDIX B –STATISTICAL ANALYSES

Table B.1 Descriptive Statistics between Groups

Groups	Group 1- In-house			Group 2 - Outsourced		
Variables	Mean	StdDev	Median	Mean	StdDev	Median
Overall Satisfaction	2.00	.535	2.00	1.80	.414	2.00
Staff Availability	2.45	1.262	2.00	2.00	.655	2.00
Response Time	2.64	1.329	2.00	2.00	.655	2.00
Knowledge	2.50	1.225	2.00	1.93	.961	2.00
Solution	2.14	.834	2.00	2.07	.884	2.00
SLA	2.55	1.299	2.00	2.00	.655	2.00
Language	2.41	1.182	2.00	2.33	1.113	2.00
Hours of coverage	2.27	1.279	2.00	2.53	1.457	2.00

Table B.2 Help Desk contact Frequency

Code	Description	Group 1- In-house		Group 2- Outsourced	
		Count	Percentage	Count	Percentage
Help Desk Contact					
1	Everyday	0	0%	0	0%
2	2 or 3 times a week	5	23%	0	0%
3	Once a week	1	5%	1	6%
4	Once every 2 weeks	5	23%	0	0%
5	Once a month	5	23%	4	25%
6	Less than once a month	6	27%	11	69%
	Total	22	100%	16	100%