//

INFORMATION SYSTEM SUCCESS AND ITS ASSOCIATION WITH USER ATTITUDE, BELIEF AND INVOLVEMENT

A THESIS PRESENTED TO THE
UNIVERSITY OF CAPE TOWN

IN FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

MASTER OF COMMERCE

MARK I MESKIN

November 1993

ACKNOWLEDGEMENTS

I acknowledge that all references are accurately recorded, and unless otherwise stated that all the work contained herein is my own.

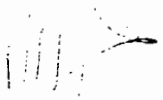
I thank my supervisor, Dr Peter M.Q. Lay, for his continued support, guidance, motivation and assistance.

I also thank Professor Derek Smith for his assistance and support in his role as co-supervisor.

I would like to express my appreciation to McCraul Management Consultants, who have been my employer during the years of completing my Masters, for their moral support and contribution of resources.

Finally, thank you to those organisations that participated in the research and to those people within each organisation that assisted me with the co-ordination and collection of information.

I dedicate this thesis to my parents, for without them, this would never have been possible.



MARK ISRAEL MESKIN

CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Overview

The motivation for this research was twofold. The first was to explore measures of information system success. The second, to investigate the influence of user variables, specifically attitude, belief and levels of user involvement, on information system success.

Although researchers agree that the aggregate organisational benefit derived from an information system is the best measure of success, no practical instrument has been employed to measure this benefit. Rather, a number of surrogate measures, specifically system use and user information satisfaction have been employed. This research explores a new measure, the "fit to objectives", as an appropriate and practical measure for information system success. It also uses this measure to establish the relationship between information system success and user involvement.

User attitude, user belief and levels of user involvement have all been examined by previous research and are postulated to be positively associated to information system success. However, in testing the above postulations previous research has achieved mixed results. The major constraints in verifying the above has been a

lack of accepted definitions, inappropriate measures, and poor methodologies. With the growth in the importance of the user in information systems development, a better understanding of the behavioural influences relating to the user is required. In examining these user influences, this research employs tested and proven measures based on past research from the information systems, organisational behaviour, and psychological disciplines.

The research is both exploratory and empirical in nature. A focus throughout has been on the practical application of constructs and instruments and providing contributions to both information system practitioners and researchers alike.

The remainder of the chapter defines the terms used, highlights some assumptions about the reader and provides an outline of the thesis.

1.2 Definition of Terms

In any research regarding information systems, a wide array of acronyms and specific terminology is usually found. It is assumed that the reader is familiar with most common terminology. The contemporary term, *information system/s*, has been used consistently throughout to refer to the general area of computing, data processing (DP), electronic data processing (EDP) and management information systems (MIS).

Although the specific definitions of each of the major constructs is dealt with in the body of the text, the following points should be noted. The terms *attitude* and *user attitude* are interchanged throughout the text. Similarly, *belief* and *user belief* are also interchanged within the text. Although both attitude and belief in most situations are plural, the singular version has been used as a standard.

The term *information systems staff* is used to describe people falling within the information systems department of an organisation, who are involved in, and responsible for, the provision of information systems within organisations. The terms *system designer* and *systems developer* are also used with reference to the *information system staff*. The term *user* has been used ubiquitously throughout the text. A more detailed discussion regarding the user is dealt with in the following chapter.

1.3 Assumptions about the Reader

In presenting this thesis, certain assumptions about the reader have been made. His information systems knowledge includes an understanding of the accepted principles and approaches to information systems development, and the roles of the information system staff therein.

Although the research examines attitude and belief, which are regarded as the domain of the discipline of psychology, the reader is not required to have a

significant knowledge of this area, and in the discussion, broad psychological definitions are used.

In terms of statistical testing, the reader is assumed to have a sufficient grounding in statistical theory, including techniques for determining normality of data and measures of association. Although some discussion regarding the terms and techniques used for the statistical analysis is provided, this is only at a summarised level. The theoretical foundation and operation of statistical techniques employed is not dealt with at all.

1.4 Thesis Outline

This chapter (Chapter 1), already dealt with, provides an overview of the research. Chapters 2 and 3 together provide a summary of prior research. The summary has been divided into two chapters to allow for easy reading, and focuses on the two specific areas of the study, namely, measuring information system success, and user influences on information system success. Chapter 4 details how the central questions and hypotheses for this research were developed. Chapter 5 provides an outline of the research methodology employed. Chapter 6 covers both the analysis of results and the discussion. Chapter 7 documents the specific contribution of this research, areas for further research and provides overall conclusions.

2. SUMMARY OF PRIOR RESEARCH

2.1 Introduction

Behavioural information systems research began towards the end of 1970's and since then has grown quickly into a major field of study within information systems research. The growth in the importance of the user in information systems success, and the need to quantify and measure information system success, have been the forces driving behavioural information system research.

Previous research into information system success has been restricted by the lack of a standard definition and measurement for information system success. Although a number of surrogate measures for information system success have been used, namely, user information satisfaction and system use, major flaws in their application have been highlighted. A new approach, the "fit to objectives" measure, is outlined in this chapter and developed further in later chapters.

In investigating users and the extent to which they influence information system success, researchers have concentrated on user involvement and user attitude. Both constructs have been plagued by multiple definitions and measurements, and a lack of theoretical foundation. However, a number of researchers (Goodhue,1988; Ives and Olson,1984; Swanson,1982) conducted reviews of

previous research and the field of study is moving towards a more theoretical foundation.

User attitude, user belief, and user involvement are the three user variables examined within this research and a review of previous research is dealt with in Chapter 3. Finally, a development framework for information system success, focusing on the user's role and those factors influencing the user is examined in Chapter 3.

2.2 A History of Behavioural Information Systems Research

Information systems as a research discipline can be dated back, at most, to the last three decades. Thus, it must still be considered a young discipline (Culnan,1986; Miller,1989). To date, research has mostly focused on the technical aspects of information systems. In the early 1970's, operations research and management science began contributing to the field of information systems (Robey,1979). Although Lucas did some pioneering (1973, 1975), it was only towards the end of the 1970's that information systems began to receive attention from a behavioural perspective, with researchers focusing on the managerial and personnel impact of information systems (Elizur and Guttman,1979; Maish,1979; Robey,1979; Schewe,1976).

In a more recent article, "The Social Determinants of Information Systems", Robertson (1989) references Kling as saying:

"....the first thing we learn, is that computers by themselves 'do' nothing to 'anybody'"

The above quotation emphasises the importance of the human aspect of information systems, and suggests that without human involvement, any information system is meaningless. Behavioural information systems research focuses on the human elements of information systems - the user and the information systems developer. Focusing on these components of the information system, it examines areas such as the impact of information systems on organisational structures, user attitudes and beliefs, patterns of communication, and the shifting of power within organisations as a result of information systems usage (Keen,1981).

The increased emphasis on the behavioral aspects of information system research has come about as a result of the rise in the importance of the user within information systems (Carroll,1982; Loewenberg,1985), and the need to determine the business or organisational benefits derived from information systems (Cerullo,1980; De Brabander and Edstrom,1977; Ives and Olson,1984; Miller,1989; Srinivasan,1985; Tait and Vessey,1988).

2.3 The Importance of the User

In order to understand the move towards considering the importance of the user, it is essential firstly to isolate who is and who is not a user of an information

system. Miller (1989) defines a user of an information system as someone who is "high enough to influence the flow of resources and is also a knowledgeable participant in the business function to be supported". Physical use of an information system, or the fact that an individual makes decisions based on information obtained from the information system, are alternative criteria for who falls within the definition of a user. A decision maker, for example may be a user by virtue of the fact that he makes use of information obtained from an information system, although not actually accessing the information system himself. Similarly, actual use of an information system to obtain information does not necessarily imply that the person who obtained the information is going to use it. For this research therefore, it is assumed that *any person, both technical and non-technical, who either accesses information from an information system or makes use of accessed information*, is defined as a user.

The shift towards more carefully considering the importance of users within the field of information systems has corresponded with increasing levels of computer literacy among managers and users, and with users becoming more aware of how they can apply computers and information to solve their work-related problems (Loewenberg,1985). The increased level of computer literacy has resulted from computer education in schools and tertiary institutions, and the ever increasing application of technology within society (Naisbitt,1984).

The acceptance of computers within society, and the move of computer literate individuals into managerial positions within organisations, has made it easier for

users to accept the fact that technology can add real value. More specifically, users have increasingly realised that information systems enable them to perform more efficiently, augment their thought processes, achieve results faster, and make better decisions. Thus, users are demanding more enhanced information systems, and information which is more timeous and accurate (Loewenberg,1985).

Given that many information systems departments did not meet the needs of the users, and as a result of the applications backlog, organisations saw the birth of end user computing and an eroding of the power base previously held by the information systems department. This has resulted in the level of power and influence that the user exerts in the development of information systems also increasing over time.

All of the above have collectively resulted in information system developers being less able to hide behind the technical aspect of information systems, and thereby exclude users from the information systems environment. Moreover, these changes have necessitated a shift in the skills of information systems staff. Technical expertise is no longer the only requirement for effective information systems personnel. Information system personnel today must also understand user desires and know how to manage and control user behaviour (Carroll,1982).

The user is increasingly recognised as a key component in the development and success of information systems. The need to understand the user better, the

behavioural impact users have on information systems and the methods by which to involve them in both systems development and implementation has been one of the major driving forces behind the growth of behavioural information systems research. Another is the need to measure the organisational and business benefit of information systems (Goodhue,1988; Ives, Olson and Baroudi,1983; Miller,1989).

2.4 The Need to Measure the Benefit of Information Systems

The need to measure the organisational benefit from information systems usage is a result of:

- the increasing awareness among organisations of the competitive advantage that some organisations have achieved through the implementation of information systems (Cash and Konsynski,1985; McFarlan,1984; Parsons,1983; Porter and Millar,1985); and

- the increasing slice of the organisation's budget which is being consumed by information systems (Brancheau and Wetherbe,1987; Ives, et al,1983; Nolan,1979)

Over and above these factors, the failure of information systems to meet objectives and provide benefit, as well as the inability of the information systems profession to quantify the value of information (Brancheau and Wetherbe,1987; Miller,1989), has meant that organisations are wary of utilising resources for information systems development without being able to understand and measure

the benefits. This is further illustrated by the fact that the topic of "measuring organisational benefit from information systems" regularly appears on the list of important information systems issues (Dickson, Leitheiser,Nechis and Wetherbe,1984; Brancheau and Wetherbe,1987).

In determining the benefit accrued from a specific information system, there is the need to determine the "success" of that information system. Although an organisation can derive benefit from an information system whether it is successful or not, in determining the actual benefit the most appropriate indication is the overall improvement in organisational effectiveness as a result of using that information system (Ives, et al,1983). Information system success, from an organisational perspective, can thus be regarded as:

> "the extent to which the information system improves the effectiveness of an organisation".

Behavioural information system researchers have focused on the user as the determinant of information success, with measures such as system usage (Barki and Huff,1985; Baroudi, Olson and Ives,1986; King and Rodriguez,1978; Lucas,1975; Robey,1979; Schewe,1976) and user information satisfaction (Barki and Huff,1985; Gallagher,1974; Ives, et al,1983; Ives and Olson,1984; Maish,1979; Olson and Ives,1981). However, defining and measuring information system success requires a broader focus than the user.

2.5 Defining and Measuring Information System Success

To date, researchers have failed to agree on a definition of information system success (De Brabander and Edstrom,1977; De Brabander and Thiers,1984; Finnie,1987; Miller,1989; Swanson,1987). Gallagher (1974) states that for a resource to be effective, and by implication successful, it must be possible to measure the benefit derived from its use and the costs incurred. Although some of the costs involved are easily measurable, the benefits that accrue from information systems are not as easily identifiable or measurable (Ives and Olson,1984). This fact highlights the difficulty, as well as the importance, of successfully defining and measuring information systems.

Powers and Dickson (1973) propose four variables for measuring information systems success: time to complete, cost, manager's satisfaction, and the impact of the project on the information systems function. The validity of these measures has not, however, been proven by subsequent research. These measures have also tended to be too focused on specific areas and have not taken into account the organisational benefits of the information system, the context of the information system within the organization and the organizational objectives behind the information systems development.

A number of surrogate measures for information system success have been proposed by research including improved decision making (De Brabander and Thiers,1984; Keen,1981), an increase in the level of user information satisfaction

(Bailey and Pearson,1983; Ives, et al,1983), and level of system use (Ives and Olson,1984; Maish,1979; Schewe,1976; Swanson,1987). The level of system use is one of the most commonly used indicators of information systems success, since it is easily measured (Ives and Olson,1984; Robey,1979; Swanson,1974). However, issues such as mandatory versus discretionary use, the influence of viable information alternatives, appropriate reductions in usage with experience, and the extent to which obtained information is actually used, complicate this construct and make its use problematic (Ginzberg,1979; Miller,1989; Srinivasan,1985).

Considering the above, De Brabander and Thiers (1984) have preferred to focus on the impact of the information system upon decision making in the organization. However, Keen (1981) had previously argued that decision making is multifaceted, emotive, conservative and only partially cognitive, stating that, "all in all, human information processing tends to be simple, experiential, non-analytic, and on the whole fairly effective". Thus, improved decision making as a measure would appear to have too many unmeasurable variables to be an effective determinant of a successful information system.

Robey (1979) found that when system use is not optional, measures of satisfaction are more meaningful criteria for information system success. The most common operationalisation of the satisfaction measure is "user information satisfaction" (Ives and Olson,1984; Miller,1989). "User information satisfaction" was originally developed by Bailey and Pearson (1983) and enhanced by Ives,

Olson and Baroudi (1983) as a surrogate measure of information system success. User information satisfaction is defined as:

> "the extent to which users believe that an information system meets their information requirements" (Ives, et al,1983)

However, user information satisfaction, as will be described in later chapters, is postulated to be more closely linked to user attitude than information systems success. By using user information satisfaction, the success or failure of a system is determined by the user's feelings, without the information systems designer being able to have an input. Aside from the user's feelings being subjective and not providing a sound platform on which to measure success, the user information satisfaction construct does not allow for any technical measures of success or any direct business benefits. Using the systems designer to determine the success of an information system based on on-time development, meeting budget expenditure and on technical efficiency will however result in a technical or information system staff bias.

Miller (1989) defines information systems effectiveness/success as an information system which achieves the purposes of its users. However, the goals and purposes of the user do not always equate with those of the organisation. Miller's study, employing a measure of fit for information system success, focused on measuring the effectiveness of information systems within an organisation as a whole and

not on specific information systems. It did, however, provide the following useful guidelines to researching information system success:

- that the definition of information system effectiveness/success is unique to a particular organisation
- that as organisational objectives change, the criteria for information system success will change
- that the best possible match between the needs of the business and the information systems provided, is the best measure of information systems success (Miller,1989).

A final issue regarding the measurement of information system success is raised by Srinivasan (1985). In his research he concludes that researchers have to be extremely cautious in using surrogate measures of information system effectiveness. He argues that:

> "....while in certain classes of systems strong associations may exist between two types of measures, in other classes of systems this relationship may be non-existent" (Srinivasan,1985).

To measure information system success there is the need for an impartial measure, one that does not bias the user or the system designer; that is not a surrogate measure; and that is testable. Ives and Olson (1984) state that the best measure of the success of an information system is the aggregate organizational benefit which accrues from the information system. In their research, however, they highlight the difficulties associated with trying to measure this benefit. It

should be stressed though that the measurement of this benefit does provide the most accurate measure of information system success. On this basis then information system success can be defined as *the extent to which the information system improves the effectiveness of an organisation.*

To measure both organisational benefit and the extent to which a specific information meets the needs of business, this research examines a new measure, the "fit to objectives" measure for measuring information systems success.

2.6 The "Fit To Objectives" Measure

Before and during the development of information systems, users and system designers typically set information system objectives based on the needs of: the organisation; the users; and the information systems department. These objectives are set with the aim of ensuring the overall effectiveness of the organisation, the users, and the information systems department. These goals provide the yardstick by which the success of the information system is measured. If this is true, then the degree to which the information system meets the goals or objectives laid down would be the most appropriate measure of the organisational benefit derived from the information system, and thus, information system success. The users and information system staff both have a say in the setting of these objectives and their criteria for success, thus alleviating any bias. To the extent that any information system meets the objectives laid down at the

start of the project, or the closer the "fit to objectives" for the information system, the more successful the implementation of the information system should be.

The "fit to objectives" measure provides a method by which the success of an information system can be determined by allowing for input from both users and information systems staff. Miller (1989) reviews previous research regarding measures of fit, and concludes that few substantial tests of fit in the broader organisational context have been conducted, thus in this study the use of the "fit to objectives" measure is exploratory. The application of the "fit to objectives" measure in research is dealt with in later chapters.

In defining and measuring information system success, there is a need to understand both behavioural and technical influences on success. This study investigates behavioural influences on success, and the following chapter examines user influences specifically.

3. USER INFLUENCES ON INFORMATION SYSTEMS SUCCESS

3.1 The User and The Information System

The user has two roles during the life of an information system. The one is in its design and the other is operating it and maximising the benefit that may accrue from its use. Thus, the user is increasingly regarded as key to successful information systems development. People are complex however, and are subject to fluctuations in attitude, belief and behaviour. These fluctuations, in turn impact on the success of an information system, through system usage, lack of computer acceptance, limited user ownership and responsibility, and both covert and overt resistance to change (Carroll,1982; Cerullo,1980; Maish,1979).

Aside from these variations in attitude, belief and behaviour having an influence on information system success, Ginzberg (1978) points out that system designers often make the mistake of assuming that users are more or less homogenous. Interviews with one or two of the users, or the "average user", used to be considered sufficient in determining the information system requirements. This invariably led to information systems being designed for the "average" user, which often resulted in frustration for the majority of users, increased negative user attitude and ultimately information systems failure. Systems designers are not, however, the only ones at fault. Carroll (1982) cites Snow asserting that:

> "the attitudes, behaviour and languages of the non-scientist and the scientist are so different that they define a separate culture between which there is a dangerous gulf of mutual incomprehension."

This "gulf of mutual incomprehension" is a major influence on the success of an information system. The "gulf" is the result of the different requirements of the user's, and the system designer's, respective job. However, in many situations, the attitude and belief of both the user and the information systems staff can widen the "gulf" and create user resistance, reduce user acceptance and contribute to a strained relationship between the user and the information systems staff. In overcoming these problems, Kanter (1986) argues that one of the healthiest situations is the interchange of people within the information systems and operating areas of a company - systems analysts, he proposes, should spend time outside of the information systems environment in order to appreciate the challenges and constraints of the business world. This in itself would not, however, ensure successful information systems development from the user's perspective. Before examining what makes information systems successful from the user's perspective, there is a need to clarify certain user influences, specifically user attitude and user belief.

3.2 User Attitude and User Belief

In research studies on the impact of user attitude and user belief on information systems, a wide array of belief, attitude and satisfaction measures have been used

without any theoretical or psychological justification (Davis,Bagozzi and Warshaw,1989; Goodhue,1988; Ives and Olson,1984; Olson and Ives,1981; Swanson,1982). The need to distinguish between belief and attitude in the use of research measures has been highlighted as a prerequisite to valid behavioral information systems research (Goodhue,1988).

Based on a psychological definition, Elizur and Guttman (1976) state that:

> "attitude is defined for itself if its domain asks about behaviour in a {affective, cognitive, instrumental} modality towards an object and its range is ordered from {very positive to very negative} towards the object"

Thus, user attitude is considered to be made up of three factors: an affective factor, illustrating one's feelings towards an information system; a cognitive factor, indicating one's perception or belief about the information system; and an instrumental factor which measures one's behaviour towards the information system. Davis, Bagozzi, and Warshaw (1989) define attitude as:

> "an individual's positive or negative feelings (evaluating affect) about performing the target behaviour".

Social psychologists tend to view attitude as:

> "a general and enduring positive or negative feeling about some person, object or issue" (Cerullo,1980).

From the above, it would appear that while some research includes belief as part of a broader attitude construct (Elizur and Guttman,1976; Tait and Vessey,1988), social psychologists and information systems researchers advocate that there is a difference between the two, with each construct associated with quite different measurement scales (Goodhue,1988; Swanson,1982). Using the latter perspective, belief is defined as the cognitive expectations about particular behaviours or specific attributes of those behaviours (Goodhue,1988), that is, user's perception of an information system. This would equate to the cognitive component of Elizur and Guttman's definition above.

Fishbein and Azjen (1975) argue that belief predicts attitude, which predicts intention, which predicts behaviour. Figure 3.1 illustrates graphically the association between attitude, belief, intention and behaviour argued by Fishbein and Azjen.

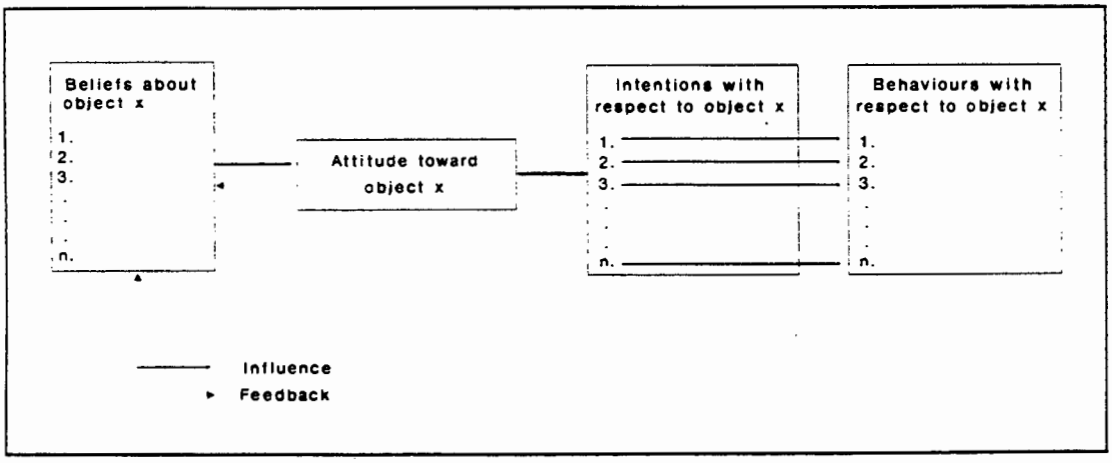


Figure 3.1 : Belief, Attitude, Intention and Behaviour (Fishbein,1975).

Two predominant arguments regarding the theoretical definition of attitude and belief are found in previous research. The first is that attitude encompasses belief and the second that they are separate constructs. Both propositions encompass an affective (evaluating feelings) and cognitive component (evaluating perceptions). This research, in line with other research regarding attitude, belief and behaviour (Azjen and Fishbein,1980; Davis, et al,1989; Davis,1989; Miller,1989) and the fact that a user has both an affective and cognitive component adopts the second approach with regard to attitude and belief, namely, that they are separate constructs.

Most research addressing user attitude postulates that favourable user attitudes are desirable and beneficial for successful information systems development (Barki and Huff,1985; Bruwer,1987; Carroll,1982; Cerullo,1980; Davis, et al,1989; Davis,1989; Finnie,1987; Huff and Munro,1987; Kim and Lee,1986; Lucas,1973; Maish,1979; Robey,1979). However, most of this research has attempted to correlate user attitude and system use, using system use as a surrogate measure of information system success. To improve information system development efforts there is a need to understand better the relationship between both user attitude and information system success, and user belief and information system success. This requires the use of appropriate measures for information system success in research. This need is confirmed by the numerous citations that user attitude is one of the prime reasons why information systems fail (Bruwer,1987; Cerullo,1980; Finnie,1987; Huff and Munro,1987; Kim and Lee,1986; Lucas,1973; Robey,1979). Robey's (1979) study concluded that information systems can and

do fail where user psychological reactions are ignored by system designers. In a survey conducted by Cerullo (1980), 122 respondents from Fortune 1000 companies ranked user attitude as the most important factor affecting the effective development of information systems. In exploring the impact of attitude on information system success, negative user attitude is postulated to result in dysfunctional behaviour leading to information system failure (Cerullo,1980). The probable types of dysfunctional behaviour are detailed in table 3.1.

Type	Description
Aggression	Users sabotage or attempt to "beat the information system".
Avoidance	Users ignore output or do not make use of output.
Projection	Users blame the information system for failure caused entirely by outside factors.

Table 3.1 : Types of Dysfunctional Behaviour (Cerullo,1980).

A major factor influencing user attitude, user belief and the success of an information system, is the level of congruency between the goals of the user and the goals of the organisation (De Brabander and Thiers,1984; Robey,1979). Incongruent goals can result in both negative belief and negative attitude about a specific information system. Robertson (1989), in examining the impact of social groups on information system use, points out that a user's peer group can be a major influence in the user formulating both his belief about, and attitude towards, an information system. Finally, users gain influence and autonomy from their control of information. New information systems can represent a direct threat to this control (Keen,1981; Lucas,1973; Miller,1989). Miller (1989)

continues this theme, stating that support for, or resistance to, an information system, can be predicted according to the direction and magnitude of implied power shifts. All of the above highlight the importance that user attitude and user belief play in formulating user behaviour.

3.3 The Relationship between User Attitude and User Belief

In examining the relationship between user attitude and belief, Lucas (1973) found a positive correlation between user attitude towards the information systems staff and a users' perception of computer potential. Lucas concludes that the nature of the relationship between user attitude and user belief is extremely difficult to determine, and that "the direction or even presence of causality is not clear".

Maish (1979), found that a positive user attitude toward information systems staff would lead to favourable user behaviour. This finding concurs with Lucas's earlier postulation. However, the most cited user variable associated with user attitude is that of usefulness or perceived usefulness (Bruwer,1987; Carroll,1982; Davis, et al,1989; Davis,1989; Ginzberg,1978; Goodhue,1988; Robertson,1989; Tait and Vessey,1988). Davis, Bagozzi and Warshaw (1989), using Fishbein and Azjen's (1975) model of attitude and belief, showed that perceived usefulness and perceived ease of use are the primary beliefs in formulating user attitude, intentions, and ultimately user behaviour. Perceived usefulness has been defined as:

> "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (Davis, et al,1989).

Davis's study (1989) identified that perceived usefulness had a significantly greater correlation with usage behaviour than did ease of use, indicating that although difficulty of use can discourage adoption of an otherwise useful system, the ease of use cannot compensate for a system that is not useful. Davis also postulates that users select and use information based on an implicit psychological trade-off between information quality (perceived usefulness) and cost of access (ease of use). This could suggest that users balance out their perceptions or beliefs about the usefulness and ease of use of an information systems in determining user attitude and system use.

In attempting to affect user attitude and belief to ensure successful development and implementation of information systems, the most often employed method has been to involve the user in the development process (Ives and Olson,1984; Lucas,1973; Robey,1979; Tait and Vessey,1988).

3.4 User Involvement and Information System Success

Numerous researchers have claimed that user involvement in information systems development is key to successful information systems development (Bruwer, 1987; De Brabander and Thiers,1984; Ginzberg,1978; Ives and Olson,1984; Kim

and Lee,1986; Kwon and Zmud,1987; Lucas,1973; Olson and Ives,1981; Tait and Vessey,1988).

Olson and Ives (1981) state that user involvement or participation in the development and implementation of information systems will :

- lead to increased systems quality
- decrease resistance to change
- increase user commitment to the new information system
- provide a more accurate and complete assessment of the user information requirements
- provide expertise about the organisation the information system is to support, expertise which is usually unavailable within the information system department
- avoid the development of unacceptable or unimportant functions
- improve user understanding of the information system.

However, involving users in the development of information systems is costly and time consuming (Baroudi, et al,1986) and although in theory all of the above have been advocated, few empirical conclusions have been arrived at concerning the impact of user involvement on the success of an information system (Barki and Hartwick,1989; Baroudi, et al,1986; Ives and Olson,1984; Olson and Ives,1981; Tait and Vessey,1989). Ives and Olson (1984), in reviewing 22 studies on user involvement, found only 8 studies proving a significant positive association, and concluded that the majority of studies on user involvement have

been methodologically flawed and that the benefits of user involvement have not been strongly enough illustrated. In a later review of user involvement, Barki and Hartwick (1989) quote Swanson stating:

> "....that management should be involved in information systems development is a popular wisdom. Unfortunately, what is meant by involvement is rarely defined, and nothing has been done to provide a rigorous foundation for its measurement"

Aside from this lack of empirical evidence to support user involvement, another major problem highlighted by previous research is the lack of a standard definition for user involvement (Barki and Hartwick,1989; Baroudi, et al,1986; De Brabander and Thiers,1984; Ives and Olson,1984). A possible definition is provided by Ives and Olson (1984) as:

> "the participation in the systems development process by the target user group."

Organisational behaviour theory (Barki and Hartwick,1989), where user involvement as a concept had its origins, offers three explanations for involvement:

- the degree to which one is allowed or encouraged to participate in the job
- the degree to which individuals identify psychologically with their job or work

- the degree to which a person's work preference affects his or her self-esteem.

The above explanations and definitions can be split into two main areas. The first views user involvement as a psychological state determined by the personal relevance of the information system to the user. The second regards user involvement as the behaviour of the user in such a way that he or she is personally involved or physically participates in the development and/or implementation of the information system. This research focuses on the physical participation of the user in information systems development and implementation, and its association with information system success. Moreover, since Ives and Olson are regarded as experts within the field of information systems research with a total of 325 citations between them during 1981-1990 (Social Science Citation Index), their definition for user involvement is adopted.

In determining a measure for levels of user involvement, the difference in types of user involvement and the degree of user involvement has also been cited as compounding the problem of determining a standard definition and measure of user involvement (Ives and Olson,1984). Over and above this, an additional measurement problem is that user involvement can also be examined along the time dimension - at what stage in the system development life cycle is user involvement considered appropriate (Davis, et al,1989; Ives and Olson,1984).

One conclusion drawn by previous research is that user involvement or participation must coincide with user influence in order for the involvement to have a positive impact on information system development and implementation (Barki and Hartwick,1989).

Ives and Olson (1984), after conducting a comprehensive review of research on user involvement, developed six categories of user involvement, as detailed in table 3.2. Each category is linked to increasing levels of involvement and impact on decision making. The categorisation of levels of involvement presented in their model provide a useful foundation by which to measure user involvement.

No	Category	Description
1	no involvement	users are unwilling or not invited to participate
2	symbolic involvement	users input is requested but ignored
3	involvement by advice	users advice is solicited through interviews or questionnaires
4	involvement by weak control	users have "sign-off" responsibility at each stage of the system development process
5	involvement by doing	users are part of the design team or act as the official "liaison" with the information systems development group
6	involvement by strong control	user may pay directly for new development out of their own budget, or the user's overall organisational performance evaluation is dependent on the outcome of the development effort

Table 3.2 : Involvement Categories (Ives and Olson,1984).

In determining which categories of user involvement are the most appropriate, it is important to consider the fit between the type of information system being

developed, and the level of user involvement (Barki and Hartwick,1989; Baroudi, et al,1986; Kim and Lee,1986; Lucas,1973; Tait and Vessey,1988). Kim and Lee (1986) state that higher levels of involvement are important for less programmed, more unstructured or more complex information systems. This was confirmed by Tait and Vessey (1988) who concluded, using Ives and Olson's categorisation outlined above, that higher levels of involvement were associated with more complex information systems.

Barki and Hartwick (1989) found a small positive relationship between user attitude and user involvement. This is strange since one would expect a large positive relationship. Common sense says that if users are involved, they will have a positive attitude. The small association may have been a result of inappropriate measures or small sample size. They also found that less involved individuals are more likely to change their attitude as a result of others urging them to do so. This highlights the role that management support, effective systems designer/user interaction, and peer pressure can play in the formation of user attitude. Ginzberg (1978), among others, confirms this, and postulates that management support for user involvement is essential (Maish,1979; Swanson,1987).

In understanding the impact of the user variables discussed on the success of an information system, a framework combining both the behavioural and technical aspects contributing to successful information systems development is provided.

3.5 A Development Framework

Following from the research already discussed and the accepted systems development life cycle a development framework has been constructed. This framework encompasses the behavioural issues which need to be addressed during the development and implementation of information systems, specifically regarding the role of the user and the system designer.

During systems development, the user represents the needs and wants of the organisation, and the systems designer represents the capabilities and technological resources available to meet those needs. Although an information system can fail for technical reasons, failure has more often been attributed to the behavioural aspects of both the user and systems designer. As is illustrated in figure 3.2, the essential link in meeting the organisation's needs and wants through technological resources, is forged by the user and the systems designer.

This link is dependent on a number of factors and it must be noted that even if this link is secure, it does not ensure the success of an information system since both the needs and wants of an organisation, and technology, change very rapidly.

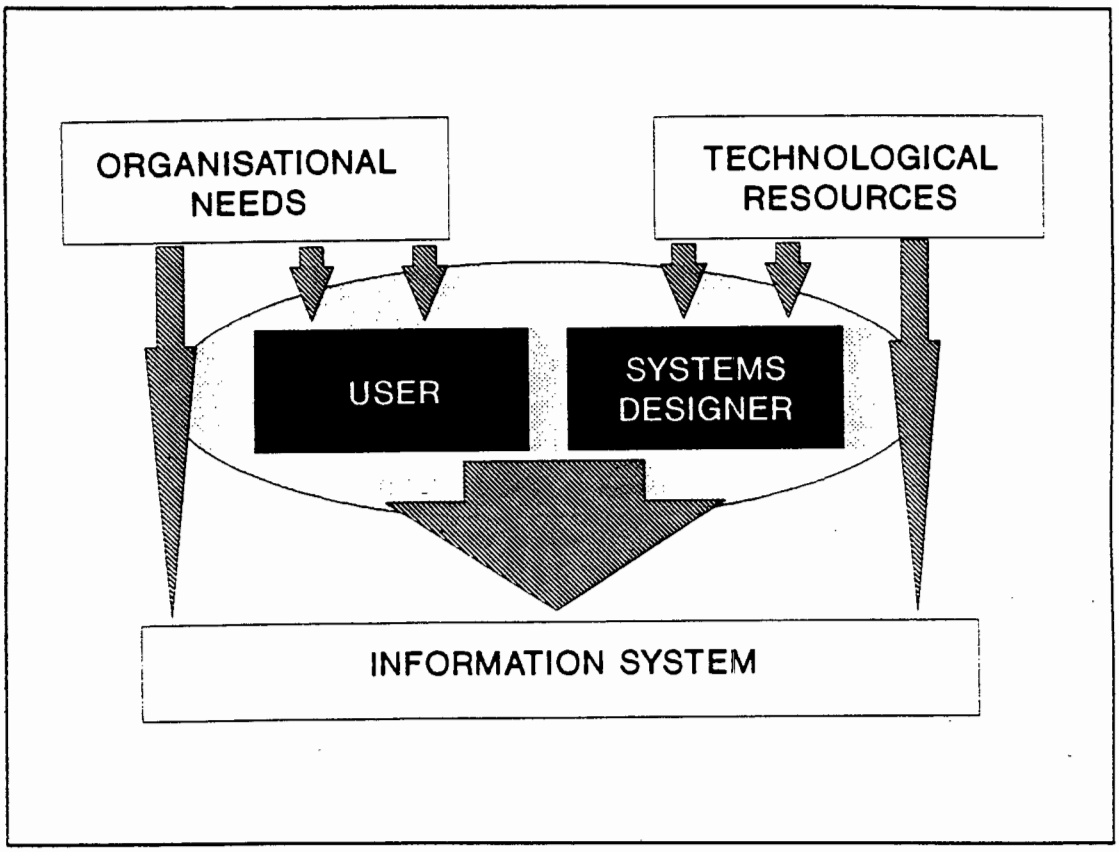


Figure 3.2 : User/System Designer Model of Information System Development

This research focuses on the user aspects of the above framework, and table 3.3 illustrates those factors which impact to varying degrees on the user during the systems development process, as well as listing those researchers who have researched the impact of the particular variables.

User Influence	Previous Research	
Goal Congruency	Robey,1979; De Brabander and Thiers,1984	USER BEHAVIOUR
Peer Pressure	Elizur and Guttman,1976; Robertson,1989	
Attitude	Azjen and Fishbein,1980; Bailey and Pearson,1983; Barki and Huff,1985; Baroudi, et al,1986; Bruwer,1987; Cerullo,1980; Davis, et al,1989, Davis,1989; Elizur and Guttman,1976; Finnie,1987; Fishbein and Azjen,1975; Goodhue,1988; Ives, et al,1983; Lucas,1973; Lucas,1975; Maish,1979; Robertson,1989; Robey,1979; Schewe,1976; Swanson,1982; Tait and Vessey,1988	
Training	Bruwer,1987; Camp, Blanchard and Huszczo,1986; Cerullo,1980; Lucas,1973; Maish,1979; Martin and Feurst,1988	
Previous Experience with Information Systems	No formal research found, referred to by research	
Age	Bruwer,1987; Mullany,1989	
Involvement	Barki and Hartwick,1989; Baroudi, et al,1986; Bruwer,1987; Carroll,1982; Cerullo,1980; De Brabander and Edstrom,1977; De Brabander and Thiers,1984; Ives and Olson,1984; Lucas,1973; Lucas,1975; Olson and Ives,1981; Powers and Dickson,1973; Tait and Vessey,1988	
Belief	Azjen and Fishbein,1980; Davis, et al,1989; Davis,1989; Fishbein and Azjen,1975; Goodhue,1988; Lucas,1973; Lucas,1975; Robertson,1989; Schewe,1976	
Computer Literacy	No formal research found, referred to by research	
Length of Service	Bruwer,1987; Maish,1979; Mullany,1989	
Organisational / Political Variables	Keen,1981	
Management Support	Bruwer,1987; Elizur and Guttman,1976; Kanter,1986; Lucas,1973; Maish,1979	

Table 3.3 : Influences on User Behaviour.

An understanding of the relationship between, and impact of, the above variables, provides a focus for researchers and practitioners in developing effective methodologies and approaches for information systems development.

3.6 Conlclusion

The research to date highlights a number of major themes, beginning with the increasing consideration of human needs and behaviour in information systems research. This has led to an increase in the focus of research within information systems on the user as a key factor in the development and implementation of successful information systems. The importance of measuring and understanding information system success are the major motivation for this research. The aggregate organisational benefit that accrues from an information system is regarded as the most appropriate definition of information system success. In attempting to find a practical measure, this research proposes the use of the "fit to objectives" measure and argues the inability of other measures to accurately measure information system success.

In terms of user attitude and user belief, the research to date has failed to make use of standard definitions and effective measures. Moreover, a sufficient distinction between attitude and belief has not been drawn in a number of studies. Furthermore, research has focused on attempting to correlate attitude and usage without correlating usage and success. Thus, research has not sufficiently examined attitude and its association with an objective measure of information system success.

User involvement research has also been marred by poor methodologies, unproven measures and a lack of foundation theory on user involvement. The only conclusion drawn has been that involvement is positively associated with level of complexity.

Information systems practitioners and researchers alike assume that positive user attitude and belief, and user involvement, are essential for information system success. In investigating the impact and role of the user in information systems, this research, using an objective measure for information system success and proven instruments for user attitude, belief and involvement, attempts to validate the above statement.

4. DEVELOPMENT AND STATEMENT OF HYPOTHESES

4.1 Introduction

The need to measure information system success has already been highlighted by information system practitioners and researchers alike. Better understanding of the behavioural aspects of information systems has also received increased consideration as the user has become more recognised as an important component of the information system, and is achieving greater influence in information systems decisions.

Based on these trends discussed earlier, the central questions of this research examine the association between user behavioural variables and information system success. In researching these associations, a new measure for information system success is developed and appropriate measures from previous research are adopted for measuring user attitude, user belief and user involvement.

Finally, with an understanding of both the central questions, previous research, and applicable measures, hypotheses are stated which provide the empirical foundation for this research.

4.2 Central Questions of this Research

Miller (1989), in his study "The Effectiveness of Computer-Based Information Systems - Definition and Measurement", concludes that "much work needs to be done to explore in detail the role of belief, attitude and behaviour and their relationship to information system effectiveness". In measuring and understanding the behavioural impacts on information system success, this research attempts to confirm specific associations which have been assumed and inconclusively proven by previous research using appropriate measures.

Although previous research has found a correlation between user attitude and information system usage (Ives and Olson,1984; Swanson,1982), system usage as will be argued later, cannot be regarded as a measure of information system success. Moreover, the use of the user information satisfaction construct as a surrogate measure for information systems success, it will be argued, is inappropriate in measuring the organisational benefit derived from an information system. This research, using an appropriate measure for information system success thus asks the question:

Q_1 Is there a relationship between information system success and user attitude, and to what extent will such a relationship impact on information systems success ?

Similarly, although not nearly as much research has been conducted, assumptions regarding belief and information system success require validation. The second central question of this research thus asks:

Q_2 Is there a relationship between the success of an information system and user belief, and to what extent will such a relationship impact on information system success ?

A third question is to examine the association between attitude and belief, to explore the area of causality and to offer an understanding of the relationship between the two. From an empirical perspective, a strong association between the two is expected and stated as follows:

Q_3 Is there a relationship between attitude and belief, and what is the nature of this relationship ?

Ives and Olson's (1984) article "User Involvement and MIS Success : A Review of Research" isolated that out of 22 studies only eight claim to demonstrate a positive relationship between user involvement and various measures of information system success. It should be noted that 12 of the studies made use of information satisfaction measures for information system success, and 6 made use of system use. This research attempts to show empirically that levels of involvement and information system success are correlated, by making use of the measure resulting from Ives and Olson's study for involvement, as well as a more appropriate measure of information system success than has been used

previously. In addition to determining a new measure for involvement, Ives and Olson called for an examination of user involvement over the systems development life cycle. Thus, this study examines involvement in two distinct phases, development and implementation. The following question is proposed:

Q_4 Will differing levels of user involvement in the development and implementation of an information system lead to varied degrees of information system success ?

In understanding user involvement, as has already been discussed, one must examine other user behaviours. Thus, this research also examines the question:

Q_5 Will differing levels of user involvement in the development and implementation of an information system influence user attitude and user belief ?

In isolating the impact of user behaviour on information system success, this research focuses on user attitude, belief and involvement from those identified from previous research in table 3.3. In investigating the above central questions of this research, the need for practical measures has already been highlighted by previous research.

4.3 Measures

The following measures were used in answering the above questions. Although a new measure for information system success is postulated, the remaining variables were examined using tested and proven measures.

4.3.1 Information Systems Success

The measurement of information system success is cited as being perhaps one of the most difficult factors to determine within the information systems environment (De Brabander,1984; Finnie,1987; Swanson,1987). Most of the previous research regarding information system success has focused on using user-related variables. As has been discussed earlier, this research proposes an alternative approach, focusing on the organisation rather than the user. Thus, the "fit to objectives" measure is used to determine information system success.

Using the concept of the fit between the importance of information system constructs to an organisation, and the provision of those constructs by the information system departments, employed by Miller (1989), the "fit to objectives" measures is developed. The basis of the measure is that if an information system meets or "fits" the objectives that it was essentially designed to achieve then the information system is successful. However, the success is from an organisational point of view. A user who works for an organisation and uses an information system is a subset of the user community and the

organisation and it is possible that his objectives differ from those of the organisation. For example, a users goals may initially be congruent with organisational goals but can become obscured by personal behavioural influences such as ambition, jealousy, rivalry, greed. These may influence his judgement of an information systems and thus his assessment of its success. His success rating, although correct from his perspective, may thus be incorrect when measured against the organisational goals. Thus, measures of information system success using user variables have significant weaknesses. Success criteria, to be representative of organisational needs, must therefore be expressed in organisational terms - they must be global, not local. They need to be expressed in terms of how the information system has contributed to improving the operation of the user, or the department, within the framework of the total organisation.

The objectives used in measuring information system success, thus represent the real criteria by which the organisational benefit derived from an information system can be measured.

The "fit to system objectives" measure provides an objective and impartial measurement of information system success. The more concrete the objectives that are laid down, the easier it is to determine the "fit to objectives" and thereafter the level of information systems success.

In determining an actual value, a Likert scale, ranging from 1 - 7 for each objective is used, with both the users, who physically access information from the system, and the system designers, who were involved in the system development and implementation, indicating the extent to which an objective has been achieved. The use of a seven point scale provides sufficient, but not too broad a scope for response. The seven point scale has been widely used in information systems research studies and its adoption was also motivated by the fact that other information system measures employed in the research make use of a seven point scale. Using the seven point scale would thus facilitate item to item comparison if required.

In obtaining an overall measure for information systems success, the respondents (user and/or systems designer) must also rank the objectives identified in order of importance, with 5 being the most important and 1 being the least. The rankings are aggregated and an organisation rank for the objectives is obtained. Aggregating the rankings ensures that both the user and the information system staff have an input into determining the importance ranking for each objective. The "fit to objectives" measure also assumes that there is no single expert with the answer and that all individuals have an input.

A score for information system success per respondent is obtained by multiplying each objective scale rating by its organisational importance ranking. A total score for information system success per respondent is obtained by adding the scores for the 5 objectives. Aggregating respondent total scores will provide a measure

of the organisational success of the information system. As the "fit to objectives" measure is exploratory, all responses were assigned equal weighting. Different users could be assigned different weighting depending on the importance of the information system to them. This weighting could provide an additional variable in calculating the overall success score for an information system. However, based on the complexity, and the exploratory nature of the "fit to objectives" measure, it was not adopted or included in this research. An example of the detailed calculations for determining information system success scores is illustrated in table 4.1 below.

Objective	Scale Rating (SR)	Importance Rank (IR)	Success Score (SS) SS = SR x IR
O_1	5	3	15
O_2	3	4	12
O_3	4	2	8
O_4	6	5	30
O_5	7	1	7
Final Score (Sum of SS column)			**72**

Table 4.1 : "Fit to Objectives" Measure.

The multiplication ensures that more important objectives are weighted accordingly. This ensures that perfect fit for low importance objectives still reflects limited information system success if higher objectives are not being achieved. Moreover, as has already been stated, the adoption of the aggregated organisational importance rank allows both the user and the information system designer to influence information system success scores. It would be natural for

a designer to want to show that his information is successful. Therefore, he may rate his system very high regardless of actual success. The more users there are, the less his influence on the results, but, in a single user system his scores could severely bias results.

To be valid, the information system objectives should be set before the information system is developed, and assessed once operational. Otherwise, there may be a tendency to converge the measures and ranks to boost the success rating. However, one must also consider that objectives change with time and it is important when measuring the "fit to objectives" that the objectives are current. Thus, the measure allows for determination of the objectives at specific points in time. This also allows for longitudinal studies to be conducted assessing the "fit" at different stages in the life cycle of an information system.

4.3.2 User Attitude

Previous research has used "user information satisfaction" as a measure of information systems success. User information satisfaction involves the feelings one has about an object, subject, event or situation and can be argued that it should be regarded as a measure of user attitude rather than information system success.

User information satisfaction was originally developed by Bailey and Pearson and has been modified by a number of researchers in its application. The most

noteworthy is Ives, Olson and Baroudi (1983) who endorsed the use of the user information satisfaction construct and presented a 13-item "Short Form" which was regarded as statistically valid and a better substitute for the lengthy original.

A criticism of user information satisfaction as a measure was raised by Swanson (1982), who notes confusion between the psychological constructs of "belief" and "attitude" in the use of user information satisfaction. Miller (1989) argues that the Bailey and Pearson, or its derivative, consists of both affective and cognitive related constructs. However, it can be suggested that user information satisfaction is a measure of the user affective component. Although some constructs fall closer to cognitive as opposed to affective constructs, the aggregated user information satisfaction score is a measure of the affective component. If one assumes that belief predicts attitude (Azjen and Fishbein,1980; Davis, et al,1989; Davis,1989; Fishbein and Azjen,1975; Miller,1989), one can argue that measures of attitude must include some cognitive constructs.

However, the application of user information satisfaction has often been as a measure of information system effectiveness, an application for which it has not been proven to be valid. Bailey and Pearson (1983) define satisfaction as "the sum of one's feelings or attitudes towards a variety of factors affecting that situation", clearly indicating that the user information satisfaction construct is more appropriate as a measure of attitude. The use of the construct as a measure for information system success hinges on the extent to which user attitude or feelings about an information system are valid measures for success.

Although Bailey and Pearson suggest that it is, they do not provide a sufficient validation of its appropriateness and indeed subsequent research has highlighted the need for further research to correlate the user information satisfaction construct with other measures of information system success (Ives, et al,1983).

The "Short Form" of the user information satisfaction instrument is used and consists of 13 questions to which the user has to respond on a seven point scale. The respective scores per item are aggregated to produce an overall value.

4.3.3 User Belief

User belief is the user's cognitive perceptions with reference to an object, subject or process (Goodhue,1988). Davis, Bagozzi and Warshaw (1989) highlight perceived usefulness as being an effective measure of the user cognitive perceptions or beliefs. Further research by Davis (1989) indicated that perceived usefulness significantly outperformed other measures in determining user belief about an information system. The original measure consisted of 10 items but was refined to include only 6 constructs. The perceived usefulness measure, adopted as a measure for user belief, is detailed in table 4.2 and involves the user responding on a seven point scale to questions relating to the usefulness of the information system. The respective scores are aggregated to produce an overall value for perceived usefulness which is regarded as an indication of the user's belief about the information system.

No	Factor
1	Your perceptions of the extent to which the information system makes you work more quickly
2	Your perceptions of the extent to which the information system improves your job performance
3	Your perceptions of the extent to which the information system increases productivity
4	Your perceptions of the extent to which the information system makes you more effective
5	Your perceptions of the extent to which the information system makes your job easier
6	Your perceptions of the extent to which the information system is useful

Table 4.2 : Factors of Perceived Usefulness (Davis,1989).

4.3.4 User Involvement

Previous research has highlighted the need to define the nature of user involvement and to determine a reliable and repeatable measure for user involvement. Ives and Olson (1984) developed a six category model of user involvement, ranging from "no involvement" to "involvement by strong control". As has already been stated, different information systems development environments will often lead to different levels of user involvement, changes in the importance of user attitude, and different approaches to development and implementation. A broader model of the Olson and Ives's 6 category model is employed in this research. The first category, "no involvement", is broken down into "uninvited users" and "unwilling users". Lack of user involvement is often viewed as occurring as a result of the information systems staff not wanting users involved within the information systems domain (uninvited users). However, user

resistance to information systems is an alternative reason for lack of user involvement (unwilling users). By splitting the no involvement category it is possible to determine the nature or reason behind the lack of user involvement. Table 4.3 details the revised involvement categories employed in this research; the descriptions for each category were also altered based on previous research discussed.

No	Category	Description
1	uninvited users	no involvement as user's are not invited
2	unwilling users	no involvement as user's are not willing to participate
3	symbolic involvement	user is involved but has no influence
4	involvement by advice	users are asked for opinions at the discretion of the systems designers
5	involvement by weak control	users have to sign off at the end of each stage of the project and are able to ask the system designer to make changes
6	involvement by doing	user is part of the project design team
7	involvement by strong control	user has a controlling interest in the development of the information system over the system designers

Table 4.3 : Revised Involvement Categories.

Each category is regarded as a distinct level of user involvement, with each category relating to different user circumstances. The first four categories are associated with the user having minimal, but increasing influence in the development and implementation of information systems. The last three categories are associated with high levels of user involvement and control in decision making.

4.4 Summary of Measures

Table 4.4 illustrates the respective measures for the variables involved in this research. A general observation is that each of the measures refers to a specific information system and does not provide a generic measure relating to all information systems within an organisation. Based on the complexity of information systems, and previous research (Robertson,1989), this contextualised focus of measures is assumed to be the most appropriate. Although the work of Miller (1989) provided insight in developing the "fit to objectives", the measure is a new measure.

Variable	Measure	Source
Information Systems Success	"Fit to Objectives"	-
User Attitude	User Information Satisfaction	Ives and Olson,1984
User Belief	Perceived Usefulness	Davis,1989
User Involvement	Involvement Categories	Ives and Olson,1984

Table 4.4 : Summary of Measures.

With the above measures for testing associations, the following hypotheses are developed.

4.5 Hypotheses

Based on prior research, and the central questions of this research, the following hypotheses are proposed.

4.5.1 Information Systems Success and User Attitude

To date, various studies have concentrated on user attitude and its relationship to information system success, but no concrete conclusions have been reached. The lack of theoretical foundation and poor methodologies have been cited as the reasons for the inconclusive findings. User attitude, defined as *a general and enduring positive or negative feeling about some person, object or issue*, is postulated to have a positive association to information system success. The more an information system meets its objectives, the more likely the users will be satisfied with the information produced by the information system. The reverse is also true, namely that users with a positive attitude will be more favourably disposed to viewing an information system as meeting its objectives and will tend to focus on benefits and not faults. Thus, users with positive attitude will tend to regard an information system with only marginal benefits as a successful system.

Negative user attitude would correlate to low information system success scores as a result of user resistance to the information system in the form of lack of acceptance, strained relationship with the information system staff and no or limited use of the information system, as well as information produced. All the

above would impact negatively on the information system and increase the possibility of failure. From previous research this relationship can be stated in the following hypothesis:

H_1 - *A user's attitude as measured by user information satisfaction is positively associated with the success of an information system as measured by its fit to objectives.*

Although it may be appear obvious that successful information systems should be associated with positive attitude, confirmation of the existence of such an association would provide a basis for determining a cause and effect relationship between attitude and information system success. Moreover, there is a need to understand those situations where users have a positive attitude but view the information system as unsuccessful, or vice versa. The possibility of such situations occurring, the likely explanations for their occurrence, and implications for information systems research are further areas to be investigated within the ambit of the above association.

Information system success as measured by its fit to objectives provides an indication of the extent to which the organisational objectives/goals are being achieved. User attitude, as measured by user information satisfaction, is determining the extent to which the users are satisfied with the information system in terms of their individual requirements. A positive association between user attitude and information systems success is thus expected; the closer the

correlation, the greater the level of congruency between the users' objectives and the organisational objectives.

A positive association between user attitude and information systems success would imply a need for information systems researchers to thereafter isolate at which stage in the systems development life cycle attitude has the most significant impact on information systems success. Once isolated, explanations and possible methods by which to influence user attitude at critical stages in the development process need to be developed. On the other hand, further questions regarding the impact of successful information systems on user attitude also need to be answered. Both of the above require longitudinal and controlled experiments in order to reach valid conclusions.

4.5.2 Information System Success and User Belief

Fishbein and Azjen's (1975) model implies that a positive association between attitude and information system success would indicate a similar association between user belief and information system success. If users believe an information system does not provide any benefit (perceived usefulness), they are unlikely to make use of the system, or if use is mandatory, they are unlikely to value the information produced by the information system. Moreover, if one assumes a causal relationship between belief and attitude, low perceptions of the usefulness will result in negative user attitude. The corollary is that if the perceived usefulness of an information system is high, it is likely that users will

view the information system in a more positive light and score it higher in terms of information system success. This relationship can be stated as:

H_2 - *A user's belief as measured by perceived usefulness is positively associated with the success of an information system as measured by its fit to objectives.*

A positive association between information systems success and user belief would confirm that user belief about an information system influences the extent to which users view the information system as being successful and as a positive contributor in performing their jobs. High scores for user belief indicates that users perceive an information system as providing significant organisational or personal benefit. Perceived usefulness could be thought to be a measure of the extent to which an information system could provide organisational benefit. A weak association between perceived usefulness and information system success would indicate that the information system has not met the expectations of the user.

Low scores of perceived usefulness require the information system staff to address either the objectives of the information system, or the level of education and understanding of the users regarding the benefits of information systems.

4.5.3 User Attitude and User Belief

Based on previous research and common sense one can assume a very significant association between attitude and belief, stated as follows:

H_3 - *A user's attitude toward an information system as measured by user information satisfaction is positively associated with that user's belief about an information system as measured by the perceived usefulness.*

A positive association would not, however, prove causality. If one assumes causality, and that attitude is determined by belief, one would expect higher scores for belief than attitude. Although the perceived usefulness of an information system may be 100%, the level of user information satisfaction, as a result of extraneous variables, may not be as high. Higher scores for user belief would indicate a need for the information systems department to address the level of training that the user has received in the operation of an information system, provided the information system has a high fit to objectives. Since, although a user can identify the benefit of an information system, that user may have a negative attitude, based for example on a current inability to access information. This inability can be a function of either the information system and/or the user.

As opposed to organisational benefit, user information satisfaction is a measure of only the benefit that a particular user derives from the information system. User belief is a measure of the user's perception about the benefit of the

information system. It is assumed that if a user is satisfied with an information system, the benefit expected is achieved. Thus, one could argue that stronger user attitude relative to user belief could predict higher levels of information systems success.

4.5.4 User involvement and Information System Success

Many researchers have advocated that user involvement is imperative for the successful development and implementation of information systems. Research to date has, however, failed to empirically prove what logical argument maintains should hold true. As has already been discussed, the existing measures of system success have not proved to be satisfactory, thus explaining why the association has not been found. If, however, a positive association could be found between user involvement and the fit to objectives then it could be deduced that the fit to objectives is a valid measure for success since the empirical conclusions confirm the logical arguments. This study thus postulates a positive relationship between user involvement and information systems success, stated as follows:

H_4 - *Higher levels of user involvement in the development of an information system as measured by user involvement levels, will be positively associated with higher levels of information system success.*

H_5 - *Higher levels of user involvement in the implementation of an information system, will be positively associated with higher levels of information system success.*

From a practical viewpoint, positive association between increasing levels of user involvement and information systems success would justify the time and resources expenditure in involving the users in the development and implementation of information systems.

4.5.5 User Attitude and User Involvement; User Belief and User Involvement

Involving users in the development and implementation of information systems is assumed to be one of the key mechanisms influencing user attitude and user belief. In terms of the user involvement categories employed in this research, except for category 7 (strong control), all are dependent upon the information system staff allowing and acknowledging higher levels of user involvement. Thus, it is assumed that user attitude and user belief cannot cause higher levels of involvement in terms of the measures and methodology employed in this research. The same argument can be made for user involvement and information systems success. Thus, higher scores for user attitude and belief within higher user involvement categories are expected and would indicate user involvement as having a positive influence on user attitude and user belief. This is stated as follows:

H_6 - *Higher levels of user involvement in the development of an information system, will be positively associated with higher user attitude as measured by user information satisfaction.*

H_7 - *Higher levels of user involvement in the implementation of an information system, will be positively associated with higher user attitude as measured by user information satisfaction.*

H_8 - *Higher levels of user involvement in the development of an information system, will be positively associated with higher user belief as measured by perceived usefulness.*

H_9 - *Higher levels of user involvement in the implementation of an information system, will be positively associated with higher user belief as measured by perceived usefulness.*

Confirming empirically that user involvement is beneficial for information system success provides a solid foundation for involving the user, justification for the costs and time involved, as well as providing a mechanism by which to address problems relating to attitude and belief.

4.6 Conclusion

The above hypotheses form the focus of the empirical portion of this research. The research approach, methodology and statistical techniques to be used in testing the associations postulated are dealt with in the Chapter 5.

5. RESEARCH METHODOLOGY

5.1 Introduction

A theme consistent throughout previous information systems research within the area of user attitude and user involvement, is the need for a rigorous methodology, one that can ensure the validity of research results, and that can be tested in other environments and timeframes. The focus for the methodology adopted here is that it involves a process which is repeatable, testable and time independent in terms of its application to specific information systems.

The approach adopted made use of questionnaires and the South African business community, as opposed to university or government institutions, were targeted as participants. Standard statistical techniques for measuring associations were adopted. Graphical analysis was also conducted on the results. The detailed description of the major processes and methodology adopted for the research is outlined below.

5.2 Research Approach

Given that questionnaires provide the most effective means for obtaining large quantities of statistical data from a variety of sources, a questionnaire-based

approach was adopted. The questionnaires were developed using the specific instruments outlined in the previous chapter.

A pilot study was conducted in one organisation, to ensure the feasibility and testability of the "fit to objectives" measure. The pilot study lead to minor modifications of the research approach and questionnaires, specifically:

- the instructions regarding the completion of the fit to objectives measure were redesigned due to the number of inappropriate responses
- the spacing and layout of the questionnaires was redeveloped for ease of completion
- tighter timeframes were placed on users to encourage completion of questionnaires.

In the collection of data, two questionnaires were used. An initial questionnaire (see Appendix B) was distributed to isolate the objectives of the information system under investigation. Once completed and returned, the responses were tabulated and reviewed. Through this process, statements referring to the same objective were grouped and the top five objectives in terms of number of responses were isolated as the objectives for the specific information system. This method of eliciting the objectives of the information system was employed, as most of the information systems investigated were post-implementation and insufficient formal objectives had been set during the development process. Moreover, as discussed earlier, the importance of measuring success based on

current information system objectives required the determination of objectives at the current point in time.

The top five objectives were transposed to the second questionnaire. The second questionnaire (see Appendix C) elicited the rating and ranking of objectives, as well as measuring user attitude, user belief and user involvement.

A research prospectus (see Appendix A) providing a summary of the research objectives and procedures was prepared to provide information for participating companies. The data was gathered over a period of four months.

5.3 PROCESS

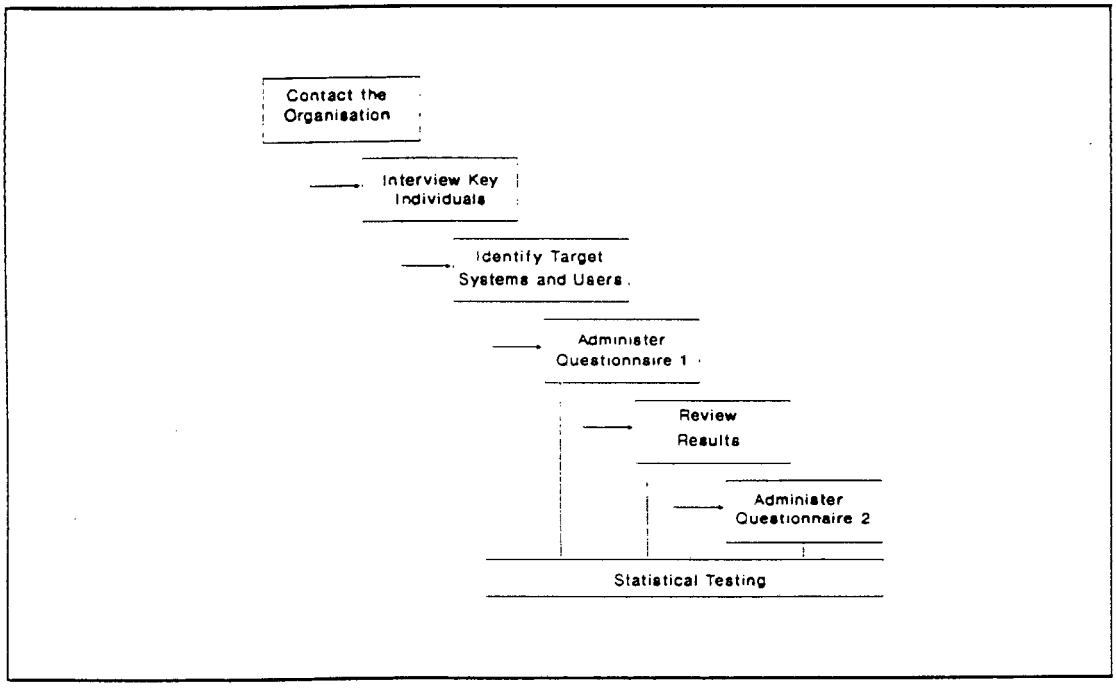


Figure 5.1 : Research Process.

The process adopted is illustrated in figure 5.1. A brief explanation of each stage in the process is provided below:

- **contact the organisation** - the organisations were contacted and asked to participate in the research

- **interview with key individuals** - once an organisation was contacted and an interest expressed, an interview with a member of the information systems departments was conducted. The focus of the interview was to explain the research, outline the benefits to participating companies and to set up the necessary procedures for the adminstration of the questionnaires and collection of data.

- **identify target users and systems** - in conjunction with the information systems department, target users and specific information systems were selected for the study. The choice of information systems and target users was largely determined by the information system staff. Aside from the target user group, information systems staff who had been involved in the specific information system identified were also encouraged to participate.

- **administer questionnaire 1** - the first questionnaire was administered to users of the information system and the information systems staff. The results obtained, were collated and tabulated.

- **review results** - the results from questionnaire 1 were reviewed and the specific objectives were isolated and transposed into questionnaire 2.

- **administer questionnaire 2** - questionnaire 2 was administered and the users and information systems staff rated (question 3) and ranked (question 4) the specific objectives identified, providing a measure of the fit to objectives (see Appendix C). The users then completed the remaining sections, measuring user attitude (questions 5 - 17), user belief (questions 18 - 23) and user involvement (questions 24 - 25). For ease of use, the measures for attitude and belief were combined into one section on the questionnaire.

- **statistical testing** - once all the data had been compiled, statistical testing was conducted which included normality of data and association testing.

5.4 Target Sample

In selecting companies to participate in the research, a broad spectrum was isolated, with a variety of industries being represented. Table 5.1 provides summarised information with regard to the information systems investigated.

System No	Industry	Location of Head Office	System Description
1	Oil	Cape Town	Stock System
2	Retail	Durban	Point of Sale
3	Insurance	Cape Town	Specialist Application
4	Retail	Johannesburg	Purchase Order Management
5	Retail	Johannesburg	Debtors System
6	Retail	Johannesburg	Point of Sale
7	Publishing	Cape Town	Financial Accounting
8	Retail	Johannesburg	Debtors Systems
9	Manufacturing	Durban	Human Resource Management
10	Oil	Cape Town	Stock System
11	Public Sector	Cape Town	Human Resource Management

Table 5.1 : List of Information Systems Investigated.

5.5 Method of Analysis

The data was captured and compiled on Lotus Spreadsheets. Once compiled, the data was imported to a PC-based statistical application, Statgraphics. All statistical testing was conducted using Statgraphics. All documentation was produced using Wordperfect and Harvard Graphics.

5.6 Statistical Techniques

In the analysis of the normality of the data obtained, Chi-Squared Goodness of Fit Tests were conducted.

In measuring the associations, based on the non-parametric nature of the sample data, Spearman Rank and Kendall Rank Correlation tests were conducted. Although Kendall Rank correlations are regarded as being slightly more strict, measuring associations with Spearman is regarded as adequate for determining significance levels of associations. Both techniques were employed for completeness in the analysis.

5.7 Conclusion

The importance of this research is not only to investigate associations between information systems success and specific user variables, but also to develop a new approach to the measurement of information systems success. Insofar as longitudinal studies are essential for better understanding the relationship between user behaviour and information systems success, the focus has been on the ability to repeat the study. All instruments can be employed at any point in time during the systems development life cycle and measures of success, attitude, belief and involvement can thus be compared at different points in time.

6. ANALYSIS OF RESULTS AND DISCUSSION

6.1 Introduction

In testing the hypotheses discussed in Chapter 4, statistical measures of associations were used. However, this was not considered sufficient to understand fully the nature of the relationship between the respective variables and the implications for practitioners and researchers. Thus, graphical techniques were also used to examine the results.

The hypotheses are tested in isolation, but a summary of results and an integrated discussion is provided in the conclusion to the chapter. Before investigating the hypotheses, the sample demographics and results, levels of significance, and the normality of the data is presented.

Although discussion regarding the results is provided in this chapter, the implications of the results, the contributions of the research and conclusions drawn are analysed in Chapter 7.

6.2 Sample Demographics and Results

The research examined 11 systems. A total of 181 user responses was obtained with the average number of users per system being 16. The detailed sample

demographics are contained in Appendix E. A diverse mix of information systems was investigated, ranging from micro to mainframe systems, with the oil, retail, manufacturing, insurance, public sector and publishing industries represented. Of the organisations participating, 5 were based in Cape Town, 2 in Durban and 4 in Johannesburg.

Appendix E lists the objectives isolated per information system, the number of references to each objective from questionnaire one, the number of uncategorised objectives, and the organisational importance ranking for each objective from questionnaire 2.

Both users and information system staff completed questionnaire 2. The information systems staff did not complete sections C and D of the questionnaire (see Appendix C), which relate to user attitude, user belief and user involvement, unless they were users of the information system as per the adopted definition.

The detailed results for each information system are produced in Appendix F, and table 6.1 below details the respective mean scores and summarised data per information system. In the analysis, all calculations for determining associations, normality of data, and levels of significance made use of percentage values rather than the raw scores. The reason for this was that using percentages allowed for easier comparisons of data by using standard formats for the axis in the graphical analysis.

System No.	n	Information System Success (%)	User Attitude (%)	User Belief (%)	% of Users Involved in Development (Categories 3-7)	% of Users Involved in Implementation (Categories 3-7)
1	26	70.77	74.60	82.05	53.84	69.23
2	14	87.82	88.93	92.69	78.57	84.71
3	19	83.76	73.74	83.71	42.10	63.15
4	16	76.01	74.86	86.46	50.00	56.25
5	16	66.96	66.28	81.40	25.00	25.00
6	16	85.95	82.69	93.90	50.00	62.50
7	21	81.77	75.72	82.43	23.80	42.86
8	13	83.68	68.55	78.94	7.69	15.38
9	11	77.84	63.54	80.09	0.00	9.09
10	15	72.51	72.53	77.78	40.00	40.00
11	15	68.25	66.08	75.41	53.00	60.00
Sample Average	**16**	**77.76**	**73.41**	**83.16**	**38.55**	**48.10**

Table 6.1 : Summary of Mean Scores per Information System.

6.3 Levels of Significance

Standard null hypotheses testing techniques are used for measuring associations. In testing associations and hypotheses, levels of significance (p) are produced. When determining appropriate levels of significance at which hypotheses can be accepted or rejected there are no standard statistical measures on which to base a decision. Consequently, precedents from previous research and other disciplines are required. Mullany (1989), in investigating user related variables, presents qualitative ratings (see table 6.2) of significance based on research within the information systems, managerial, psychological and statistical disciplines.

Significance Level	Qualitative Ratings
$p \leq 0{,}001$	Highly significant Null hypothesis strongly rejected Alternative hypothesis strongly supported
$0{,}001 < p < 0{,}050$	Significant Null hypothesis rejected Alternative hypothesis supported
$0{,}050 < p < 0{,}100$	Not very significant No strong reason to reject null hypothesis Weak support for alternative hypothesis Inconclusive result
$p \geq 0{,}100$	Not significant No reason to reject null hypothesis No support for alternative hypothesis

Table 6.2 : Qualitative Ratings Assumed for Significance Levels (Mullany, 1989).

6.4 Normality of Data

In order to ascertain the reliability of the measuring instruments and sample data obtained, testing for normality was conducted. The testing for normality was conducted on the scores for information system success, user attitude, user belief and involvement levels, using the combined results of all eleven systems.

If a sample is not normal then tests which assume normality cannot be used. Sample data which tests not normal does not necessarily indicate that the measuring instrument was not appropriate, since the sample population itself may not be normal.

In testing for normality, Chi-Square Goodness of Fit tests were conducted on the total sample. In the majority of the individual information systems, insufficient

responses were obtained to conduct Chi-Square Goodness of Fit tests. Moreover, small samples of data are unlikely to exhibit properties of a normal distribution. The Chi-Square Goodness of Fit test produces x^2, which when compared to the relevant statistical tables, indicates the percentage probability that the distribution will fall on the normal distribution curves. In conducting the test, standard normal distributions were assumed for the expected distribution. This would explain the extremely high x^2 values for the user involvement sample results. In determining the significance levels for normality, the qualitative ratings presented by Mullany (1989) were used (see table 6.3 below).

Significance Level	Qualitative Ratings
$p \leq 0{,}05$	Not normal
$p > 0{,}30$	Approximately normal
$p > 0{,}50$	Very normal

Table 6.3 : Significance Levels for Normality (Mullany, 1989).

Table 6.4 details the levels of normality for the variables examined. Using the significance levels above, apart from user attitude, the sample results were found to be not normal. The non-parametric nature of the data was not unexpected. User involvement levels varied considerably between information systems, with the majority of responses falling in categories 1,4 and 6, thereby not following a normal distribution curve. Thus, it is assumed that the non-parametric nature of the user involvement results do not indicate measure unreliability.

Variable	x^2	*df*	*p*	Normality
Information System Success	25.98	12	0.0107	Not normal
User Attitude	8.48	11	0.6695	Very normal
User Belief	118.38	11	0.0000	Not normal
User Involvement - Development	347.75	4	0.0000	Not normal
User Involvement - Implementation	306.64	5	0.0000	Not normal

Table 6.4 : Chi-Square Goodness of Fit Test Significance Levels for Normality.

In terms of information system success, which is a new measure, the fact that the data is not normal impacts on the question of reliability regarding the instrument. However, once again, the differences between information system objectives will influence testing for normality, by having varying means and standard deviations. The sample chosen also determines the normality of the data. A non-parametric sample would influence the resulting scores for each variable. In terms of perceived usefulness, the sample data also tested not normal. Since, this measure has been shown to be a valid instrument, the fact that the results were found to be not normal, would indicate that the sample had a significant impact on testing for normality. If this is assumed, the question of the reliability of the measure for information system success is weakened.

Due to the non-parametric nature of the sample data, non-parametric statistical techniques were adopted for association testing, specifically Spearman Rank and Kendall Rank Correlation procedures.

6.5 Hypothesis Testing

The measures of association for each hypothesis are produced in each section, followed by a graphical analysis of the results and a discussion.

6.5.1 Information System Success and User Attitude

Table 6.5 details the measures of associations between information systems success and user attitude.

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	$p < 0.050$
1	26	24	0.7611	0.0001	0.5638	0.0001	Yes
2	14	12	0.5069	0.0676	0.4052	0.0548	Inconclusive
3	19	17	0.2063	0.3813	0.1747	0.3070	No
4	16	14	0.2381	0.3564	0.1391	0.4662	No
5	16	14	0.1332	0.6058	0.0773	0.6228	No
6	16	14	0.7172	0.0055	0.5448	0.0049	Yes
7	21	19	0.8734	0.0001	0.7076	0.0000	Yes
8	13	11	0.4262	0.1398	0.3268	0.1251	Inconclusive
9	11	9	0.4279	0.1760	0.2991	0.2088	No
10	15	13	0.2583	0.3338	0.1584	0.4236	No
11	15	13	0.6652	0.0132	0.4757	0.0148	Yes
Total	**181**	**179**	**0.5638**	**0.0000**	**0.4059**	**0.0000**	**Yes**

Table 6.5 : Association Measures - Information System Success and User Attitude.

Although individual system results do not always provide positive associations ($p < 0.050$), when examining the consolidated results there is a very high correlation between information systems success and user attitude. Smaller sample sizes require stricter rules for determining associations leading to inconclusive results in some cases. In those individual information systems which do have a positive association, the association is very strong using both Kendall and Spearman Rank procedures. Of the individual information systems, 2 produced inconclusive results, with 5 having no association between attitude and information system success. The fact that graphical analysis indicated a strong positive association, would confirm that the sample size influenced the results.

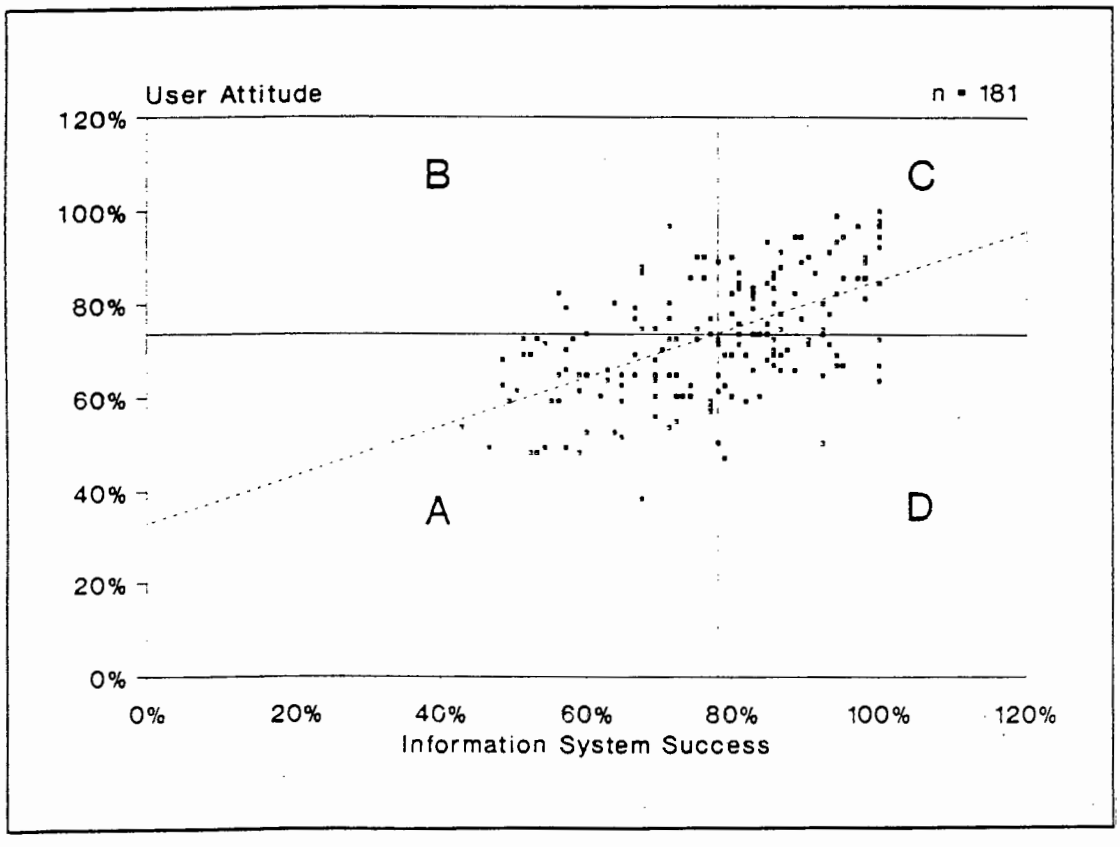


Figure 6.1 : Scatter Plot - Information System Success and User Attitude

Figure 6.1 is a scatter plot of the results using the total sample for information system success and user attitude. The mean score for information system success, of 77.76%, is plotted on the graph and represented by the vertical line. The horizontal line, at 73.41% represents the mean score for user attitude within the total sample. If one assumes that low information system success is associated with low user attitude and vice versa, the majority of responses should lie in the areas marked A and C. The results which fall in the areas marked B and D are those that do not agree with the association, and need to be addressed to understand why they deviate from the norm.

In analysing these results, one can assume that those results which fall just inside the areas B and D but are close to the average lines are a result of the method of testing and in a retest situation could possibly fall into the association areas. The focus was thus on those results which were distinctly different from the norm. Those that were, in areas B and D could not be isolated to any particular variable, moreover, only approximately 10% of responses appear to be markedly divergent from the association trend line. This indicates that the strong correlation for consolidated results is justified. Results which are markedly different from the norm would be a result of extraneous variables outside the confines of the specific information system and the areas being examined in this research.

Where information system success scores are above average (x-axis > 77.76%) but attitude scores are below average (y-axis < 73.41%), area B, it indicates that

although the system has met its objectives the users are not satisfied. If one assumes that the objectives were correct, but the users are not able to accrue benefit it would indicate a need for the users to receive additional training in the use of the information system as this could be the reason for them not being satisfied. Examining those responses which were 10% or more below average for attitude and above average for success, yielded 8 responses. Of the 8, 6 respondents scored the level of training they received as insufficient.

Extraneous variables, outside the information system environment may also be causing negative user attitude. An additional scenario is that although the fit to objectives is high, the user does not feel that the objectives for the information system were correct, and is thus dissatisfied in terms of personal benefit that he or she is receiving from the information system.

In analyzing the differences between user attitude and information system success scores, figure 6.2 provides an indication of the extent to which large differences between attitude and success are occurring, and the nature of the difference. These large differences can possibly be associated with goal congruency or incongruency between user objectives and organisational/system objectives. The implications of the wrong objectives being achieved have already been mentioned. However, in determining the goal congruency between the user and the organisation, the user's personal objectives or goals are best measured by the user information satisfaction construct, which is a measure of how satisfied the user is with the information that is being received from the information system.

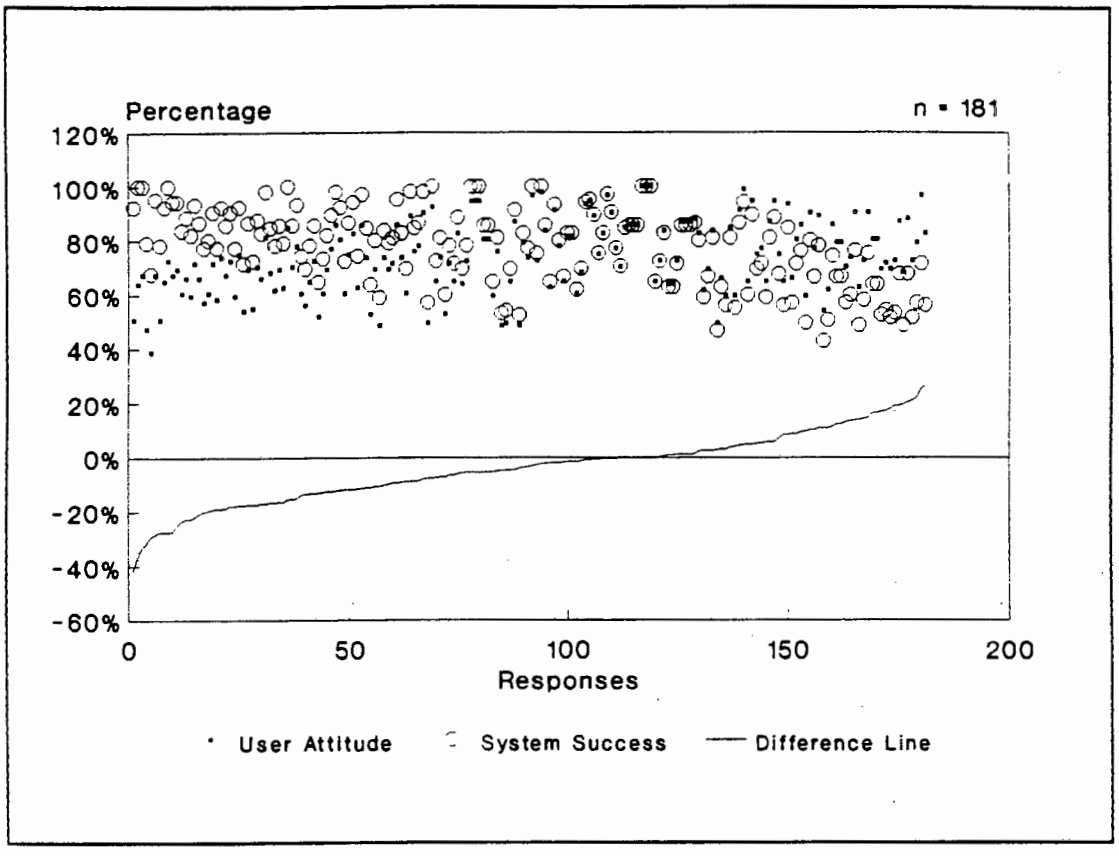


Figure 6.2 : Ordered Difference Plot - User Attitude minus Information System Success.

The goals of the organisation are best indicated by the objectives isolated for the information system. The extent to which these goals are in line with the user's objectives is the measure of the goal congruency between the user and the information system. Large difference between information system success and user attitude would thus indicate a lack of congruency between user and organisational goals. Moreover, for an information system, no association between attitude and information system success would also indicate a lack of goal congruency.

6.5.2 Information System Success and User Belief

Table 6.6 details the measures of associations for information systems success and user belief. The measures of association for information system success and user belief are similar to those of attitude, in that, although individual systems do not have significant correlation ($p < 0.050$), when measuring the aggregate association there is a very strong correlation between information system success and user belief. Of the 11 information systems, 4 had no associations and 1 produced inconclusive results.

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
1	26	24	0.4487	0.0145	0.3667	0.0112	Yes
2	14	12	0.4167	0.1329	0.3509	0.1117	No
3	19	17	0.6538	0.0055	0.5280	0.0025	Yes
4	16	14	0.3073	0.2340	0.2366	0.2284	No
5	16	14	0.3664	0.1559	0.2526	0.1961	No
6	16	14	0.6345	0.0140	0.4901	0.0177	Yes
7	21	19	0.4788	0.0322	0.3780	0.0213	Yes
8	13	11	0.7607	0.0084	0.6491	0.0026	Yes
9	11	13	0.1425	0.6522	0.1698	0.4773	Inconclusive
10	15	13	0.4932	0.0650	0.3620	0.0700	No
11	15	13	0.7424	0.0055	0.5589	0.0045	Yes
Total	**181**	**179**	**0.5094**	**0.0000**	**0.4384**	**0.0000**	**Yes**

Table 6.6 : Association Measures - Information System Success and User Belief.

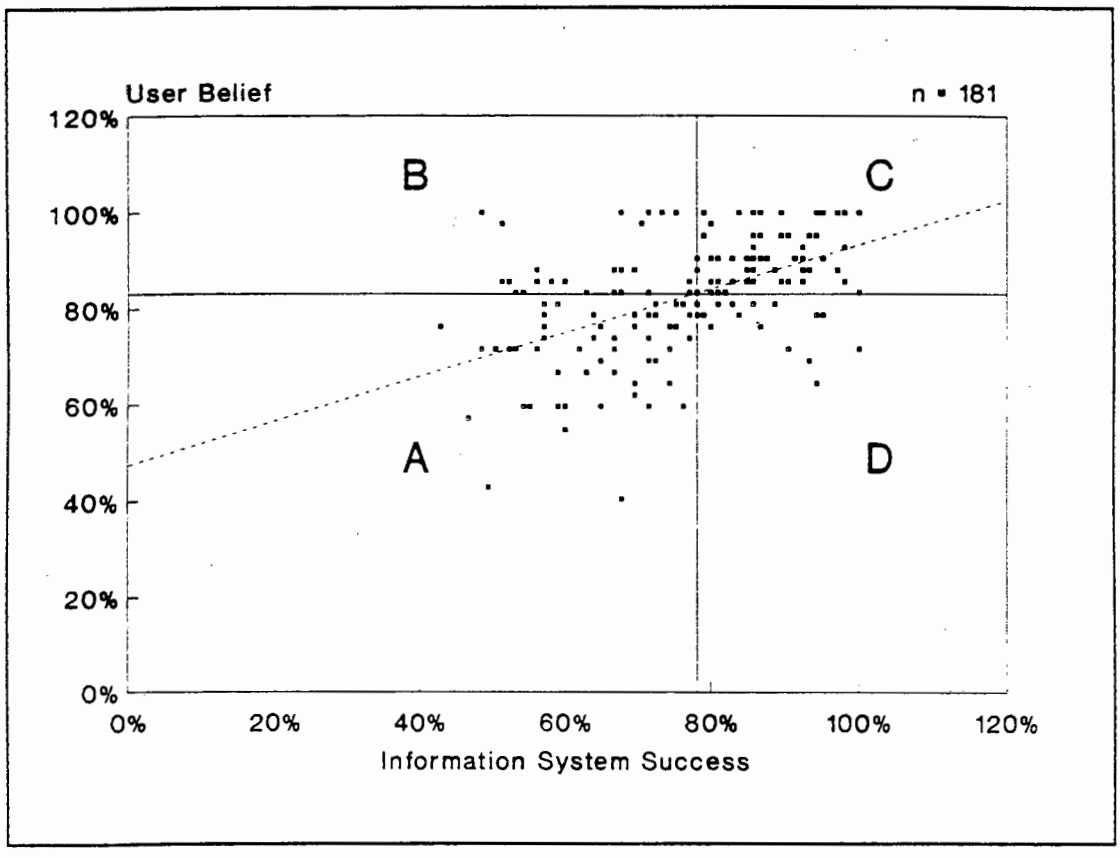


Figure 6.3 : Scatter Plot - Information System Success and User Belief.

Figure 6.3 is a scatter plot of results for information systems success and user belief. On the figure, the respective mean scores for information system success, 77.76%, and user belief, 83.16%, are plotted by the vertical and horizontal lines respectively. The results which fall in the areas marked A and C are those that conform to the association postulated. The results which fall in areas B and D are those that do not agree with the association. These results could not be isolated to any particular information system and were found in all information systems. As can be seen from the figure, very few results fall in area D, where information system success is above average (x-axis > 77.76%) and user belief is below average (y-axis < 83.16%). Results in this area would indicate that although

the information system is successful, users are sceptical about its benefit - this could be a function of user resistance to information systems in general or a lack of education on the part of the users with regards the benefit of information systems. However, with less than 10 results falling in this area it is difficult to perform any analysis, and one can assume that with such a small number of responses such a result is unlikely.

The results in area B, where information system success is below average (x-axis < 73.16%), and user belief is above average (y-axis > 83.16%), are those responses where the user's belief or perceptions about the information system was not met in terms of its success. It can be argued that the results in this area are a result of the natural tendency of individuals to expect too much from information systems. The users' beliefs about the information system are high as they perceive that there will be significant benefit from the information system, however, the reality in terms of actual benefit has not been achieved. This tendency is indicated in figure 6.4 below with the majority of differences between user belief and information system success having a net positive difference with user belief being higher than information system success.

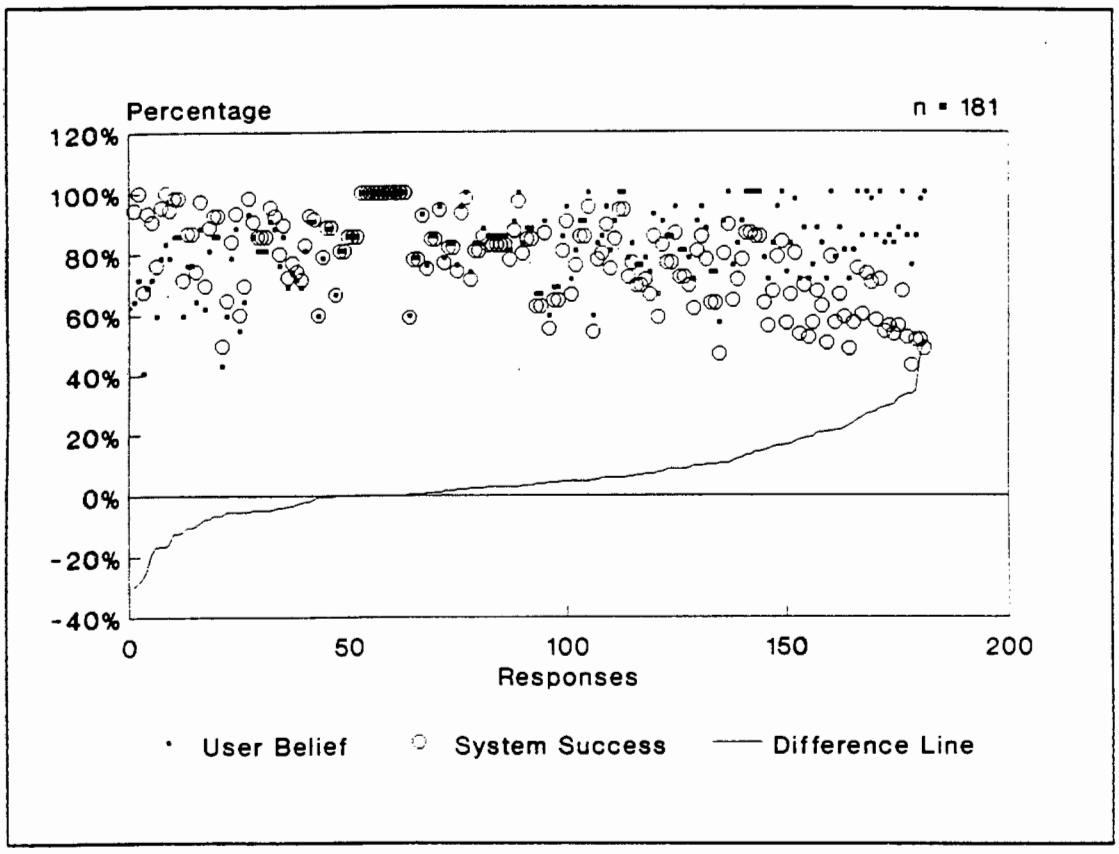


Figure 6.4 : Ordered Difference Plot - User Belief minus Information System Success.

6.5.3 User Attitude and User Belief

Table 6.7 details the measures of associations between user attitude and user belief. In 8 out of the 11 individual information systems and the consolidated results, there is a strong association between user attitude and user belief. As discussed in chapter 4, this is expected considering Fishbein and Azjen's model of the relationship between attitude and belief. However, the strong association does not prove causality. Fishbein and Azjen state that belief predicts attitude, and that through behaviour and a feedback mechanism, user belief is modified. This implies a circular relationship with each factor influencing the other.

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant *p* < 0.050
1	26	24	0.6025	0.0026	0.4671	0.0013	Yes
2	14	12	0.7834	0.0047	0.5824	0.0067	Yes
3	19	17	0.5157	0.0287	0.3990	0.0214	Yes
4	16	14	0.6281	0.0150	0.5369	0.0063	Yes
5	16	14	0.6364	0.0137	0.4893	0.0126	Yes
6	16	14	0.6084	0.0185	0.4573	0.0246	Yes
7	21	19	0.5699	0.0108	0.4800	0.0036	Yes
8	13	11	0.5388	0.0620	0.4267	0.0484	Yes
9	11	9	-0.0876	0.7819	-0.0381	0.8741	No
10	15	13	0.3873	0.1473	0.3282	0.1054	No
11	15	13	0.3923	0.1422	0.3432	0.0810	Inconclusive
Total	**181**	**179**	**0.5961**	**0.0000**	**0.4568**	**0.0000**	**Yes**

Table 6.7 : Association Measures - User Attitude and User Belief.

Figure 6.5 is a scatter plot of results for user attitude and user belief. The vertical line (x-axis = 73.41%) represents the mean user attitude success score for the sample. The horizontal line (y-axis = 83.16%) represents the mean user belief score for the sample. The results which fall in the areas B and D are those that do not agree with the association. Those users with high attitude scores but low belief scores bring into question Fishbein and Azjen's model, however, the limited number of responses in area D would indicate that the responses are due to individual differences and not representative of the user community.

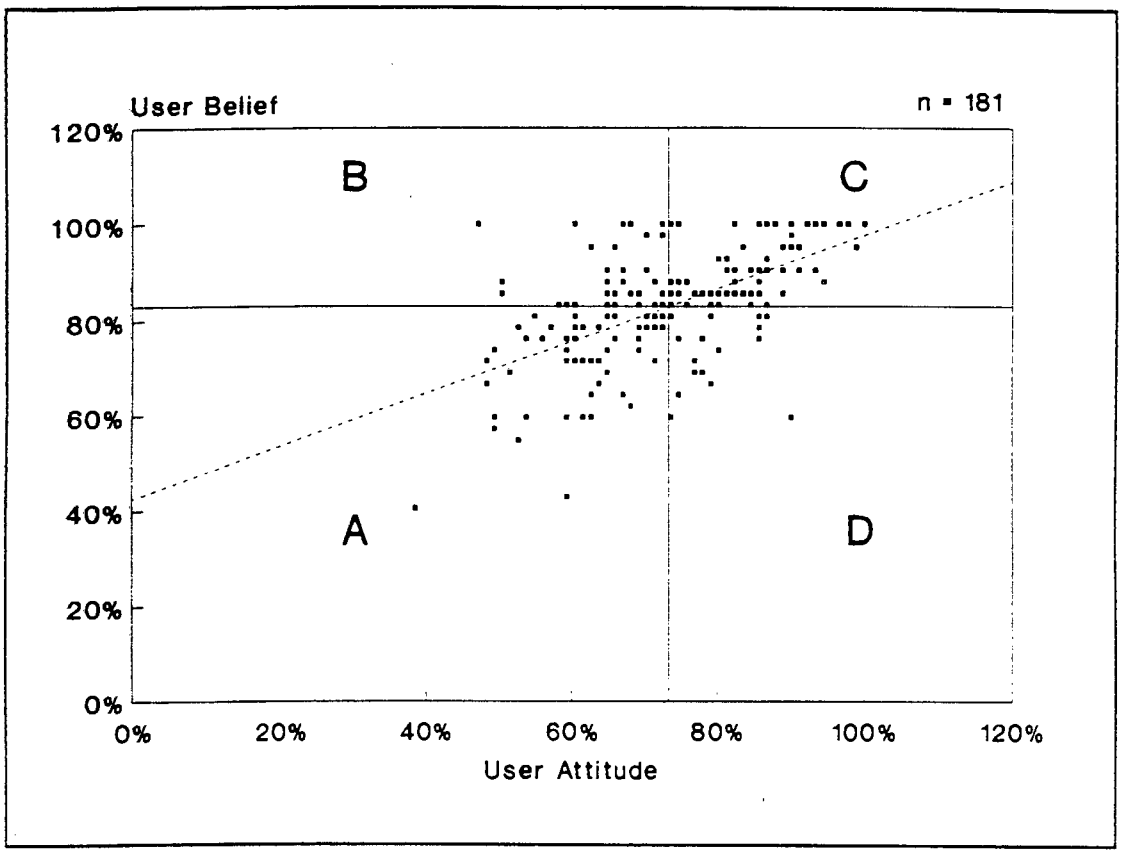


Figure 6.5 : Scatter Plot - User Attitude and User Belief

The majority of responses in area B which are markedly divergent fall close to a 100% for user belief scores. This would indicate extreme positive perceptions about the benefit of an information system, with lower attitude scores in terms of the benefit actually received.

In examining the differences in scores between user attitude and user belief, figure 6.6, a significant majority of user belief scores are higher than user attitude scores. This would be in line with the results regarding information systems success and user belief, in that the users expectations or perceptions about an information system exceed what is actually delivered.

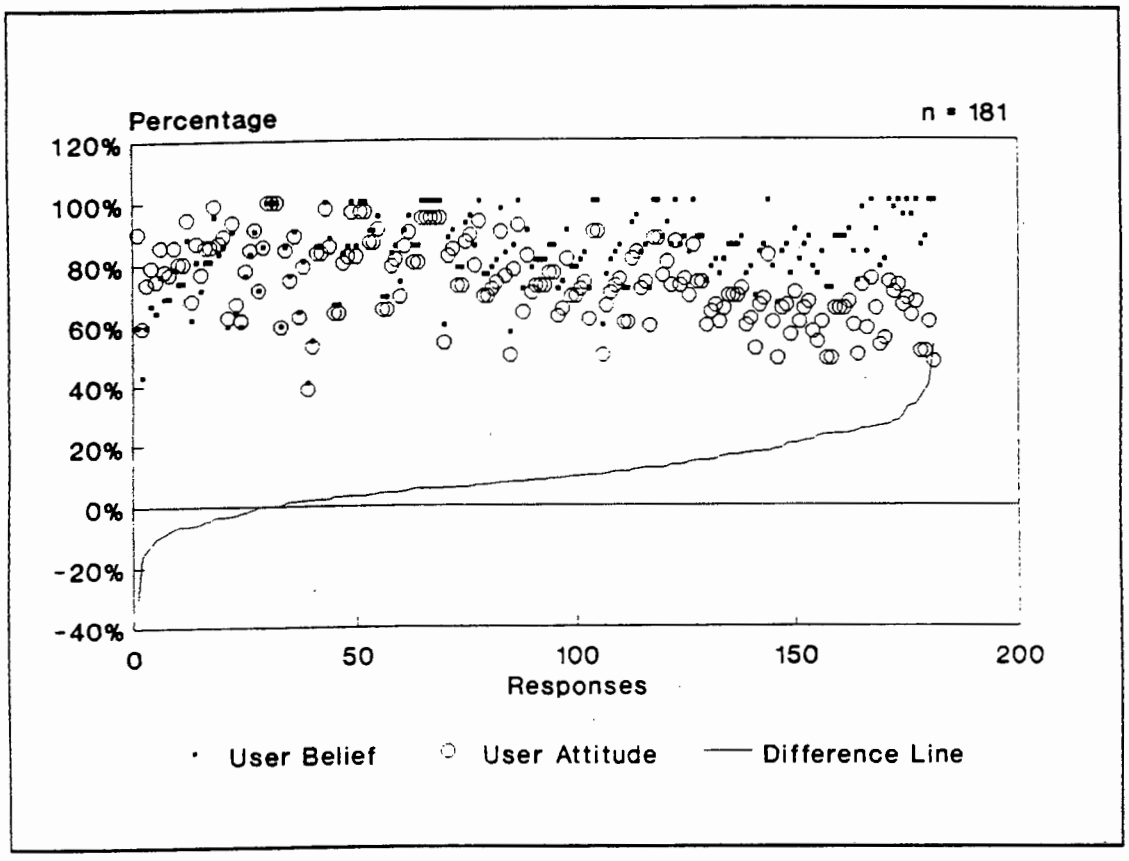


Figure 6.6 : Ordered Difference Plot - User Belief minus User Attitude.

The limited number of respondents who scored user attitude higher than user belief are testimony to the fact. There is a need to understand further the relationship between attitude and belief, for example, how negative user attitude will impact on user belief over time, and vice versa.

6.5.4 Information System Success, User Belief and User Attitude

In examining the relationship between information system success, user attitude and user belief, a scatter plot figure ordered by information system success on the x-axis and the corresponding percentage scores for user belief and user

attitude on the y-axis is provided in figure 6.7. Information system success has been categorised into low, mid and high information system success categories. The lack of previous research to determine categories of information system success required the adoption of alternative measures. Based on the range of responses for information system success, 40-100%, three equidistant categories were calculated, and termed low, mid and high. Table 6.8 details the respective means for information system success, user belief and user attitude within each information system success category.

At low levels of success, it would appear that the results for user attitude and user belief are very dispersed in relation to the middle and high levels of information system success, which, although having a much higher concentration of responses, has a closer correlation of attitude and belief scores. However, what does appear is that perfect scores for information system success (100%) have corresponding scores for attitude ranging down to 50%. This would once again relate to goal congruency as well as mitigate the extent to which information system success causes changes in user attitude. The existence of causality however, would require controlled experimental situations.

Success Level	Range	*n*	Success Mean %	Attitude Mean %	Belief Mean %
Low	< 60%	26	53.74	62.84	75.54
Middle	60% - 80%	68	71.41	68.92	78.29
High	> 80%	87	89.99	80.61	89.24

Table 6.8 : Mean Scores per Information System Success Levels.

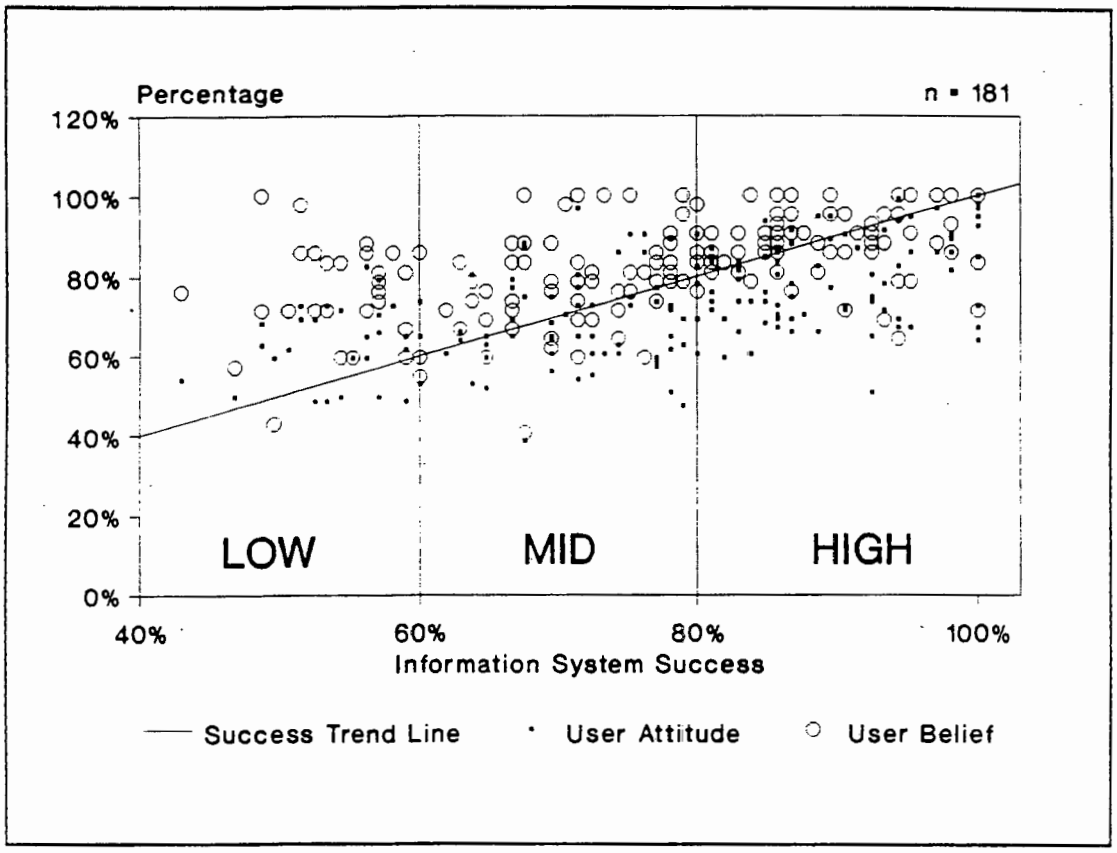


Figure 6.7 : Scatter Plot - Information System Success Categories.

Examining the low information system success area also indicates that at low levels of success, belief scores are considerably higher than user attitude scores and always higher than success scores. In addition, user belief scores in relation to attitude and information system success are high in all three information system success categories. This indicates a general positive perception among the sample users of the benefits of information systems.

The closest correlation of results tends to be the middle success range with user attitude and user belief scores limited between 60% - 100%, with no obvious deviations from the associations proven earlier. Within the high category of

information systems success, the mean scores for user belief and information system success are extremely close. This is a result of the general tendency of the user to perceive an information system as very useful, and it is questionable as to whether information system success will cause any changes in perceptions for high levels of information system success.

6.5.5 User involvement

Before investigating user involvement, it must be pointed out that the modification of Ives and Olson's first category of involvement provided no additional information. The splitting of the lowest level of involvement into "uninvited" and "unwilling" yielded no responses to the "unwilling" category. The lack of responses could be a result of there being no users who were unwilling, or, the negative connotation that could be associated with users formally indicating that they were not willing. Further research is needed to understand whether users are ever unwilling to participate and the development of an instrument that could detect user's unwillingness.

Out of the total sample, the major concentrations of responses were in category 1 (no involvement) and category 6 (involvement by doing) as depicted in Figure 6.16. This was true for both involvement in development and involvement in implementation, although more users were involved in category 6 (involvement by doing) in terms of implementation.

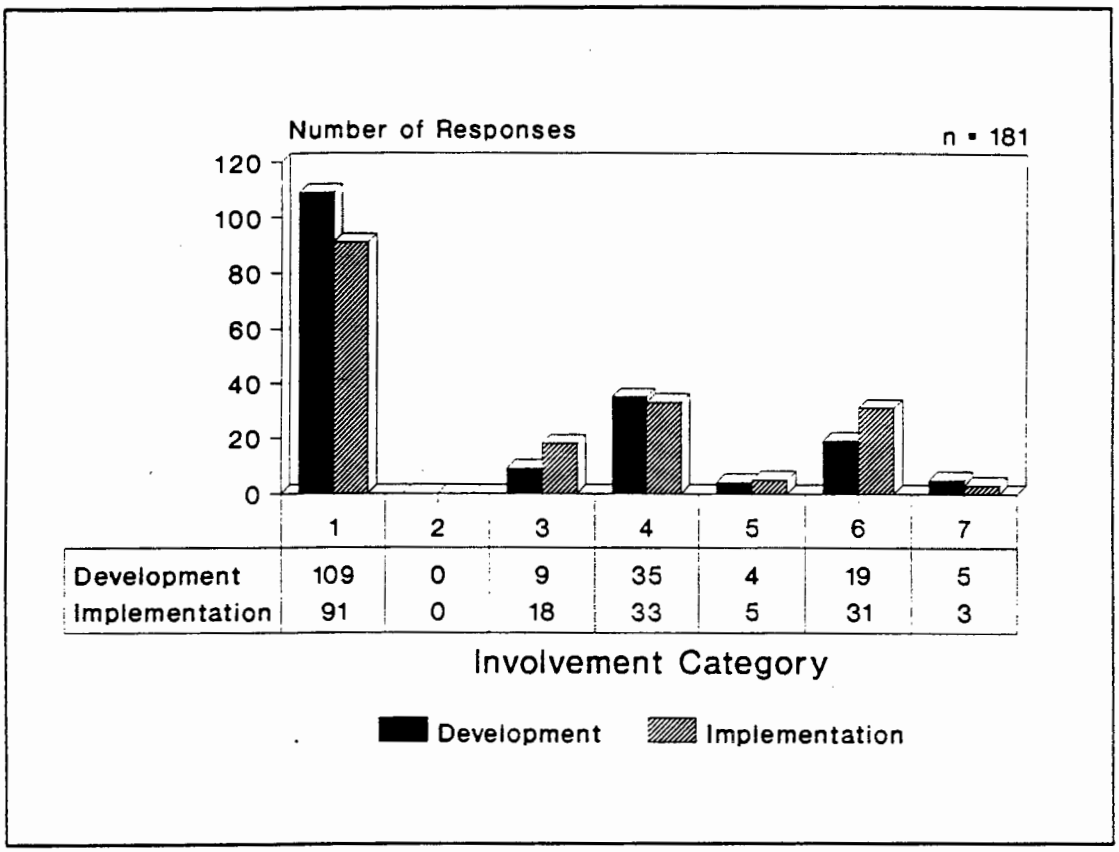


Figure 6.8 : Responses per Involvement Category in Development and Implementation.

In measuring the associations between user involvement and information system success, user attitude and user belief, it should be noted that the use of Spearman and Kendall Rank procedures may not be ideal when determining associations as the increasing levels of user involvement may not be ordinal. Thus, alternative statistical techniques may be required. A possible alternative identified but not employed is the Terpstra-Janckheer test (Neave and Worthington,1988). Although the levels of involvement may not be ordinal from a qualitative point of view, it is ordinal from a quantitative perspective. Thus, the associations were examined using Spearman and Kendall techniques, the results of which are contained in Appendix G.

Out of the 11 information systems, only 1 had a significant association between information systems success and user involvement in development. 2 out of 11 information systems were found to have a significant association between information system success and user involvement in implementation. Similar results for the individual information systems were found between user attitude and involvement. Only 1 of the 11 information systems indicated an association between user belief and involvement. Table 6.9 provides a summary of the significance levels and association measures for the sample as a whole. Similarly, table 6.10 provides a summary of the results for user involvement in implementation and the respective variables.

User Involvement in Development	***n***	***df***	**Spearman *r***	**Spearman *p***	**Kendall *r***	**Kendall *p***	**Significant *p* < 0.050**
and Information System Success	181	179	0.0945	0.2047	0.0740	0.2019	No
and User Attitude	181	179	0.3030	0.0000	0.2374	0.0000	Yes
and User Belief	181	179	0.1617	0.0301	0.1291	0.0295	Yes

Table 6.9 : Summary Association Measures - User Involvement in Development and Information System Success, User Attitude, and User Belief.

Although in Tables 6.9 and 6.10, association testing produced 5 out of 6 significant results, the lack of associations for individual information systems indicates a need for some caution. However, the small sample sizes and fact that in any particular system, all the users sampled may have not been involved at all

indicates that the consolidated results are possibly a better indication.

User Involvement in Implement-ation	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
and Information System Success	181	179	0.1528	0.0403	0.1181	0.0382	Yes
and User Attitude	181	179	0.3271	0.0000	0.2503	0.0000	Yes
and User Belief	181	179	0.1557	0.0392	0.1210	0.0382	Yes

Table 6.10 : Summary Association Measures - User Involvement in Implementation and Information System Success, User Attitude, and User Belief.

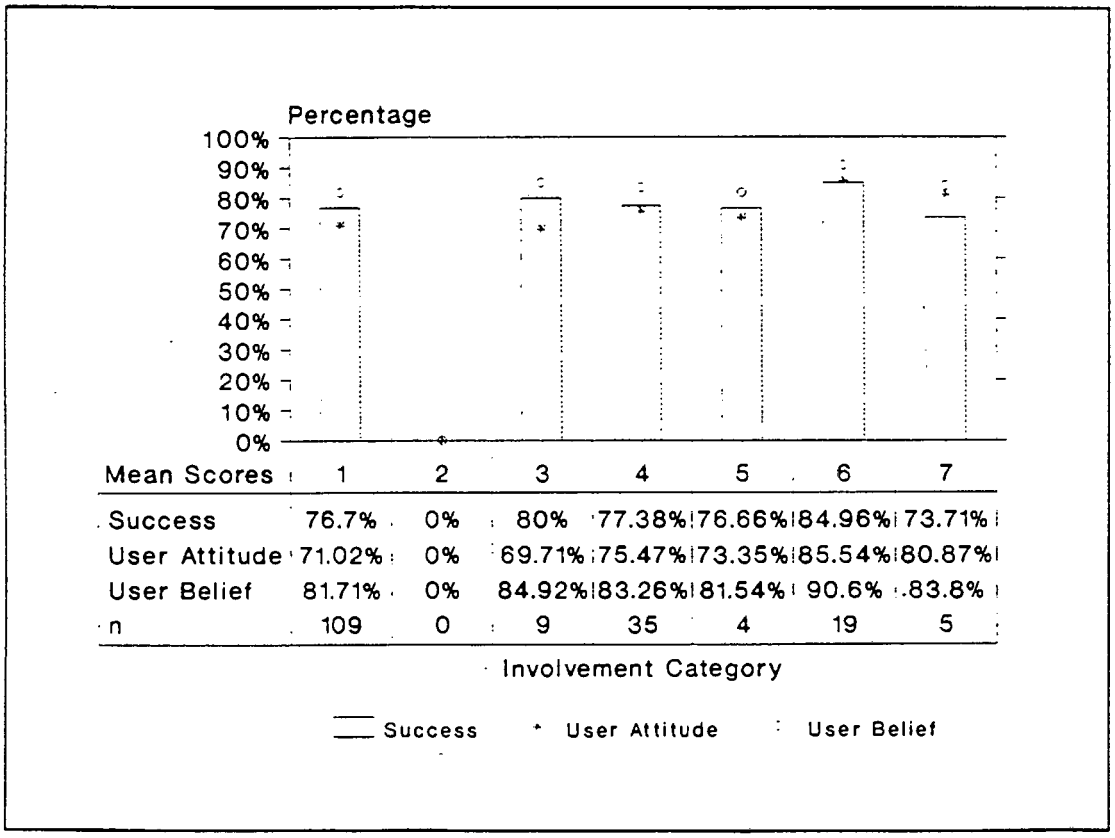
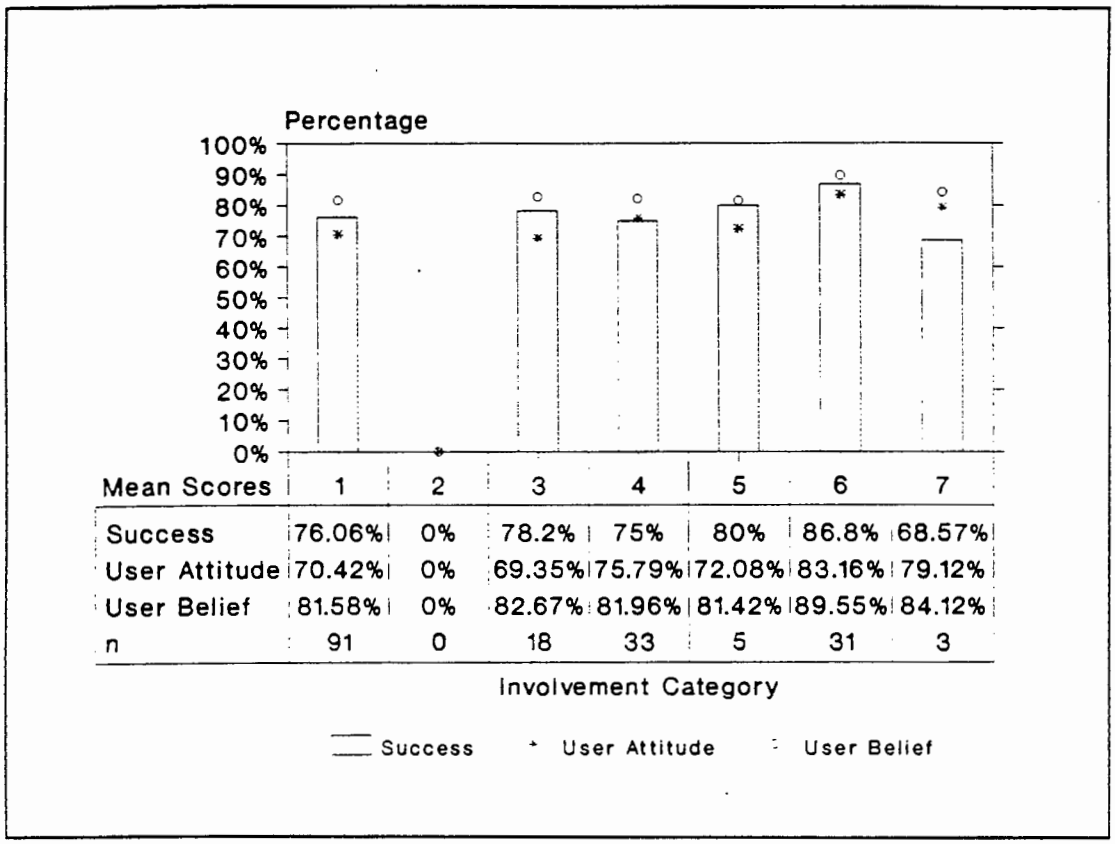


Figure 6.9 : User Involvement in Development - Category Analysis.

Once again, to gain a better understanding of the impact of user involvement, results are analysed per user involvement category. From the results, depicted in figure 6.9 and 6.10, users at higher levels of involvement in information systems development, specifically in category 6, have mean scores of above 85% for information system success, user attitude and user belief. Thus, a graphical analysis confirms the postulation that increasing levels of involvement are associated with higher information system success scores. The lowest scores for success are not found where users had no involvement, category 1, but rather in category 4, where users are asked for advice at the discretion of the information system staff, and in category 7, where users have a controlling interest in the project and typically have control of the information system development. In the latter situation, this could be a result of the fact that category 7 involvement would include individuals within the organisation who have to authorise and justify the costs of the information system. The cost-benefit of the information system in their perception, or their inability to determine the cost benefit, may be mitigating factors against scoring the information system highly successful. However, the limited number of responses in category 7 indicate that the explanation is only tentative and further research, examining the relationship between organisational level of the user, user involvement and the implications for information systems development, should be conducted.

Referring to figure 6.9 and 6.10, user attitude scores are the lowest in involvement category 3, which is where the user is involved as a token gesture. This confirms the earlier stated fact, that involvement must include influence

(Lucas,1973), and that since user involvement is a mechanism by which user attitude can be changed, involvement without influence will lead to lower user attitude. In line with the trend for information system success, higher levels of involvement, categories 5,6, and 7 are associated with higher scores for user attitude.



Mean Scores	1	2	3	4	5	6	7
Success	76.06%	0%	78.2%	75%	80%	86.8%	68.57%
User Attitude	70.42%	0%	69.35%	75.79%	72.08%	83.16%	79.12%
User Belief	81.58%	0%	82.67%	81.96%	81.42%	89.55%	84.12%
n	91	0	18	33	5	31	3

Figure 6.10 : User Involvement in Implementation - Category Analysis.

When examining information system success and user attitude, at involvement categories 1 and 3, the mean scores for user attitude are lower than information systems success, although this is not the case at higher levels of involvement. This indicates that dissatisfaction is influenced by level of involvement and highlights the possibility of changing user attitude through involving users in both the

information system development and implementation process.

Although the mean scores for user belief per involvement category in both development and implementation follow a similar trend to user attitude and information system success, it should be noted that all the belief scores are above 80%, and although the higher levels of involvement would raise expectations through contact with advanced technology (Lucas,1973), the user's belief about the benefits of an information system can be high at all levels of involvement.

From the results of involvement discussed, limited involvement in the form of categories 3 and 4 are barriers in terms of successful information systems development and implementation. Further research is needed, however, including a longitudinal study, to examine the causality between involvement, attitude, belief and success - isolating the impact that differing levels of involvement have on attitude, belief and information systems success and vice versa.

6.6 Conclusion

In analysing the results, both statistical and graphical techniques were used to ensure a clear and accurate picture of the association between variables being researched. Table 6.11 reproduces the hypotheses presented earlier and the extent to which statistical testing for measures of association enable one to accept or reject the hypotheses.

Although strong associations and correlations were not always found for individual information systems, the aggregated data did substantiate 8 out of the 9 hypotheses. Very significant ($p < 0.001$) positive association for the total sample between user attitude and information system success, user belief and information systems success, and user attitude and user belief, were found, and H_1, H_2, and H_3, were accepted.

Standard association testing employed for user involvement and information system success (see Appendix G) found only one significant association between involvement in development and information system success at the individual information system level, and no association for the total sample. This indicates that user involvement in the actual development of the information system is not essential for success.

Two significant associations between user involvement during implementation and information system success were found. This could indicate rejection of any association between involvement and information system success, however, the measures of association for the consolidated results and graphical analysis indicate that H_5 can be accepted at $p < 0.050$. The existence of an association between user involvement in implementation and information systems success is a result of the fact that involvement is more critical during implementation when users are required to take ownership of the information system.

No	Statement of Hypotheses	p	Accept / Reject
H_1	*A user's attitude as measured by user information satisfaction is positively associated with the success of an information system as measured by its fit to objectives.*	0.0000	Accept
H_2	*A user's belief as measured by perceived usefulness is positively associated with the success of an information system as measured by its fit to objectives.*	0.0000	Accept
H_3	*A user's attitude toward an information system as measured by user information satisfaction is positively associated with user's belief about an information system as measure by the perceived usefulness.*	0.0000	Accept
H_4	*Higher levels of user involvement in the development of an information system as measured by user involvement levels, will be positively associated with higher levels of information system success.*	0.2000	Reject
H_5	*Higher levels of user involvement in the implementation of an information system, will be positively associated with higher levels of information system success.*	0.0400	Accept
H_6	*Higher levels of user involvement in the development of an information system, will be positively associated with higher user attitude as measured by user information satisfaction.*	0.0000	Accept
H_7	*Higher levels of user involvement in the implementation of an information system, will be positively associated with higher user attitude as measured by user information satisfaction.*	0.0000	Accept
H_8	*Higher levels of user involvement in the development of an information system, will be positively associated with higher user belief as measured by perceived usefulness.*	0.0300	Accept
H_9	*Higher levels of user involvement in the implementation of an information system, will be positively associated with higher user belief as measured by perceived usefulness.*	0.0400	Accept

Table 6.11 : Summary of Results - Hypotheses Accepted/Rejected.

Similarly, although limited associations were found at the individual system level, based on measures of association using the total sample, user attitude and user involvement were found to be associated ($p < 0.0001$) with both user involvement in development and implementation. Thus, H_6 and H_7 are accepted. The

existence of a relationship at both the development and implementation stages of the information system life cycle indicates the need to examine a cause and effect relationship between user attitude and user involvement.

Although not as strong, an association between user involvement and user belief was found using the total sample results. Thus, H_8 and H_9 were accepted. Following from this, and Fishbein and Azjen's model, one can assume that user involvement influences user perceptions regarding the benefit of an information system, since it is unlikely that a users' perception will determine their level of involvement.

Aside from the hypotheses testing, observations have also been made with reference to the graphical analysis. The implications of these, and the hypotheses testing above, for both researchers and practitioners, is discussed in the concluding chapter.

7. CONCLUSION

7.1 Introduction

Several factors impacted on the research results and this chapter highlights the possible implications of these as well discussing how they can be addressed in further research. Based on the limitations of this research, and the analysis of results, areas for further research are highlighted, specifically relating to the measures used. This research study has raised a number of other research areas. These are also discussed in this chapter.

A discussion of the associations and relationship between the variables examined is detailed in the contributions of research section. The conclusion reiterates major findings and implications.

7.2 Limitations of Results and Areas for Further Research

Although every effort was made to ensure the validity and accuracy of the research, a number of limitations should be considered when reviewing the results and findings. These limitations fall into two general areas:

7.2.1 Precision of Measures

A central consideration is the exploratory nature of the information system success measure adopted for this research. Although the measure is argued to have a strong theoretical foundation in terms of its appropriateness, the lack of additional research making use of the instrument, the lack of other instruments against which to compare the "fit to objectives" measure, and the nature of a new instrument requires that it be refined over time. All these factors indicate that although theoretically the research instrument may be valid, retest situations and additional testing may be required to generalise the results.

Further research into the appropriateness of the "fit to objectives" measure is required to prove or disprove its validity, and develop a strong empirical foundation. This research should address a number of issues, including but not limited to the following:

- Are 5 objectives sufficient to represent the organisational goals for a complex information system, or does one need to include all the objectives isolated ?
- Are the techniques used to isolate the objectives per information system appropriate? The possibility of a feedback loop should be investigated, whereby, once the objectives are identified the users and information system staff could review the objectives and highlight any missing. Alternatively, objectives should be set during the planning stage of any information system and used to determine the fit to objectives.
- In measuring the fit to objectives, a mechanism is needed to ensure that the objectives are current. Longitudinal studies should also examine the extent to which the objectives change over the duration of the information systems development process and thereafter.

- The inclusion of specific instruments to determine the technical success of the information system, to get a broader success measure for the information system.

The above would enhance the appropriateness of the "fit to objectives" instrument as well as providing additional rigour in its practical application. Once a refined instrument and comprehensive knowledge base has been determined, formulae for aggregating information system success scores within an organisation to produce generic information system success scores can be developed.

Previous researchers have already highlighted the limitations regarding the applicability of the user information satisfaction construct to all organisations and that the survey questions may be interpreted differently within different organisations. The need for further validation of the user information satisfaction construct is required; the details of this can be found in previous research, specifically Ives and Olson(1984) and Miller(1989).

7.2.2 Research Approach and Analysis

The researcher had little control in the selection of both the information systems examined and the participating users per information system. Reliance on the information system staff within each organisation to select users could lead to a bias in the results. Moreover, stronger control needs to be asserted in selecting the level of user to respond to the questionnaire and a more comprehensive

breakdown is required in terms of level of user education, specifically in the South African context, to better understand the results.

7.2.3 Other Areas for Further Research

Aside from the limitations and areas for further research already covered, additional questions to be addressed have emerged from the analysis. The measuring of goal congruency and impact on information system success, user attitude, belief and involvement is required. An understanding of the convergence or divergence of organisational and user goals could indicate the extent to which an information system will be utilised, accrue benefit or result in user resistance.

Following from the broad analysis of the relationship between attitude and belief, an investigation into causality is required to ascertain the extent to which belief predicts attitude. Based on the strong association between attitude and information system success, it can be argued that if an information system prior to development is believed to be beneficial, user behaviour should be a positive contributor during the development process.

A final area for further research involves repeat testing and longitudinal studies, to fully comprehend the interrelationship between the variables examined in this research and the impact that changes have on attitude, belief and involvement over time. Longitudinal studies including case studies and repeat testing are vital

to developing the necessary insight within the behavioural information systems research discipline.

7.3 Contributions of Research

The results of the research include implications for both researchers and practitioners alike. Throughout the research, a focus has been on the applicability of the research to information system practitioners. The user information satisfaction instrument has already been used within organisational environments for monitoring information systems, however, the "fit to objectives" measure provides a new and easily operationalised instrument for measuring the success of an information system.

Building on previous research, and the results of this research, an interpretation of the key issues regarding user behaviour and information system success is discussed below.

In general there is a strong association between user attitude, measured by user information satisfaction, and information system success, as measured by its fit to objectives. This relationship is logical and a result of the integral role that the user plays in information systems. However, if one defines information system success as the aggregate organisational benefit that accrues from an information system, this research indicates that user attitude, and specifically user information satisfaction, is not a surrogate measure of information system success. User

attitude and information system success are two separate constructs, with user information satisfaction measuring the degree to which a user accrues personal benefit from an information system. Information system success, on the other hand, is a measure of the degree to which the organisation accrues benefit from an information system.

Following from the above, a large difference between user attitude and information system success indicates a lack of congruency between the goals of the user and those of the organisation.

User belief, as measured by the perceived usefulness of an information system, also has a strong association with information system success as well as with user attitude. The association with attitude is natural and a result of the behavioural model developed by Fishbein and Azjen, whereby belief predicts attitude. Although this research does not prove the causality between attitude and belief, the existence of very significant associations verifies the existence of a relationship.

The strong association between user belief and information system success indicates that a user's perception of the benefit of an information system is associated with the overall information system success. Logically, an information system which a user believes to provide no usefulness, will not be used once implemented. Coming back to goal congruency, if the users goals are not addressed by an information system, he will perceive it to have no usefulness for

him. Ultimately, through an association with attitude, this will translate into a low levels of information system success.

Moreover, the high scores for user belief indicate that users generally have high expectations and perceived benefits regarding an information system. The implications of these expectations not being met, both in terms of user information satisfaction and information system success, is a key area for further research to understanding the impact of user behaviour on information systems.

User involvement is regarded as a mechanism whereby user attitude and user belief can be influenced. For discussion purposes regarding involvement, it is assumed that the associations found are indicative of the effect of user involvement on the respective user variables. The basis for this is the fact that user involvement was measured post-implementation, and that it is unlikely that user attitude and belief could have determined the level of user involvement, since this is generally determined by the information systems development team.

Associations between involvement and information system success were only found when users were involved in the implementation of information systems. Thus, user involvement may not be essential to the design and development of the information system, but during implementation the desired levels of information system acceptance and user ownership necessitate that users be involved. This involvement should preferably be as part of the project team doing the implementation; other levels of involvement, specifically "token gesture", do

not always have a positive impact on attitude.

User attitude and user involvement were found to have strong associations, both during development and implementation. This highlights the influence that involvement can have on user attitude. Following on from the above, involvement as a "token gesture" has severe implications for user attitude, since the user is involved without being able to actually contribute. Ultimately this results in user frustration, negative user attitude, and, based on the existence of the association between attitude and information system success, lower levels of information system success.

User belief, although not as strong as user attitude, is also associated with levels of involvement both during development and implementation. This is a result of the user perceptions being affected positively by exposure to new technology and the workings of the information systems function. User belief is possibly determined by previous experience with, and level of education regarding, information systems.

7.4 Conclusion

Although several limitations and considerations have been highlighted, the research provides answers and poses several new questions relevant to both information system practitioners and researchers. The major contributions have been a furtherance of the body of knowledge on measuring the organisational

benefit that accrues from information systems, and developing a better understanding of the role the user has in information systems development. Specifically, user involvement and user attitude are two key variables which need to be addressed by the information system developer to ensure successful information systems. In addressing these, the information system developer must ensure that involvement is at a sufficient level to allow user influence and thereby lead to positive user attitude and ultimately information system success.

8. BIBLIOGRAPHY

Azjen,I., & Fishbein,M., *Understanding Attitudes and Predicting Social Behaviour*, Prentice-Hall, Englewood Cliffs, 1980.

Bailey,J.E., & Pearson,S.W., "Development of a Tool for Measuring and Analyzing Computer Satisfaction", *Management Science*, Vol. 29, No. 5, May, 1983, pp.530-545.

Barki,H., & Huff,S.L., "Change, Attitude to Change, and Decision Support System Success", *Information and Management*, Sep, 1985, pp.261-268.

Barki,H., & Hartwick,J., "Rethinking the Concept of User Involvement", *MIS Quarterly,* Vol, 13, No. 1, Mar, 1989, pp.55-63.

Baroudi,J.J., Olson,M.H., & Ives,B., "An Empirical Study of the Impact of User Involvement on System Usage and Information Satisfaction", *Communications of the ACM*, Vol. 29, No. 3, Mar, 1986, pp.232-238.

Baroudi,J.J., & Orlikowski,W.J., *A Short Form Measure of User Information Satisfaction : Research and Practice*, Centre for Research on Information Systems, New York University, Mar, 1986.

Ben-Horim,M., & Levy,H., *Statistics - Decisions and Applications in Business and Economics*, Random House, New York, 1981.

Bowen,W., "The Puny Payoff From Office Computers", *Fortune*, May, 1986, pp.20-24.

Brancheau,J.C, & Wetherbe,J.C., "Key Issues in Information Systems Management", *MIS Quarterly*, Vol. 11, No. 1, Mar, 1987, pp.23-45.

Bruwer,P.J.S, "User Attitudes - Main Reason Why Information Systems Fail", *Questiones Informaticae*, Vol. 5, No. 2, 1987, pp.40-45.

Camp, R.R, Blanchard, P.N, and Huszczo, G.E., *Toward a More Organizationally Effective Training Strategy and Practice*, Prentice-Hall, Englewood, 1986.

Carroll,A.B., "Behaviourial Aspects of Developing Computer Based Information Systems", *Business Horizons*, 1982, pp.42-51.

Cash,J.J.(jr), & Konsynski,B.R., "IS Redraws Competitive Boundaries", *Harvard Business Review*, Mar-Apr, 1985, pp.134-142.

Cerullo,M.J., "Information Systems Success Factors", *Journal of Systems Management*, 1980, pp.10-16.

Chandler,J.S., "A Multiple Criteria Approach for Evaluating Information Systems", *MIS Quarterly*, Vol. 6, No. 1, Mar, 1982, pp.61-74.

Cooke,J.E., & Drury,D.H., *Management Planning and Control of Information Systems*, Society of Management Accountants of Canada, 1980.

Culnan,M.J., "The Intellectual Development of Management Information Systems, 1972-1982 : A Co-Citation Analysis", *Management Science*, Vol. 32, No. 2, Feb, 1986, pp.156-172.

Dagwell,R., & Weber,R., "System Designers' User Models : A Comparative Study and Methodological Critique", *Communications of the ACM*, Vol. 26, No. 11, Nov, 1983, pp.987-997.

Davis,F.D., Bagozzi,R.P., & Warshaw,P.E., "User Acceptance of Computer Technology : A Comparison of Two Theoretical Models", *Management Science*, Vol. 35, No. 8, Aug, 1989, pp.982-1002.

Davis,F.D., "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology", *MIS Quarterly*, Vol. 13, No. 3, Sep, 1989, pp.319-339.

Davis,G.B., & Olson,M.H., *Management Information Systems : Conceptual Foundation, Structure and Development,* Second Edition, McGraw-Hill, 1985.

De Brabander, B., & Edstrom,A., "Successful Information Systems Development Projects", *Management Science*, Vol. 23, No. 10, Oct, 1977, pp.191-199.

2De Brabander,B., & Thiers,G., "Successful Information Systems Development in Relation to Situational Factors which Affect Effective Communication Between MIS-Users and EDP-Specialists", *Management Science*, Vol. 30, No. 2, Feb, 1984, pp.137-155.

Delone,W.H., "Firm Size and the Characteristics of Computer Use", *MIS Quarterly, Vol. 5, No. 4,* Dec, 1981.

Dickson,G.W., Leitheiser,R.L., Nechis,M., & Wetherbe,J.C., "Key Information System Issues for the 1980's", *MIS Quarterly*, Vol. 8, No. 3, Sep, 1984, pp.135-148.

Dixon,P.J., & Darwin,A.J., "Technology Issues Facing Corporate Management in the 1990s", *MIS Quarterly*, Vol. 13, No. 3, Sep, 1989, pp.247-255.

Elizur,D., & Guttman,L., "The Structure of Attitudes Toward Work and Technological Change Within an Organization", *Administrative Science Quarterly*, Vol. 21, Dec, 1976, pp.611-622.

Feldberg,M., *Organisational Behaviour* - Text and Cases, Juta & Co., Cape Town, 1975.

Finnie,G.R., "Novice Attitude Changes During a First Course in Computing : A Case Study", *Questiones Informaticae*, Vol. 5, No. 2, 1987, pp.56-62.

Fishbein,M., & Azjen,I., *Belief, Attitude, Intention and Behaviour*, Addison-Wesley Publishing Co., Reading, Mass., 1975.

Gallagher,C.A., "Perceptions of the Value of a Management Information System", *Academy of Management Journal*, Vol. 17, No. 1, Mar, 1974, pp.46-55.

Ginzberg,M.J., "Steps Towards More Effective Implementation of Management Science and Management Information Systems", *Interfaces*, Vol. 8, No. 3, May, 1978, pp.57-63.

Goodhue,D., "Information System Attitudes : Towards Theoretical and Definitional Clarity", *Database*, Winter, 1988, pp.6-15.

Hamilton,S. & Chervany,N.L., "Evaluating IS Effectiveness - Part I : Comparing Evaluation Approaches", *MIS Quarterly*, Vol. 5, No. 3, Sep, 1981, pp.55-69.

Hamilton,S. & Chervany,N.L., "Evaluating IS Effectiveness - Part II : Comparing Evaluator Viewpoints", *MIS Quarterly*, Vol. 5, No. 4, Dec, 1981, pp.79-86.

Hartog,C., & Herbert,M., "1985 Opinion Survey of MIS Managers : Key Issues", *MIS Quarterly*, Vol. 10, No. 4, Dec, 1986, pp.351-361.

Huff,S.L., & Munro,M.C., "Managing End-User Computing in Large Organizations", *Computer Programming Management,* Auerbach, 1987.

Ives,B., & Olson,M.H., "User Involvement and Management Information Systems Success : A Review of Research", *Management Science*, Vol. 30, No. 5, May, 1984, pp.586-603.

Ives,B., Olson,M.H., & Baroudi,J.J, "The Measurement of User Information Satisfaction", *Communications of the ACM*, Vol. 26, No. 10, Oct, 1983. pp.785-793.

Jin,K.G., & Franz,C.R., "Obstacle Coping During Systems Implementation", *Information and Management*, 1986, pp.65-75.

Kaiser,K.M., & King,W.R., "The Manager-Analyst Interface in Systems Development", *MIS Quarterly*, Vol. 6, No. 1, Mar, 1982, pp.39-59.

Kanter,J., "The Role of Senior Management in Management Information Systems", *Journal of Systems Management*, Apr. 1986, pp.10-17.

Keen,P.G.W., "Information Systems and Organisational Change", *Communications of the ACM*, Vol. 24, No. 1, Jan, 1981, pp.24-33.

Kim,E., & Lee,J., "An Exploratory Contingency Model of User Participation and Management Information System Use", *Information and Management,* 1986, pp.87-97.

King,W.R., & Rodriguez,J.I., "Evaluating Management Information Systems", *MIS Quarterly*, Vol. 2, No. 3, Sep, 1978, pp.43-51.

Kwon,H., & Zmud,R., "Unifying the Fragmented Models of Information Systems Implementation", in *Critical Issues in Information Systems Research,* Boland,R.J., & Hirschheim,R.A.,(eds), John Wiley & Sons, New York, 1987.

Loewenberg,J.D., "The Changing Role of the User", *Journal of Information Management*, 1985, pp.43-51.

Lucas,H.C.,(jr), "User Reactions and Management of Information Services", *Management Informatics, Vol. 2, No. 4,* 1973, pp.207-212.

Lucas,H.C.,(jr), *Why Information Systems Fail*, Columbia University Press, New York, 1975.

Maish,A.M., "A User's Behaviour Towards His Management Information System", *MIS Quarterly*, Vol. 3, No. 1, Mar, 1979, pp.39-52.

Martin, M.P., and Feurst, W.L., "Effect of Computer Knowledge on User Performance Over Time", *Information and Software Technology*, 1988, pp.561-566.

Mason,R.O., & Mitroff,I.I, "A Program for Research on Management Information Systems", *Management Science*, Vol. 19, No. 5, Jan, 1973, pp.475-487.

McFarlan,F.W., "IT Changes the Way You Compete", *Harvard Business Review*, May-Jun, 1984, pp.98-103.

McKersie,R.B., & Walton,R.E., "Organisational Change", in *The Corporation of the 1990s -Information Technology and Organisational Transformation*, Scott Morton,M.S. (Editor), Oxford University Press, New York, 1991, pp.244-277.

Meter,J., Wasserman,W., & Whitmore,G.A., *Applied Statistics*, Second Edition, Allyn and Bacon, Inc, Boston, 1982.

Miller, J., *The Effectiveness of Computer-Based Information Systems : Definition and Measurement*, Unpublished Ph.D Thesis, University of Cape Town, 1989.

Morrison,W., "Communicating with User During Systems Development", *Information and Software Technology*, Vol. 30, No. 5, June, 1988, pp.295-298.

Mullany,M.J, "An Analysis of the Relationship between Analyst-User Cognitive Style Differences and User Resistance to Information Systems", Unpublished M.Comm Thesis, University of Cape Town, 1989.

Naisbitt,J., *Megatrends - 10 New Directions Transforming Our Lives*, McDonald & Co., London, 1984.

Neave,H.R, & Worhtington,P.L., *Distribution-Free Tests*, Unwin Hyman, London, 1988.

Nolan,R.L., "Managing the Crises in Data Processing", *Harvard Business Review*, Mar-Apr, 1979, pp.115-125.

Olson,M.H., & Ives,B., "User Involvement in Systems Design : An Empirical Test of Alternatives", *Information and Management*, 4, 1981, pp.183-195.

Olson,M.H., & Ives.B., "Chargeback Systems and User Involvement in Information Systems - An Empirical Investigation", *MIS Quarterly*, Vol. 6, No. 2, Jun, 1982, pp.47-60.

Osterman,P., "The Impact of IT on Jobs and Skills", in *The Corporation of the 1990s - Information Technology and Organisational Transformation*, Scott Morton, M.S., (Editor), Oxford University Press, New York, 1991, pp.220-243.

Parsons,G.L., "Information Technology : A New Competitive Weapon", *Sloan Management Review*, Fall, 1983, pp.3-14.

Porter,M.E., & Millar,V.E., "How Information Gives You Competitive Advantage", *Harvard Business Review*, Jul-Aug, 1985, pp.149-160.

Powers,R.F., & Dickson,G.W., "Management Information Systems Project Management : Myths, Opinions and Reality", *California Management Review*, 1973, pp.147-156.

Rivard,S., & Huff,S.L., "User Developed Applications : Evaluation of Success from the DP Department Perspective", *MIS Quarterly*, Vol. 8, No. 1, Mar, 1984, pp.39-50.

Robbins,S.P., *Organisational Behaviour - Concepts, Controversies and Applications*, Fourth Edition, Prentice Hall International, Inc., New Jersey, 1989.

Robertson,D.C., "Social Determinants of Information System Use", *Journal of Management Information Systems*, Vol. 5, No. 4, Spring, 1989, pp.55-71.

Robey,D., "User Attitudes and Management Information System Use", *Academy of Management Journal*, Vol. 22, No. 3, 1979, pp.527-538.

Schemerhorn,J.R., Hunt,J.G., & Osborn,R.N., *Managing Organizational Behaviour*, Second Edition, John Wiley & Sons, 1985.

Schewe,C.D., "The Management Information System User : An Exploratory Behaviourial Analysis", *Academy of Management Journal,* Vol. 19, No. 4, Dec, 1976, pp.577-590.

Srinivasan,A., "Alternative Measures of System Effectiveness : Associations and Implications", *MIS Quarterly,* Vol. 9, No. 3, Sep, 1985, pp.243-253.

Swanson,E.B., "Measuring User Attitudes in Management Information Systems Research", *OMEGA,* Mar, 1982, pp.157-165.

Swanson,E.B., "Information Systems in Organization Theory : A Review", in *Critical Issues in Information Systems Research*, Boland,R.J., & Hirschheim,R.A., (eds),John Wiley & Sons, New York, 1987.

Tait,P., & Vessey,I., "The Effect of User Involvement on System Success : A Contingency Approach", *MIS Quarterly,* Vol. 12, No. 1, Mar, 1988, pp.91-107.

Toffler,A., *Future Shock*, Pan Books Limited, London, 1971.

Walton,R.E., *Up and Running - Integrating Information Technology and the Organisation*, Harvard Business School Press, 1989.

Wessel,A.E., *The Implementation of Complex Information Systems,* John Wiley & Sons, New York, 1979.

Zmud,R.W., *Information Systems in Organisations*, Scott, Foresman and Company, Illinois, 1983.

APPENDIX A

Research Prospectus

An investigation into the relationship between user attitude, user involvement and the success of an information system.

INTRODUCTION

This outline provides basic information regarding the proposed research. Empirical research is fundamental to the expansion of knowledge within any field - this research seeks to expand the knowledge base with reference to Information Systems in South Africa.

The area of research is the impact that users have on the success of an information system. The research is confined to two user elements, namely attitude and involvement, and their implications for successful information systems. The research data is to be obtained using both proven and new instruments contained in questionnaires completed by both users and information systems staff within organisations.

The research will form the basis for a Masters thesis.

BACKGROUND

Researchers and practitioner's increasingly highlight that the user, as a key component of information systems, must receive increased consideration from information systems developers to ensure effective information systems. However, receiving increased consideration is not a sure sign of success, and this research asks the question: Does user attitude towards an information system, and information systems in general, have a direct link to the success of the system? In addition, it is postulated that certain types of user involvement in the development and implementation of information systems will correlate to certain levels of user attitude and ultimately differing levels of information systems success.

Research to date, although examining this area, has tended to have a fragmented approach, lack a theoretical foundation and make use of inappropriate measures when determining information systems success. In overcoming these obstacles, this research makes use of proven measures for attitude and involvement and develops a new measure for information systems success, based on measuring the extent to which set objectives are achieved.

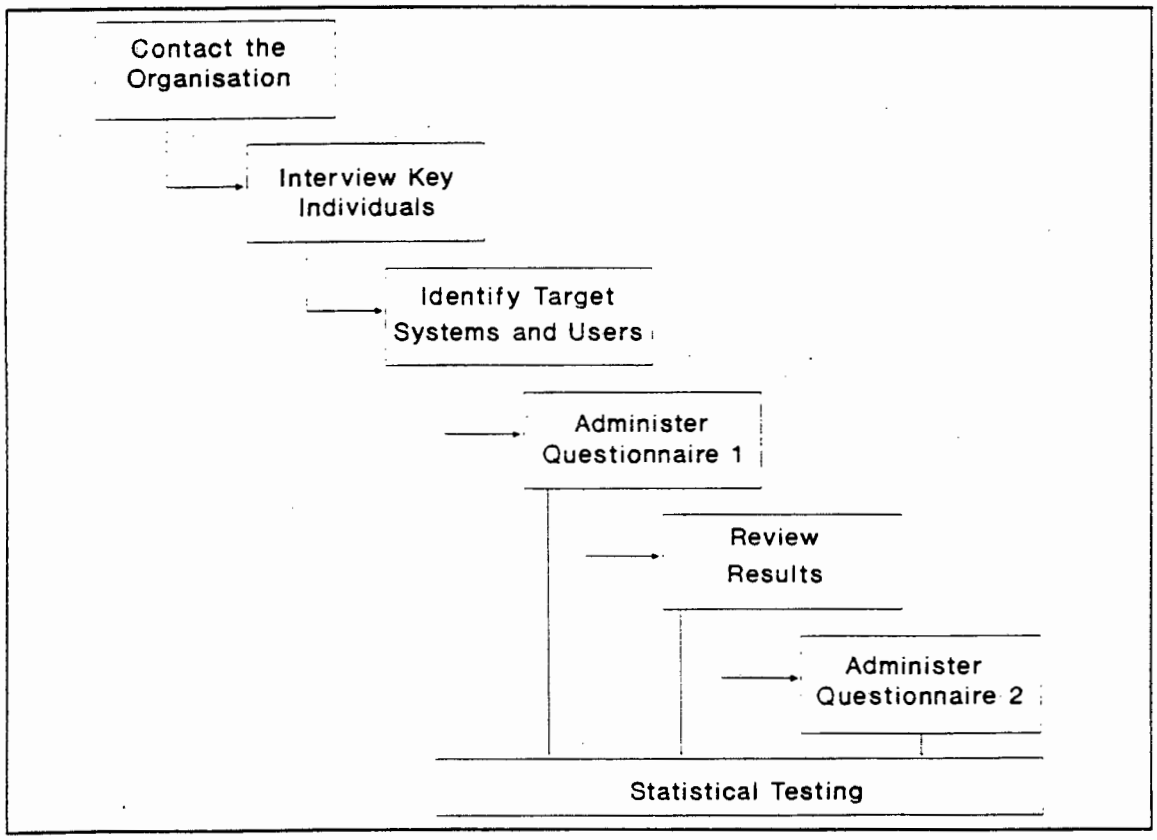
INVOLVEMENT REQUIRED

The central requirements for those organisations interested in participating is an information system which:

- has been implemented and not in development;
- has 11 users or more; and
- has users who use the system for more than data capture.

Any organisation with information systems conforming to the above requirements can participate in the research and there is no limit to the number of separate information systems included. All information obtained from companies will be treated as confidential. Names of participating organisations will only be referred to once permission has been obtained in writing.

The research involves an initial questionnaire (Appendix B) which is distributed to both users and information systems staff, completed and returned to an individual co-ordinating the questionnaire within the organisation. The results from the first questionnaire are analysed and used as input to the second questionnaire (Appendix C). The second questionnaire is distributed to the users, completed and once again returned. An illustration of the process can be seen in the diagram on the page following:



Once the second questionnaire has been completed, the information will be analysed, and the results and interpretations thereof will be provided to participating organisations.

SUMMARY

All participating companies will receive statistical information regarding each system they included. The information could prove to be invaluable to an Information Systems department, both in providing feedback regarding user attitude and the success of the information system.

APPENDIX B

Questionnaire 1

Measuring Information Systems Objectives

This questionnaire forms the basis of research investigating the success of an Information System by eliciting the objectives of the Information System.

The questionnaire consists of Sections A - B and you are requested to ensure that all are completed. There are no right or wrong answers and all responses will remain anonymous. All sections have detailed instructions, if there are any queries you should please contact Mark Meskin (021-212 313).

The questionnaire must be completed and returned to _____ at _____ by the _____ April 1992.

Thank you for your co-operation.

SECTION A

DEMOGRAPHIC INFORMATION

1. Please complete the following section by filling in your details in the blocks provided:

Name of your Company:	
Date Completed:	
Your Position:	
Your Age:	years.
Number of years with the company:	years.
Number of years of experience with information systems:	years.

2. Please complete the following section by filling in your details in the blocks provided:

Name of Information System:	

SECTION B

INFORMATION SYSTEMS OBJECTIVES

o

3. Please complete the following section by writing down your understanding of the objectives of the previously identified information system. You should please list a maximum of 5 objectives that you believe the information system was designed and implemented to achieve:

i) _____

ii) _____

iii) _____

iv) _____

v) _____

APPENDIX C

Questionnaire 2

Measuring User Attitude, User Involvement, and Information Systems Success

This questionnaire forms the basis of research investigating the impact of User attitude, and User involvement on the Success of an Information System.

The questionnaire consists of Sections A - D and you are requested to ensure that all are completed. There are no right or wrong answers and all responses will remain anonymous. All sections have detailed instructions, if there are any queries you should please contact Mark Meskin (021-212 313).

The questionnaire must be completed and returned to _____ at _____ by the _____ May 1992.

Thank you for your co-operation.

SECTION A

DEMOGRAPHIC INFORMATION

1. Please complete the following section by filling in your details in the blocks provided:

Name of your Company:	
Date Completed:	
Your Position:	
Your Age:	**years.**
Number of years with the company:	**years.**
Number of years of experience with information systems:	**years.**

2. Please complete the following section by filling in your details in the blocks provided:

Name of Information System:	

INFORMATION SYSTEMS SUCCESS

Please respond to the following 5 questions by rating the extent to which the Information System meets the specified objectives. Using the 7 point scale provided, please rate each item by placing a cross underneath the number which best describes your response.

For example, the national speed limit of 60 kmh is:

too slow	1	2	3	4	5	6	7	too fast
					X			

---

i) *Objective One*

not at all	1	2	3	4	5	6	7	totally

ii) *Objective Two*

not at all	1	2	3	4	5	6	7	totally

iii) *Objective Three*

not at all	1	2	3	4	5	6	7	totally

iv) *Objective Four*

not at all	1	2	3	4	5	6	7	totally

v) *Objective Five*

not at all	1	2	3	4	5	6	7	totally

4. Please rank the following objectives in order of importance for the specific Information System. Use the table provided by placing a **5** in the block corresponding to the **most important objective**, and a **1** in the block corresponding to the **least important objective**. Place a **4,3,2** in the blocks corresponding to objectives with **decreasing importance.** Each rank can only be used once.

Objective	**Rank**
Objective One	
Objective Two	
Objective Three	
Objective Four	
Objective Five	

SECTION C

USER ATTITUDE

For the following questions, please rate the item listed on the 7 point scale provided, by placing a cross underneath the number which best describes your response.

For example, the national speed limit of 60 kmh is:

too	1	2	3	4	5	6	7	too
slow					X			fast

---

5. Your relationship with the Information System staff is:

strained	1	2	3	4	5	6	7	harmonious

6. The speed to process requests for changes to existing Information Systems is:

untimely	1	2	3	4	5	6	7	timely

7. The training you received for the Information System is:

insufficient	1	2	3	4	5	6	7	sufficient

8. Your understanding of the Information System is:

limited	1	2	3	4	5	6	7	extensive

---

9. Your feeling of participation in the Information System is:

unpleasant	1	2	3	4	5	6	7	pleasant

10. The attitude of the Information System staff is:

self centred	1	2	3	4	5	6	7	user oriented

11. The reliability of the Information System output is:

doubtful	1	2	3	4	5	6	7	credible

12. The relevance of the Information Systems output is:

insignificant	1	2	3	4	5	6	7	significant

13. The accuracy of the Information Systems output is:

inconsistent	1	2	3	4	5	6	7	consistent

14. The precision of Information Systems output is:

low	1	2	3	4	5	6	7	high

15. Your communication with the Information System staff is:

pointless	1	2	3	4	5	6	7	rewarding

16. The comprehensiveness of the Information Systems output is:

inadequate	1	2	3	4	5	6	7	substantial

17. The level of time required for new Information Systems development is:

unreliable	1	2	3	4	5	6	7	dependable

18. The Information System makes you work:

slower	1	2	3	4	5	6	7	faster

19. The Information System makes you perform your job:

worse	1	2	3	4	5	6	7	better

20. The Information System leads to productivity:

curtailment	1	2	3	4	5	6	7	enhancement

21. The Information System makes you more:

ineffective	1	2	3	4	5	6	7	effective

22. The Information System makes your job more:

difficult	1	2	3	4	5	6	7	easy

23. The Information System is:

worthless	1	2	3	4	5	6	7	useful

SECTION D

USER INVOLVEMENT

24. Please indicate which of the following categories best corresponds with the level and type of involvement you had during the **development** of the Information System:

Uninvited You were not involved at all as you were not invited.	
Unwilling You were not involved at all as you were unwilling to participate.	
Symbolic You were involved as a symbolic gesture and you had no influence.	
Advice You were involved as an advisor and asked for opinions at the discretion of the Information Systems staff.	
Weak Control You were involved and had to sign off at the end of each stage of the project and could request changes.	
Doing You were involved and formed an integral part of the project team.	
Strong Control You were involved and had a controlling interest over the Information Systems staff.	

25. Please indicate which of the following categories best corresponds with the level and type of involvement you had during the **implementation** of the Information System:

Uninvited You were not involved at all as you were not invited.	
Unwilling You were not involved at all as you were unwilling to participate.	
Symbolic You were involved as a symbolic gesture and you had no influence.	
Advice You were involved as an advisor and asked for opinions at the discretion of the Information Systems staff.	
Weak Control You were involved and had to sign off at the end of each stage of the project and could request changes.	
Doing You were involved and formed an integral part of the project team.	
Strong Control You were involved and had a controlling interest over the Information Systems staff.	

APPENDIX D

Sample Demographics

The diagrams below provide a graphical illustration of the demographics of the sample respondents according to age, lenght of service and previous experience with information systems.

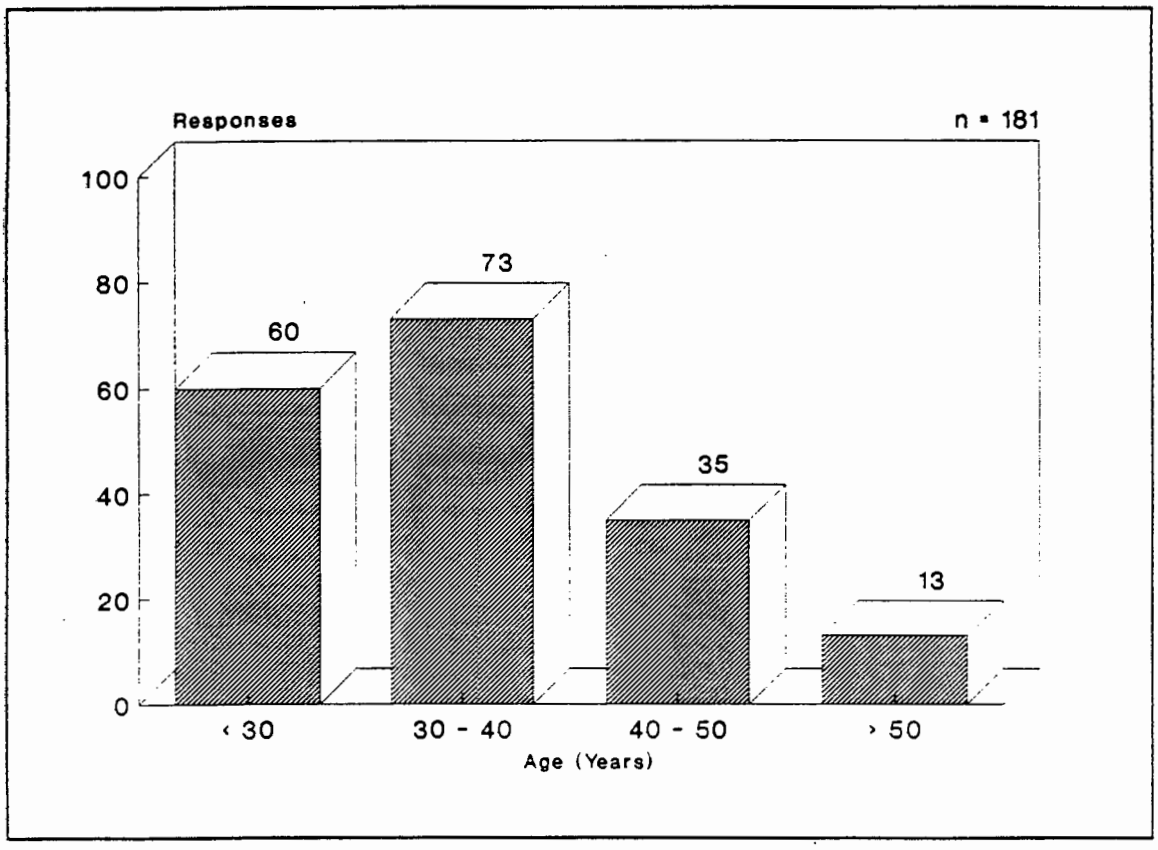


Figure D.1 : Respondents per Age Category

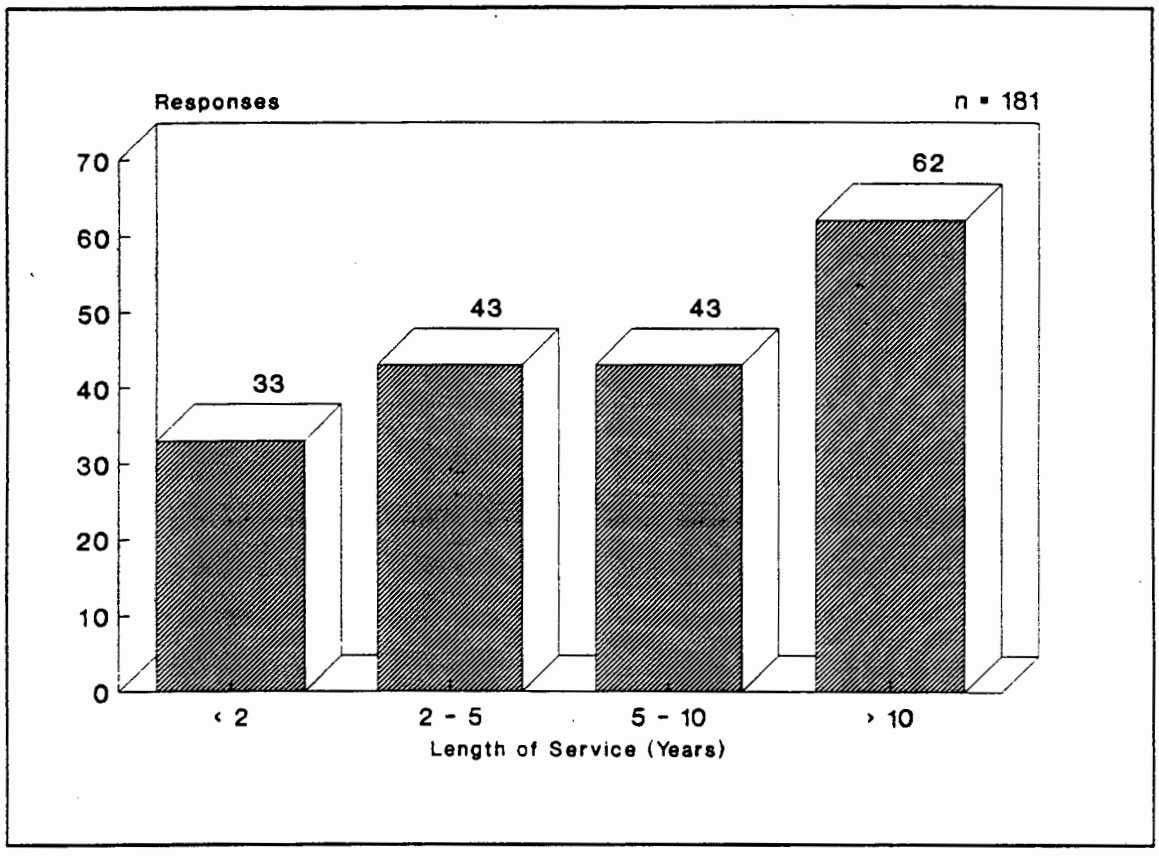


Figure D.2 : Respondents per Length of Service Category

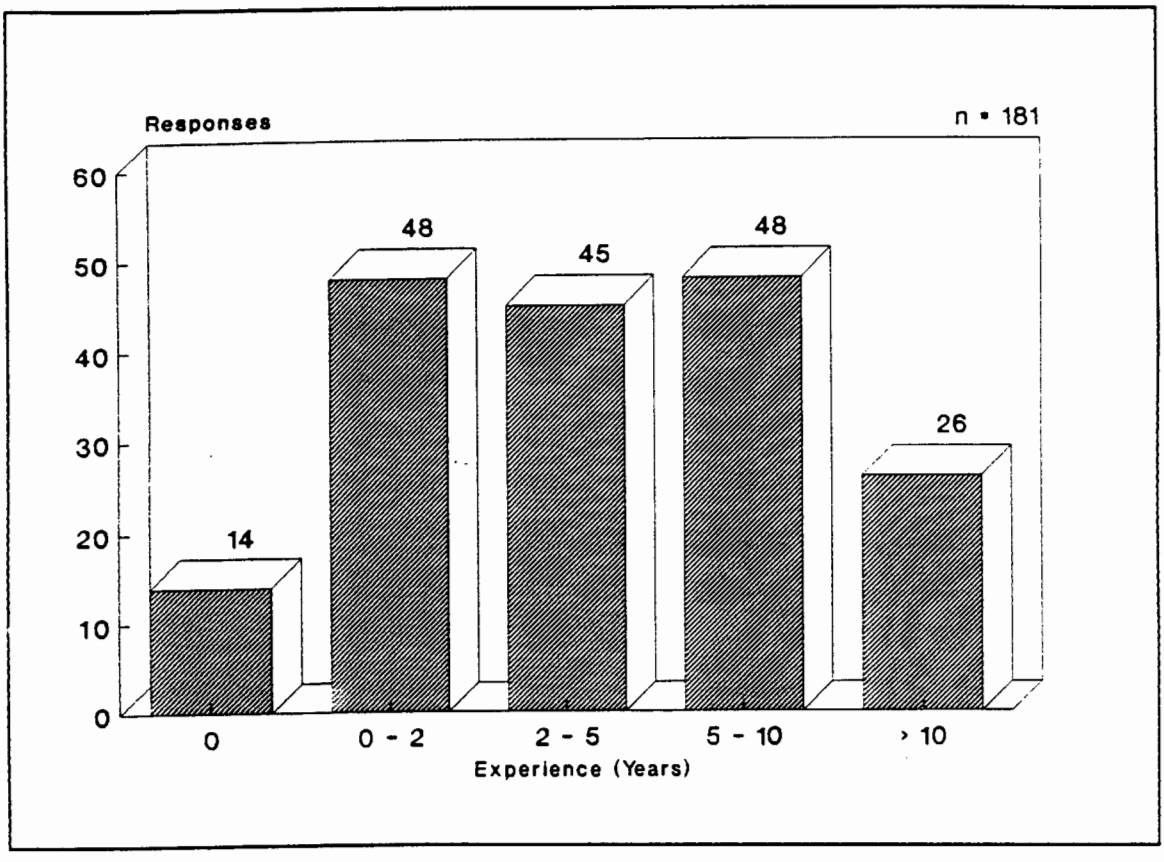


Figure D.3 : Respondents per Level of Information System Experience

APPENDIX E

Sample Information System Objectives

For each information system, the objectives and demographics are produced in the following tables.

The first table provides an overview of the information system demographics and number of responses to questionnaire 2.

The second table details the objectives identified for the specific information system. The objectives have been determined from the answers to questionnaire 1 completed by both users and information systems staff. In the table, the number of referring comments and percentage of the total is also provided. This information was not available to respondents when completing the second questionnaire. The last column indicates the organisational importance rank assigned to each objective based on the results from the questionnaire 2.

Information System Number One

Information System Number	1
Industry Type	Oil
Description of System	Stock System
Number of Responses	26

Table E.1 : Demographics of Information System Number 1

No	Objective	Ref	%Ref	Rank
1	To provide accurate product tracking information.	29	27.62	4
2	To assist in the controlling of product movement, stock variations and related activities	28	26.67	5
3	To make efficient and effective use of computing resources	9	8.57	1
4	To make sure that there was sufficient flexibility to allow changes, enhancements, and correction of errors	13	12.38	2
5	To make sure that it is user friendly	20	19.05	3
	Uncategorised statements	6	5.71	

Table E.2 : Identified Objectives for Information System Number 1.

Information System Number Two

Information System Number	2
Industry Type	Retail
Description of System	Point of Sale
Number of Responses	13

Table E.3 : Demographics of Information System Number 2

No	Objective	Ref	%Ref	Rank
1	To capture accurate information relating to point of sale.	10	16.12	3
2	To assist in the controlling of shrinkages and markdowns.	7	11.29	2
3	To improve overall company performance through improved planning, buying and distribution of stock.	14	22.58	5
4	To provide improved customer service.	9	14.51	4
5	To make sure that it is user friendly.	5	8.06	1
	Uncategorised statements	17	27.4	

Table E.4 : Identified Objectives for Information System Number 2.

Information System Number Three

Information System Number	3
Industry Type	Insurance
Description of System	Specialist Application
Number of Responses	19

Table E.5 : Demographics of Information System Number 3

No	Objective	Ref	%Ref	Rank
1	To provide accurate and timeous client information.	30	31.25	4
2	To improve client service	4	4.16	3
3	To improve the efficiency and effectiveness of the field staff.	19	19.79	2
4	To assist field staff in conserving business and retaining clients.	14	14.53	5
5	To reduce the costs associated with paper and postage of client information	6	6.25	1
	Uncategorised statements	23	23.95	

Table E.6 : Identified Objectives for Information System Number 3.

Information System Number Four

Information System Number	4
Industry Type	Retail
Description of System	Purchase Order Management
Number of Responses	16

Table E.7 : Demographics of Information System Number 4

No	Objective	Ref	%Ref	Rank
1	To capture, monitor and report on information relating to purchase orders.	33	50.76	5
2	To assist in the management of the open to buy budget.	14	21.53	4
3	To provide stock and sales information of goods by styles, colour, size and promotions.	6	9.23	3
4	To provide online enquiry facilities to all interested parties, both internal and external, regarding purchase orders.	4	6.15	1
5	To provide information for other systems which are linked to it.	3	4.61	2
	Uncategorised statements	5	7.69	

Table E.8 : Identified Objectives for Information System Number 4.

Information System Number Five

Information System Number	5
Industry Type	Retail
Description of System	Debtors System
Number of Responses	16

Table E.9 : Demographics of Information System Number 5

No	Objective	Ref	%Ref	Rank
1	To improve the ease with which all account transactions are processed on a monthly basis	12	19.67	5
2	To save time and money in the processing of all account transactions	10	16.39	2
3	To improve customer service by providing up-to-date and accurate customer information	10	16.39	4
4	To improve the accuracy of account processing and allow for easy correction of errors	15	24.59	3
5	To assist marketing department with customer information	3	4.91	1
	Uncategorised statements	11	18.03	

Table E.10 : Identified Objectives for Information System Number 5.

Information System Number Six

Information System Number	6
Industry Type	Retail
Description of System	Point of Sale
Number of Responses	16

Table E.11 : Demographics of Information System Number 6

No	Objective	Ref	%Ref	Rank
1	To improve the efficiency and effectiveness of the store staff.	36	24.65	2
2	To assist in controlling stock, oversells and mistakes.	30	20.54	3
3	To improve the company's image.	20	13.69	1
4	To improve customer service.	24	16.43	4
5	To provide accurate and up to date information.	18	12.32	5
	Uncategorised statements	18	12.32	

Table E.12 : Identified Objectives for Information System Number 6.

Information System Number Seven

Information System Number	7
Industry Type	Publishing
Description of System	Financial Accounting
Number of Responses	21

Table E.13 : Demographics of Information System Number 7

No	Objective	Ref	%Ref	Rank
1	To provide comprehensive information for decision making and reporting	8	8.42	2
2	To provide easy access to information for enquiries and reporting	9	9.47	3
3	To provide online and up to date information	12	12.63	4
4	To make sure it is user friendly	8	8.42	1
5	To process all accounting,stock and sales information	37	38.94	5
	Uncategorised statements	21	22.10	

Table E.14 : Identified Objectives for Information System Number 7.

Information System Number Eight

Information System Number	8
Industry Type	Retail
Description of System	Debtors Control System
Number of Responses	13

Table E.15 : Demographics of Information System Number 8

No	Objective	Ref	%Ref	Rank
1	To assist with the following up of debtors	14	20.00	3
2	To improve credit control and prevent bad debt	20	28.57	5
3	To improve customer service	10	14.29	4
4	To provide easy access to comprehensive customer account information	13	18.57	1
5	To improve credit controller efficiency and thereby reduce staff compliment	7	10.00	2
	Uncategorised statements	6	8.57	

Table E.16 : Identified Objectives for Information System Number 8.

Information System Number Nine

Information System Number	9
Industry Type	Manufacturing
Description of System	Personnel System
Number of Responses	11

Table E.17 : Demographics of Information System Number 9

No	Objective	Ref	%Ref	Rank
1	To keep accurate personal information regarding all employees	15	29.41	5
2	To facilitate the electronic processing of salaries	7	13.72	4
3	To provide effective statistical and other reporting on human resource issues	9	17.64	2
4	To provide easy access to and updating of information	7	13.72	3
5	To provide an integrated Human Resource Information System	7	13.72	1
	Uncategorised statements	6	11.76	

Table E.18 : Identified Objectives for Information System Number 9.

Information System Number Ten

Information System Number	10
Industry Type	Oil
Description of System	Stock System
Number of Responses	15

Table E.19 : Demographics of Information System Number 10

No	Objective	Ref	%Ref	Rank
1	To provide global stock reporting and loss/gain control	The objectives for the information system were isolated during a user forum meeting which both users and information system staff attended.		5
2	To assist in the management of global stock and accommodation balances			4
3	To assist in making business decisions regarding oil supplies and oil distribution			1
4	To provide stock accounting and control to assist in securing stock assets			2
5	To provide product costing reporting			3
	Uncategorised statements			

Table E.20 : Identified Objectives for Information System Number 10.

Information System Number Eleven

Information System Number	11
Industry Type	Public Sector
Description of System	Human Resource Management
Number of Responses	15

Table E.21 : Demographics of Information System Number 11

No	Objective	Ref	%Ref	Rank
1	To provide easy access to and updating of employee information	18	28.57	5
2	To keep accurate personal records regarding all employees	13	20.63	4
3	To replace the manual system for storing and retrieving information	10	15.87	3
4	To provide effective statistical and other reporting on human resource issues	5	7.93	1
5	To provide a comprehensive and integrated human resource information system	12	19.04	2
	Uncategorised statements	5	7.93	

Table E.22 : Identified Objectives for Information System Number 11.

APPENDIX F

Individual Information System Results

The tables presented provide detailed results per respondent for each information system. The results have been ordered by type of user, namely, clerical, managerial or training and support. At the end of the table, the respective mean, maximum and minimum values, range, standard deviation and variance per variable is provided.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	41	11	11	24	20	5	12	18	79	75.24%	82	90.11%	42	100.00%	1	4
2	CLERICAL	27	7	7	24	25	5	14	21	89	84.76%	69	75.82%	37	88.10%	1	1
3	CLERICAL	40	10	7	20	30	6	12	21	89	84.76%	67	73.63%	37	88.10%	6	6
4	CLERICAL	39	18	10	20	30	7	12	21	90	85.71%	79	86.81%	38	90.48%	4	4
5	MANAGERIAL	43	18	13	4	15	3	8	21	51	48.57%	62	68.13%	42	100.00%	1	1
6	MANAGERIAL	37	14	14	8	10	3	12	18	51	48.57%	57	62.64%	30	71.43%	4	3
7	MANAGERIAL	32	10	6	16	10	4	8	18	56	53.33%	44	48.35%	30	71.43%	1	3
8	MANAGERIAL	53	20	8	16	15	4	10	12	57	54.29%	45	49.45%	25	59.52%	1	1
9	MANAGERIAL	31	10	0.5	16	15	5	8	15	59	56.19%	59	64.84%	37	88.10%	1	1
10	MANAGERIAL	39	16	10	20	5	4	10	21	60	57.14%	45	49.45%	31	73.81%	3	3
11	MANAGERIAL	48	16	10	16	20	4	10	12	62	59.05%	44	48.35%	28	66.67%	1	3
12	MANAGERIAL	54	16	6	20	10	5	10	18	63	60.00%	59	64.84%	36	85.71%	1	1
13	MANAGERIAL	51	20	20	12	30	3	10	12	67	63.81%	73	80.22%	31	73.81%	4	4
14	MANAGERIAL	51	20	20	12	30	3	10	12	67	63.81%	73	80.22%	31	73.81%	4	4
15	MANAGERIAL	44	22	10	20	20	5	10	15	70	66.67%	70	76.92%	30	71.43%	4	4
16	MANAGERIAL	27	6	6	20	15	5	10	21	71	67.62%	79	86.81%	35	83.33%	3	4
17	MANAGERIAL	51	25	2	16	20	5	12	18	71	67.62%	68	74.73%	37	88.10%	1	1
18	MANAGERIAL	40	6	3	20	25	4	6	18	73	69.52%	68	74.73%	27	64.29%	1	1
19	MANAGERIAL	43	20	3	24	20	6	12	18	80	76.19%	78	85.71%	34	80.95%	7	6
20	MANAGERIAL	43	9	9	24	25	5	12	18	84	80.00%	82	90.11%	41	97.62%	1	1
21	MANAGERIAL	30	4.5	0.25	20	30	6	10	18	84	80.00%	63	69.23%	32	76.19%	1	3
22	MANAGERIAL	44	17	10	24	30	5	14	18	91	86.67%	71	78.02%	32	76.19%	6	6
23	MANAGERIAL	56	35	18	24	30	6	10	21	91	86.67%	83	91.21%	38	90.48%	6	6
24	MANAGERIAL	39	20	20	24	30	6	12	21	93	88.57%	86	94.51%	37	88.10%	6	6
25	TRAINING	52	29	10	24	25	6	14	21	90	85.71%	78	85.71%	38	90.48%	4	6
26	TRAINING	47	19	13	28	25	6	14	21	94	89.52%	81	89.01%	40	95.24%	4	6
	AVERAGES	42.4	16.1	9.5	19.1	21.5	4.8	10.8	18.0	74	70.77%	68	74.60%	34	82.05%	3	3
	MAXIMUM	56.0	35.0	20.0	28.0	30.0	7.0	14.0	21.0	94	89.52%	86	94.51%	42	100.00%	7	6
	MINIMUM	27.0	4.5	0.3	4.0	5.0	3.0	6.0	12.0	51	48.57%	44	48.35%	25	59.52%	1	1
	RANGE	29.0	30.5	19.8	24.0	25.0	4.0	8.0	9.0	43	40.95%	42	46.15%	17	40.48%	6	5
	STD DEV	8.2	7.2	5.6	5.5	7.6	1.1	2.0	3.1	14	13.27%	13	13.92%	5	11.00%	2	2
	VARIANCE	67.2	51.7	31.2	29.9	57.2	1.2	4.1	9.7	194	1.76%	160	1.94%	21	1.21%	4	4

TABLE F.1 : Detailed Results for Information System Number 1.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	23	7	1	21	14	35	28	7	105	100.00%	89	97.80%	42	100.00%	1	1
2	CLERICAL	38	9	0	21	14	35	28	7	105	100.00%	77	84.62%	35	83.33%	6	6
3	CLERICAL	24	5	0	18	10	30	24	7	89	84.76%	85	93.41%	38	90.48%	1	1
4	CLERICAL	36	7	2	21	14	35	28	7	105	100.00%	88	96.70%	42	100.00%	6	6
5	CLERICAL	29	1	0.5	21	14	35	28	7	105	100.00%	86	94.51%	42	100.00%	6	6
6	CLERICAL	36	7	0	18	12	30	24	6	90	85.71%	78	85.71%	34	80.95%	1	3
7	CLERICAL	39	15	2	21	12	35	24	7	99	94.29%	85	93.41%	42	100.00%	6	6
8	MANAGERIAL	34	13	14	15	10	30	24	5	84	80.00%	84	92.31%	39	92.86%	6	6
9	MANAGERIAL	39	3	1	21	12	35	24	7	99	94.29%	90	98.90%	40	95.24%	6	3
10	MANAGERIAL	41	19	0.5	21	10	30	20	6	87	82.86%	72	79.12%	36	85.71%	3	3
11	MANAGERIAL	40	11	1	18	10	25	24	5	82	78.10%	59	64.84%	35	83.33%	3	6
12	MANAGERIAL	42	1	0.75	21	14	35	28	7	105	100.00%	86	94.51%	42	100.00%	6	6
14	MANAGERIAL	46	19	1	18	6	20	12	5	61	58.10%	66	72.53%	36	85.71%	7	4
13	TRAINING	40	20	1	15	10	25	20	5	75	71.43%	88	96.70%	42	100.00%	6	6
	MEAN	36.2	9.8	1.8	19.3	11.6	31.1	24.0	6.3	92	87.82%	81	88.93%	39	92.69%	5	5
	MAXIMUM	46.0	20.0	14.0	21.0	14.0	35.0	28.0	7.0	105	100.00%	90	98.90%	42	100.00%	7	6
	MINIMUM	23.0	1.0	0.0	15.0	6.0	20.0	12.0	5.0	61	58.10%	59	64.84%	34	80.95%	1	1
	RANGE	23.0	19.0	14.0	6.0	8.0	15.0	16.0	2.0	44	41.90%	31	34.07%	8	19.05%	6	5
	STD DEV	6.4	6.3	3.4	2.2	2.3	4.7	4.3	0.9	13	12.45%	9	9.95%	3	7.28%	2	2
	VAR	41.5	40.0	11.9	4.8	5.2	22.1	18.3	0.8	171	1.55%	82	0.99%	9	0.53%	5	4

TABLE F.2 : Detailed Results for Information System Number 2.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	MANAGERIAL	30	3	0.5	20	18	14	35	7	94	89.52%	86	94.51%	42	100.00%	4	4
2	MANAGERIAL	27	3	3	24	21	10	30	5	90	85.71%	79	86.81%	42	100.00%	1	1
3	MANAGERIAL	27	8	8	20	18	4	25	6	73	69.52%	58	63.74%	33	78.57%	1	4
4	MANAGERIAL	27	5.5	1	28	21	14	35	7	105	100.00%	61	67.03%	42	100.00%	1	1
5	MANAGERIAL	42	18	10	20	15	10	25	6	76	72.38%	59	64.84%	29	69.05%	4	6
6	MANAGERIAL	27	4	0.5	28	21	12	30	7	98	93.33%	83	91.21%	40	95.24%	1	1
7	MANAGERIAL	31	6	6	20	18	12	30	7	87	82.86%	74	81.32%	38	90.48%	1	3
8	MANAGERIAL	42	16	8	20	15	10	20	3	68	64.76%	57	62.64%	25	59.52%	4	4
9	MANAGERIAL	42	22	5	24	18	12	30	3	87	82.86%	60	65.93%	36	85.71%	1	4
10	MANAGERIAL	30	5	0	24	15	12	25	4	80	76.19%	82	90.11%	25	59.52%	4	4
11	MANAGERIAL	34	7	0	20	15	12	30	4	81	77.14%	54	59.34%	31	73.81%	1	3
12	MANAGERIAL	25	3.5	3.5	24	18	14	35	7	98	93.33%	65	71.43%	37	88.10%	4	5
13	MANAGERIAL	28	1	1	28	21	14	35	7	105	100.00%	58	63.74%	30	71.43%	1	1
14	MANAGERIAL	25	3	1	28	21	14	25	7	95	90.48%	82	90.11%	40	95.24%	6	6
15	MANAGERIAL	32	5	5	28	21	14	35	7	105	100.00%	66	72.53%	42	100.00%	1	1
16	MANAGERIAL	35	7	10	20	12	10	25	3	70	66.67%	63	69.23%	31	73.81%	1	1
17	MANAGERIAL	26	1.5	6	20	12	10	30	3	75	71.43%	66	72.53%	33	78.57%	1	1
18	MANAGERIAL	35	6	0	20	18	12	30	7	87	82.86%	76	83.52%	36	85.71%	4	4
19	MANAGERIAL	30	11	6	20	21	14	35	7	97	92.38%	46	50.55%	36	85.71%	3	3
	MEAN	31.32	7.13	3.92	22.95	17.84	11.79	29.74	5.63	88	83.76%	67	73.74%	35	83.71%	2	3
	MAXIMUM	42.00	22.00	10.00	28.00	21.00	14.00	35.00	7.00	105	100.00%	86	94.51%	42	100.00%	6	6
	MINIMUM	25.00	1.00	0.00	20.00	12.00	4.00	20.00	3.00	68	64.76%	46	50.55%	25	59.52%	1	1
	RANGE	17.00	21.00	10.00	8.00	9.00	10.00	15.00	4.00	37	35.24%	40	43.96%	17	40.48%	5	5
	STD DEV	5.51	5.58	3.39	3.39	3.00	2.42	4.43	1.66	12	11.17%	11	12.31%	5	12.96%	2	2
	VARIANCE	30.32	31.13	11.51	11.52	8.98	5.85	19.67	2.76	138	1.25%	125	1.52%	30	1.68%	3	3

TABLE F.3 : Detailed Results for Information System Number 3.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	43	11	9	30	24	18	3	6	81	77.14%	70	76.92%	36	85.71%	6	6
2	CLERICAL	28	1	1	30	24	18	4	12	88	83.81%	55	60.44%	33	78.57%	1	1
3	CLERICAL	28	4	2	30	24	18	6	12	90	85.71%	76	83.52%	40	95.24%	1	1
4	CLERICAL	25	2	2	30	24	18	6	12	90	85.71%	63	69.23%	36	85.71%	1	3
5	MANAGERIAL	42	13	10	30	28	3	7	14	82	78.10%	81	89.01%	38	90.48%	5	4
6	MANAGERIAL	45	22	0.5	30	24	18	5	10	87	82.86%	75	82.42%	36	85.71%	1	1
7	MANAGERIAL	40	14	4	25	20	18	2	8	73	69.52%	55	60.44%	32	76.19%	1	1
8	MANAGERIAL	35	14	10	30	24	18	5	10	87	82.86%	74	81.32%	36	85.71%	5	1
9	MANAGERIAL	30	7	7	25	12	3	3	12	55	52.38%	63	69.23%	36	85.71%	1	1
10	MANAGERIAL	35	11	6	20	20	15	6	12	73	69.52%	51	56.04%	32	76.19%	1	1
11	MANAGERIAL	41	12	15	30	28	9	7	10	84	80.00%	75	82.42%	38	90.48%	7	7
12	MANAGERIAL	44	11	6	30	20	3	5	8	66	62.86%	60	65.93%	35	83.33%	4	4
13	MANAGERIAL	39	5.5	21	30	24	3	7	14	78	74.29%	78	85.71%	32	76.19%	7	7
14	MANAGERIAL	33	12	12	25	24	6	6	12	73	69.52%	59	64.84%	37	88.10%	4	4
15	MANAGERIAL	35	12	8	35	28	21	5	10	99	94.29%	75	82.42%	42	100.00%	1	1
16	MANAGERIAL	42	10	12	35	24	3	1	8	71	67.62%	80	87.91%	42	100.00%	6	5
	MEAN	36.56	10.03	7.81	29.06	23.25	12.00	4.88	10.63	80	76.01%	68	74.86%	36	86.46%	3	3
	MAXIMUM	45	22	21	35	28	21	7	14	99	94.29%	81	89.01%	42	100.00%	7	7
	MINIMUM	25	1	0.5	20	12	3	1	6	55	52.38%	51	56.04%	32	76.19%	1	1
	RANGE	20	21	20.5	15	16	18	6	8	44	41.90%	30	32.97%	10	23.81%	6	6
	STD DEV	6.164	5.1340	5.373	3.630921	3.799671	7.035623	1.763341	2.204399	11	10.09%	10	10.59%	3	7.37%	2	2
	VARIANCE	37.99	26.358	28.87	13.18359	14.4375	49.5	3.109375	4.859375	112	1.02%	93	1.12%	10	0.54%	6	5

TABLE F.4 : Detailed Results for Information System Number 4.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	35	6	6	25	10	16	18	6	75	71.43%	73	80.22%	35	83.33%	4	4
2	CLERICAL	21	3	3	15	8	8	9	5	45	42.86%	49	53.85%	32	76.19%	1	1
3	CLERICAL	19	0.5	0	30	12	16	15	5	78	74.29%	55	60.44%	30	71.43%	1	1
4	CLERICAL	29	7	3	25	8	8	12	1	54	51.43%	66	72.53%	41	97.62%	1	1
5	CLERICAL	28	5	4	35	12	12	18	4	81	77.14%	52	57.14%	33	78.57%	1	1
6	CLERICAL	32	5	4	25	8	12	9	5	59	56.19%	54	59.34%	30	71.43%	1	1
7	CLERICAL	32	6	4	25	8	16	12	4	65	61.90%	55	60.44%	30	71.43%	1	1
8	CLERICAL	42	4	4	30	14	28	21	7	100	95.24%	86	94.51%	42	100.00%	1	1
9	CLERICAL	27	2	3	25	12	20	18	6	81	77.14%	53	58.24%	35	83.33%	1	1
10	CLERICAL	31	6	6	20	10	4	15	4	53	50.48%	56	61.54%	30	71.43%	4	4
11	CLERICAL	26	1.5	2.5	25	12	24	15	6	82	78.10%	56	61.54%	33	78.57%	1	1
12	CLERICAL	49	20	6	20	8	12	15	5	60	57.14%	64	70.33%	33	78.57%	4	4
13	CLERICAL	63	14	14	20	4	8	21	4	57	54.29%	65	71.43%	35	83.33%	1	1
14	CLERICAL	35	0.5	12	25	6	16	18	5	70	66.67%	59	64.84%	37	88.10%	1	1
15	CLERICAL	38	6	6	30	10	20	18	6	84	80.00%	55	60.44%	35	83.33%	1	1
16	MANAGERIAL	32	5	5	25	12	20	18	6	81	77.14%	67	73.63%	36	85.71%	6	6
	MEAN	33.69	5.72	5.16	25.00	9.63	15.00	15.75	4.94	70	66.96%	60	66.28%	34	81.40%	2	2
	MAXIMUM	63.00	20.00	14.00	35.00	14.00	28.00	21.00	7.00	100	95.24%	86	94.51%	42	100.00%	6	6
	MINIMUM	19.00	0.50	0.00	15.00	4.00	4.00	9.00	1.00	45	42.86%	49	53.85%	30	71.43%	1	1
	RANGE	44.00	19.50	14.00	20.00	10.00	24.00	12.00	6.00	55	52.38%	37	40.66%	12	28.57%	5	5
	STD DEV	10.41	4.82	3.36	4.68	2.57	6.24	3.60	1.34	14	13.63%	9	10.08%	4	8.43%	2	2
	VARIANCE	108.46	23.28	11.30	21.88	6.61	39.00	12.94	1.81	205	1.86%	84	1.02%	13	0.71%	2	2

TABLE F.5 : Detailed Results for Information System Number 5.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	MANAGERIAL	32	5	0.3	12	9	7	28	35	91	86.67%	68	74.73%	42	100.00%	1	4
2	MANAGERIAL	49	2	0	14	12	7	16	10	59	56.19%	75	82.42%	36	85.71%	1	1
3	MANAGERIAL	24	0.3	4	10	21	7	24	30	92	87.62%	64	70.33%	38	90.48%	4	6
4	MANAGERIAL	23	0	8	10	18	4	16	35	83	79.05%	57	62.64%	40	95.24%	6	6
5	MANAGERIAL	37	5	0.2	12	15	7	28	35	97	92.38%	67	73.63%	37	88.10%	1	1
6	MANAGERIAL	26	3	0.1	10	18	6	24	30	88	83.81%	67	73.63%	42	100.00%	4	6
7	MANAGERIAL	23	2	1	14	21	7	28	35	105	100.00%	91	100.00%	42	100.00%	1	6
8	MANAGERIAL	24	0.3	4	12	18	6	24	30	90	85.71%	66	72.53%	34	80.95%	4	6
9	MANAGERIAL	64	2	0	14	21	7	28	35	105	100.00%	84	92.31%	42	100.00%	1	1
10	MANAGERIAL	31	4	0.2	14	21	7	28	35	105	100.00%	91	100.00%	42	100.00%	4	4
11	MANAGERIAL	29	1	1	14	21	7	28	35	105	100.00%	86	94.51%	42	100.00%	1	1
12	MANAGERIAL	31	1	0	14	15	7	28	25	89	84.76%	77	84.62%	36	85.71%	1	1
13	MANAGERIAL	33	1	6	10	15	6	24	30	85	80.95%	77	84.62%	38	90.48%	1	1
14	MANAGERIAL	30	2	4	12	18	7	24	30	91	86.67%	80	87.91%	42	100.00%	4	6
15	MANAGERIAL	38	4.5	0.3	14	21	7	28	35	105	100.00%	91	100.00%	42	100.00%	4	6
16	TRAINING	27	4	0	12	3	5	24	10	54	51.43%	63	69.23%	36	85.71%	6	7
	AVERAGES	32.56	2.32	1.82	12.38	16.69	6.50	25.00	29.69	90.25	0.86	75.25	0.83	39.44	0.94	2.75	3.94
	MAXIMUM	64.00	5.00	8.00	14.00	21.00	7.00	28.00	35.00	105.00	1.00	91.00	1.00	42.00	1.00	6.00	7.00
	MINIMUM	23.00	0.00	0.00	10.00	3.00	4.00	16.00	10.00	54.00	0.51	57.00	0.63	34.00	0.81	1.00	1.00
	RANGE	41.00	5.00	8.00	4.00	18.00	3.00	12.00	25.00	51.00	0.49	34.00	0.37	8.00	0.19	5.00	6.00
	STD DEV	10.42	1.67	2.47	1.62	4.97	0.87	3.87	8.00	14.82	0.14	10.75	0.12	2.83	0.07	1.85	2.38
	VARIANCE	108.50	2.78	6.08	2.61	24.71	0.75	15.00	63.96	219.69	0.02	115.56	0.01	8.00	0.00	3.44	5.68

Table F.6 : Detailed Results for Information System Number 6.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	30	7.5	1.5	12	18	28	6	30	94	89.52%	70	76.92%	36	85.71%	1	4
2	CLERICAL	19	1.5	1.5	10	18	20	5	30	83	79.05%	63	69.23%	33	78.57%	1	4
3	CLERICAL	37	8	2	12	18	24	6	30	90	85.71%	73	80.22%	36	85.71%	1	1
4	CLERICAL	30	2	0.666	12	21	28	7	35	103	98.10%	78	85.71%	36	85.71%	1	1
5	CLERICAL	37	19	2	6	9	16	1	20	52	49.52%	54	59.34%	18	42.86%	1	1
6	CLERICAL	39	6	1	12	18	24	7	35	96	91.43%	79	86.81%	38	90.48%	1	1
7	CLERICAL	33	10	0	12	21	28	7	35	103	98.10%	81	89.01%	36	85.71%	6	6
8	CLERICAL	27	7	5	10	15	24	5	25	79	75.24%	66	72.53%	34	80.95%	4	4
9	CLERICAL	42	3	9	12	21	24	5	35	97	92.38%	73	80.22%	39	92.86%	3	3
10	CLERICAL	40	9	2	12	21	28	7	35	103	98.10%	82	90.11%	42	100.00%	1	3
11	CLERICAL	53	10	5	12	15	20	5	25	77	73.33%	55	60.44%	42	100.00%	4	1
12	CLERICAL	45	2	5	8	9	20	4	25	66	62.86%	58	63.74%	28	66.67%	1	1
13	CLERICAL	38	3	18	14	18	28	7	35	102	97.14%	88	96.70%	42	100.00%	1	6
14	CLERICAL	32	2	2	10	15	24	4	25	78	74.29%	57	62.64%	27	64.29%	1	1
15	CLERICAL	27	7	4	2	15	20	4	35	76	72.38%	55	60.44%	34	80.95%	1	1
16	CLERICAL	27	8	4	14	21	28	5	30	98	93.33%	71	78.02%	29	69.05%	1	5
17	CLERICAL	34	2	2	12	18	24	6	30	90	85.71%	78	85.71%	42	100.00%	1	1
18	CLERICAL	31	3	3	8	9	20	4	25	66	62.86%	58	63.74%	28	66.67%	1	1
19	MANAGERIAL	30	3	7	10	15	20	6	25	76	72.38%	66	72.53%	33	78.57%	1	1
20	MANAGERIAL	50	4.5	8	10	21	28	6	35	100	95.24%	78	85.71%	33	78.57%	4	4
21	MANAGERIAL	39	10	4	2	12	20	5	35	74	70.48%	64	70.33%	41	97.62%	1	1
	AVERAGES	35.24	6.07	4.13	10.10	16.57	23.62	5.33	30.24	85.86	0.82	68.90	0.76	34.62	0.82	1.76	2.43
	MAXIMUM	53.00	19.00	18.00	14.00	21.00	28.00	7.00	35.00	103.00	0.98	88.00	0.97	42.00	1.00	6.00	6.00
	MINIMUM	19.00	1.50	0.00	2.00	9.00	16.00	1.00	20.00	52.00	0.50	54.00	0.59	18.00	0.43	1.00	1.00
	RANGE	34.00	17.50	18.00	12.00	12.00	12.00	6.00	15.00	51.00	0.49	34.00	0.37	24.00	0.57	5.00	5.00
	STD DEV	7.94	4.14	3.89	3.24	3.99	3.68	1.43	4.75	14.28	0.14	10.08	0.11	6.01	0.14	1.44	1.79
	VARIANCE	63.04	17.17	15.16	10.47	15.96	13.57	2.03	22.56	203.93	0.02	101.71	0.01	36.14	0.02	2.09	3.20

Table F.7 : Detailed Results for Information System Number Seven.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	34	3	3	18	30	24	6	12	90	85.71%	79	86.81%	39	92.86%	1	1
2	CLERICAL	38	11	3	18	30	24	7	12	91	86.67%	60	65.93%	40	95.24%	1	1
3	CLERICAL	46	13	16	12	25	20	4	10	71	67.62%	35	38.46%	17	40.48%	1	1
4	CLERICAL	34	1	0	21	30	28	6	8	93	88.57%	60	65.93%	34	80.95%	1	1
5	CLERICAL	21	0.6	0.6	21	35	28	7	12	103	98.10%	74	81.32%	39	92.86%	1	1
6	CLERICAL	24	1	1	21	30	28	7	14	100	95.24%	61	67.03%	38	90.48%	1	1
7	CLERICAL	68	20	20	15	30	24	7	10	86	81.90%	63	69.23%	35	83.33%	1	1
8	CLERICAL	35	1	1	18	35	28	6	10	97	92.38%	68	74.73%	36	85.71%	1	1
9	CLERICAL	35	18	18	15	20	16	4	8	63	60.00%	48	52.75%	23	54.76%	1	1
10	CLERICAL	41	4	4	18	30	28	7	12	95	90.48%	66	72.53%	36	85.71%	3	3
11	MANAGERIAL	50	2.5	2.5	15	30	24	6	10	85	80.95%	69	75.82%	35	83.33%	1	1
12	MANAGERIAL	45	6	21	18	30	20	5	12	85	80.95%	79	86.81%	34	80.95%	1	6
13	MANAGERIAL	38	5	20	15	25	20	5	10	75	71.43%	49	53.85%	25	59.52%	1	1
	AVERAGES	39.15	6.62	8.47	17.31	29.23	24.00	5.92	10.77	87.23	0.83	62.38	0.69	33.15	0.79	1.15	1.54
	MAXIMUM	68.00	20.00	21.00	21.00	35.00	28.00	7.00	14.00	103.00	0.98	79.00	0.87	40.00	0.95	3.00	6.00
	MINIMUM	21.00	0.60	0.00	12.00	20.00	16.00	4.00	8.00	63.00	0.60	35.00	0.38	17.00	0.40	1.00	1.00
	RANGE	47.00	19.40	21.00	9.00	15.00	12.00	3.00	6.00	40.00	0.38	44.00	0.48	23.00	0.55	2.00	5.00
	STD DEV	11.38	6.44	8.46	2.67	3.85	3.84	1.07	1.67	11.21	0.11	12.17	0.13	6.76	0.16	0.53	1.39
	VARIANCE	129.51	41.49	71.63	7.14	14.79	14.77	1.15	2.79	125.72	0.01	148.08	0.02	45.67	0.03	0.28	1.94

Table F.8 : Detailed Results for Information System Number Eight.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	28	3.5	2	30	20	12	12	5	79	75.24%	68	74.73%	32	76.19%	1	1
2	CLERICAL	47	18	4	35	24	12	21	7	99	94.29%	61	67.03%	27	64.29%	1	1
3	CLERICAL	34	6	0.5	30	28	12	15	5	90	85.71%	61	67.03%	37	88.10%	1	1
4	CLERICAL	42	12	7	15	20	6	9	5	55	52.38%	44	48.35%	30	71.43%	1	1
5	MANAGERIAL	24	1.5	1.5	25	20	12	21	5	83	79.05%	43	47.25%	42	100.00%	1	1
6	MANAGERIAL	27	4	4	30	24	12	18	6	90	85.71%	73	80.22%	36	85.71%	1	1
7	MANAGERIAL	29	5.5	4	30	20	6	9	3	68	64.76%	54	59.34%	32	76.19%	1	4
8	MANAGERIAL	25	0.5	0	30	24	12	15	5	86	81.90%	54	59.34%	35	83.33%	1	1
9	MANAGERIAL	30	5	3	30	28	10	18	5	91	86.67%	63	69.23%	32	76.19%	1	1
10	MANAGERIAL	23	2.5	2	30	24	10	15	3	82	78.10%	65	71.43%	33	78.57%	1	1
11	MANAGERIAL	23	1.5	1	25	24	8	15	4	76	72.38%	50	54.95%	34	80.95%	1	1
	AVERAGES	30.18	5.45	2.64	28.18	23.27	10.18	15.27	4.82	81.73	0.78	57.82	0.64	33.64	0.80	1.00	1.27
	MAXIMUM	47.00	18.00	7.00	35.00	28.00	12.00	21.00	7.00	99.00	0.94	73.00	0.80	42.00	1.00	1.00	4.00
	MINIMUM	23.00	0.50	0.00	15.00	20.00	6.00	9.00	3.00	55.00	0.52	43.00	0.47	27.00	0.64	1.00	1.00
	RANGE	24.00	17.50	7.00	20.00	8.00	6.00	12.00	4.00	44.00	0.42	30.00	0.33	15.00	0.36	0.00	3.00
	STD DEV	7.52	4.97	1.93	4.90	2.86	2.33	3.93	1.11	11.62	0.11	9.21	0.10	3.75	0.09	0.00	0.86
	VARIANCE	56.51	24.66	3.73	23.97	8.20	5.42	15.47	1.24	134.93	0.01	84.88	0.01	14.05	0.01	0.00	0.74

Tabhle F.9 : Detailed Results for Information System Number Nine.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	MANAGERIAL	36	13	8	30	20	5	12	18	85	80.95%	65	71.43%	34	80.95%	5	5
2	MANAGERIAL	29	5	4	30	24	5	10	18	87	82.86%	67	73.63%	34	80.95%	1	3
3	MANAGERIAL	38	14	12	25	20	4	10	9	68	64.76%	47	51.65%	29	69.05%	5	5
4	MANAGERIAL	43	9	20	35	28	5	14	15	97	92.38%	59	64.84%	38	90.48%	3	1
5	MANAGERIAL	37	20	2	20	16	4	10	12	62	59.05%	59	64.84%	34	80.95%	1	1
6	MANAGERIAL	31	13	4	25	16	4	10	15	70	66.67%	72	79.12%	28	66.67%	6	6
7	MANAGERIAL	35	15	7	25	24	4	4	3	60	57.14%	72	79.12%	34	80.95%	1	1
8	MANAGERIAL	38	13	10	30	16	3	6	3	58	55.24%	54	59.34%	25	59.52%	1	1
9	MANAGERIAL	42	22	18	30	24	5	10	15	84	80.00%	71	78.02%	36	85.71%	7	6
10	MANAGERIAL	29	3.5	3.5	20	16	4	8	15	63	60.00%	67	73.63%	25	59.52%	1	1
11	MANAGERIAL	24	3	3	35	28	6	12	21	102	97.14%	78	85.71%	37	88.10%	1	1
12	MANAGERIAL	33	4	4	15	24	4	12	15	70	66.67%	72	79.12%	35	83.33%	3	3
13	MANAGERIAL	55	36	15	10	12	1	12	21	56	53.33%	66	72.53%	35	83.33%	1	1
14	MANAGERIAL	37	15	3	25	24	6	12	18	85	80.95%	76	83.52%	36	85.71%	1	1
15	MANAGERIAL	34	1.5	1.5	30	24	6	14	21	95	90.48%	65	71.43%	30	71.43%	1	1
	AVERAGES	36.07	12.47	7.67	25.67	21.07	4.40	10.40	14.60	76.13	0.73	66.00	0.73	32.67	0.78	2.53	2.47
	MAXIMUM	55.00	36.00	20.00	35.00	28.00	6.00	14.00	21.00	102.00	0.97	78.00	0.86	38.00	0.90	7.00	6.00
	MINIMUM	24.00	1.50	1.50	10.00	12.00	1.00	4.00	3.00	56.00	0.53	47.00	0.52	25.00	0.60	1.00	1.00
	RANGE	31.00	34.50	18.50	25.00	16.00	5.00	10.00	18.00	46.00	0.44	31.00	0.34	13.00	0.31	6.00	5.00
	STD DEV	7.01	8.75	5.82	6.80	4.73	1.25	2.65	5.57	14.85	0.14	8.10	0.09	4.06	0.10	2.09	1.96
	VARIANCE	49.13	76.48	33.92	46.22	22.33	1.57	7.04	31.04	220.38	0.02	65.60	0.01	16.49	0.01	4.38	3.85

Table F.10 : Detailed Results for Information System Number Ten.

USER NO.	TYPE OF USER	AGE	TENURE	IS EXP	OBJECTIVE SCORES ONE	TWO	THREE	FOUR	FIVE	SCORE SUCCESS	% SUCCESS	SCORE ATTITUDE	% ATTITTUDE	SCORE BELIEF	% BELIEF	INVOLVEMENT CAT. DEVELOP	IMPLEMENT
1	CLERICAL	40	14	6	25	20	12	6	10	73	69.52%	62	68.13%	26	61.90%	1	1
2	CLERICAL	37	20	7	25	20	15	5	10	75	71.43%	59	64.84%	31	73.81%	1	1
3	CLERICAL	28	7	7	35	24	15	5	10	89	84.76%	62	68.13%	36	85.71%	4	4
4	CLERICAL	31	3	3	25	24	12	4	10	75	71.43%	70	76.92%	29	69.05%	1	1
5	CLERICAL	28	2.5	5	35	28	21	5	10	99	94.29%	63	69.23%	33	78.57%	4	4
6	CLERICAL	22	9	8	20	16	12	4	8	60	57.14%	60	65.93%	32	76.19%	4	4
7	CLERICAL	45	27	20	25	12	18	5	8	68	64.76%	59	64.84%	29	69.05%	4	4
8	CLERICAL	34	14	7	25	24	18	6	12	85	80.95%	67	73.63%	35	83.33%	4	4
9	CLERICAL	31	4	4	10	20	12	1	6	49	46.67%	45	49.45%	24	57.14%	1	1
10	CLERICAL	26	10	7	20	12	15	5	10	62	59.05%	56	61.54%	25	59.52%	1	1
11	CLERICAL	21	3	3	35	20	15	4	8	82	78.10%	46	50.55%	37	88.10%	4	3
12	MANAGERIAL	54	10	6	15	24	15	5	8	67	63.81%	48	52.75%	33	78.57%	1	6
13	MANAGERIAL	33	12	8	30	20	15	5	12	82	78.10%	66	72.53%	34	80.95%	4	4
14	MANAGERIAL	36	19	4	30	24	21	6	12	93	88.57%	75	82.42%	37	88.10%	4	4
15	MANAGERIAL	37	14	12	30	24	18	6	12	90	85.71%	64	70.33%	34	80.95%	1	1
	AVERAGES	33.53	11.23	7.13	25.67	20.80	15.60	4.80	9.73	76.60	0.73	60.13	0.66	31.67	0.75	2.60	2.87
	MAXIMUM	54.00	27.00	20.00	35.00	28.00	21.00	6.00	12.00	99.00	0.94	75.00	0.82	37.00	0.88	4.00	6.00
	MINIMUM	21.00	2.50	3.00	10.00	12.00	12.00	1.00	6.00	49.00	0.47	45.00	0.49	24.00	0.57	1.00	1.00
	RANGE	33.00	24.50	17.00	25.00	16.00	9.00	5.00	6.00	50.00	0.48	30.00	0.33	13.00	0.31	3.00	5.00
	STD DEV	8.34	6.83	4.10	7.04	4.43	2.94	1.22	1.77	13.34	0.13	8.27	0.09	4.09	0.10	1.50	1.63
	VARIANCE	69.58	46.63	16.78	49.56	19.63	8.64	1.49	3.13	177.84	0.02	68.38	0.01	16.76	0.01	2.24	2.65

Table F.11 : Detailed Results for Information System Number Eleven.

APPENDIX G

Association Measures - User Involvement

The following tables provide the detailed association measures for user involvement in development and implementation, and information system success, user attitude and user belief.

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
1	26	24	0.5079	0.0111	0.3768	0.0158	Yes
2	14	12	-0.0652	0.8140	-0.0728	0.9523	No
3	19	17	-0.0925	0.6949	-0.0777	0.6896	No
4	16	14	-0.2517	0.3296	-0.1889	0.3537	No
5	16	14	-0.1188	0.6454	-0.0906	0.6731	No
6	16	14	-0.2979	0.2485	-0.2527	0.2417	No
7	21	19	0.2558	0.2527	0.2177	0.2352	No
8	13	11	0.2318	0.4220	0.1974	0.4220	No
9	11	9	1.0000	0.0000	1.0000	0.3173	No
10	15	13	0.1598	0.5499	0.1324	0.5341	No
11	15	13	0.4338	0.1046	0.3687	0.1046	No
Total	**181**	**179**	**0.0945**	**0.2047**	**0.0740**	**0.2019**	**No**

Table G.1 : Association Measures - User Involvement in Development and Information System Success

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
1	26	24	0.6264	0.0017	0.5026	0.0011	Yes
2	14	12	0.0765	0.7826	0.0582	0.8006	No
3	19	17	-0.2715	0.2494	-0.2183	0.2372	No
4	16	14	-0.2733	0.2898	-0.1889	0.3533	No
5	16	14	-0.1188	0.6454	-0.0906	0.6731	No
6	16	14	-0.1759	0.4957	-0.1472	0.4872	No
7	21	19	0.6196	0.0056	0.5103	0.0039	Yes
8	13	11	0.0044	0.9879	0.0000	1.0000	No
9	11	9	-0.4009	0.2049	-0.3443	0.2049	No
10	15	13	0.1124	0.6741	0.0728	0.7341	No
11	15	13	0.2072	0.4382	0.1898	0.3816	No
Total	**181**	**179**	**0.1528**	**0.0403**	**0.1181**	**0.0382**	**Yes**

Table G.2 : Association Measures - User Involvement in Implementation and Information System Success

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
1	26	24	0.4843	0.0155	0.3695	0.0180	Yes
2	14	12	0.0381	0.8907	0.0278	0.9016	No
3	19	17	0.2218	0.3467	0.1689	0.3777	No
4	16	14	0.5003	0.0527	0.3777	0.0636	Inconclusive
5	16	14	0.4668	0.0706	0.3900	0.0704	Inconclusive
6	16	14	-0.4444	0.0852	-0.3744	0.0782	Inconclusive
7	21	19	0.1201	0.5913	0.1053	0.5665	No
8	13	11	0.0774	0.7887	0.0662	0.7887	No
9	11	9	1.0000	0.0000	0.0000	1.0000	No
10	15	13	-0.0731	0.7843	-0.0737	0.7333	No
11	15	13	0.2789	0.2968	0.2370	0.2968	No
Total	**181**	**179**	**0.3030**	**0.0000**	**0.2374**	**0.0000**	**Yes**

Table G.3 : Association Measures - User Involvement in Development and User Attitude

System Number	n	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
1	26	24	0.5739	0.0041	0.4219	0.0063	Yes
2	14	12	-0.1057	0.7031	-0.0833	0.7107	No
3	19	17	0.0078	0.9736	0.0202	0.9120	No
4	16	14	0.4001	0.1213	0.2883	0.1566	No
5	16	14	0.4668	0.0706	0.3900	0.0704	Inconclusive
6	16	14	-0.3296	0.2018	-0.2661	0.2022	No
7	21	19	0.4930	0.0275	0.3972	0.0251	Yes
8	13	11	0.3898	0.1769	0.3349	0.1679	No
9	11	9	-0.1507	0.6357	-0.1303	0.6337	No
10	15	13	0.0429	0.8730	0.0371	0.8685	No
11	15	13	0.1329	0.6189	0.1068	0.6226	No
Total	**181**	**179**	**0.3271**	**0.0000**	**0.2503**	**0.0000**	**Yes**

Table G.4 : Association Measures - User Involvement in Implementation and User Attitude

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
1	26	24	0.0616	0.7580	0.0453	0.7754	No
2	14	12	0.2889	0.2976	0.2421	0.3031	No
3	19	17	-0.1591	0.4998	-0.1267	0.5182	No
4	16	14	0.1623	0.5296	0.1560	0.4568	No
5	16	14	0.0059	0.9817	0.0137	0.9512	No
6	16	14	-0.0113	0.7825	-0.0611	0.7879	No
7	21	19	0.1629	0.4662	0.1389	0.4583	No
8	13	11	0.1164	0.6869	0.1007	0.6869	No
9	11	9	1.0000	0.0000	1.0000	0.3173	No
10	15	13	0.0756	0.7773	0.0499	0.8192	No
11	15	13	0.6363	0.0193	0.5452	0.0173	Yes
Total	**181**	**179**	**0.1617**	**0.0301**	**0.1291**	**0.0295**	**Yes**

Table G.5 : Association Measures - User Involvement in Development and User Belief

System Number	*n*	*df*	Spearman *r*	Spearman *p*	Kendall *r*	Kendall *p*	Significant $p < 0.050$
1	26	24	0.1847	0.3556	0.1701	0.2783	No
2	14	12	0.2531	0.3615	0.1907	0.4028	No
3	19	17	-0.2435	0.3016	-0.1738	0.3537	No
4	16	14	0.1432	0.5793	0.1352	0.5187	No
5	16	14	0.0055	0.9817	0.0137	0.9513	No
6	16	14	0.0483	0.8515	0.0468	0.8338	No
7	21	19	0.1160	0.6041	0.0802	0.6571	No
8	13	11	-0.0747	0.7959	-0.0727	0.7670	No
9	11	9	-0.2018	0.5233	-0.1754	0.5233	No
10	15	13	-0.1125	0.6738	-0.1131	0.6066	No
11	15	13	0.5229	0.0504	0.3593	0.0706	Inconclusive
Total	**181**	179	**0.1537**	**0.0392**	**0.1210**	**0.0382**	**Yes**

Table G.6 : Association Measures - User Involvement in Implementation and User Belief