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A Contingency Model Of Dss Success: An Empirical Investigation

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A CONTINGENCY MODEL OF DSS SUCCESS: AN EMPIRICAL INVESTIGATION

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ABSTRACT

The importance of contingent relationships between variables influencing MIS implementations has often been emphasized. This study tests ten propositions regarding the contingent relationships influencing the implementation of a certain class of information systems, generally called Decision Support Systems (DSS). These propositions are derived from a contingency framework that groups the variables relevant to DSS implementations into four categories. These are the characteristics of: the decision maker/user, the DSS, the decision environment, and the implementation process. It is posited that the successful implementation of DSS depends not only on the direct effects of variables in each category, but also on the overall "fit" between these variables. DSS implementation success is defined as high user satisfaction and system usage.

Based on the proposed framework, ten propositions regarding specific "contingent" or "fit" relationships between variable pairs from the four categories of the framework are suggested. Defined as multiplicative effects between the variable pairs concerned, the propositions were tested in a field survey of DSS in 9 organizations from the insurance, banking, and utility industries.

The results of the study indicate that multiplicative effects do not account for a significant portion of the observed variance in the three dependent variables, over and above the portion accounted for by the main effects. The results also show that the main effect variable, DSS flexibility, accounts for nearly half the observed variance in user

information satisfaction. These results and the fact that a relatively high proportion of the variance in the three dependent variables was accounted by the main effect variables DSS flexibility, decision maker/user willingness to change, and involvement in implementation, leads to the conclusion that, for DSS implementations, multiplicative effects are unimportant. On the other hand, DSS flexibility appears as a primary consideration to keep in mind in implementing DSS.

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Writing this section proved to be at least as demanding as the main text. As probably is customary, one writes the acknowledgements last in order to thank everybody who has contributed to the creation of the final document. The problem with this procedure is that, unless one is an accomplished novelist, it is impossible to fully convey the emotions and the gratitude one feels for certain people. I am facing that problem at this moment because I cannot describe with written words, the appreciation I feel. However, I also am very fortunate because every individual I want to thank is also a good friend of mine so that I have ample opportunity to thank them in person.

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INTRODUCTION

Recent advances in communications and computer technology have enabled many organizations to bring the powerful and rapid processing capabilities of computers to the support of managerial decision making. Software applications whose function is to provide this support are generally referred to as Decision Support Systems (DSS) (see NOTE below). Because of the proliferation of such tools in many organizations (Hogue and Watson, 1983), research is needed to improve our understanding of their development and use.

That there is a strong need to increase our understanding of DSS is demonstrated by a recent large scale survey of "user managers", which concluded that

- many of the systems frequently used by managers are not of the appropriate type;
- many important tasks of managers could be, but are not, supported by computer based information systems;
- relative to monitor and exception systems, (e.g. transaction processors), inquiry and analysis systems, (e.g. DSS), relate to important tasks more often and are more appropriate;
- users' demand for new systems has dramatically shifted away from transaction processors and toward managerial support systems;
- users are expecting increased implementation of managerially oriented system types e.g. DSS, in the near future (Alloway and Quillard, 1983).

NOTE- The definitions, assertions and conclusions presented here are duly developed and supported in the following chapters. The detailed description of the terminology and the quoting of numerous references was omitted in order to be brief and clear.

The widespread current interest of both practitioners and academics in DSS supports their conclusions. Today, the marketplace is full of software packages being sold under the DSS name, and vendors still continue to jump on the DSS bandwagon because they perceive a high user demand for such systems. The DSS interest is also pervasive in the academic community, which now holds an annual, international DSS conference, and in early 1984 will start publishing a journal, dedicated to DSS.

It is therefore apparent that the DSS subject offers new and exciting research issues relevant to both the practitioner and academic communities. One such issue is the implementation of DSS applications and the determinants of DSS implementation success. This need arises because there is a high potential for DSS implementations to fail. Although considerable research has been done in the area of MIS implementation, the findings there are not immediately applicable to DSS, because the implementation of DSS is substantially different from the implementation of MIS applications.

In view of this difference and in view of the very small number of previous studies of DSS implementation, there is a strong need

- in the practitioner field, to develop and implement DSS more successfully,

- in the academic arena, to synthesize and extend the existing knowledge on the DSS subject.

This study addresses both of these needs. From a managerial perspective, the purpose of the study is to better understand the determinants of DSS success, with a view to improving existing implementation practices. From a research perspective, its purpose is to propose a research framework as a guide to studying DSS.

To achieve these purposes the study proposes a research framework for DSS implementation and empirically tests ten propositions derived from this framework using data obtained from a survey of user managers. Accordingly, this document is organized as follows.

Chapter I describes and defines the DSS concept, and presents a review of the general implementation literature relevant to DSS.

Chapter II develops the research framework being proposed, and describes ten propositions to be tested in a field setting.

Chapter III presents the methodology used in testing these ten propositions including the operational definitions and the research design.

Chapter IV, presents the data analysis and the results obtained.

Chapter V concludes the study with the interpretation and discussion of the findings.

CHAPTER I

DECISION SUPPORT SYSTEMS - DEFINITION AND IMPLEMENTATION

A- INTRODUCTION

Like many terms that become popular in novel fields, the term Decision Support Systems (DSS) has been the focal point of many discussions and sharp disagreements. At one extreme, its avid proponents hail it as a new tool "... which provides Executive Mind Support" (Wagner, 1982, p.5) and also as "... a fulfillment of the computer's long-standing promise of eventually becoming directly useful to executives." (Wagner, 1981, p. 16) As such, DSS are envisioned to be a vital component of "The Office of the Future". At the other extreme, however, are scholars who attack the DSS concept itself and the ambitious claims some of its proponents make:

> "In conclusion, there are four major points I would like to make about DSS. First, DSS is a redundant term currently being used to describe a subset of Management Science that predates the DSS movement. Second, DSS is not based on any formal conceptual framework, and this lack casts serious doubts on its substantive underpinnings. Third, very few chief executive officers will opt to become computer programmers, with or without DSS. And, finally, the office of the future is a myth." (Naylor, 1982, p.94)

This study attempts to take an impartial view in this matter (if that is at all possible) and is motivated by the assumption that a concept which can strike such controversy while becoming very popular both in academia and the business world, is therefore real, important and worthy of research.

The difficulties that information system professionals have experienced in implementing all types of computer-based information systems are well known. Decision Support Systems present especially challenging implementation problems, since

- they often involve new applications of IS technology with which both the user and the system developer are unfamiliar;
- they entail a particularly close relationship between the system and the user;
- they require a close relationship between the system developer and the user (in many cases both roles are played by the same person);
- they are usually discretionary in nature; that is, users can choose whether to use the DSS or not..

In view of these difficulties DSS implementations can fail for a variety of reasons, and published accounts of DSS implementation failures exist (Rudelius et. al., 1982; Hurst et. al., 1983).

The focus of this research is DSS implementation. By that we mean the process of developing and installing a DSS in an organization together with integrating it with the organization. This definition of implementation is much broader than other definitions of implementation which focus on the construction of a computer-based tool (i.e., the writing of programs and the acquisition of equipment (Bennett, 1983, p.8)). As such, the issue of whether DSS are a subset of other academic disciplines or not, is tangential to the research questions investigated here. On the other hand, the definitional issues of DSS (i.e. what is a DSS and what is not) are important since the DSS studied had to be selected according to some definition. Both of these issues are addressed in Section B of this chapter where a review of the salient parts of the definitional literature on DSS is presented together with the definition of DSS used in this study.

B- DSS DEFINITION

The origins of the concept of "Decision Support System" can be traced back to the late nineteen sixties. By that time the advances in computer technology made it possible to bring the combined power of management science and computer based information systems to bear on the decision making activities of individual managers. In trying to name this concept researchers used terms such as "Management Information-Decision Systems" (Dickson, 1968), "Management Decision Systems" (Scott Morton, 1971), "Decision Calculus" (Little, 1970), and "Man-Machine Decision Systems" (Gerrity, 1971). Towards the middle part of the nineteen seventies the nomenclature converged on the term "Decision Support Systems". It was then that the first major empirical DSS researches were also being completed. Since then, there has been a tremendous increase in both the number of applications called DSS (Naylor, 1982), and the amount of research done on this subject. Today, a yearly international conference on DSS is held separately from the main MIS conference, and a new journal devoted to the DSS subject alone is supposed to begin publication late this year.

Despite this widespread interest, however, defining DSS continues to be a thorny problem. So far, no one has been able to come up with a formal definition agreeable to everyone. Consequently, it is not surprising to find that the typical research article does not spend any more time on this issue than stating a working definition at the start. However, some efforts have been made to establish generally acceptable definitions, and these can be grouped into two categories: functional definitions and content definitions.

1- Functional Definitions of DSS

In defining DSS one group of researchers adopt a functional approach in that they describe the functions performed by a DSS. The notable contributors in this group are Alter, Keen and Scott Morton.

In the first large scale empirical study of DSS Alter investigated the characteristics of 56 DSS (Alter, 1975). Based on this and subsequent research he identified DSS as having the following characteristics:

- Designed to aid in decision making and decision implementation
- Used generally to facilitate management, planning or staff activities
- Oriented towards the overall effectiveness of individuals or organizations
- Often used on a voluntary basis whereby the user often initiates each instance of system use, either directly or through a staff intermediary.(Alter, 1977)

and defined DSS as

"... computer-based systems designed specifically to support decision making rather than to increase the efficiency of transaction processing or record keeping. (Alter, 1978, p.33)

Furthermore, he proposed a taxonomy of DSS with seven categories. These are:

- File Drawer Systems allow immediate access to data items

- Data Analysis systems allow the manipulation of data by means of operators tailored to the task and setting or operators of a general nature.

- Analysis Information Systems provide access to a series of data bases and small models.

- Accounting models calculate the consequences of planned actions based on accounting definitions.

- Representational Models estimate the consequences of actions based on models which are partially non-definitional.

- Optimization Models provide guidelines for action by generating the optimal solutions consistent with a series of constraints.

- Suggestion models perform mechanical work leading to a specific suggested decision for a fairly structured task.

In its entirety, Keen's work probably constitutes one of the most prolific and pioneering efforts made towards the development of a conceptual base for DSS. In reviewing this work, one encounters a variety of DSS descriptions and definitions:

> A DSS is a computer-based system which is used personally on an ongoing basis by managers and their immediate staffs in direct support of managerial activities- that is decisions. Another term for DSS might be "executive mind-support system." (Wagner and Keen, 1979, p.117)

> A conversational, interactive computer system with access through some form of terminal to the analytic power, models and data base held in the computer. DSS are interactive systems frequently used by individuals with little experience in computers and analytic methods. DSS is in effect a staff assistant to whom the manager delegates activities involving retrieval, computation and reporting. (Keen and Scott Morton, 1978, p.58)

> "...designed to help improve the effectiveness and productivity of managers and professionals. They are

> interactive systems frequently used by individuals with little experience in computers and analytic methods. They support, rather than replace, judgement in that they do not automate the decision process nor impose a sequence of analysis on the user. A DSS is in effect a staff assistant to whom the manager delegates activities involving retrieval, computation, and reporting. The manager evaluates the results and selects the next step in the process." (Keen, 1981, p.1))

Although these and other similar definitions convey an overall conceptual picture of what DSS are, they suffer from a lack of rigour. This stems from the fact that words like 'support', 'help', and 'unstructured decision' are, in and of themselves, fuzzy terms amenable to different interpretations by different people.

For example, although the DSS characteristics outlined by Alter and Keen are similar, the distinction becomes clear when we compare the DSS examples given by Keen against the DSS taxonomy given by Alter. Alter's taxonomy covers a broader range of applications while including applications considered to be DSS by Keen. Alter's taxonomy is based on a single dimension: the amount of decision making left to the user. Accordingly, a wide variety of applications, ranging from those that are highly structured and that literally make the decisions for the user to those that are unstructured and leave all the decision-making effort to the user, are considered to be DSS according to Alter's definition. Keen's definitions, on the other hand, seem to exclude those applications that are relatively structured and leave little decision making to the user (e.g. systems like IFPS, BRANDAID, IRIS, IMS, GADS (Keen, 1981)).

In addition to citing DSS characteristics, taxonomies, and examples, researchers have also contrasted DSS to Electronic Data Processing (EDP), Management Information Systems (MIS), and Operations Research/Management Science (OR/MS) in order to further clarify its meaning. For example, comparing DSS to EDP, Alter notes the following differences (Alter, 1976):

DSS	EDP
DSS Purposes	EDP Purposes
Decision making Decision implementation	Transaction processing Record keeping Business reporting
DSS Uses	EDP Uses
Retrieve isolated data items Use as mechanism for ad hoc analysis of data files Obtain prespecified aggregations of data in the form of standard reports Estimate consequences of proposed decisions Propose decisions Make decisions	Obtain prespecified aggregations of data in the form of standard reports
DSS Characteristics	EDP Characteristics
Active line, staff, and management activities Oriented toward overall effectiveness Focus on the present and the future Emphasis on flexibility and ad hoc utilization	Passive clerical activities Oriented toward mechanical efficiency Focus on past Emphasis on consistency

Keen and Scott Morton, on the other hand, contrast DSS to OR/MS and MIS (Keen and Scott Morton, 1978):

OR-MS	MIS	DSS
Problem oriented	Task oriented	Decision oriented
Structured problems	Structured tasks	Semi-structured decisions
Minimizes costs	Is cost conscious	Is profit conscious
Provides answers	Provides information	Provides decision support
May or may not use a computer	Uses a computer	Invariably uses a computer

Such contrasts, however, seem to be doing more harm than good. First of all, their contribution to furthering the clarification of DSS is rather dubious. For instance Grindlay has pointed out that:

> "There are, of course, many exceptions to the above classification scheme, the most obvious of which is the entire field of Decision Making Under Uncertainty. This area is decision-oriented, is often profit conscious, and frequently provides decision support rather than either answers or information. Usually, however, analysis of decisions under uncertainty does not require a computer and if it does, the computer is brought into use only after the hard intellectual work has been done. Not so with DSS. By definition, a DSS requires the use of a computer either by or for a manager." (Grindlay et. al., 1981, p.2)

Secondly, and more important, such stratifications tend to aggravate academics in the other fields, especially in Management Science. For example, the claim that OR/MS deals with structured problems only, has obliged more than one researcher to respond critically. (Vazsonyi, 1978, Naylor, 1982, Vazsonyi, 1982)

Furthermore, similar functional definitions lack a description of a DSS's components, the goals and activities of each of its components, and the performance measures by which DSS are to be evaluated. As such, functional definitions of DSS also fall short of considering all of the five basic aspects of systems in general (i.e. system objectives, its environment, resources, components, and its management) that Churchman deems necessary for having a complete description of any system (Churchman, 1968).

From the discussion made above it is apparent that descriptions focusing on function alone are not by themselves sufficient to clearly and completely define DSS. Their main deficiency seems to be that they define what a DSS does, but not what it is. This shortcoming is addressed in DSS definitions grouped under the 'Product Definitions' category, reviewed in the next section.

2- Product Definitions of DSS

Some researchers and many system development professionals have tried to define DSS by viewing it as a system in itself. In other words, they describe DSS by defining its parts (components), the relationships between those parts, and the function of each part within the DSS. In view of the fact that these definitions do not incorporate the relationships between the DSS and the organizational context in which they are used, and because they place a great deal of emphasis on a DSS components, they can be viewed as definitions having a "product" view. One such definition is reviewed below.

Viewing DSS as a synthesis between management science models and data handling capabilities of information systems, Bonczek et. al. propose a generic framework and a taxonomy for DSS (Bonczek et. al., 1980(a), and 1980(b)). According to their framework, DSS have three basic components as shown in Figure I.1.

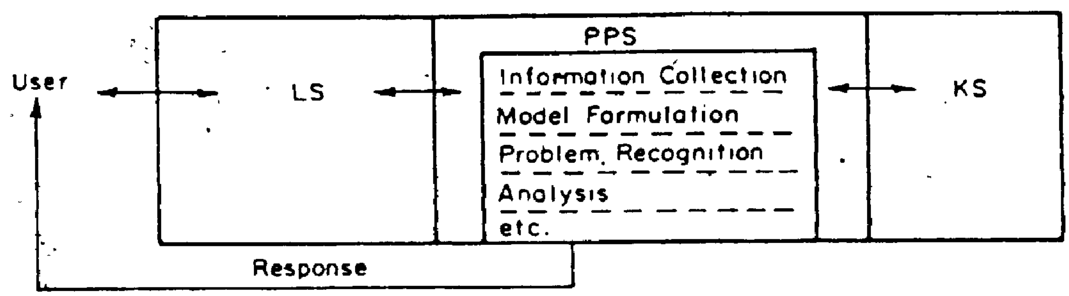


Figure I.1- Generic DSS

(from Boncrek et. al., "Future Directions for Developing Decision Support Systems", Decision Sciences, Vol. 11, 1980)

The Language System (LS) consists of the linguistic facilities made available to the user (or decision maker). It may include data retrieval and/or computational languages, but not the interface between models and data (i.e. the user does not have to know how to interface the models with the data).

The Knowledge System (KS) is formally defined as knowledge about the decision maker's problem domain. In essence it consists of the data base.

The Problem Processing System (PPS) interacts with both the LS and KS, and produces information to be used as an aid to a decision process. It incorporates at least one of the seven capabilities postulated by the authors as being the basic facets of any decision making process: power, perception, design, analysis, valuation, organization, and adaptation. (Bonczek et. al., 1979, p. 279)

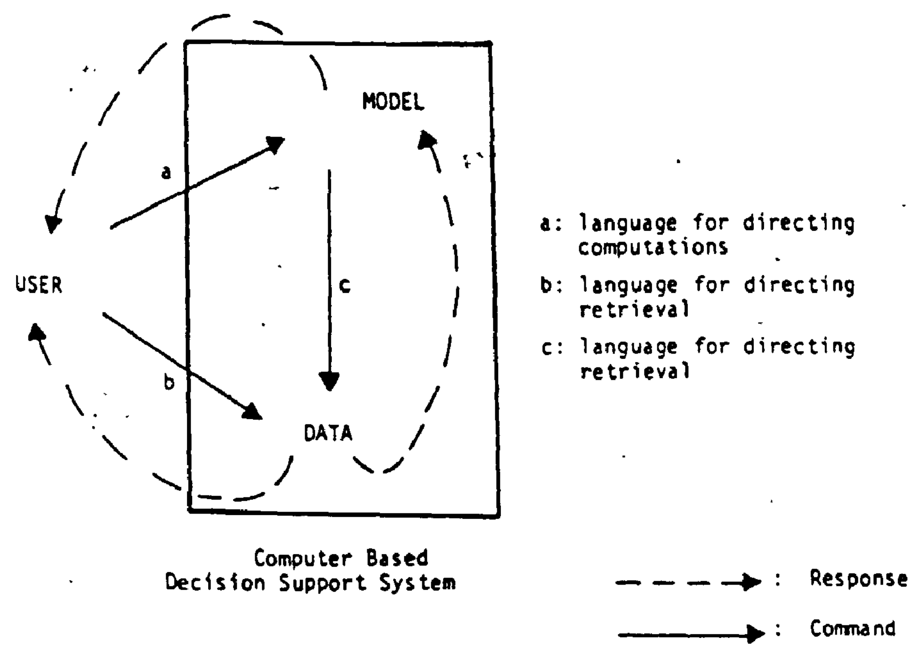


Figure I.2- Computer-based DSS

(from Bonczek et. al., "The Evolving Roles of Models In Decision Support Systems", Decision Sciences, Vol. 11, 1980)

The generic DSS framework proposed by Bonczek et. .al. is not necessarily restricted to a computer-based DSS. It can also be used to represent human-based DSS. Furthermore, by making a simple logical extension to this framework, it is possible to obtain a design oriented framework for computer-based DSS. Bonczek et. al. present the framework in Figure I.2 with particular emphasis on the interfaces between the model base, the data base and the user. (Bonczek et. al., 1980(a), p. 339) Using the "procedurality" of the retrieval and the computational languages as two orthogonal dimensions each with three categories, Bonczek et. al. then propose a taxonomy of DSS with nine categories.

While the Bonczek et. al. framework provides a useful description of the components of DSS and their function, it suffers from one major shortcoming: a lack of consideration of the context in which the DSS is used, how it is used and what it is used for. In other words, it does not consider the total system objectives, the DSS's environment, or its management, which, according to Churchman, need to be kept in mind when describing a system (Churchman, 1968, p.29). To illustrate: an airline reservation system having only query capabilities, is a DSS according to Bonczek et. al. since it has a KS, an LS, a PPS, and perception capabilities. When simply used by airline clerks to inquire about flight and seat availabilities, such a system would probably not be considered a DSS by most researchers. If, however, some statistical reporting capability is added to it and executives use this information to make decisions on, say, the allocation of planes to different destinations, then the system would be considered a DSS.

This view is similar to one espoused by Stabell:

> "The concept of DSS is essentially a view of the role of computers in management (Keen, 1980). Therefore the context for a definition of DSS cannot be merely technological, but must address where and why the technology is developed and how the technology is used. It is thus conceptually not very meaningful to try to distinguish DSS from other computer-based systems merely by looking at properties of the technological components in isolation." (Stabell, 1983, p.222)

It is then apparent that neither product nor functional definitions alone provide an adequate definition of DSS. Taken together, however, they make possible a thorough definition of DSS.

3- Functional plus Product Definition of DSS

A definition of DSS that has both a "product" and a "functional" orientation is provided by Sprague and Carlson (Sprague and Carlson, 1982). Similar to the Bonczek et. al. definition of a computer-based DSS, Sprague and Carlson's "design" perspective of a DSS also has three basic components: database management software; model base management software; and dialogue generation and management software (Sprague and Carlson, 1980, p. 14). However, this definition is but one part of the larger framework proposed by Sprague and Carlson. This larger framework defines DSS by categorizing its various aspects.

a- From a technological standpoint, three DSS "technology levels" are identified:

- i- Specific DSS consist of specific applications that allow a specific decision maker to deal with a specific set of related problems;
- ii- DSS Generators are packages of hardware and software that provide a set of capabilities to quickly and easily build a Specific DSS;
- iii- DSS Tools consist of hardware and software elements that may be used to assist in the development of a Specific DSS or a DSS Generator.

b- Spread over these three technology levels, five key roles played by managers and technicians are identified:

- i- the manager or user who has to make decisions;
- ii- the intermediary who assists the decision maker;
- iii- the DSS builder who develops the specific DSS from DSS tools or generators;

iv- the technical supporter who maintains and enhances the DSS generator;

v- the toolsmith who creates the new hardware and software technology with which DSS generators and tools can be built.

c- From a development perspective, DSS are identified as adaptive systems that provide search capabilities in the short run, a learning capability in the medium term, and an evolutionary capability in the long run. These capabilities are best obtained through iterative design whereby an initial system is developed first to address a small but significant subproblem to which both the builder and the designer agree. After a short period of use, the system is evaluated, modified, and incrementally expanded. This evaluation, modification and expansion process may be repeated several times until a comparatively stable system emerges i.e the iterative development approach and the DSS itself, together become the so called "adaptive system".

d- Finally, a normative assessment of the performance objectives and capabilities of DSS is made, based on the three technology levels and the three major parties interested in the development of DSS. In other words, the questions "what should a DSS accomplish?" and "what capabilities and characteristics must a DSS have?" are answered for the three major parties involved: the manager, the builder, and the toolsmith.

The Sprague and Carlson framework summarized above, covers all the major points a complete definition of DSS must consider. From a system point of view, it also incorporates all of the five basic aspects one has to consider when defining any system: system objectives, its environment, resources, components, and its management (Churchman, 1968). A possible refinement to the Sprague and Carlson framework would involve the addition of the patterns in which DSS are used (Alter, 1975, pp. 124-128). One suggestion for such a refinement classifies the DSS usage patterns into the three interrelated categories of Personal Support, Group Support, and Organizational Support (Hackathorn and Keen, 1981). The addition of the "patterns of usage" dimension to the Sprague and Carlson framework enables it to incorporate the person to person interactions involved in the design and implementation of DSS.

In this study DSS are defined according to the Sprague and Carlson framework. The study is concerned with the implementation of Specific DSS and/or DSS Generators. It addresses the attitudes and views of the users and/or intermediaries regarding the DSS, its implementation, its builders, and the organizational context in which the DSS is used.

C- DSS IMPLEMENTATION

The literature relevant to DSS implementation has two major antecedents: studies of the implementation of OR/MS applications and computer-based information systems (CBIS).

By the mid nineteen sixties, it was being realized that OR/MS applications were enjoying a less than desirable degree of success in real life settings. In many instances the main problem was that managers simply did not adopt the OR/MS models analysts developed, regardless of how technically sophisticated these were (Grayson, 1973; Ginzberg, 1974; Schultz and Slevin, 1975). This situation which came to be known as the "implementation gap", motivated a new research direction, wherein investigators focused on the ways in which OR/MS applications were being introduced into organizations, instead of concentrating solely on the problem being addressed by the application.

At approximately the same time, it was also being recognized that the development and installation of large scale CBIS was suffering from a variety of similar problems, ranging from cost and time overruns to lack of use or rejection. The United States Post Office's Postal Source Data System and the problems that plagued it throughout a decade (Dickson, Simmons, and Anderson, 1974), typify the CBIS implementation problems of that period. Such experiences led to another similar avenue of research, called CBIS or MIS implementation research.

These two avenues of research overlap to a great extent. First, they both deal with the introduction of a "new way of doing things" to the organization, and as such they both heavily rely on theories of change. Second, in many instances their products are very closely linked. In other words, the implementation of OR/MS models frequently involve the implementation of software applications that embody these models, which means that OR/MS implementations are closely related to MIS implementations. Consequently, research in one is closely related to research in the other. For example, the impact of individual differences between managers and system developers on implementation was initially studied in an OR/MS context (Churchman and Schainblatt, 1965). This concept was later heavily used in MIS implementation research, and also in later OR/MS implementation research (Huysmans, 1970; Doktor and Hamilton, 1973). Today, the influence of individual differences on MIS success is generally accepted and is still being researched. An excellent overview of the literature on this subject is available (Zmud, 1979).

Since DSS are in large part a synthesis of OR/MS and MIS, the implementation of DSS, while different, shares some common elements both with OR/MS and MIS implementation. In reviewing the literature on DSS implementation, one is therefore compelled to include the relevant aspects of both OR/MS and MIS implementations.

The OR/MS and MIS implementation literature, however, is very large. Since the mid nineteen sixties, a great deal of research has been done in order to identify the important factors influencing the success of OR/MS and MIS applications. Numerous empirical studies have been conducted to examine a host of variables deemed important in influencing the success of such systems. For example, as one literature review showed, by 1974, in a variety of OR/MS and MIS implementation studies, over 140 variables had been researched as factors influencing implementation success. For the purposes of this study, a subset of these variables, i.e., those that were thought to be relevant and important to DSS implementations, are reviewed below.

As should be apparent from the DSS definition given in Section B of this chapter, this study has a "user" perspective, rather than a "design" perspective. In other words, it looks at DSS implementation as experienced and evaluated from the users' point of view.

Consequently, the studies reviewed below include those that have investigated issues relevant to DSS implementations from a user perspective.

To add coherence and cogency, the relevant independent variables have been grouped into a framework of four categories: Decision maker/user characteristics, DSS characteristics, Decision Environment characteristics, and Implementation characteristics.

This grouping of independent variables is suggested here as a more suitable framework for studying DSS implementations than other MIS research frameworks proposed up to date. Since an excellent review of previous MIS research frameworks already exists (Ives, Hamilton, and Davis, 1980), and since the framework proposed here involves only a slight modification to the Ives, Hamilton, and Davis (IHD) framework, past MIS research frameworks will not be elaborated upon here. Table I.1 presents a summary of the notable MIS research frameworks so as to illustrate the way in which the proposed framework relates to the others and the modification to the IHD framework suggested.

The main difference between the IHD framework and the one proposed here lies in the separation of the Environment variables in the IHD framework into three groups of variables: Decision maker/user, Decision Environment, and Implementation characteristics. The need for this separation will become clearer when the main focus of this study is expounded in Chapter II. For the time being, suffice it to say that in our view, the proposed framework provides a more convenient way of representing and analyzing the contingent relationships between a

A FRAMEWORK FOR DSS	EXOGENOUS VARIABLES				ENDOGENOUS VARIABLES
	DSS CHARACTERISTICS	DECISION MAKER/USER CHARACTERISTICS	DECISION ENVIRONMENT CHARACTERISTICS	IMPLEMENTATION CHARACTERISTICS	DECISION MAKER/USER SATISFACTION SYSTEM USE
Gorry and Scott Morton (1971)	Programmed/Nonprogrammed	-	Levels of Managerial Activity Decision Structure	-	-
Chervany, Dickson and Kozar (1971)	Characteristics of the Information System	Characteristics of the Decision Maker	Characteristics of the Decision Environment	-	Decision Effectiveness
Mock (1973)	Information Structure Variables	Individual/Psychological Variables	Organizational/Interpersonal Variables Sociological and Environmental Variables	-	Decision Maker
Lucas (1973)	Quality of System	Attitudes Perceptions Personal Factors Decision Style	Situational Factors	-	System Use Performance of User
Mason and Mittroff (1973)	Evidence Mode of Presentation	Psychological Type	Class of Problems (Structured/Unstructured) Organizational Context (Operational Control/Management Control/Strategic Planning)	-	-
Ives, Hamilton and Davis (1980)	IS Characteristics	User Environment Characteristics	External Environment Organizational Environment	IS Development Environment IS Operations Environment	Development Effectiveness Operations Effectiveness Use Process Effectiveness
Jenkins (1982)	IS Characteristics (Input, Process, Output, Characteristics)	Human (Decision Maker) Characteristics (Demographic, Psychological, Style, Skills, Motivational)	Decision Task (Function, Level, Environment)	-	Human (Attitudes) Decision (Cost, Quality, Time) IS (Decision Aids, Hardware, Reports)

Table I.1

Comparison of MIS Frameworks

variety of variables. In other words, we feel that these relationships can be hypothesized and tested in a more meaningful way when the relevant variables are grouped into three categories as opposed to a single category.

One further comment about the selection of variables relevant to DSS implementation needs mentioning. While reading this next section, the reader will notice a lack of reference to the technical aspects of system development and design of DSS, i.e., development and design considerations that are invisible to the user e.g. the programming technique used. This omission is due not to their lack of relevance, but to empirical evidence showing that technical characteristics do not have a great impact on the implementation success of DSS. For example, empirical studies indicate that for systems of high complexity (which include many DSS), the technical dimension is relatively unimportant in influencing system success (Ginzberg, 1975, p. 227). Also, as one study found, lack of success in 90 percent of Management Support Systems i.e. DSS, could

> "... be attributed to managerial considerations of a non-technical nature- a much higher percentage than for software development projects in general." (Moore, 1979, p. 37).

In view of these and similar findings, the characteristics relevant and important to DSS implementation that are reviewed below, are primarily organizational and behavioral in nature.

1- Decision maker/user Characteristics

The variables under this category relate to the individuals who, in one way or another, interact with or use a DSS. An operational definition for the construct Decision Maker/User as used in this research, will later be given. Presently, however, this term is used to refer to individuals who either directly (i.e., as an intermediary) or indirectly (i.e., as a decision maker) use a DSS (not precluding decision makers who are hands on users). As such, any differences in their characteristics are likely to influence the success of the implementation of a DSS. This expectation stems from the fact that the importance of individual differences on both the design and the implementation success of MIS is recognized by many researchers (Lucas, 1975(b), p. 918; Zmud, 1979). In synthesizing the previous research on this subject, Zmud classified the important individual differences into three categories: cognitive styles, personality and demographic/situational variables (Zmud, 1979). To this classification, the present study adds a fourth category that is not totally independent from these three: beliefs and attitudes.

a- Cognitive Style refers to the relatively fixed patterns with which individuals experience the world e.g. analytic vs. heuristic. According to Witkin, cognitive styles can be defined as "...characteristic modes of functioning that we show throughout our perceptive and intellectual activities in a highly consistent and pervasive way" (Witkin, 1972, p. 2). The concept of cognitive styles and their potential influence on individual preferences has been found to be very appealing:

"... the cognitive style theme is of persistent interest and influence in MIS." (Keen and Bronsema, 1981, p.21)

The importance of this theme, particularly to DSS, is frequently mentioned (Benbasat, 1981), and furthermore it has been pointed out that

"... a very important characteristic of a DSS is that it provide the decision maker with a set of capabilities to apply in a sequence and form that fits each individual cognitive style." (Sprague, 1980, p. 13)

In spite of its appeal and the large number of research efforts it has attracted, the cognitive style concept has proven to be rather elusive as evidenced by conflicting results (Taylor and Benbasat, 1980). One of the few tentative conclusions that can be drawn from this research indicates that relatively structured, model based information systems are better suited to analytic individuals whereas more flexible query type systems fit heuristic individuals better (Benbasat and Dexter, 1979; Benbasat and Dexter, 1982). Recently, the usefulness of such conclusions and of cognitive style research in MIS as a whole, has also been seriously questioned (Huber, 1983; Robey, 1983).

Since cognitive style is a multidimensional construct, past research has used a variety of instruments in order to measure the various cognitive style dimensions. Although researchers have used different adjectives to name the dimensions investigated, these usually cluster around four types of cognitive styles on two dimensions, as shown in Figure I.3. The three models all use the information evaluation and

Information Gathering Dimension (Perception)

1 - Preceptive
(fitting data into preconceived categories)

2 - Convergers
(abstract conceptualizers and active experimenters)

3 - Intuition

1 - Systematic
(Using a structured approach to decision making)

2 - Assimilators
(Reflective observation and abstract conceptualization)

3 - Thinking

1 - Intuitive
(Relying on trial and error)

2 - Accomodators
(Active experimentation and concrete experience)

3 - Feeling

1 - Receptive
(Sensitive to the data themselves)

2 - Divergers
(Rely on concrete experience and reflective observation)

3 - Sensation

1 - McKenney and Keen, 1974
2 - Kolb, Rubin & McIntyre, 1979 (Kolb's Learning Style Inventory)
3 - Myers, 1962 (Myers-Briggs Type Indicators MBTI)

Figure 1.3

Two Cognitive Style Dimensions and Three Models the information gathering dimension as two axis. Along each dimension, an individual can be rated dichotomously or on a continuous scale, thus occupying a place in one of the four quadrants.

Somewhat related to cognitive styles, is individual differentiation in terms of cognitive complexity. Cognitive complexity has been defined as the amount of information a decision maker uses and the number of alternatives he/she generates from this information (Driver and Mock, 1975). Dichotomizing these two dimensions as low and high, four types of decision styles are identified: decisive, hierarchic, flexible, and integrative.

Pointing out the prevalence of conflicting results and the general state of confusion in the field, Benbasat and Taylor tried to clarify the subject of cognitive styles by concentrating on three styles that appear to have the greatest relevance for MIS design. These are: cognitive complexity, field dependent-independent and analytic/heuristic styles (Benbasat and Taylor, 1978). Furthermore, these authors also point out the similarities between field dependent/independent and analytic/heuristic styles. In view of these similarities and due to the fact that most of the cognitive style research has focused on the analytic/heuristic dimension, this dimension appears to be the most important one vis a vis both MIS and DSS research.

b- Personality variables or psychological attributes believed to influence an individual's information processing ability include dogmatism, conceptual structure, risk taking propensity, and aspiration level (Taylor, 1975(a)). Those believed to impact the design, implementation, and usage of MIS are listed by Zmud to include locus of control, dogmatism, ambiguity tolerance, extroversion/introversion, need for achievement, risk taking propensity, evaluative defensiveness and anxiety level. (Zmud, 1979). It is of course possible to extend this list further, but implementation research in this area is rather shallow and empirical findings linking even these factors to MIS success variables are practically nonexistent.

c- Demographic/situational variables include a wide range of personal characteristics such as intellectual abilities, knowledge about specific subjects as well as sex, age, experience, education, organizational level, etc. Most empirical research in MIS gathers some data on these variables. Depending on the research questions and the dependent variables of the research, personal and situational variables have been found to influence a system's usage with inconsistent results. For example, in one study, less time in the job position was found to predict high levels of use (Lucas, 1975(b)), whereas in another study more time in the job position was found to be significantly related to voluntary use (Fuerst and Cheney, 1982). In similar fashion, user's age, while significantly related to system use in one study (Lucas, 1975(c)), was insignificant in another (Fuerst and Cheney, 1982), and was found to predict only certain types of use in yet another (Lucas, 1975(b)). These findings are further confounded by conflicting results regarding whether or not age is related to an individual's information processing capabilities and/or decision quality (Kirchner, 1958; Birren, Jerome, and Chown, 1961; Taylor, 1975(b)). As far as educational background and experience with computer is concerned, several studies converge on the finding that experienced users are less influenced by computer generated information (computer printouts) than are inexperienced users (Koester and Luthans, 1979).

These contradictory results support the notion that personal and situational variables influence a system's usage and/or satisfaction in more complex ways than hypothesized in previous research. However, their influence could be clarified by properly controlling for a variety of intervening environmental factors.

d- Attitudinal Variables influencing implementation cover a broad range and are dependant on the three categories of variables described above and on a variety of environmental factors. Since no complete model explaining these influences exists, attitudinal variables are grouped here as a separate and fourth category of variables relevant to DSS implementation.

User attitudes have been widely researched both in OR/MS and MIS. They have been treated as independent variables influencing system success (where system success was defined as system use). Some studies found no relationship between attitudes and system use (Schewe, 1976). However, there is an abundance of empirical evidence suggesting that user attitudes do influence a system's usage (Lucas, 1975(c); King and Rodriguez, 1978; Robey, 1979; Swanson, 1982), a system's appreciation by the users (Swanson, 1974), and the perceived worth of a system (Robey, 1979). User attitudes have also been used as dependent variable measures of information value (Gallagher, 1974; Neumann and Segev, 1979; Epstein and King, 1982).

User attitudes can also be used as independent variables in studies that examine their influence on the implementation process. The implementation of CBIS and MIS has been studied as a change process. These studies usually adopt a normative change model such as the Lewin/Schein Model (Lewin, 1952; Schein, 1972), or the Kolb/Frohman Model (Kolb and Frohman, 1970), and examine user attitudes as they influence the change process and its outcome. The overall conclusion of these studies is that adequate handling of each step in these process models of change is necessary for successful implementation (Ginzberg, 1975; Galbraith, 1979; Zand and Sorensen, 1975). The results of these studies also indicate that favorable user attitudes can be used as predictors of client resistance to change (Manley, 1975), and of users' assessment of implementation success (Ginzberg, 1981(a)). Further findings also indicate that user attitudes are correlated with positive user behaviors towards the system (Maish, 1979), and system success as defined by usage (Lucas, 1978(b)) In addition, a system's contribution to decision quality and performance has also been found to influence system use (Ein-Dor, Segev, and Steinfeld, 1981). Finally, congruence between consultants' and users' expectations about a DSS was found to be significantly related to both user satisfaction and usage (Ginzberg, 1981(a)), and the creation of a felt need for change has been found important to the introduction of new concepts in an organization (Narasimhan and Schroeder, 1979).

Despite a few conclusions to the contrary (Alter, 1975, p. 146), it would be rather safe to accept that the implementation of DSS requires considerable amount of change:

> "Again, the results support the notion that a much greater level of change is required for successful implementation of DSS's than is needed for other types of systems." (Ginzberg, 1978(c), p.47)

> "This issue (necessity of commitment to change) should be particularly important for decision support systems, which typically imply a greater degree of change than do other information systems." (Ginzberg, 1981(b), p. 54)

The differing views of Alter and Ginzberg in this subject are due to their differing DSS definitions. Since Alter's definition covers a very broad range of applications, most of which reduce the decision making to a mechanical and routine activity, his contention that most DSS do not produce too much change is readily explained. The DSS definition used here (see Section B), however, implies a great amount of change for the individual. With that perspective in mind, it is apparent that user attitude variables, especially those related to user resistance to change, are very important to DSS implementation research.

2- DSS Characteristics

The influence of DSS characteristics on success have been widely researched. We can group these characteristics into two broad, somewhat overlapping categories: DSS interface characteristics and DSS characteristics related to implementation.

a- DSS interface characteristics refer to DSS characteristics visible to the user, and have been extensively studied. Most of these studies have been conducted in experimental settings, the most notable of which have become known as "The Minnesota Experiments" (Dickson, Senn, and Chervany, 1977). From a DSS perspective these can be categorized according to Zmud's classification of MIS design characteristics since he perceives MIS's organizational role as being one of decision support, i.e., DSS (Zmud, 1979, pp.968). Accordingly DSS interface characteristics are classified into the following two categories:

i- Information related characteristics of a DSS output. The dimensions found important in past research include timeliness, level of aggregation, completeness, accuracy, reliability, validity, frequency, currentness (Zmud, 1979, pp.968), clarity.and cost (Gallagher, 1974) of the information provided by the DSS output. These are generally thought to constitute the dimensions of the benefit or value provided by the information (Epstein and King, 1982; Zmud, 1978). They have been extensively used as surrogate measures of a system's success, either by themselves (Neumann and Segev, 1979), or in conjunction with additional success measures (King and Rodriguez, 1978). For DSS in particular, accuracy and relevance of output information have been found to have a strong effect on system success as defined by system usage (Fuerst and Cheney, 1982).

ii- Ease of use of the DSS. This category covers DSS characteristics which determine how easy, simple, and convenient it is for the users to use the DSS. Past research has investigated several dimensions of this concept, including the training and experience required to use the tool, the DP support required to use the tool, man-computer response times, query languages (Zmud, 1979) and the flexibility of the tool (Robey and Taggart, 1982, p.69). Among these, a dimension deemed critical for DSS success is flexibility (Sprague and Carlson, 1982).

b- The second category of DSS characteristics include aspects of a DSS that can be evaluated only with respect to the organization in which it is implemented. In other words, they are jointly determined by the DSS and the organization.

i- The novelty or familiarity of a particular DSS to the organization compared to existing DSS they are using. This can also be interpreted as one dimension of the degree of pioneering referred to by Ein-Dor and Segev (Ein-Dor and Segev, 1978(b), pp.1632). Although little empirical research has been done to investigate the influence of this variable on implementation outcomes, indications are that it is important (Alter, 1978).

ii- User multiplicity. This variable relates to the number of people using a DSS and the extent to which their requirements from the DSS are different from each other's. The contention is that a DSS serving too many people with different interests, i.e., high multiplicity, runs a high risk of implementation failure (Alter, 1979).

iii- The organizational issue that a particular DSS addresses. Despite the lack of empirical evidence on this variable, it is believed to have an important influence on the success of a system. The idea is that systems which address an important issue or problem of the organization stand a higher chance of being successful (Ein-Dor and Segev, 1978(b)) .

iv- The attractiveness of the DSS's cost/benefit profile (Radnor, 1979; Lucas, 1978(a)). This is an obvious, but often neglected, characteristic that bears on the success of a system. The main reason for this seems to be the difficulties associated with specifying the benefits of information systems, and especially DSS, either in advance, or during usage. (A discussion of these difficulties can be found under the section The Dependent Variable in Chapter II). Although there is empirical evidence indicating that the existence of measurable project objectives at the time of conception of the project is not related to various measures of success (Dickson and Powers, 1974), strong evidence suggests that the ability to specify the impact and benefits of a system is positively related to system use (Lucas, 1975(c)), and satisfaction (Hopelain, 1982). It has also been said that an inability to do so constitutes an implementation risk factor (Alter, 1979). Furthermore, studies also indicate that increases in perceived system operating cost correlate with decreases in intended use (Ein-Dor, Segev, and Steinfeld, 1981), and that perceived personal benefits from the system correlate with expected system worth and usage (Schultz and Slevin, 1973).

A related issue that could also influence a system's eventual success is the "fit" of the DSS within the existing portfolio of MIS projects (Radnor, 1979; McFarlan, 1982). However, empirical studies in this area are nonexistent.

v- The amount of change caused by DSS. DSS have been said to require "... a change that goes beyond <u>how</u> things are done and extends to <u>what</u> things are done." (Ginzberg, 1978(c), p. 40). which essentially means a change in the users' task definitions. An understanding of these changes and the ways in which users' relationships to and interactions with other people change is thought to be important to the successful implementation of MIS (Nichols, 1981). Empirical evidence also supports this view. For example, users' expectations of changes in executive decision making, effects on relations with others and changes in communication systems and interpersonal relations, have all been found to correlate significantly with expectations of system worth and with system use (Schultz and Slevin, 1973). In addition, willingness of those involved to make the necessary changes, has also been found to influence user satisfaction (Ginzberg, 1981(b)). Since DSS cause even greater changes than MIS, it would be natural to expect the nature and extent of these changes to have an influence on the implementation success of DSS.

3- Decision Environment Characteristics

Decision environment characteristics are generally recognized to have an important influence on a MIS in general (Lucas, 1975(b); Huber, 1981). Their importance for DSS is also apparent:

> "... the essential assumption underlying Decision Support is that DSS must be built from the manager's perspective and based on a very detailed understanding of the decision process and organizational context." (Keen, 1980, p. 33).

Decision Environment characteristics can be classified into two broad categories.

a- The characteristics of the particular decision supported by the DSS. This category refers to the nature of the decision that a DSS deals with and can be analyzed from a variety of dimensions. However, empirical evidence suggests several dimensions which are important within the context of a DSS. These include: organizational level (Gorry and Scott Morton, 1971, Dickson, Senn and Chervany, 1977) and the inherent structure, uncertainty and complexity of the decision (Gorry and Scott Morton, 1971). The organizational level of the users are thought to be an important consideration especially in the selection of an evaluation approach to assessing information value (Ahituv, Munro, and Wand, 1981; Gallagher, 1974).

b- The environmental context of a particular decision. This category covers an extremely broad range of variables related to the organization, industry, and other external factors that might have an influence on the particular decision supported by a DSS. One study suggests a classification scheme whereby the environmental context variables are categorized depending on whether they are uncontrollable, partially controllable, or fully controllable variables (Ein-Dor and Segev, 1978(a)). Subsequent research results on this subject, although contradictory, indicate the presence of an association between organizational size, organizational structure, and MIS structure (Ein-Dor and Segev, 1982), and the importance of organizational factors on MIS success (Narasimhan and Schroeder, 1979). Some of the variables relevant to DSS implementation and for which empirical evidence exists, include the key success factors of an organization (Rockart, 1979, Ein-Dor and Segev, 1978(b)) and management orientation to innovation (Harvey, 1970; Vertinsky, 1972). Recent evidence also shows that, the "managerial sophistication" of the MIS department (as defined in terms of progression through the stages of the Stage Theory (Nolan, 1974)), positively influences user satisfaction and system use (Cheney and Dickson, 1982).

4- Implementation Process Characteristics

DSS implementation process characteristics are determined by the policies, strategies, and procedures employed in the development and installation of DSS. As such, DSS implementation process characteristics overlap with the three categories of characteristics described above. For example, the nature and extent of user involvement is largely determined by the organizational policies and procedures employed during implementation. Thus, we can posit that user involvement is a characteristic of the implementation process. On the other hand, it would be difficult to make a strong case against classifying it under the Decision maker/user category, since the extent to which a user is involved in a DSS implementation is also a part of his characteristics. Similar arguments can be made to suggest that user training is also a decision maker/user characteristic, while top management support should be classified as a characteristic of the organizational context of the decision environment. The reason why all these characteristics have been put in the implementation category is that they are dependent upon, and are outcomes of, the policies and procedures adopted in carrying out the implementation process. In other words, DSS implementation characteristics are determined by conscious decision making within the organization whereas the other three categories of characteristics are more or less given in a particular situation.

The DSS implementation process characteristics reviewed here have been identified as important generic issues in MIS implementation (Zmud and Cox, 1979; Ginzberg, 1981(b)). These factors and some previous research that studied them, is listed below:

a- <u>User involvement</u> in implementation is among the most often quoted ingredients of implementation success (Hammond, 1974; Keen and Scott Morton, 1978, p. 196). Early empirical studies found that the extent to which users and system developers communicated correlated with the acceptance of OR/MS projects by management (Evan and Black, 1970), but did not correlate with user perceived usefulness of the projects (Drake, 1973). Evidence also exists to show that the extent of user cooperation and participation in implementation is related to success as defined by subjective judgement of researchers (McKinsey and Co., 1968), and as defined by expected system worth and usage (Schultz and Slevin, 1973). User involvement was also found to influence users' appreciation of a system (Swanson, 1974), and perceived involvement was found to correlate with positive behavior towards the system (Maish, 1979).

Further empirical evidence indicates that user initiation of projects leads to decreased user resistance to change (Alter, 1978). The findings of another study also suggest that participation in any phase of the development process leads to influence, which in turn leads to conflict; in addition, conflict resolution is achieved through participation and influence (Robey and Farrow, 1982). The relationships between the people involved in an implementation are also important (Hopelain, 1982), especially from a DSS perspective (Alavi, 1982). Lack of user involvement has also been identified as a major reason contributing to the failure of a DSS implementation (Rudelius, Dickson, and Hartley, 1982). In spite of the large number of studies that found user involvement to be a significant influence on success, what really constitutes user involvement is still unclear. For example, one study found that for an ill-structured MIS design, a user-designer interaction process whereby an initial sharing of information and mutual suggestions were followed by a critique of each other's suggestions, led to a greater learning and system understanding on the part of the users than did a traditional interaction process whereby the designer asked questions of the user, analyzed the data and made suggestions (Boland, 1978). This experiment shows that what needs to be considered is not only the extent, but also the nature of user involvement in implementation. As one study suggests, user involvement might be more complicated a concept than is generally thought (Olson and Ives, 1981). There may be different types of involvement each influenced by organizational and individual factors.

b- Top management support is also frequently quoted together with user involvement as a strategy to increase the likelihood of implementation success (Keen and Scott Morton, 1978, p.196). As with user involvement, abundant evidence exists confirming this relationship (Smith et. al., 1973; Bean et. al., 1973; Zand and Sorensen, 1975; Maish, 1979). Further studies indicate that top management support influences user attitudes towards a system which in turn influence system usage (Lucas, 1978(b)). At least one case study identifies lack of top management support as a major reason contributing to a DSS's fall into disuse (Rudelius, Dickson, and Hartley, 1982).

c- User training is also an implementation characteristic often studied in implementation research. It is hypothesized to be an important consideration for DSS (McLean and Riesling, 1980), and has been found to have a strong effect upon general DSS usage (Fuerst and Cheney, 1982). For DSS, it is suggested that user training include not only system-related training (e.g. how to produce an output), but also task-related training (e.g. how to use this output within the task context) (Ginzberg, 1978(c)).

d- System development approach essentially includes the implementation characteristics described above since the approach taken in system development determines in part the extent and nature of both user involvement and training. Furthermore, top management support is related to the system development approach since it influences what approach is taken in a given implementation. System development approach is listed as a separate characteristic here in order to increase the clarity of the presentation.

Previous research indicates that the implementation strategy followed is an important determinant of success, and should be contingent upon the particular situation at hand (Alter, 1979). Researchers seem to generally agree that in implementing DSS, a participative, evolutionary approach with an iterative nature would lead to better results than would the traditional life cycle approach to system development (Ginzberg, 1978(c); Lucas, 1978(c)).

"Although the systems development life cycle approach, with its iterative modification, has proven to be the single most useful approach to developing transaction systems and most MIS-oriented systems, we hold that its focus and purpose are inadequate for the task of building and implementing successful DSS." (Moore and Chang, 1983, p. 181)

A popular development and implementation approach advocated for DSS is usually called "Evolutionary Design", and is different from the prototyping approach suggested by some researchers for DSS (McLean and Riesling, 1980; Alavi, 1982). Its main difference lies in the fact that in evolutionary design, the initial simple system developed is actually used and slowly evolves by building upon it, whereas in prototyping the initial system (the prototype) is developed to clarify various design issues, after which the large system is developed.

Other system development approaches have also been suggested for DSS development. In addition to variations on the "Evolutionary Design" theme, such as "middle-out design" (Hurst et. al., 1983), "adaptive design" (Keen and Gambino, 1983), and "decision oriented design" (Stabell, 1983), the "Team Approach" is offered as a concept to ensure greater involvement and commitment by organizational members (Looander, Napier, and Scamell, 1979). It basically involves the forming of a team from three groups of interested parties (i.e. managers, department representatives, and IS professionals), and assigning appropriate responsibilities to each team during both project definition and implementation.

The system development approach is probably a major reason contributing to the turnover rate of project personnel which has been found to correlate negatively with system success (Drake, 1973; Smith et. al., 1973; Dickson and Powers, 1977), and as such is identified as an implementation risk factor (Alter, 1975). Another variable possibly influenced by the system development approach, concerns the technical and organizational skills of system developers. For example, the acceptance by management scientists of the responsability for achieving successful implementation (Harvey, 1970), and the management scientists' technical competence (Rubenstein et. al., 1968), have been found to influence the acceptance and successful implementation of consultants' recommendations. In addition, the OR/MS group's ability to work with managers has been found to positively influence user expectations of model use and worth (Schultz and Slevin, 1973), and the quality of the information system staff was found to correlate highly with positive user behavior towards a system (Maish, 1979).

Although the precise nature of the characteristics described in this section and the way they influence the outcome of a DSS implementation are still not very well understood, existing evidence provides a good indication as to what the important considerations in implementing DSS are.

D- SUMMARY

This chapter has presented a review of the literature on both DSS definitions and implementation.

Section B of the chapter included studies and discussions about what DSS are. These studies were classified into three categories. The first category reviewed definitions having a "functional" focus i.e. definitions that describe the functions that DSS perform, their objectives, how they are developed, how they are used and by whom they are used. The second category reviewed definitions which have a "product" focus in that they define DSS as a product. The third, and final, category discussed a DSS definition that has both a "functional" and a "product" focus. This definition was adopted for the purposes of this study.

In Section C of the chapter a review of the implementation literature on MIS, OR/MS and DSS was presented. This was done within a framework that classified the variables relevant to DSS implementation into four categories: characteristics of the Decision maker/user, the DSS, the Decision environment, and Implementation. For each category, characteristics relevant and important to DSS were reviewed together with the main existing research findings. Based on the categorization presented in this chapter, the next chapter develops and describes a research framework for studying DSS implementations.

CHAPTER II

DSS IMPLEMENTATION: A RESEARCH FRAMEWORK AND RESEARCH HYPOTHESES

A- INTRODUCTION

Wheresas previous research on implementation focused on either the process of implementation through case studies, or on factor studies of implementation success (Lucas, 1981(b)), current research is showing an increasing interest in the study of the relationships between variables that influence a CBIS implementation process and its outcomes. It appears that the factor and process studies of the past fifteen years have resulted in the accumulation of sufficient insight and empirical knowledge about implementation to enable researchers in this area to conduct investigations in greater depth.

The idea that the relationships and the contingencies between the variables influencing an implementation process are also very important is not new (Chervany, Dickson and Kozar, 1971; Mason and Mitroff, 1973). One of the most complete reviews of implementation studies states

> "Implicit in most factor research is the assumption that factors are universal- management involvement is always good, or the OR group's selecting the projects to be worked on is always bad. We contend that this is an unwarranted assumption, that the impact of a given factor will vary from situation to situation." (Ginzberg, 1975, p.59)

Despite the fact that this idea has also been repeatedly stressed by many other researchers (Benbasat and Schroeder, 1977, p.38; Hammond, 1979, p.36; McFarlan, 1982, p.15) empirical studies investigating the interactions between independent variables of an MIS implementation are very scarce. Those that have done so usually look at the MIS design variables in laboratory experiments. The reason for this lack of emphasis on contingencies is largely due to the exploratory nature of most of the earlier studies. These studies, however, have resulted in the identification of several important variables and have provided us with rich insight into the relationships that might exist between those variables. As a result, implementation research has now reached a stage where more refined and in depth field investigations can be undertaken. As a matter of fact several such studies are already underway and hold the promise of a better understanding of the implementation process.

The purpose of this study is to approach the problem of DSS implementation by focusing on the contingencies between important variables. As such, this part of the chapter presents a simple research framework to study DSS implementation. As should be apparent from the DSS definition adopted in the first chapter, the focus of this study has a "user" perspective rather than a "design" perspective. In other words, the framework upon which this research is built looks at DSS implementation as experienced and evaluated from the users' and/or decision makers' perspectives.

Section B of this chapter describes this framework. Section C of the chapter describes the research propositions derived from this framework. This description is accomplished by explaining the dependent variable, DSS Success, first. Then, the independent variables and the ways in which they are hypothesized to influence the dependent variable, are presented.

B- A RESEARCH FRAMEWORK

Past research on implementation has been frequently criticized for having overlooked some important considerations. The following quote summarizes this attitude:

> "1. Individual research efforts tend (necessarily) to focus on a few elements of the overall implementation problem, explicitly or implicitly ignoring others. The resulting frameworks are not sufficiently encompassing to deal effectively with most live implementation situations.
>
> 2. Few frameworks or recommendations are contingent. They tend to offer "universal" advice (such as "involve the user") rather than advice which varies with the situation.
>
> 3. Results are often presented conceptually, at a high level of generality; they are not operational. Relatively scarce are frameworks that show how to adapt these generalized implementation strategies to the needs of a given situation." (Hammond, 1979, pp. 35-36)

Among the earliest , and better known MIS frameworks that do not suffer from most of these shortcomings, is Mason and Mitroff's. They state:

> "...that an information system consist of at least one PERSON of a certain PSYCHOLOGICAL TYPE who faces a PROBLEM within some ORGANIZATIONAL CONTEXT for which he needs EVIDENCE to arrive at a solution (i.e. to select some course of action) and that the evidence is made available to him through some MODE OF PRESENTATION".

(Mason and Mitroff, 1973, p.26)

and thus identify the key variables of an MIS. A similar framework is given by Dickson, Senn and Chervany (1971), Other notable frameworks that have been proposed are those of Lucas (1973), Mock (1973) and Gorry and Scott Morton (1971). An excellent overview and critique of these frameworks is given by Ives, Hamilton and Davis (1980).

These frameworks generally imply several requirements which subsequent research needs to fulfill. These include the need to incorporate both human and information system variables, to investigate main effects and interactions, and to use several success criteria (Benbasat and Schroeder, 1977). However, while all of these frameworks are very useful in helping organize and focus many types of research efforts they neglect to explicitly emphasize the importance of contingent conditions. That contingencies are important is apparent. As Keen concludes:

> "Nonetheless, the conclusion to be drawn from both the wise old men and the factor research is not so much that we lack any basis for a conventional wisdom as that there are very few absolutes. It is this fact that makes it so hard to study implementation and learn better ways of increasing the chances of success. The contradictions Ginzberg found in the 14 studies suggest that implementation is a <u>contingent</u> process, meaning that the characteristics of the situation most determine the approach the implementor should take." (Keen, 1978, p.196)

One way to deal with contingencies is to focus on the congruence or fit between various characteristics of an information system, and several such suggestions have been made in the literature. These mainly fall into two categories.

The fit approaches in the first category emphasize the fit between the user, the task, and the system. One such fit framework is suggested by Robey and Taggart, who in a recent article, after reviewing the cognitive style research state:

> "These findings suggest that information support should fit both the objective demands of the task and the cognitive style of the user." (Robey and Taggart, 1982, pp.68)

Their framework of fit is shown in Figure II.1 which is reproduced from their article.

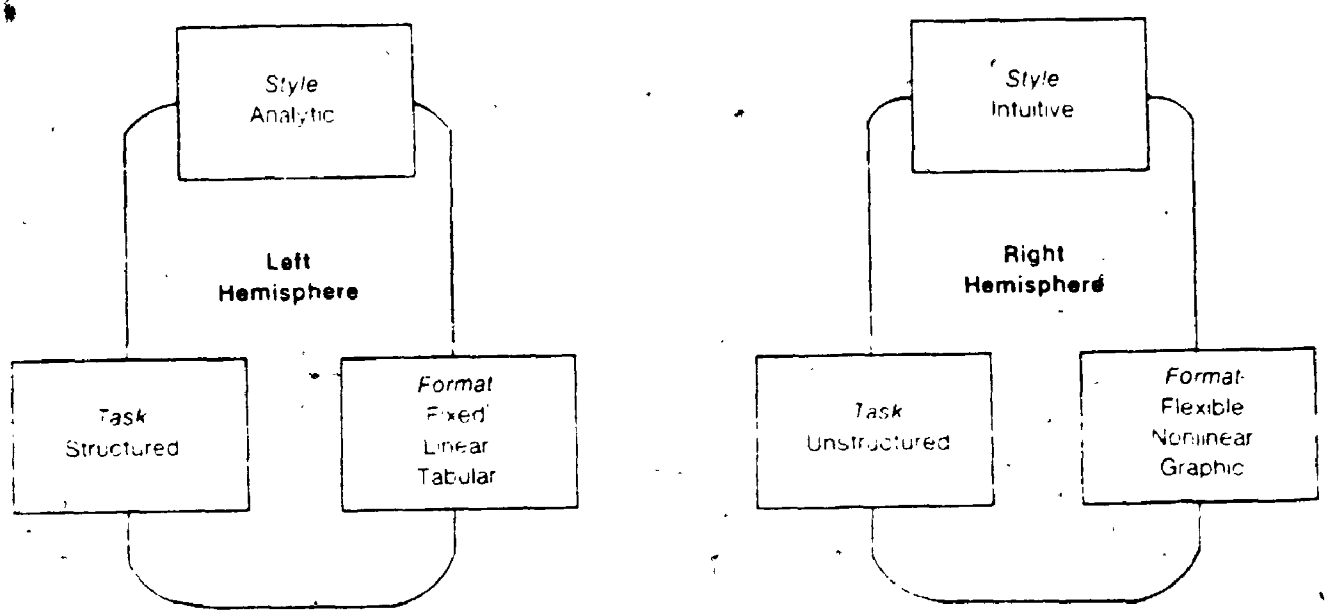


Figure II.1

(from Robey, D. and Taggart, W., "Human Information Processing in Information and Decision Support Systems", MIS Quarterly June, 1982)

In explaining the meaning of fit they state that the above framework:

> "...suggests that structured tasks are best performed by

> analytical persons operating with structured data reports, consistent with both sets of findings discussed above".
> and that
> "...less structured tasks are best performed by non-analytic, intuitive problem solvers using a flexible, nonlinear, graphic system." (Robey and Taggart, 1982, p.68)

Furthermore, recognizing both the shortcomings and potentials of this framework, they also point out that

> "...human decision makers are potentially quite flexible and can shift their styles to fit the problem and/or information support provided. Further, most problem situations cannot easily be categorized as structured or unstructured. Most contain elements of both. The identification of mismatches among tasks, systems, and decision makers is unlikely to be as "structured" as implied in Figure II.1. However, the idea of fit can be a guiding principle for system design...". (Robey and Taggart, 1982, pp.68)

A similar contingency approach, in the same category, suggests that the fit between user, task, and system can be looked at in terms of users' cognitive complexity and the task's uncertainty and complexity. From an MIS and DSS design perspective, optimal designs are proposed for each decision style (as defined by an individual's cognitive complexity dimensions) contingent upon the amount of complexity and uncertainty of the decision maker's task (Driver and Rowe, 1979).

In an effort to bring existing MIS research together, a slightly different "fit" framework that focuses on "Individual Fit" and "Organizational Fit" has also been proposed (Ein-Dor and Segev, 1981). After examining previous MIS research and the variables that have been investigated by numerous researchers, these authors conclude that a "fit" framework that looks at the fit between an MIS and the organizational and individual variables provides the needed unifying conceptual structure for future MIS research.

The fit approaches in the second category have an implementation process perspective. Notable work in this area was done by Schultz and Slevin who proposed an approach called Behavioral Model Building to measure the fit between a model and the organization (Schultz and Slevin, 1975). They defined this fit as the difference between the required and actual states of the organization, or as the degree of organizational change required to implement the model. Schultz and Henry described Behavioral Model Building as a strategy whereby

> "... a formal assessment of the desired fit between a decision model and an organization is made and the change necessary to achieve this fit (or "organizational validity") is measured using instruments developed for this purpose. Organizational validity can be measured at the individual, small group and organizational levels as studies by Robey and Zeller (1978), Larreche (1979) and others have shown. Many of the determinants of implementation success can be evaluated within this framework, i.e. by evaluating the gap between desired (post-implementation) and actual (pre-implementation) attitudes, cognitive style, goals, communication patterns, organizational structure, and so forth." (Schultz and Henry, 1979, p. 7)

Alloway, in studying Temporary Management Systems, which are organizations set up to perform a temporary, one-shot, complex, unique, and important task for an organization, used the idea of fit to examine contingencies (Alloway, 1976). A major finding of this study was that the Project Approach balance, i.e., fit, with the needs of the Nature of Task and Organizational Context accounted for 72 percent of the observed variance in Composite Success.

The frameworks briefly reviewed above are particularly useful in studying the congruences between certain classes of variables in a given implementation situation. However, they are not comprehensive enough to take into account most of the important variables in most DSS implementation situations. To study DSS implementations, what is needed is a framework that includes both of the congruence perspectives described above. The framework in Figure II.2 incorporates both of these perspectives and is proposed as a guide to the study of DSS implementation.

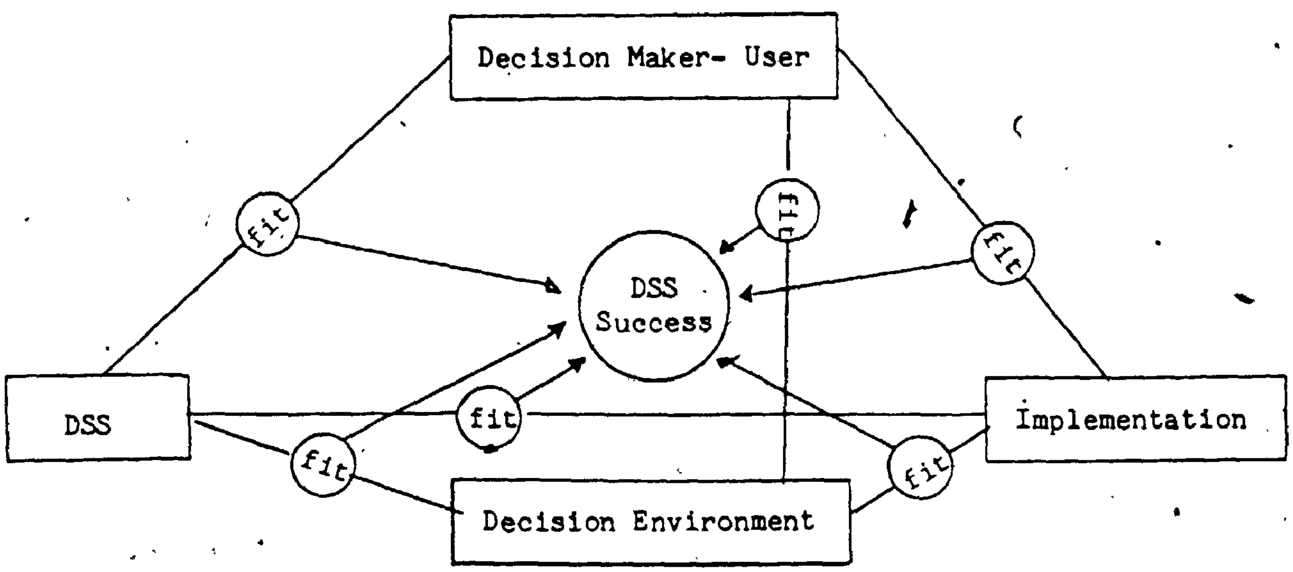


Figure II.2

A Framework For DSS Implementation

In verbal form the framework simply states that the success (however defined) of a Decision Support System depends on the congruence or 'fit' between the characteristics of the Decision Maker/User, the DSS, the Decision Environment, and the Implementation process. In other words, it is asserted that the "success" of a DSS is determined by the "goodness of fit" between the four constructs mentioned above. These are defined as follows:

Decision Maker/User is defined according to context and the definition of success being used. It is meant to refer, in most cases, to the person(s) who decide(s) how to interact with the DSS and what questions to ask.

DSS involves the data base, the model base, and the interface but can be defined as any or a combination of the three, again depending on context of use and the way success is defined. It is also possible to superimpose any of the three technology level definitions (DSS tool, DSS generator, Specific DSS, Sprague and Carlson, 1982) on top of the previous definition.

Decision Environment has two components. The first one is the particular decision(s) supported by the DSS. The second component consists of the organizational environment in which the particular decision(s) is(are) being made.

Implementation Process is defined as the strategies, policies and actions through which the DSS was installed or put to use in the organization.

The central theme of this framework can be described in a slightly different manner:

> "An artifact can be thought of as a meeting point -an 'interface' in today's terms - between an 'inner' environment, the substance and organization of the artifact itself, and an 'outer' environment, the surroundings in which it operates. If the inner environment is appropriate to the outer environment, or vice versa, the artifact will serve its purpose." (Simon, 1982, p.9)

Thus, if we view DSS as artifacts with the intended purpose of supporting decision making, and the constructs Decision maker/user, Decision environment, and Implementation process as the elements of the 'outer' environment in which DSS operate, then Simon's description tells us that this 'outer' environment should be appropriate to the 'inner' environment for DSS to serve their intended purposes. In this study, the "appropriateness" to which Simon refers is called "fit" in view of the fact that MIS researchers have referred to this concept as such.

The framework presented above is similar to that of Chervany, Dickson and Kozar (Chervany, Dickson and Kozar, 1971) but contains three important differences:

- When criticising the Chervany, Dickson and Kozar model Ives, Hamilton and Davis point out its two limitations. The first criticism is that their list of variables is not exhaustive. The framework proposed here does not have a predefined list of variables. Variables can be added and subtracted from the framework as research continues.

- The second criticism centers around the fact that the Chervany, Dickson and Kozar model "...focuses on designing the user interface and overlooks development process considerations". (Ives, Hamilton and Davis, 1980, pp.913). The framework proposed here, by taking into account the characteristics of the implementation process overcomes this deficiency.

- In addition to the above revisions, and more important, the present framework explicitly considers the congruence between variables that impact DSS success and as such constitutes a more complete framework for research in DSS.

The contingency model presented here is also similar to both Robey and Taggart's and Alloway's models in the sense that its main thrust concerns the idea of fit. Its important distinction is in the key improvement offered. Using Swanson's terminology (Swanson, 1982, p.157) we can view the Robey and Taggart framework as having an information perspective whereas Alloway's framework can be seen as having an implementation perspective. The framework presented here looks at DSS success from both perspectives.

At this point, the rationale behind the organization proposed in Section C of Chapter I, i.e. the splitting of the Environment variables category in the Ives, Hamilton, and Davis (IHD) framework into three groups, should be clear. From the variable descriptions presented up to now, it is apparent that characteristics of the Decision maker/user, the Decision environment, and Implementation are, in and of themselves, distinctly important for DSS implementations. In addition, the main thesis of this study stems from the belief that the "success" of DSS implementations is significantly influenced by the "fit" between these constructs. Since it is more meaningful to examine a fit relationship between different entities than it is to investigate fit relationships between components of the same entity, the categorization proposed here appears more appropriate for DSS implementations than the IHD categorization.

C- RESEARCH PROPOSITIONS

The research framework presented above facilitates the formulation of a number of propositions related to DSS success. Before discussing these, however, the dependent variable, DSS success, needs to be defined. This is done next, in Section 1, following which, in Section 2, the independent variables and the specific research propositions are explained.

1 - THE DEPENDENT VARIABLE: DSS SUCCESS

> "There have been several references to the 'success' of decision system without any attempt having been made at defining 'success'. Although academicians can duck such thorny issues, MIS managers cannot and they are being increasingly pressured to provide some rationale or justification for the DSSs they are sponsoring. 'Improved managerial effectiveness' is of course the justification most often offered; and if the cost of the proposed DSS is small enough, or if the intended user is willing to pay for it regardless of the cost, then this answer is usually sufficient, although not very satisfying intellectually. But better measurements must be found ......" (McLean and Riesing, 1980, p. 26).

As is apparent from the above quote, measuring the success of CBIS, and especially DSS, is not an easy task and numerous criteria have been proposed to measure this construct.

The reason for the difficulty of the task and the variety of measures proposed stem largely from two characteristics of information systems. First, information systems applications involve many people and therefore it is impossible to construct a normative measure of success. For example what constitutes success from the point of view of one user might not coincide with the success perception of other users, EDP departments, and top management. Second, information systems applications involve many dimensions ranging from the time and cost it takes to develop the applications to the quality of the output provided by the application. Consequently, devising a rigorous, widely acceptable and unidimensional measure of success is out of the question.

One way of organizing the variety of available means and approaches to measure success is provided by the conceptual hierarchy of system objectives proposed by Hamilton and Chervany who state:

> "One of the primary objectives of the MIS function is to develop and operate/maintain information systems that will enhance the organization's ability to accomplish its objectives. Accomplishment of this objective can be evaluated from two perspectives for a specific information system:
>
> 1- The efficiency with which the MIS development and operations processes utilize assigned resources (staff, machines, materials, money) to provide the information system to the user
>
> 2- The effectiveness of the users, or the users' organizational unit, using the information system in accomplishing their organizational mission." (Hamilton and Chervany, 1981, p.56)

Based on this perspective the authors classify different evaluation approaches according to the hierarchy of objectives shown in Figure II.3.

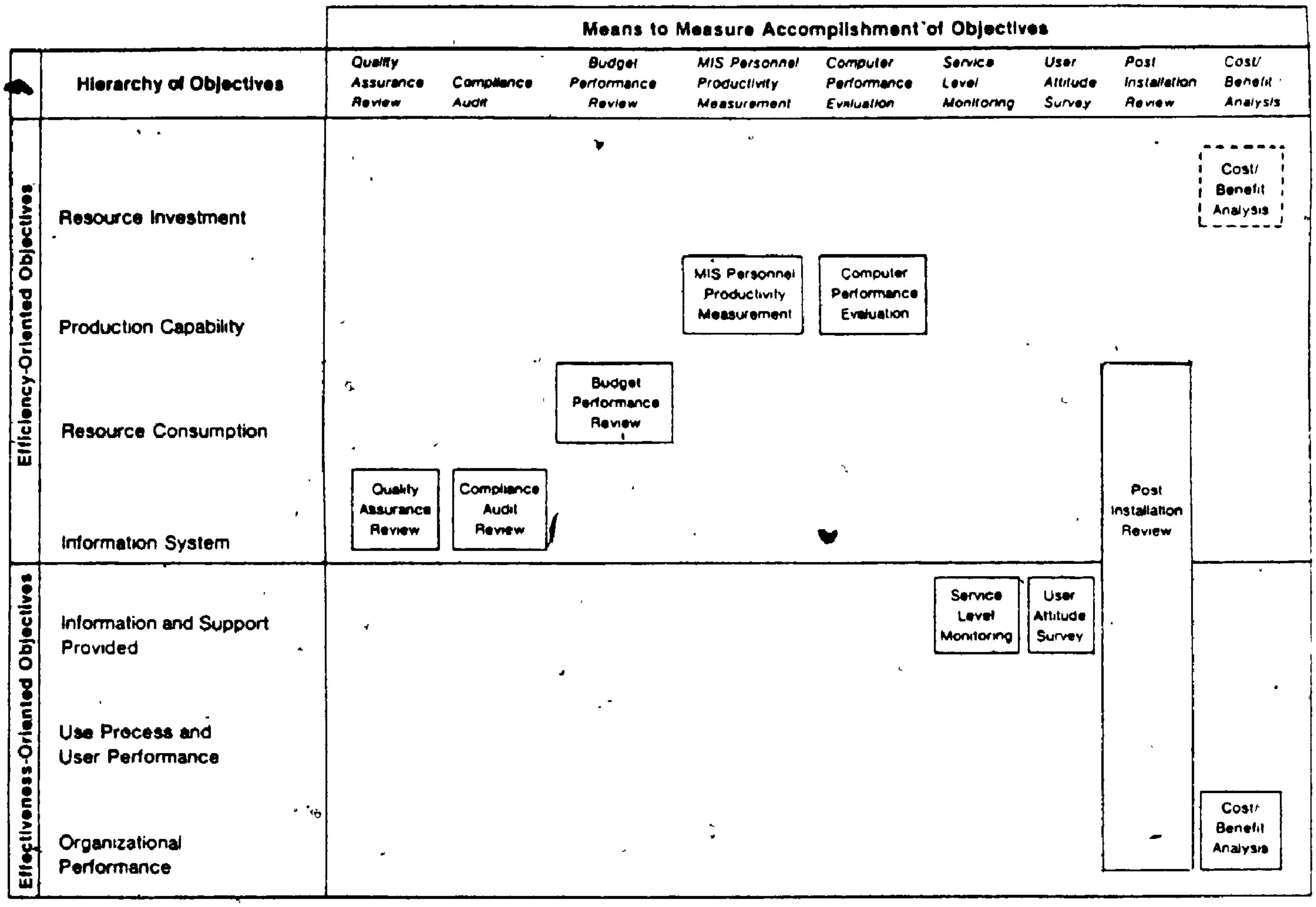


Figure II.3
(from Hamilton, S. and Chervany, N.L., "Evaluating Information System Effectiveness- Part 1: Comparing Evaluation Approaches", MIS Quarterly, September, 1981)

Putting the primary objective of the MIS function and the above framework together we see that, ideally, the success of a particular application should be measured with a cost/benefit analysis, in its broader sense. On this, many researchers agree (Ginzberg, 1978(a); Keen, 1975). The problem, however, lies in the meaningfulness of doing cost/benefit analyses when they involve extensive subjective judgements, especially with regards to the measurement of benefits. The difficulties of measurement become evident when we consider the types of benefits in question. For example, one study suggests the following six classes of benefits for CBIS (Knutsen and Nolan, 1974)

- Equipment displacement
- Reduction of personnel in DP tasks
- Increased operational efficiency in functional areas
- Increased sales
- Better managerial planning and control
- Other organizational impacts e.g. flexibility, job enrichment.

Ginzberg, in contrast, proposes a taxonomy of benefits with nine categories (Ginzberg, 1978(a))

- Record/Report required information (Mandated)
- Reduce information processing/handling costs (Efficiency)
- Improve asset utilization and control
- Improve planning process
- Increase organizational flexibility
- Promote organizational learning
- Provide greater accuracy in clerical operations, fewer errors
- Provide information on a more timely basis
- Provide new/more/better information

As can be seen from these classifications, each application is likely to offer a different mixture of such benefits that cannot usually be objectively measured. The difficulties associated with measuring the values of the different benefits are given by King and Schrems (1978) and can be summarized as follows:

- The natural unit of measurement may not be comparable across all benefits.
- Some benefits will be of different value to different people.
- The quantification of some benefits is, of necessity, highly subjective and subject to uncertainty.
- The benefits actually obtained may depend on the operating environment for the system (e.g. response time of the system may affect the value of the information it produces)
- Benefits are estimated at the start of a project but may change over the life of the system.

Consequently, the usefulness of cost/benefit analyses in evaluating system effectiveness is rather restricted to applications that provide more or less tangible benefits which can be reduced to a dollar measure relatively easily and objectively. In the case of DSS, the use of cost/benefit analyses seems especially difficult and fruitless to carry out:

> "Assessing benefits and costs in a DSS is an uncertain proposition at at best. Benefits are especially hard to assess, since they depend largely on the decision maker's perception." (Hurst et. al., 1983, p. 127)

> "Traditional cost-benefit analysis is not well-suited to DSS. The benefits they provide are often qualitative; examples cited by users of DSS include the ability to examine more alternatives, stimulation of new ideas, and improved communication of analysis. It is extraordinarily difficult to place a value on these. In addition, most DSS evolve. There is no 'final' system; an initial version is built and new facilities are added in response to the users' experience and learning. Because of this, the costs of the DSS are not easy to identify." (Keen, 1981(a), pp.1-2)

Figure II.4

Establish Value:

Define operational list of benefits:

e.g., solves urgent business problem,
provides a flexible tool for recurrent analysis,
makes planning data quickly accessible,
saves time in recurrent *ad hoc* reporting

Determine Cost Threshold:

Define maximum one would be ready to pay to gain the benefits
Determine if a prototype can be built that delivers the necessary capabilities

Build Version 0:

Define an architecture that permits the full system to be evolved from the initial Version 0
Define routines for prototype

Stage I

Assess Prototype:

Review benefits; revise and extend list
Review desired and obtainable capabilities
Define functional capabilities of full system

Establish Cost of Version 1:

How much will the full system cost?

Determine Benefit Threshold:

What level of benefits must be obtained to justify the investment in the full system?
What is the likelihood these can be obtained?

Stage II

Build Version 1

Evolve Version N

Review usage, evaluate new capabilities desired or obtainable
Establish cost
Determine benefit threshold

(from Keen, P.G.W., "Value Analysis: Justifying Decision Support Systems", MIS Quarterly, March, 1981).

To overcome these difficulties Keen proposes a "value analysis" approach to evaluate DSS. The approach involves prototyping and its key ideas are shown in Figure II.4 reproduced from Keen's article (Keen, 1981(a)). Being a low risk approach to project selection and implementation, such a prototyping approach is indeed pragmatic and has been advocated by practitioners also (Asner and King, 1981). Conceptually, this approach reminds one of the cybernetic Decision Making theory of Steinbruner. In describing this theory Steinbruner uses the analogy of a tennis player:

> "Even a careful observation of some human behavior impels one away from the analytic paradigm to account for it. Take the tennis player, for example. Balls fly at him from across the net at different speeds and in different trajectories. Usually, he must move to intercept them and do so in a very short time. The degree to which the skilled player can achieve such interceptions is much greater than would expected by chance. The moves of the tennis player clearly reflect decisions on his part, a fair number of which are successful in that they enable him to bring his racket in contact with the ball. Given what we know about the pace of the game and the intellectual characteristics of tennis players, it seems intuitively very implausible that the player makes his moves by estimating the speed and trajectory of the ball and by computing the probable intersection point given his own rates of movement. Few, if any, tennis players could provide the proper equations on demand." (Steinbruner, 1973, pp. 49-50).

Therefore, Steinbruner argues, similarly complex decision problems:

> "...seem to require a very simple decision mechanism but one with considerable logical power. The mechanism, whatever it might be, clearly solves problems of impressive difficulty and does it apparently with little burden on the decision maker. It is from considerations of this sort that a cybernetic paradigm of the decision process has begun to emerge - organized around notions of short-cycle information feedback and the elimination of uncertainty." (Steinbruner, 1973, pp.50).

Consequently we can view cost/benefit analysis as a product of the analytic paradigm, whereas Keen's Value Analysis can be viewed as a product of the cybernetic paradigm. Unfortunately, however promising value analysis may be in helping managers justify DSS, it does not explain much, if anything, about what makes a DSS successful. In particular, it helps a manager in tailoring a DSS to his own liking, but does not attempt to explain what the manager's liking is. Since there can be no explanation of DSS success without an explanation of what the manager's liking is, we have to turn to a measure of success that would enable such an explanation.

In MIS research, the most often used measure of system success seems to be intended or actual system "usage" (Swanson, 1974; Schewe, 1976; Lucas, 1978(b); Robey and Zeller, 1978; Robey, 1979; Maish, 1979; Ein-Dor, Segev, and Steinfeld, 1981; Fuerst and Cheney, 1982). However, in cases where use of the system is mandatory, system usage becomes inappropriate as a measure of success (Robey, 1979, p. 534; Olson and Ives, 1981, p. 184), and user satisfaction becomes the best alternative surrogate. As a substitute measure of system success, user satisfaction is also often used in MIS research (Ginzberg, 1975; Hopelain, 1982), especially when system use is mandatory (Lucas, 1978(a)). Nonetheless, this does in no way diminish either the value or the appropriateness of user satisfaction in measuring the success of either CBIS, MIS or DSS. In fact, for DSS, which usually involve voluntary use, user satisfaction might be a better measure of success than system use.

> "...with respect to MIS projects, it is our opinion that the user-satisfaction criterion is the most critical one of the four posited for the study.

> This conclusion stems from the nature of the MIS project as one oriented primarily to supporting managerial decision making. While it is desirable that any project be kept within time and budget constraints and that it not create undue problems for computer operation, the MIS project is a failure if the end product does not satisfy the manager whom it is to serve." (Dickson and Powers, 1974, pp.408)

These conclusions are indirectly supported by a survey of DSS where no significant differences between heavy users and light users of DSS were observed in terms of user perceived system effectiveness (Rivard et. al., 1980). Such a result could be explained by accepting that a system cannot be considered successful if, despite heavy use, users are dissatisfied with the system. Such a situation could occur if a particular DSS, with which users are dissatisfied, is the only alternative available to supporting a decision manually.

Going back to Hamilton and Chervany's framework in Figure II.3, we see that a user attitude survey is also appropriate for the present study. Since the objectives of a DSS are more effectiveness-oriented, than efficiency-oriented the means listed on the top half of the framework are ruled out. As the main purpose of this study is to explain DSS success with a view to using the model developed before implementing an application, the post installation review is also not suitable. The service level monitoring approach also does not apply (because it is mainly concerned with the evaluation of the quality of the service, e.g. response and turnaround times, provided to the users) and the reasons for excluding cost/benefit analysis were given above.

The discussion presented above clearly indicates that from the perspective of the research framework proposed in Section B of this chapter, the most viable mechanism for measuring system success is a user attitude survey. Furthermore, given the discussion made above, both "system use" and "user satisfaction" need to be included in the "success" measure as two dimensions. Before concluding this section, however, it should also be mentioned that, since the proposed framework has both an information and an implementation perspective, the appropriate success construct is one which includes users' satisfaction from both perspectives. In other words, the definition of user satisfaction which is appropriate to the framework presented, involves satisfaction with both the information output of a DSS, and satisfaction with the way in which the DSS was implemented. The specific way in which this construct is made operational in this study is described in Chapter III.

2- THE INDEPENDENT VARIABLES

This section of the chapter presents the propositions derived from the research framework described in the first section. Before delineating these research propositions, we need to repeat the primary proposition underlying this research which states that the better the "fit" between the four characteristics of the framework, the more successful a DSS will be. The propositions to be shortly described are related to various dimensions of this overall "fit". Since the empirical investigation carried out in this study is a first step in examining the relationship between the idea of fit and DSS success, the propositions generated from the framework involve only the first order fit relationships between the four groups of characteristics. In other words, the fit propositions that follow look at the fit relationships between Decision maker/user, DSS, Decision environment, and Implementation, taken two at a time, thus generating six fit categories. The investigation of higher order fit relationships i.e. between categories taken three and/or four at a time, is left to future research.

Based on previous empirical and theoretical research, and common sense, it is possible to determine a number of specific relationships that could characterize a fit for each category. What follows, is then a description of various specific fit relationships for each category, and propositions regarding their influence on the dependent variable, user satisfaction. The way these propositions are made operational and the specific research hypotheses tested, are described in the following chapter on methodology.

a- The Fit Between Decision Maker/user and DSS

We can view the fit between a decision maker and a DSS from two perspectives: "design" and "implementation".

i- Design Fit

From a design perspective, previous research indicates that there can be various kinds of fit between cognitive behaviour and the information output from a MIS or DSS. One such fit was previously mentioned and it concerned an individual's decision making styles in terms of cognitive complexity (Driver and Rowe, 1979). A different kind of fit suggested by the cognitive style research, provides empirical evidence for certain contingencies between cognitive style and the nature of the information received (Benbasat and Taylor, 1978). Together, these can be used as an indication of the fit between the decision maker/user and the information characteristics of a DSS output.

Specifically, empirical evidence suggests that

> "... the use of decision aids or problem solving models is closely associated with the analytic/heuristic (field dependent/independent) dimension of cognitive style."

in a way which imples that

> "... analytics would be more willing to use an information system which employed models or mathematical optimization techniques". (Benbasat and Taylor, 1978, p.47).

Although the tentativeness of these conclusions and the contradictory nature of the evidence supporting them is frequently pointed out (Benbasat and Taylor, 1978; Huber, 1983), the findings accumulated up to now seem to indicate that

> "structured/aggregate reports are preferable for high analytic decision makers, and database inquiry systems... are preferable for low analytics" (Benbasat and Dexter, 1979, pp.747).

> "For example, the analytical decision maker may prefer a

> decision support system containing models, while the heuristic decision maker may prefer a data analysis facility to support inductive problem solving." (Lucas, 1981(a), p. 767)

These findings suggest that, in general, analytics prefer to use structured systems while heuristics prefer to use somewhat less structured systems (Robey and Taggart, 1982). This leads to the proposition that one dimension of the design fit can be the fit between an individual's cognitive style and the structuredness of the DSS he/she is using.

At this point what is meant by DSS 'structure' needs to be clarified. DSS are inherently structured systems in view of the fact that, as defined here, they are computerized. Consequently, the term DSS structure appears to be redundant. For lack of a better name, this term is used throughout this study to mean the extent to which the DSS leaves the decision making to the user. DSS that literally make the decision are referred to as structured DSS while systems that leave all the decision making to the user are referred to as unstructured DSS.

PROPOSITION 1- The better the fit between the decision maker/user and the DSS, as measured by the extent to which analytic decision makers/users are provided with structured DSS and heuristic decision makers/users are provided with unstructured DSS, the more satisfied the decision maker/user will be.

ii- Implementation Fit

Previously reviewed process studies of implementation identify user resistance to change as an important variable, especially in the early stages of implementation e.g. in the "unfreezing" stage of the

Lewin/Schein model. In fact, the whole idea of the unfreezing stage, is to decrease users' resistance to change, so that the "moving" and "refreezing" stages can be accomplished more easily. The change literature then provides various strategies and tactics to help decrease this resistance to change. In trying to answer the question "why do people resist change?" Lorsch and Kotter observe that

> "People generally seem to resist change that threatens their psychological contract. Unconsciously, when people sense that some change will result in a loss to them with no compensating gain in their contract, in a new contract that demands something they can't do, or in the replacement of the current acceptable contract for an uncertain one in the future, they tend to resist." (Lorsch and Kotter, 1976, p.2)

Since a DSS is likely to bring extensive changes, indeed, that is the main purpose of it (see earlier discussion in Section C of Chapter I), we could speculate that resistance to DSS should be high. That this is not necessarily so is readily explained by the fact that users do not always perceive the changes a DSS brings as being negative. On the contrary, they might perceive extensive gains in using a DSS. In such instances

> "... they not only accept change, but they are a positive force in helping to bring it about." (Lorsch and Kotter, 1976, p.2)

It therefore becomes important to recognize the fit between the amount of change that a DSS will bring and the extent to which users perceive a net loss or gain from these changes. If we assume that their perceived loss or gain is outwardly expressed as resistance or willingness to change, we can state the following proposition:

<u>PROPOSITION 2</u>- The better the fit between the decision maker/user and

the DSS, as measured by the extent to which there is a match between the amount of change the DSS brings as perceived by the decision maker/user and the degree to which the decision maker/user is willing to undergo those changes, the more satisfied the decision maker/user will be.

For example, if a DSS is going to cause extensive changes and the users feel they are not willing to go through those changes, then there obviously is a misfit contributing to a high risk of implementation failure. On the other hand, if, for a similar DSS, the users are ready to undergo the changes the DSS will bring, then chances for the users to be satisfied are increased.

b- The Fit Between Decision Maker/user and Decision Environment

From an implementation perspective of a DSS, the interaction between decision maker/user willingness to change, and the structuredness of the decision with which the DSS deals, could impact implementation success. In other words, willingness to undergo the changes that a DSS brings would in general facilitate the implementation process, but would be more crucial for DSS that support unstructured and complex decisions since such systems usually involve greater degrees of change for the user, and thus run a greater risk of implementation failure. We can therefore formulate the following proposition:

PROPOSITION 3- The better the fit between the decision maker/user and the decision environment, as measured by the extent to which a DSS supporting less structured decisions is provided to a decision maker/user with high willingness to change and a DSS supporting more structured decisions is provided to a decision maker/user with low willingness to change, the more satisfied the decision maker/user will be.

c- The Fit Between Decision Maker/user and Implementation

This congruence can be viewed as one measure of how well the change process is carried through. Previous research linking these two factors has mainly centered around the cognitive style differences between users and designers (Gingras and McLean, 1979) and on the effect of cognitive differences on a priori involvement (Edstrom, 1977; Zmud and Cox, 1979) where the presence of cognitive style differences between users and designers is seen as a major impediment to successful implementation (Kaiser and Srinivasan, 1982). However, since a priori involvement in MIS design has consistently been found to correlate positively with user satisfaction with a MIS (Dickson and Powers, 1974; Lucas, 1975; Maish, 1979; Swanson, 1974) together with top management support (Manley, 1975; Lucas, 1978(b); Ginzberg, 1978(b)), two measures of congruence seem warranted.

i- User Need Fulfillment

The first of these is the congruence between the amount of training, top management support and involvement that the decision maker/user felt he/she needed, before the system was built, to make the DSS effective, and the extent of training, top management support, and involvement provided during implementation. In other words, it is hypothesized that DSS success is influenced by the extent to which pre-implementation user perceived needs with regards to training, support and involvement are satisfied. This follows from the reasoning that if we are using user satisfaction as the measure of success, then it is natural to expect that satisfaction with fulfillment of their perceived implementation needs will influence the decision maker/user's final satisfaction with the system. Stated differently,

PROPOSITION 4- The better the fit between the decision maker/user and the implementation process, as measured by the extent to which decision maker/user perceived needs with regards to training, involvement and top management support are fulfilled by the actual perceived amount of training, involvement and top management support provided during implementation, the more satisfied the decision maker/user will be.

ii- Appropriateness of Unfreezing

The second congruence is that between decision maker/user willingness to change versus user involvement and top management support provided during implementation. This rather obvious relationship is readily explained by the previously mentioned theories of change; training and involving the users in the various stages of the project, and providing top management support, are long established implementation strategies which, among other things, serve to decrease users' resistance to change. It would therefore be natural to suspect that the influence of these implementation strategies should depend on the extent of user resistance to change. In other words, we would expect that a decision maker/user who has a low willingness to change, will need to perceive a greater amount of top management support for the DSS and experience a greater amount of self involvement in the implementation process (compared to a decision maker/user having a high willingness to change) in order to be equally satisfied with a DSS. These ideas can be stated as

PROPOSITION 5- The better the fit between the decision maker/user and the implementation process, as measured by the extent to which the actual perceived implementation performance matches the degree of decision maker/user willingness to change, the more satisfied the decision maker/user will be.

d- The Fit Between the DSS and the Decision Environment

Since Decision Environment has been defined as including the characteristics of both the particular decision(s) which, the DSS addresses and the organizational context in which that/those decisions are being made, we can identify two dimensions of this congruence; one related to organizational context and one related to the particular decision(s) supported.

i- Organizational Fit

The first dimension of this congruence relates to the fit between the DSS and the organizational environment in which it is being used. One view in MIS contends that each organization faces a unique set of problems and opportunities thereby making it dangerous to attempt to duplicate the successes of others (McKinsey and Co., 1968; Ein-Dor and Segev, 1978). Based on this view one proposition states:

> "The more unique the situation, the greater the likelihood that duplication of an existing system will lead to failure" (Ein-Dor and Segev, 1978, pp.1634).

This implies that to increase the likelihood of success in more unique situations one would have to resist the temptation to duplicate other systems and adopt a pioneering approach by developing a system better suited to the particular requirements of the situation. It is therefore reasonable to expect that for a pioneering approach to succeed, management's general attitudes towards innovation should be favorable. Management orientation towards innovation has been found to correlate with OR/MS project success (Harvey, 1970), and the findings of Harvey's study indicate that managements that have created

> "...a climate that encouraged innovation throughout the organization".

had a higher rate of successes than organizations where management had created

> "...a generally negative attitude towards actions involving the kind of bold attitudes that encourage the breakthrough mentality, as contrasted with the climate that favors waiting until someone else has tried a new approach and proved that it is all it claims to be" (Harvey, 1970, pp.B318).

Consequently, we suggest the following proposition:

<u>PROPOSITION 6</u>- The better the fit between the DSS and the organizational environment in which it is used, as measured by the extent to which a DSS involving a great degree of pioneering is implemented and used in organizations whose managements have favorable attitudes towards innovation, the more satisfied the decision maker/user will be.

This congruence is yet another dimension of Alter's two risk factors previously mentioned, namely, inability to predict and cushion impact and loss or lack of support.

ii- Decision Fit

The second dimension relates to the fit between the DSS and the particular decisions it supports, and contains the following two components:

ii.1- Decision Structure Fit

Although as yet no empirical evidence has been provided, it seems that the congruence between the stability and structuredness of the decision environment and the structuredness of the MIS would be an important factor in influencing MIS success. As Benbasat and Dexter point out

> "As the environment approaches the programmable end of the decision continuum or as the uncertainty in the decision environment decreases, the "value" approach (structured/aggregate) seems warranted. On the other hand, as uncertainty about the controllable factors in the environment increases or if the decision-making process is not well understood, the "events" approach (i.e. data-base inquiry systems) may be more suitable". (Benbasat and Dexter, 1979, pp.747)

An important difference between the "value" and "event" approaches is the flexibility they provide to the decision maker/user in analyzing a decision problem. The "events" approach enables the decision maker/user to view the problem in more ways and detail than the "value" approach which restricts the decision maker/user to preconceived ways of analysis that are difficult to change. Thus, the "events" approach appears as being more flexible than the "value" approach.

Translated into the fit concept of this study, the above quote can be expressed in proposition form as:

<u>PROPOSITION 7</u>- The better the fit between a DSS and the particular decisions it supports, as measured by the extent to which unstructured decisions are supported by flexible DSS and structured decisions are supported by structured DSS, the more satisfied the decision maker/user will be.

The DSS flexibility and the structuredness of the decision problem that the proposition refers to, are "as perceived by the decision maker/user". We agree with the view that decision structure is a relative concept and that it is in the eye of the beholder (Keen and Scott Morton, 1978, p.96). Stated differently

> "As we see it, a problem can only be considered more or less structured <u>with regard</u> to a particular decision maker, or group of similar decision makers, and at a particular point in time. In our experience there is simply no structure that can be identified with any decision-making problem independent of the decision maker." (Moore and Chang, 1983, p. 176)

ii.2- <u>Issue Fit</u>

The importance of designing a MIS around the critical success factors (CSF) of an organization is well known (Zani, 1970; Rockart, 1979). Although empirical evidence on this subject is lacking, several related propositions have been suggested:

> "Applications which contribute to MIS success provide benefits to the organization, directly or indirectly; are consistent with institutional criteria; address the major problems of the organization; and are consistent with the level of sophistication of the organization". (Ein-Dor and Segev, 1978, pp.1635)

Or alternatively

> "The use of an information system will increase when it is perceived as attacking a major problem of the organization, and will decrease if the problem is not perceived to be of great importance." (Ein-Dor, Segev, and Steinfeld, 1981)

A similar argument has been made for DSS:

> "Perhaps even more than for data processing systems, the support of the organization is critical to the success of DSS. The organization must recognize that the problem is important and must provide the resources necessary for its solution." (Hurst et. al., 1983, p.122)

If a DSS is addressing a CSF of the organization, then it would be natural to expect that the DSS's importance will be more readily recognized, hence increasing its chances of being successful. Consequently, we suggest the following proposition:

<u>PROPOSITION 8</u>- The better the fit between a DSS and the particular decisions it supports, as measured by the extent to which those decisions are similar to the critical success factors (CSF) of the department and/or organization, the more satisfied the decision maker/user will be.

Unlike previous propositions, Proposition 8 does not involve contingencies. The decisions supported by the DSS are either close to the CSFs or not. The influence this closeness might have on success does not depend on other variables.

e- The Fit Between DSS and Implementation

Depending on the characteristics of a MIS, the suitability of various implementation approaches have been widely researched and debated. Different approaches to information requirements analysis and system design have been advocated according to the nature of the MIS being developed. For DSS, the general agreement is that an iterative development approach seems to work best and is not so much dependent on contingencies

In addition, we can identify two congruences that might influence DSS success.

i- Implementation Management Fit

The general agreement on the importance of user training, user involvement and top management support in influencing MIS success was previously mentioned. What seems more important for MIS success, however, is their existence in cases where there is a multiplicity of users. In other words, while user training, user involvement, and top management support might be helpful in assuring MIS success in general, in cases where multiple users with incompatible interests and viewpoints exist, they become crucial.

<u>PROPOSITION 9</u>- The better the fit between a DSS and its implementation, as measured by the extent to which there is a correspondence between incompatibility of user requirements and interests, and user training, user involvement, and top management support in implementation, the more satisfied the decision maker/user will be.

In other words, it is suggested that a high degree of user multiplicity and a low degree of implementation performance represents a bad fit and influences success negatively, whereas a low degree of user multiplicity and a high degree of implementation performance have a positive influence on success.

One indicator of how well the implementation process has been managed, is the resulting turnover rate of people involved with the design and implementation of the DSS. Turnover rate of project personnel has been found to negatively influence OR/MS implementation success (Dickson and Powers, 1974, Drake, 1973). This is recognized by Alter as an implementation risk factor which he calls disappearing users, implementors or maintainers (Alter, 1979). That high turnover rates of users/implementors/designers would have an adverse effect on DSS is obvious but what has to be taken into account is the amplification of those negative effects in the case of multiple users with incompatible interests. In such cases successful implementation heavily depends on continual cooperation and communication between and among users and implementers. A high turnover rate of people involved is bound to disrupt the communication process, thereby increasing the likelihood of implementation and project failure.

f- The Fit Between the Decision Environment and Implementation

The importance of user involvement and top management support on successful OR/MS and MIS implementation is generally an accepted fact supported by an abundance of empirical evidence (Ginzberg, 1974). Also accepted is the fact that as the decisions with which MIS applications deal become less structured, more complex and uncertain, the benefits of the applications become less tangible and defining user requirements become more difficult. Obtaining user involvement and top management support in such cases is therefore crucial for successful implementation (Ginzberg, 1978(c), p. 49). Consequently the following proposition is suggested:

PROPOSITION 10- The better the fit between the Decision Environment and the Implementation process, as measured by the extent to which there is a correspondance between the lack of structure in the decisions supported by the DSS and the extent of user training, user involvement, and top management support provided during implementation, the more satisfied the decision maker/user will be.

D- SUMMARY

Chapter II has presented a research framework, to study DSS implementation and delineated several research propositions derived from this framework.

In Section B of the chapter, a framework focusing on the congruence relationships between the four categories of characteristics described in Chapter I, was suggested. This framework proposes that the success of a DSS is heavily influenced by the overall fit between the characteristics of the Decision maker/user, the DSS, the Decision Environment, and the Implementation process.

Section C of the chapter presented the research hypotheses addressed in this study. In Part 1, after discussing the suitability of various dependent variables, user satisfaction with the information and implementation aspects of a DSS was defined as the dependent variable for this study.

Based on threads of empirical evidence and suggestions from previous research, Part 2 of Section C presented ten propositions regarding the contingent relationships between selected variables taken two at a time. A summary of the variables included in the propositions and a summary of the hypothesized fit relationships are presented in Table II.1 and Table II.2.

I- Decision Maker/User

I.1- Cognitive Style
I.2- Willingness to change
I.3- Training needs
I.4- Involvement needs
I.5- Top management support needs

II- DSS

II.1- Flexibility
II.2- Degree of pioneering
II.3- Changes caused
II.4- Issue addressed
II.5- Multiplicity
II.6- Structure

III- Decision Environment

III.1- Critical success factors
III.2- Decision structure
III.3- Management attitude towards innovation

IV- Implementation

IV.1- Decision maker/user involvement
IV.2- Top management support
IV.3- Decision maker/user training
IV.4- Turnover rate of project personnel

Table II.1

Variables Included In The Propositions

<u>I- Decision Maker/User vs. DSS</u>

Variables I.1 and II.6
Variables I.2 and II.3

<u>II- Decision Maker/User vs. Decision Environment</u>

Variables I.2 and III.2

<u>III- Decision Maker/User vs. Implementation</u>

Variables I.3 and IV.1
Variables I.4 and IV.2
Variables I.5 and IV.3
Variables I.2 and IV.1
Variables I.2 and IV.2
Variables I.2 and IV.3

<u>IV- DSS vs. Decision Environment</u>

Variables II.2 and III.3
Variables II.1 and III.2
Variables II.4 and III.1

<u>V- DSS vs. Implementation</u>

Variables II.5 and IV.1, IV.2, IV.3, IV.4

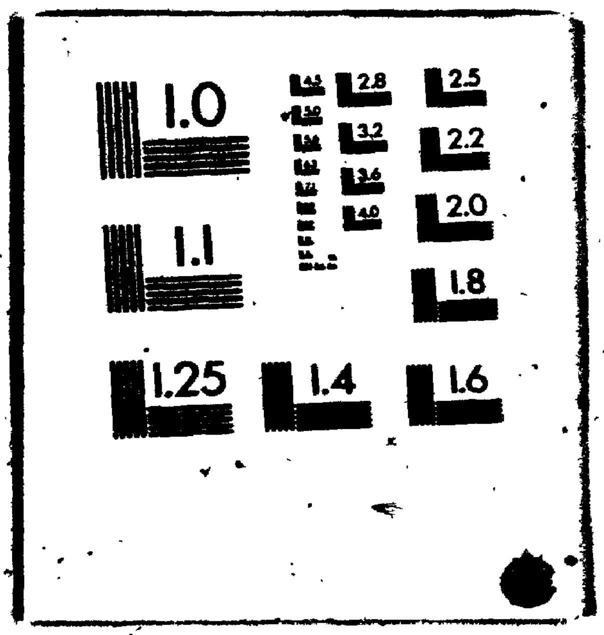
<u>VI- Decision Environment vs. Implementation</u>

Variables III.2 and IV.1, IV.2, IV[illegible]

Table II.2

Fit Relationships Between Variables

2



CHAPTER III

METHODOLOGY

A- INTRODUCTION

The purpose of this study is to test ten propositions derived from a research framework for DSS implementation success and from previous research. In the previous chapters this research framework was described and proposed as a guide to the study of DSS implementation, and from the framework, several research propositions were derived. In this chapter the methodology used in this study for testing these propositions is described.

The concept of fit and the ten fit propositions described earlier are defined here as interaction effects. In other words, all ten propositions postulate that interaction effects between the specific variable pairs involved have an important influence on DSS success. To test these propositions, the variables concerned were measured in a cross section survey of decision makers/users using DSS. In Section B of this chapter, the operational definitions of decision maker/user and DSS are described first. Since the questionnaire is the main instrument used to measure the variables of this study, these variables and the way in which they were operationalized in the questionnaire are also described in Section B. The sampling and data collection procedures are explained in Section C of this chapter.

To test nine of the ten propositions which involve multiplicative terms as interactions, a hierarchical procedure was followed. Although the testing and interpretation of interaction effects in nonexperimental designs is difficult,

> "... there appears to be general agreement that the analysis should be carried out hierarchically. That is, the cross-product vectors are adjusted for their correlations with the vectors representing the variables, but not the other way around. In other words, the purpose is to note whether the multiplicative, or joint, relations add meaningfully and significantly to the proportion of variance accounted for by the variables themselves." (Pedhazur, 1982, pp. 386-387)

Furthermore, following Pedhazur's suggestion that product terms in nonexperimental research be called "multiplicative" or "joint" relations (Pedhazur, 1982, pp.385), the product terms will, from now on, be referred to as "multiplicative" terms, variables or effects. The measurement of "fit" in Proposition 8 does not involve the creation of multiplicative terms. The testing of Proposition 8 simply involves the significance testing of the measured variable.

Choice of Research Design

Since implementation processes are closely related to their respective organizational contexts, a crucial requirement in DSS implementation research is the achievement of external validity. In other words, unlike research in DSS design, for instance, which can partly be carried out in laboratory settings, the study of DSS implementation needs to be carried out in the field because the organizational context in which the implementation of a DSS takes place plays an essential role in the outcome of that process.

In the simplest and ideal case, testing the interaction effects could be conducted with an orthogonal two factor experimental design in a field setting. With such a design, one would first test for the significance of interaction effects. If these were found to be significant, the analysis would then proceed to examine the nature of the interaction effects by doing multiple comparisons of the simple main effects. For example, to test whether the interaction effects of PROPOSITION 1 are significant, one might manipulate the two variables involved (i.e. cognitive style and decision structure) at two levels (e.g. high and low), thereby constructing a two by two contingency table such as Table III.1.

		Cognitive Style	
		Analytic	Heuristic
DSS Structure	Structured	+	-
	Unstructured	0	+

Table III.1

With an orthogonal design, the testing of interaction effects would be carried out by observing whether the proportion of the variance accounted for by the product term is significant after the main effects have been accounted for. If this variance is significant, the analysis would proceed with multiple comparisons of the four cell means in Table III.1. In Table III.1, the hypothesized influence on success of each cell i.e, simple main effect, relative to the influence of other cells, is indicated with a 0, -, or + sign. Thus, for example, one could formulate six hypotheses for the two-way comparison of the four cells in Table III.1:

H1: Analytic users working with structured DSS will be significantly more satisfied than analytic users working with unstructured DSS.

H2: Analytic users working with structured DSS will be significantly more satisfied than heuristic users working with structured DSS.

H3: Analytic users working with structured DSS and heuristic users working with unstructured DSS, will exhibit no significant difference in terms of their satisfaction.

H5: Heuristic users working with unstructured DSS will be significantly more satisfied than heuristic users working with structured DSS.

H5: Analytic users working with unstructured DSS will be significantly more satisfied than heuristic users working with structured DSS.

H6: Heuristic users working with unstructured DSS will be significantly more satisfied than analytic users working with unstructured DSS.

If these hypotheses were not rejected, than we could say that

- an analytic user working with a structured DSS or a heuristic user working with an unstructured DSS, represents a case of good fit;

- an analytic user working with an unstructured DSS represents a case of neither bad nor good fit;

- a heuristic user working with a structured DSS represents a case of bad fit;

- a case of good fit has a positive influence on satisfaction while a case of bad fit has a negative influence; furthermore a case of neither good nor bad fit has no influence on satisfaction.

Unfortunately however, designing and conducting a similar experiment in the field is practically impossible not only because of the usual difficulties associated with field experimentation, but also because of the impossibility of adequately measuring and manipulating most of the variables involved in this study. These measurement difficulties are due to the lack of reliable and valid instruments in MIS (Turner, 1980) to measure important constructs such as decision structure, DSS flexibility or user resistance to change. Even the most important variables - e.g., endogenous variables like "user satisfaction" - do not currently have perfected measures. Some recent work has been carried out to develop tested instruments for related problem areas (Ives, Olson, and Baroudi, 1982; Bailey, and Pearson, 1983) but much more effort is required here.

Conducting a longitudinal study provides an alternative to experimentation. In addition to enabling the drawing of clear cause and effect relationships, a longitudinal study of DSS implementation also provides the advantage of observing "unsuccessful" DSS. Unfortunately, the resources needed for a longitudinal study of a sufficiently large number of DSS implementations is very large. Especially from a timing consideration, locating and observing more than a few DSS before, during, and after implementation, would span several years. Given the constraints of this study, it was therefore decided to employ a cross section survey design, which, although methodologically weaker than a longitudinal study, was feasible within this study's resource limitations.

B- OPERATIONAL DEFINITIONS

This part describes the operational definitions used for the constructs DSS and Decision maker/user, and for the variables of the study.

1- DSS

In selecting the DSS to be included in the study, several objective and subjective criteria were used. Specifically, in order to be considered a DSS, the system had to be a software application that

1- had been developed with the specific purpose of supporting decisions;

2- was being used in supporting administrative decisions;

3- enabled the decision makers to evaluate alternative decisions;

4- was developed within the last three years but had been in use for at least six months.

The first criterion was needed in order to separate DSS that were developed with the intention of supporting decisions from those applications that had been in existence for a while until, say, somebody thought that it might be useful in supporting some decision. This separation ensured that the implementation characteristics of the DSS included in the study were implementation characteristics of developing DSS and not some other application.

By focusing on DSS that support administrative decisions as opposed to engineering decisions, the second criterion helped achieve some homogeneity in DSS and Decision Environment (and possibly Decision maker/user and Implementation) characteristics.

The third criterion requires an evaluation of the context in which the DSS is used, and as such is a very important factor in determining whether an application is or is not a DSS. For example, in one context, a linear programming package could be used to determine the optimal allocation of some resource on a regular day to day basis. In this context, the output of the LP package might constitute the decision itself or it might provide an input to some other decision. In another context, however, the same software package could be used to do post-optimality analysis leading to a purchasing decision, or it could be used in order to conduct 'what if' type of analyses by investigating, say, the effect of various parameter values on the optimal solution i.e. doing sensitivity analysis to investigate the impact of different decisions. Using Criterion 3, the LP package would be considered a DSS only in the second context.

In the final analysis, many kinds of DSS output serve to evaluate consequences of alternative decisions to a varying extent. In some cases this evaluation is done mostly by the decision maker, whereas in some other cases it is done by the DSS itself. The latter cases usually require the incorporation of some kind of a model into the DSS, and Criterion 3 provides the necessary screening so that DSS that do not make use of analytical models are excluded from consideration. Furthermore, Criterion 3 combined with the context of use helps screen DSS which use models but without leaving any decision making to the user. As a result, the DSS included in this study roughly correspond to DSS in categories 4, 5, and 6 in Alter's taxonomy (Alter, 1977).

The fourth criterion was intended to provide the necessary screening so that the selected DSS would be relatively new, but not so new that the decision maker/users were not yet familiar with its features. Unfortunately, however, it became apparent during data collection, that strict adherence to this criterion would have shrunk the sample size (or alternatively, would have increased the time and expenses required to maintain the sample size large enough). Consequently, the criterion was relaxed to include DSS that had been in use for more than three years.

2- Decision Maker/User

The typical (and maybe ideal) image of a DSS user is usually that of a manager sitting in front of a terminal and using the DSS to evaluate various alternatives in order to make a decision. Indeed such cases do exist and their number has probably increased in recent years. However, it is also very common to find a manager or assistant using a DSS in order to prepare and submit relevant (and processed) information to a superior so that the superior can make a decision.. In such instances it is not always clear who ought to be viewed as the "decision maker/user", i.e. whose individual characteristics most influence the success of the DSS.

In this study, the construct Decision maker/user is defined as the person who decides how, and for what, the DSS will be used in analyzing a decision problem. Defined this way, who this person is in a given situation depends on context. In other words, depending on the characteristics of a particular situation, this person can be either the decision maker or the intermediary. Specifically

- In cases where the person using the DSS is also the Decision Maker, then Decision maker/user refers to that person.

- In cases where the person using the DSS does not make the final decision, but prepares processed information to be presented to a decision maker (who does not interact in any way with the DSS), then Decision maker/user refers to the person using the DSS i.e. the "intermediary".

- In cases where the decision maker does not directly interact with the DSS, but makes use of an intermediary who uses the DSS to process information according to specific requests for output of the decision maker, then Decision maker/user refers to the decision maker.

The distinction between the second and third categories can be made more clear with an example. A common way in which DSS were used in the organizations visited was through intermediaries. These were junior or, in some instances, senior managers cognizant of the various aspects of the decision problem and also of the potential ways in which the DSS could be used to support those decisions. Although these intermediaries were not the ultimate decision makers, they provided valuable input and often made recommendations to the final decision makers. These individuals fit the definition of Decision maker/user made here, and form part of the "right" respondent group. Another common way in which DSS were used in the organizations visited, was through "operators". These operators were generally individuals with systems and computer expertise located in user departments. They helped develop and enhance the applications being used in their department, and very frequently "ran" the DSS based on the specific requests of their superiors. They usually did not know what the particular decision making situation was, but once told what kind of output was requested, they knew where and how to get the input data, and make the necessary modifications to both the data and the DSS, in order to provide the output information. According to the definition of Decision maker/user made here, the "right" respondents in this situation are the superiors who requested the output, not the operators.

A classification similar to the operational definition of Decision maker/user made above has been previously noted (Alter, 1975, p.122). Such a definition essentially enables the separation of those who "decide" how to use the DSS from those who do not, and as such provides an adequate operational definition for the construct Decision maker/user.

3- The Variables Measured

The questionnaire presented in Appendix A forms the basis of the operationalization of all the variables measured in this study. Some of these variables are not directly related to the propositions and the model presented in Chapter II, and will be described in Subsection b. Subsection a, which follows, describes the operationalization of the variables in the ten propositions and the model of success previously proposed.

It will be noted that most of the rating scales used in the questionnaire are known as semantic differential scales which use bipolar adjective pairs as anchors (Snider and Osgood, 1969). The semantic differential scale is widely used and accepted as a useful tool in the measurement of attitudes and other types of sentiments

(Nunnally, 1978). Since most of the variables of this study concern people's perceptions and attitudes, the semantic differential is particularly suitable. Furthermore, as will shortly be described, the dependent variable of this study is measured with an existing semantic differential instrument. In order to achieve consistency of form throughout the questionnaire, the semantic differential was consequently preferred over other forms of rating scales. The questionnaire also contains a number of Likert-type scales either because that is the form of the original instrument or because Likert-type scales were more appropriate for those particular questions.

a- Variables In The Model

A list of the variables included in the model is provided in Table III.2 together with their abbreviated names.

In describing the questionnaire items and the variables of the study, the following nomenclature will be used from here on. The individual semantic differential adjective pairs appearing in the questionnaire wil be referred to as items. A combination of scales or a single scale, both measuring a dimension of a construct, will be referred to as a question. Finally, a combination of items measuring a construct will be referred to as a composite variable or composite scale.

I- Decision Maker-User Characteristics

I.1- Cognitive style (COGSTYLE)
I.2- Willingness to change (WILTOCHG)
I.3- Decision maker/user involvement needs (INVNEEDS)
I.4- Decision maker/user top management support needs (SUPNEEDS)
I.5- Decision maker/user training needs (TRANEEDS)

II- DSS Characteristics

II.1- Flexibility (DSSFLEX)
II.2- Degree of pioneering (PIONDEG)
II.3- Changes caused (CHGCAUS)
II.4- Issue addressed (CSFSUPP)*
II.5- Multiplicity (MULTIP)
II.6- DSS Structure (DSSSTRUC)

III- Decision Environment Characteristics

III.1- Critical Success Factors (CSFSUPP)*
III.2- Decision structure (DECSTRUC)
III.3- Management attitude towards innovation (MGMTATT)

IV- Implementation Characteristics

IV.1- Actual decision maker/user involvement (ACTUINV)
IV.2- Actual top management support (ACTUSUP)
IV.3- Actual decision maker/user training (ACTUTRA)
IV.4- Turnover rate of project personnel (TURNOVER)

Table III.2

COMPOSITE VARIABLES IN THE MODEL

Note(*): Although separately measured, the variables "Issue addressed" and "Critical Success Factors" were combined to form a single variable measuring the closeness between the two. Called CSFSUPP, this variable will be described below.

i- User Information Satisfaction (UIS)

In Chapter II, decision maker/user satisfaction with the information characteristics of the DSS and its implementation was determined to be the most appropriate dependent variable for the purposes of both the framework proposed and the present study.

Measuring user satisfaction is an active research topic in MIS and it is generally agreed that the use of single item instruments in measuring such a complex construct is not adequate (Nunnally, 1978; Ives, Olson, and Baroudi, 1982). Consequently, numerous researchers have developed multi-item instruments that fit the particulars of their own studies(Turner, 1980). As a result the MIS field is currently lacking a widely accepted, validated instrument to measure user satisfaction.

To overcome this deficiency, a group of researchers has recently reviewed the existing literature on this subject, and has selected a 39 item instrument previously developed (Pearson, 1977; Bailey and Pearson, 1983) as the one most suitable for measuring user satisfaction. Having conducted further reliability and validation tests on the original instrument, these authors have proposed a refined and a shortened version to MIS researchers as one standard instrument (Ives, Olson, and Baroudi, 1982). Since the proposed 13 item short version of the instrument measures users' satisfaction with respect to both the information characteristics of a system and its implementation, it appears quite appropriate as an operationalization of the dependent variable of this study. Furthermore, should it be utilized by other researchers in future research, which is quite likely, it would increase the present study's contribution to the field since it would enable the comparability of results with other studies. Consequently the dependent variable of this research, Decision maker/user satisfaction with the information and implementation characteristics of a DSS, was measured with the short form of the User Information Satisfaction instrument developed by the above referenced authors.

Scoring

The thirteen scales (each item containing two adjective pairs thus giving a total of 26 adjective pairs or items) of this instrument appear in Section IV of the questionnaire in Appendix A. The direction of all items are reverse as indicated by the letter R in front of every item in Appendix A (here 'reverse' refers to items for which either the lower or the negative end of the scale is on the right, and 'forward' refers to items for which the lower or negative end of the scale is on the right). Accordingly, the right end of each item corresponds to low user information satisfaction and is given a score of 1, while the left end of the item is given a score of 7. The total UIS score is obtained by adding the scores of all items giving a range from a low of 26 to a high of 182. The total score is then divided by the number of nonmissing items to get an average value for perceived UIS, for each respondent, ranging from a low of 1 to a high of 7 provided no more than one third of the items are missing. If more than one third of the items have missing values, then the observation is deleted for that variable. This was done in order not to exclude respondents for whom some of the items were inapplicable.

ii- Cognitive Style (COGSTYLE)

As previously mentioned, defining and measuring cognitive styles is still a controversial issue. The existing validated instruments measure different dimensions of the cognitive style construct, and there is yet no agreement among researchers as to their appropriateness for use in MIS research. Nonetheless, from the point of view of relevance to MIS, empirical evidence suggests a convergence on two overlapping cognitive style definitions and their corresponding instruments: Witkin's Embedded Figures Test (EFT), and the Myers Briggs Type Indicator (MBTI) (Keen and Bronsema, 1981).

The present study is unable to utilize either of these instruments for the simple reason that they are very difficult to use in field settings. The length of the MBTI, which contains over 120 items, is prohibitively long for use in field settings, especially when other variables also need to be measured. The cognitive style variable is only one out of eighteen composite variables being measured in this field study, and the use of the MBTI would have more than doubled the length of the questionnaire. The EFT, on the other hand, requires the solving of puzzle type problems and the measurement of the time it takes the respondents to solve them. As such, obtaining cooperation and agreement from manager-respondents to take the test would have been extremely difficult (Benbasat and Taylor, 1978), and given the constraints of this study, inappropriate.

In view of these considerations, a much shorter pencil and paper instrument consisting of seventeen items was used. This instrument was developed as an important part of a PhD dissertation (Barkin, 1974), and has also been used in several field surveys (Lucas, 1981(a); Fuerst and Cheney, 1982). It distinguishes between Type I and Type II individuals, where these types correspond roughly to heuristic and analytic styles.

Scoring

The seventeen items of the instrument appear in Section VI of the questionnaire. The item directions are split with 9 forward and 8 reverse items, as shown by the letters F and R near each corresponding item in Appendix A. As described by the developer of the instrument (Barkin, 1974), in the case of forward items, a score of 1 or 2 is assigned a value of 0, while a score of 3 or 4 is assigned a value of 1. For reverse items, the scoring is reversed. According to Barkin, a total score of 8 or less corresponds to a Type II individual, and a total score of 9 or more corresponds to a Type I individual. In this study, the 0/1 total score of each respondent was treated as a continuous variable.

iii- Willingness to Change (WILTOCHG)

This construct refers to the willingness, on the part of the Decision maker/users, to undergo the various changes that they feel a particular DSS is likely to bring. Currently, instruments are not available to measure this construct, but previous research indicates some of its more important dimensions. These would include overlapping dimensions such as the nature of earlier experiences with DSS, the perceived need for change, the perceived uncertainties regarding the DSS, the perceived positive or negative impact of the DSS, the perceived adequacy of existing procedures for decision making.

From the point of view of the Lewin/Schein Theory of Change, resistance (or willingness) to change can be perceived as consisting of favorable and unfavorable forces affecting the "unfreezing" stage. Forces along the dimensions mentioned have been found to influence implementation success in the "unfreezing" stage, which in turn has been found to influence the eventual success of OR/MS implementations (Sorensen and Zand, 1975). Consequently, the construct "willingness to change", was operationalized with ten questions, developed by the investigator, measuring various relevant facets of these five dimensions. These questions appear in Section I of the questionnaire.

Scoring

As indicated by the letters R and F corresponding to each item in Appendix A, the 18 items are split 10 to 8 in terms of their directionality. In the case of forward items, the left end corresponds to low willingness to change and is given a score of 1 while the right end is given a score of 7. For reverse direction items the scoring is also reversed. For each respondent a value for WILTOCHG is obtained by taking the average of the nonmissing items so long as there are not more than one-third missing (i.e. not more than six items missing). From now on this procedure will be referred to as "the one third rule".

iv- Implementation Needs (IMPNEEDS)

Implementation needs refer to the decision maker/users' perceived needs with respect to the implementation process of a DSS. In this study, they are identified as important characteristics of the decision maker/users, characteristics that influence the success of DSS implementations. Three important dimensions of these needs are identified as training, involvement, and top management support. Specifically, the three dimensions, extent of training in the use of a DSS, extent of personal involvement in the implementation process, and extent of top management support that decision maker/users feel should be present in the implementation of a particular DSS, constitute the most important dimensions of decision maker/users' needs with respect to the implementation process. The three composite variables corresponding to these dimensions were labelled INVNEEDS, SUPNEEDS, and TRANEEDS.

Scoring

The specific needs along these three dimensions are operationalized by the second items in questions 1 through 7 in Section II of the questionnaire. Question 1 measures TRANEEDS, Questions 2 to 4 measure INVNEEDS, and Questions 5 to 7 measure SUPNEEDS. The left end of each item corresponds to a low level of perceived need for that particular implementation characteristic and is assigned a value of 1 while the right end is given a value of seven. A value for perceived IMPNEEDS is calculated, for each respondent, by averaging the scores for the seven items and applying the one third rule for missing items. A value for TRANEEDS, INVNEEDS, and SUPNEEDS is calculated in the same fashion but using only the corresponding items mentioned above.

v- DSS Flexibility (DSSFLEX)

Flexibility is a general term used to refer to a certain desirable characteristic of DSS. Sprague and Carlson argue that it has four dimensions or levels (Sprague and Carlson, 1982): The first dimension concerns the ability of the DSS to enable the decision maker/user to explore different ways of regarding or solving a problem, and therefore is of utmost importance for the decision maker/user. The second dimension of flexibility refers to the ease with which a DSS's composition or configuration can be changed or modified so that a different or expanded domain of problems can be analyzed. As such, it is the concern of both the decision maker/user, and the DSS developer. The third dimension of DSS flexibility concerns the addition or deletion of various types of capabilities to the DSS. This level of flexibility is "... the ability to adapt to changes that are extensive enough to require a completely different SDSS (Specific DSS)." (Sprague and Carlson, 1982, p.133). As such, it is of importance mainly for the DSS developer while being of relatively minor importance for the decision maker/user. Finally, the fourth dimension of flexibility refers to the system's ability to evolve with changing technology, and is the concern of the DSS developers who use DSS tools.

As this study takes a user perspective, only the first three dimensions of DSS flexibility are relevant. Furthermore, it is also evident that what we really need to measure is not the absolute flexibility of a DSS because ultimately, given enough time and effort, all DSS can be changed to adapt to changing conditions and requirements. What we need to measure is the degree of user perceived ease with which the DSS can be made to adapt to changes. Consequently, the construct DSS flexibility was operationalized along the three dimensions described by way of questions 1 through 5 of the second part of Section III in the questionnaire. Of the 13 items, 11 are reverse and 2 are forward. Given the relatively small number of items, a half and half split seemed both unnecessary and cumbersome from the respondents' point of view.

Scoring

The scoring is done in a fashion similar to the scoring of previously described variables. For a reverse item, the left end corresponds to a high degree of flexibility and is assigned a value of 7, while the end of the item is assigned a value of 7. A value for perceived DSSFLEX is found by applying the one third rule and taking the average of the nonmissing item scores for each respondent.

vi- DSS Degree of Pioneering (PIONDEG)

This construct refers to how innovative and different a particular DSS is from systems existing in an organization. A system can be new and unique in terms of the hardware or software technology it incorporates, the strategy used in its development, or the nature of the decision or problem it supports. One could therefore look at the degree of pioneering either from a technological or from an organizational perspective. Having a user perspective, this study is interested in the organizational degree of pioneering involved in DSS. The technological and developmental pioneering involved in the implementation of a DSS are largely hidden from the decision maker/users, and are also of relatively little concern to them. Consequently, they are not in a position to provide a reliable assessment of the degree of pioneering of a DSS along those dimensions. However, knowing the organization and the context in which a particular DSS is used, decision maker/users can provide a rough evaluation of a DSS's degree of organizational pioneering. This is defined as the novelty of the process of using a DSS for decision making. Consequently, the degree of pioneering involved in a DSS was operationalized through questions 7, 8, and 9 in Section V of the questionnaire.

Scoring

All three questions are in the same direction with the left end corresponding to a low degree of perceived pioneering. Two of the questions have semantic differential scales, and one is a Likert-type question. In order to give equal weighting to all three questions the score on the Likert-type item was multiplied by 1.4 and added to the scores obtained from the two semantic differential items for each respondent. A value for PIONDEG was then calculated applying the one third rule and by taking the average of the three items for each respondent. For DSS that have more than one respondent, a score for PIONDEG is found by averaging the PIONDEG scores of all the respondents of that DSS.

vii- Changes Caused by DSS (CHGCAUS)

The important dimensions of the changes caused by a DSS in a decision maker/user's task environment were highlighted in Chapter I, Section C. It has been argued in the literature that change should be measured by assessing the perceptions of those who were subjected to change (Keen and Scott Morton, 1978, p. 175). Consequently, this construct was interpreted as perceived changes caused by a DSS, and was operationalized via questions 1 through 6 in the first part of Section III of the questionnaire.

Scoring

All six items are in the same direction with the left end of each corresponding to a low degree of change and being assigned a score of 1. The reasoning behind unidirectionality is similar to the one made for DSSFLEX. For each respondent, a value for perceived CHGCAUS is calculated by averaging the scores of the six items and applying the one third rule.

viii- Issue Addressed and Critical Success Factors (CSFSUPP)

The testing of Proposition 8 requires measurement of the similarity (or closeness) between the decision problem a DSS supports and the critical success factors (CSFs) of the organization. One way to obtain a direct measure of this proximity is to ask the decision maker/users for their perceptions in this regard. Since this study has a decision maker/user perspective, and decision maker/user satisfaction is the success measure used, we would expect decision maker/user perceived closeness between the issue addressed by the DSS and the CSFs, to have a greater influence on success than an "objective" closeness. Consequently, questions 1, 2, and 3 in Section V of the questionnaire were used to measure the decision maker/user's perception of the CSFs and the similarity between the CSFs and the decisions the DSS supports.

Scoring

A value for CSFSUPP was obtained by counting the number of CSFs a respondent indicated as being either directly or indirectly supported by the DSS. A score of 1 was assigned to each letter circled in questions 3a and 3b, and a score of 0 was assigned to each uncircled letter. Since we can expect that

- direct support of a CSF will have a greater impact than an indirect support,
- direct/indirect support of a CSF with high importance will have a greater impact than direct/indirect support of a CSF with low importance,

the scores were weighted to take these considerations into account. This weighting was done by multiplying the 0/1 scores with the weights 6, 4, 2, 6, 4, 2 for a1, a2, a3, b1, b2, b3 in Question 3a, and by the weights 3, 2, 1 for a1, a2, a3, b1, b2, b3 in Question 3b. Finally, a score for CSFSUPP was calculated by adding all the weighted scores in Questions 3a and 3b, and dividing the total score by 12, which gave CSFSUPP a range between 0 and 3. Thus a low value for CSFSUPP indicates a low degree of closeness between the CSFs and the issues addressed by the DSS, as perceived by each respondent.

ix- DSS Multiplicity (MULTIP)

This construct has two basic dimensions: the first is simply the number of decision maker/users using a DSS; the second dimension is the extent to which the requirements of the decision maker/users are both different and incompatible. These dimensions are measured with questions 11 and 12 in Section V of the questionnaire. The measure is based on decision maker/user perceptions. Nonresponse to question 12 could be high because it is likely that some decision maker/users will not be cognizant of the requirements and purposes of other users of the DSS. For that reason, question 10 was also included in the questionnaire as a proxy for question 12, to be used in cases where question 12 was not answered.

Scoring

A value for perceived MULTIP was obtained for each respondent by multiplying the scores for the two Likert items with 1.4, adding them to the scores of the two semantic differential scales and dividing by the number of nonmissing items while applying the one third rule. If a DSS has more than one respondent, a score for MULTIP is calculated by averaging the MULTIP scores of all the respondents of that DSS. The resulting value for MULTIP, if low, would indicate a low degree of perceived user multiplicity while a high value would correspond to a high degree of perceived user multiplicity.

x- DSS Structure (DSSSTRUC)

The DSS taxonomy suggested by Alter (Alter, 1975), and outlined in Section B of Chapter I, is based on a single dimension: the degree of action implication of a DSS, i.e. the amount of decision making left to the user. As such, the taxonomy presents a proxy for the extent of structure inherent in a particular DSS. Moving through Alter's taxonomy from file drawer systems to suggestion systems, we see a gradually increasing amount of structure (or a decreasing amount of action implication) embedded into the system. For example, file drawer systems perform data retrieval only. The decision maker/user has to decide what data to retreive, how to combine it meaningfully, and what manipulations to perform. As a result, file drawer systems are at the least structured end of the scale. Data analysis systems, on the other hand, offer decision specific or general commands to perform calculations, and consequently contain a little more structure than file drawer systems, but less structure than analysis information systems where models (which inherently are more structured than specific or general data manipulation commands) are provided. A similar comparison of the remaining categories reveals a gradual increase in structure up to suggestion systems, which lie at the most structured end of the scale. Since the DSS definition used in this study includes only systems belonging to categories 4, 5, and 6, it was decided to assign a low, medium, or high structure score to each DSS based on where it fitted in Alter's taxonomy. Unfortunately, during data collection it became apparent that this procedure was both inaccurate and inappropriate. This was due to the fact that nearly half the DSS surveyed could be assigned to more than one category.

Since this assignment had also to be entirely based on the investigator's judgement, thereby further aggravating the measurement problem, the construct DSS Structure was measured only for DSS that could be assigned to a single category.

xi- Decision Structure (DECSTRUC)

In distinguishing between programmable (structured) and nonprogrammable (unstructured) decisions, Simon stated that

> "Decisions are programmed to the extent that they are repetitive and routine, to the extent that a definite procedure has been worked out for handling them so that they don't have to be treated de novo each time they occur...... Decisions are nonprogrammed to the extent that they are novel, unstructured, and consequential. There is no cut-and-dried method of handling the problem because it hasn't arisen before, or because its precise nature and structure are elusive or complex, or because it is so important that it deserves a custom-tailored treatment." (Simon, 1960, pp. 5-6)

Similarly, Bennett considers a task unstructured when

- Objectives are ambiguous and nonoperational; or objectives are relatively operational but numerous and conflicting.

- It is difficult to determine the cause (after the fact) of changes in decision outcomes and to predict (in advance) the effect on decision outcomes of the actions taken by the decision maker; and

- It is uncertain what actions taken by the decision maker might effect decision outcomes. (Bennett, 1983, p. 2)

Since it has also been argued that decision structure is a relative concept and that it lies in the eye of the beholder (Keen and Scott Morton, 1978, p.96), it makes sense to measure decision structure as it is perceived by the decision maker/user. Consequently, questions 1 through 6 in part three of Section I were constructed from the adjectives used in Simon's description, to measure decision structure as perceived by decision maker/users.

Scoring

All seven items are forward and scoring is done by assigning a score of 1 to the left end of the item corresponding to 'structured' decisions (i.e. high degree of structure). The right end of each item corresponds to 'unstructured' decisions (i.e. low degree of structure) and is assigned a score of 7. A value for DECSTRUC is obtained by using the one third rule and averaging the nonmissing items for each respondent.

xii- Management Attitude To Innovation (MGMTATT)

This construct refers to senior managers' receptiveness to innovation. It was measured by questions 4, 5, and 6 in Section V of the questionnaire. Questions 4 and 5 are adapted from a previous study (Evan and Black, 1967). Question 4 was slightly changed from the original, to state "managers influential to the respondent" instead of the more ambiguous "influential managers". Furthermore, question 6 was added to clarify the distinction between attitudes toward innovation prevalent in the organization in general, and in the respondent's department in particular.

Scoring

The three questions are all scored in the same direction, from unfavorable to favorable. To obtain a value for MGMTATT the scores from the two Likert items are each multiplied by 1.4 and added to the score on the semantic differential scale, following which the average for each respondent is calculated using the one third rule. In cases where more than one respondent exists for one DSS, a score for MGMTATT is found by averaging the scores of all the respondents who have filled the questionnaire for that DSS.

xiii- Actual Implementation Performance (ACTUIMP)

Respondents' perceptions of the way in which a particular DSS was implemented were measured in terms of training, top management support, and involvement. This was done in similar fashion to the measurement of the construct "implementation needs" by way of the first items in each of questions 1 through 7 in Section II of the questionnaire. The questions in this Section of the questionnaire each ask the respondent "what actually happened" and "what they thought should have happened", in order to provide a clarifying contrast of their own perceptions. In Section II, questions 2, 3, and 4 measure decision maker/user perceptions of self-involvement (ACTUINV), while questions 5, 6, and 7 measure their perceptions of the extent of top management support given to the DSS development and implementation (ACTUSUP). The extent and adequacy of training received is measured with question 1 of Section II and question 15 of Section V (ACTUTRA).

Scoring

The questions are all in the same direction. A value for ACTUIMP is calculated by multiplying the Likert item score with 1.4 and adding it to the scores of the six semantic differential scales, then taking the average over nonmissing items with the one third rule. Scores for ACTUINV, ACTUSUP, and ACTUTRA are calculated in similar fashion to the calculation of scores for INVNEEDS, SUPNEEDS, and TRANEEDS except that for DSS which have more than one respondent a score for ACTUTRA and ACTUSUP is calculated by averaging the scores of all the respondents that have filled the questionnaire for the same DSS.

xiv- Turnover of Project Personnel (TURNOVER)

The turnover rate of the people who worked in the development of the DSS was operationalized through questions 13 and 14 in Section V of the questionnaire.

Scoring

A value for TURNOVER was obtained by dividing the number of personnel that quit working on the project during development by the total number of people that worked in the development of the DSS. If a DSS had more than one respondent, a score for TURNOVER is calculated by averaging the TURNOVER scores obtained from all the respondents of that DSS.

b- Variables Not In The Model

An important portion of the cost of doing empirical research goes to data collection. This portion is even higher in studies where site visits are part of the data collection process. Since the marginal cost of collecting additional data, once the study is under way, is very small, it was decided to incorporate measures of some additional variables not in the model. The purpose in measuring these additional variables is to obtain additional information about issues that are not directly relevant to the research question of the study. The investigation of these issues is going to be undertaken in a separate study.

i- Attitude Towards Work Related Change (ATTOCHG)

An instrument consisting of a set of nine Likert-type items, developed by Trumbo, was used to measure respondent attitudes to change in managerial practices in general (Trumbo, 1961). This instrument provides a reliable and short measure of general attitudes towards change (Hardin, 1967; Kirton and Mulligan, 1973), and appears in the second part of Section VI of the questionnaire.

Scoring

The Trumbo instrument has 8 forward and 1 reverse direction items. A value for ATTOCHG is obtained by averaging each respondent's scores, where a low score corresponds to unfavorable attitudes and a high score corresponds to favorable attitudes towards work related change.

ii- Decision Level (DECLEVEL)

Closely related to the concept of "decision structure" is the concept of the "level" of managerial activity that particular decisions correspond to, i.e. operational control, management control, and strategic planning (Gorry and Scott Morton, 1971, p. 91). This relationship is particularly important for DSS since it has been suggested that DSS are used for semi-structured decisions that usually fall in the domain of management control and strategic planning (Gorry and Scott Morton, 1971). With a view to investigating this relationship, Questions 1 through 7, in part two of Section I, were adapted from Gorry and Scott Morton's description of the dimensions of information requirements for each of the decision categories.

Scoring

All seven questions are in the same direction with the left end of the items, corresponding to Operational Control, being assigned a score of one, and the right ends a score of 7. A value for DECLEVEL is calculated by applying the one third rule and averaging each respondent's scores.

iii- Realization of Expectations (REALEXP)

One of the important findings of a recent empirical study of information system implementations was that the user perceived success of systems was strongly associated with the degree to which users' initial expectations were realistic (Ginzberg, 1981(a)). This finding implies that decision maker/users' perceptions of DSS success will also be associated with the extent to which the DSS fulfilled their initial expectations. A measure of this construct was developed by making use of Questions 1 through 7 in page 5 of the questionnaire.

Scoring

The last two questions are reversed so that the right end of the items, assigned a score of 1, correspond to nonrealization of original expectations. A value for REALEXP is obtained by taking the average of the seven items while using the one third rule.

iv- Other Dependent Variables (SATISFAC) and (SYSTUSE)

The need for using different measures of system success was previously discussed in both Chapter II and subsection C.1 of this chapter. A single item, asking the respondents how satisfied they were with the DSS, was included and appears as Question 16 in Section V of the questionnaire. Here, a low value for SATISFAC corresponds to a low level of satisfaction with the DSS.

In addition, the level of system use was measured as another dependent variable and was operationalized as the percentage of the time the DSS is used whenever the particular decision(s) it supports had to be made. The measure for SYSTUSE is derived from Question 17 in Section V of the questionnaire.

C- SAMPLING AND DATA COLLECTION

The unit of analysis of this study is the decision maker/user. The target population was all decision maker/users using DSS; both these constructs were defined in the previous section.

In drawing a sample from this population several steps were followed. The first step was to refine the target population as decision maker/users using DSS in large Canadian organizations in similar industries (industries in which information is a key resource). The purpose of this refinement was to control, as much as possible, for the contaminating effects of industry environment variables such as competition and technology.

It was subsequently decided to investigate DSS in the banking, insurance and utility industries in Canada. Information is a key resource for all companies in these industries. Furthermore, organizations in these industries are fairly large and make extensive use of computer technology in their operations, thus making the use of DSS in their decision making activities highly likely. In each industry, the organizations selected for study were those in which entry and cooperation could be obtained. However, it was also ascertained that this convenience sample of organizations contained an equal number of organizations from each industry.

Before deciding on the number of organizations to include in the study, it was first necessary to determine the sample size of the decision maker/users to be used, since the decision maker/user is the unit of analysis. The sample size was initially set at 100 (i.e. it was decided to administer the questionnaire to 100 decision maker/users); the justification for choosing this number is explained at the end of this section.

In order to obtain 100 decision maker/users, it was initially decided to select six organizations as test sites by assuming that each organization would have more than 15-20 decision maker/users using DSS. Consequently, two organizations from each of banking, insurance, and utility industries were solicited for their cooperation. All six organizations contacted agreed to participate in the study. During data collection, however, it became necessary to increase the number of organizations surveyed as the number of respondents obtained from the six organizations fell short of the estimated 15-20 per organization. Increasing the number of organizations to 9 resulted in an organization sample of two from banking, three from utility, and four from insurance industries.

The data for the study was collected through interviews with and personally administered questionnaires to a sample of decision maker/users using DSS. The organizations in the sample were visited several times in order to identify both the DSS and the respondents in each organization. Subsequently, the questionnaires were left with the respondents to be filled out at their convenience. This procedure was deemed necessary because, unlike traditional MIS applications which can usually be found in the information systems department of an organization, most DSS are located in user departments. This means that, in order to identify both the DSS and their users, the researcher must spend considerable effort tracking down the "right" individuals in each organization. This is required not only to identify the DSS, but also to gather data about them, since information about the broad range of variables influencing DSS implementations cannot usually be obtained from one person only. For example, one would need to talk to the system developers in order to obtain information on the technical characteristics of a DSS about which the users would generally be ignorant; on the other hand it would be inappropriate to ask the system developers about the ways in which specific users make use of the system. Thus, the researcher needs to talk to a large variety of individuals in each organization. Furthermore, low cost mail survey approaches are not appropriate for in-depth studies of DSS in organizations, since the likelihood of the "right" person receiving and completing the questionnaire would be very low. Conducting interview-plus-survey research, however, is an expensive exercise that puts serious constraints on sample sizes.

In order to locate the "right" respondents, the survey was conducted in the following manner. Having gained entry into the organization, the nature and scope of the DSS used in the organization, were first identified through interviews held with the Data Processing (DP) manager. In the next stage, the senior users of each DSS in each organization were interviewed, for two reasons. The first purpose was identifying as many DSS in each organization as possible. Many DP managers are not fully informed about the various user developed applications that are usually run on stand-alone micros. Interviewing the DP manager alone, is thus usually insufficient to identify all the DSS existing in the organization.

The second purpose was to obtain a bias free assessment of the degree of "success" each DSS was perceived as enjoying. The reasoning here is that the DP managers who, contrary to what Keen and Scott Morton reported in 1978 were found to be extremely involved with the implementation of DSS, are less likely to point out DSS that have failed than they are to point out DSS that are successful. Thus, asking the DP managers only is apt to result in a sample containing mostly successful systems.

The data gathering procedure described above appears to be very suitable for conducting survey research on DSS, mainly because it ensures the identification of both the DSS in an organization and the proper respondents for each DSS. Furthermore, by interviewing the respondents first, and then leaving the questionnaire to be filled at their convenience, not only achieves exceptionally good response rates, but by allowing the respondents sufficient time, also provides a good way of minimizing nonsampling error which is believed to amount to roughly 90 percent of total error (Assael and Keon, 1982).

This procedure, and the questionnaire, were both pretested. First, the initial version of the questionnaire was developed and administered to six collegues. As a result of this initial pretest, the wording of several items was changed to make their meaning more clear. Subsequently, the improved version of the questionnaire was administered to 10 decision maker/users in three organizations. The only change made in the questionnaire after this pretest was the deletion of certain scales from several questions, and the addition of the Trumbo instrument together with the system use measure. The final version of the questionnaire used in data collection, appears in Appendix A.

The appropriateness of the data collection procedure described above i.e., interview plus survey, became apparent during the pretest and proved very useful during data collection. In one of the sites, for example, it took four interviews with four different people until the "right" respondents were found. This would not have been possible without the interview plus survey procedure used in this study.

1- Sample Size

"The power of a statistical test is the probability that it will yield statistically significant results." (Cohen, 1977, p.1). In other words, given a statistical test, its power is the probability that a phenomenon will be observed in a sample when the phenomenon exists in the population. Mathematically stated P = 1-b, where P is the power and b is the probability of making a Type II error, i.e., the probability of accepting the null hypothesis when it is false.

In the absence of a basis for setting a power value, it has been suggested that .80 be used (i.e. b = .20) as an arbitrary but reasonable value (Cohen, 1977, p.56). In selecting a sample size for this study the guideline suggested by Cohen was used. The power of a test, the effect size of a phenomenon, the value of alpha (Type I error probability), the degrees of freedom and the size of the sample are all related to each other. Therefore, when one selects a power value, it is necessary to assume the effect size and decide on a value for alpha, in order to determine the needed sample size.

As for this study, Table III.3 provides the sample sizes required for various R-square values in order to obtain a power value of .80 (Cohen, 1977, pp.441-442).

alpha= .05		alpha= .10	
R-square	N	R-square	N
.20	111	.15	125
.25	89	.20	95
.30	74	.25	77

Table III.3- Sample size with P = .80 and 22 independent variables

Table III.4 provides the respective power values for a sample size of 100 and various R-square values (Cohen, 1977, pp. 417-418).

alpha= .05		alpha= .10	
R-square	P	R-square	P
.20	.73	.15	.66
.25	.87	.20	.83
.30	.94	.25	.93

Table III.4- Power with N = 100 and 22 independent variables

From Tables III.3 and III.4 it is apparent that as long as the 22 independent variables explain more than 20 percent of the variance in the dependent variable, the present study has a reasonably good chance of observing this effect with a sample size of about 100 respondents.

The values in Tables III.3 and III.4 apply to the explanation provided by all of the 22 independent variables, which are made up of 13 main variables and 9 multiplicative variables. Since one of the major interests of the present work is the investigation of multiplicative effects, power analysis was performed to find the probability of observing the multiplicative effects when they exist.

With a sample size of 100, the probability of observing these effects is given in Table III.5.

Total R-square	Multiplicative R-square	Power
.20	.10	.56 (alpha= .05) .69 (alpha= .10)
.20	.15	.75 (alpha= .05) .85 (alpha= .10)
.30	.10	.60 (alpha= .05) .73 (alpha= .10)
.30	.15	.82 (alpha= .05) .89 (alpha= .10)

Table III.5- Power in observing the effect of 9 multiplicative variables

From Table III.5 it is apparent that given N = 100, the probability of observing the multiplicative effects is better than .80 provided that the variance explained by the multiplicative effects is more than 15 percent over and above the variance explained by the main effects (13 variables).

Prior to data collection, it seemed reasonable to assume that the 9 multiplicative variables would explain more than 15 percent of the variance in the dependent variable and that the 22 independent variables would account for more than 25 percent of the variance. Consequently, the sample size was targeted at 100. This decision was also facilitated by the fact that, should these assumptions prove to be overestimations during the data analysis stage, increasing the sample size accordingly would pose no methodological problems in view of the nature of the data collection procedure. If, on the other hand, these assumptions proved to be underestimations, it would also be possible to decrease the sample size by stopping data collection at the appropriate time.

D- SUMMARY

This chapter presented the methodology used in this study. In Section A, the suitability, for this study, of different research designs was discussed. Section B presented the operationalization of all the constructs and variables measured in this study. Finally, Section C described the sampling and data collection procedures of the study. The results obtained from the analysis of the data collected, are presented in the next chapter.

CHAPTER IV

DATA ANALYSIS

This chapter presents the results obtained from the analysis of the data collected in the survey. In Section A general information regarding the companies, systems and subjects surveyed is presented. Section B describes the reliability and validity analysis of the scales used in this study. This is followed, in Section C, by the results of the testing of the ten propositions delineated in Chapter II.

A- DESCRIPTIVE STATISTICS

This section of the chapter discusses the survey results and provides descriptive information and statistics regarding the characteristics of the organizations, DSS, and Decision maker/users surveyed.

1- Questionnaire Administration and Response Rate

Over a four month period, 57 questionnaires were distributed to 52 Decision maker/users in 9 organizations. Of these, 46 were returned from 42 Decision maker/users in 9 organizations, i.e., 80.7 percent response rate was obtained.

At this point it would be appropriate to make a note of the fact that the sample size used in the study was nearly half the initially intended sample size, and explain why this deliberate reduction was made. During the data collection procedure, which took place over a four month period, the analyses described in Sections B and C were being carried out concurrently with the receipt of questionnaires from the organizations interviewed. The results of the preliminary data analyses were very similar to the ones reported in the following sections. When the current sample size of 46 was reached it became apparent that the main effects were explaining a surprisingly large proportion of the variance in the three dependent variables used. Specifically, DSSFLEX explained nearly half the observed variance in UIS, while WILTOCHG and ACTUINV together accounted for more than half the variance in SATISFAC and SYSTUSE. Given the strength of the main effects, and given the fact that effect sizes stronger than the ones observed are quite rare in applied Social Science research, it became evident that contingent effects could at best have little explanatory power. Furthermore, as shown in Table IV.12 at the end of this Chapter, the sample size of 46 still had a reasonably good chance of observing contingent effects of significant size. Consequently, it was decided to stop data collection at the current sample size and shift the emphasis of the study away from testing contingencies to the main effects.

Five of the 11 questionnaires that were not returned had been given to very senior managers, at the Presidential or Vice Presidential level. During the interviewing process it had not been possible to interview these individuals, and a questionnaire copy had been left with their subordinates who also were decision maker/users, and had been interviewed. Follow up inquiries with these subordinates revealed that the top managers were too busy and excused themselves for not having the time to fill out the questionnaires. An interesting observation is that the top managers who did not return the questionnaires were also those with whom it had not been possible to arrange an interview. On the other hand, those top managers who had agreed to an interview, invariably returned the questionnaires. This supports the contention that the interview plus questionnaire drop-off technique of collecting data helps increase response rates. The investigator's personal observation was that, following an interview, it became rather hard for the interviewed person to refuse to respond to a questionnaire. Once they had spent time, the respondents became committed to the project. In addition, the fact that the investigator had spent time and effort in arranging and conducting the interviews, showed that the researcher was very much interested in their views and answers. These, coupled with the convenience of being able to fill the questionnaire out whenever they wanted, no doubt contributed to the high response rate obtained in the survey.

The remaining four unreturned questionnaires had been given to four middle managers in one department in a utility, and because of departmental work overload, they were not able to return the questionnaires. As a result, the sample of 42 decision maker/users contains 11 high level managers (26 percent), instead of 16 out of the original 57 distributed (28 percent). Since the two percentages are very close, it can safely be concluded that the sample contains negligable bias in terms of managerial level.

The data used in subsequent analyses are contained in the 46 questionnaires obtained from 42 respondents (four Decision maker/users each completed two questionnaires for two different DSS they were using). Table IV.1 illustrates this distribution in detail.

Industry	DSS	Respondents	Questionnaires
Utility	7	11	14
Utility	8	9	9
Utility	3	3	3
Insurance	6	9	9
Insurance	2	3	3
Insurance	2	3	4
Insurance	1	1	1
Banking	2	2	2
Banking	1	1	1
TOTALS	32	42	46

Table IV.1

Distribution of Questionnaires

Of 32 DSS surveyed, 20 had one respondent each, 11 had two respondents each, and one had four respondents. In the case of the 20 DSS with single respondents, some actually had more than one user. The fact that some difficulty was experienced in getting all the users of a DSS to respond was largely due to either

- the unwillingness of some Decision maker/users using more than one DSS, to fill out more than one questionnaire, or

- the unwillingness of some top managers to fill out the questionnaire (in fact if the 5 top managers who did not return the questionnaire had responded, there would have been 15 instead of 12 DSS with more than one respondent).

If a questionnaire could have been given to every identified decision maker/user of every identified DSS, a total of 82 questionnaires would have been distributed instead of the actual 57. Consequently, a potential for nonresponse bias exists, since the selection of the DSS for which the questionnaires were filled out, was jointly made by the investigator and the decision maker/user who was to respond for only one of the DSS he/she was using. One source for bias comes from the tendency of the decision maker/users to select "successful" systems among the DSS they are using. Every effort was therefore made to convince the decision maker/users who were using more than one DSS but were going to respond for only one DSS, that for good results, the study needed as many "failures" as "successes". (in order to obtain a representative sample and sufficient variance in the dependent variables). Furthermore, the respondents were also told that since only aggregate statistics were going to be used in data analysis, and since complete confidentiality would be maintained, it would make no difference to them whether they chose a success or a failure. Since there is no way of knowing the exact distribution of "DSS success", it is not possible to assess the accuracy of the success distribution obtained. However, all of the decision maker/users interviewed seemed to understand the study's need to incorporate DSS that have failed and several "DSS failures" were disclosed following the above explanation. Consequently, while the sample may still be biased towards "successful DSS", there is sufficient reason to believe that the procedure that was followed has helped to reduce this bias substantially.

2- Decision maker/user, DSS, and Organizational Characteristics

As is apparent from Table IV.1, of 46 Decision maker/users in the sample, 17 are from 4 organizations in the insurance industry, 26 are from 3 organizations in the utility industry, and 3 are from two organizations in the banking industry.

The reason why the sample contains only 3 DSS from the banking industry is probably due to the ways and philosophies by which computers are put into use in different industries. Although computers and information are strategic elements in all three industries, the banking industry seems to have, up to now, focused on the difficult task of efficiently handling the very large number of transactions that they have to process daily. Having concentrated their efforts mainly on coping with the difficulties and problems involved in processing very large number of transactions, the banking industry appears to have lagged behind the insurance and utility industries in developing and using DSS (as defined in this study). These views are naturally the subjective opinion of this investigator (and also of several senior managers who candidly and informally disclosed their personal observations and judgements).

As a result, although two chartered banks and one trust company were visited and the managers interviewed seemed to provide their full cooperation, only 6 DSS (as defined here) in two of these companies could be identified. Since one Decision maker/user in one bank was using four DSS and was not willing to fill out more than one questionnaire, data on only one DSS could be obtained from that respondent. This resulted in a total of three respondents for three DSS from the banks surveyed.

In all companies visited, some sort of a DSS "user support group" existed. This took the form of an Information Center in some organizations (Grindlay, 1980), while in others it consisted of people with systems or management science background. In addition, most functional departments had their own "systems oriented" people who performed either the "intermediary" or the "operator" function, and served as the interface between the Data Processing department and the functional department. This reflects the recent trend in application development away from DP and towards the end users (Rivard, 1982). Although this trend was common to all the organizations visited, the specific applications existing in the three banks were mostly geared towards reporting aggregated data about current status. As such, these applications fell into the first or second DSS category in Alter's taxonomy, but did not qualify as DSS for this study, according to the DSS definition made here (see Section B in Chapter III).

In 6 of the 9 organizations surveyed, the specific DSS had been developed using APL as a DSS tool. In the remaining three organizations, the DSS had been developed using general purpose packages as DSS generators. Two of these three organizations were using commercially available financial packages while the third one was using a similar general purpose package developed in-house.

The functions performed by the 32 DSS in the sample, while showing great variety between industries, were quite similar within an industry. This is expected since many decision problems in a given industry, especially those that exhibit sufficient structure to be amenable to computerized support, are usually faced by all the organizations in that industry.

In the utility industry, for example, an important decision problem concerns the regulated pricing of the product. DSS developed to support these pricing decisions enabled financial analysis of different scenarios with different rate structures. Pricing is also an important decision problem in the insurance industry, and similar DSS assessing the impact of claim frequencies and other relevant variables on company profitability were common across three of the four companies visited. Another critical decision problem in the insurance industry is the portfolio investment problem, i.e., where and how to invest current assets with a view to meeting future commitments. It was therefore not surprising to find that similar DSS were being used across the companies visited to address this decision problem. Although not many DSS were found in the three banks visited, a common decision making problem concerned the opening of new branches. In two of the banks, similar DSS were developed to assess the feasibility of opening new branches in different locations.

Based on the information obtained in the interviews and on their responses to Question 19 in Section V of the questionnaire, the 42 Decision makers/users were distributed into four categories in terms of their seniority in the organization. The distribution of the decision maker/users in the sample, according to managerial level, functional area, and the length of time they have been in their current position, is given in Table IV.2 and Table IV.3.

Managerial Level	Number of Respondents	Functional Area	Number of Respondents
Junior Mgr.	18	Accounting	11
Senior Mgr.	13	Finance	11
Vice Pres.	8	Marketing	6
President	3	General Mgmt.	8
		Other	6

Table IV.2
Respondent Distributions Of Managerial Level and Functional Area

Of 42 Decision makers/users, 24 were in their current position when the DSS was developed, while 18 were in other positions when the DSS was developed. Naturally, questionnaire items relating to the time of DSS development were not answered by these 18 respondents unless they had closely observed the development process while in their previous position.

B- RELIABILITY AND REFINEMENT OF COMPOSITE SCALES

While some of the scales described in Chapter III are borrowed from other studies, most were developed by the investigator. For all the composite variables used in this study, it would be desirable to demonstrate high reliabilities together with content validity,

Time In Current Position (years)	Number of Respondents
Less than 1	12
Between 1 and 2	10
Between 2 and 3	6
Between 3 and 4	1
Between 4 and 5	4
Between 5 and 6	4
Between 6 and 10	4
More than 10	1

Table IV.3
Respondent Distribution In Terms Of Time In Current Position

predictive validity and construct validity. At a minimum, such a demonstration would require, for each composite variable:

- For Reliability
  - Test/retest reliability (consistency of measurement in repeated measurements)
  - Internal consistency reliability i.e. the extent to which the items of a composite variable measure the same "thing".
- For Content Validity
  - Positive and significant correlations between items of a composite variable
  - High correlations with other measures of the construct
  - Composite variable items loading into a single factor in factor analysis

- Reasonable and logical links between scale items and construct

- For Predictive Validity

  - Correlation with other measures of the construct taken at different times

- For Construct Validity

  - Positive and significant correlations between each item and the total score excluding that item

  - Establishment of the theoretical dimensions of the construct in conjunction with existing theories related to the construct.

The completion of some of the steps listed above requires, for each construct, the existence of a sound theoretical basis together with the existence of different established measures and previous research with which results can be compared. Unfortunately, for most of the constructs used in this study, all these are lacking. Consequently, the reliability and validity analysis of the composite variables measured, was carried out by considering only the steps that were possible at the time of study. Since logical links between items and the constructs were discussed in detail in Chapter III, the analysis described here includes the Cronbach alpha, inter-item correlations, and factor analysis. The objective of this analysis was to assess the reliability and validity of the scales used in the study, and to improve the original items by eliminating those with undesirable psychometric properties. This objective was accomplished as follows.

First, each item was assigned a unique variable number. As can be seen from the questionnaire copy in Appendix A these range from V1 to

V156. Next, items measuring each composite variable were analyzed with the Cronbach alpha, inter-item correlations, and factor analysis.

The Cronbach alpha is a measure of the internal consistency of a composite variable. It can also be interpreted as the lower bound for the correlation between composite variable scores obtained in repeated measurements. An overall reliability score (i.e. overall Cronbach alpha) of 0.80 or greater is usually considered adequate for this type of research (Nunnally, 1978).

Inter-item correlations are the Pearson correlations between items of a composite variable. Positive and significant correlations between the items provide support for both content and construct validity.

The extent to which the items of a composite variable load into a single factor in factor analysis, is also indicative of content validity. The decision about what factor loading to use as a cut off point, largely depends on the purposes of the research. In this study, a factor loading of 0.50 was considered to be sufficient.

For each composite variable in this study, the above three analyses were performed using the Reliability Procedure in SPSS Update 7-9 (Hull and Nie, 1981), the Correlation Procedure and the Factor Procedure with principal factoring without iteration (PA1) in SPSS Second Edition (Nie, et. al., 1975). The results are provided in Table IV.4. Table IV.4 does not show the individual inter-item correlations and the factor loadings of each item as this would have taken a great deal of space (The correlation matrix for the composite variables, however, is

COMPOSITE VARIABLES

	UIS	WILTOCHG	INVNEEDS	SUPNEEDS
# of Items	26	18	3	3
(Var. #s)	(V74 to V99)	(V1 to V18)	(V44 to V48)	(V50 to V54)
Cronbach a	0.957(*)	0.773	0.744	0.758
(# of cases)	(17)	(30)	(30)	(42)
# of items loading<0.50 to one factor	0	8	0	0
# of items deleted	0	8	0	0
(Var. #s)		(V4,V5,V8,V9,V11) (V12,V17,V18)		
New # of Items	26	10	3	3
(Var. #s)	(V74 to V99)	(V1,V2,V3) (V6,V7,V10) (V13 to V16)	(V44 to V48)	(V50 to V54)
Cronbach a	0.957	0.888	0.744	0.758
(# of cases)	(17)	(39)	(30)	(42)
# of items loading<0.50 to one factor	0	1	0	0
(loading)		(0.47)		

(*) Previously reported value 0.95 (Ives, Olson, and Baroudi, 1982)

Table IV.4(a)
Reliability and Validity Results

COMPOSITE VARIABLES

	DSSFLEX	PIONDEG	CHGCAUS	MULTIP
# of Items	13	3	6	4
(Var. #s)	(V61 to V73)	(V115 to V117)	(V55 to V60)	(V118 to V121)
Cronbach a	0.948	0.650	0.893	0.841
(# of cases)	(35)	(36)	(44)	(31)
# of items loading<0.50 to one factor	0	0	0	0
# of items deleted	0	0	0	0
(Var. #s)				
New # of Items	13	3	6	4
(Var. #s)	(V61 to V73)	(V115 to V117)	(V55 to V60)	(V118 to V121)
Cronbach a	0.948	0.650	0.893	0.841
(# of cases)	(35)	(36)	(44)	(31)
# of items loading<0.50 to one factor	0	0	0	0
(loading)				

Table IV.4(b)
Reliability and Validity Results

COMPOSITE VARIABLES

	DECSTRUC	MGMTATT	ACTUINV	ACTUSUP
# of Items	7	3	3	3
(Var. #s)	(V27 to V33)	(V112 to V114)	(V43,V45,V47)	(V49,V51,V53)
Cronbach a	0.764	0.769	0.835	0.820
(# of cases)	(43)	(45)	(30)	(42)
# of items loading<0.50 to one factor	1	0	0	0
# of items deleted	1	0	0	0
(Var. #s)	(V33)			
New # of Items	6	3	3	3
(Var. #s)	(V27 to V32)	(V112 to) (V114)	(V43,V45,V47)	(V49,V51,V53)
Cronbach a	0.785	0.769	0.835	0.820
(# of cases)	(43)	(45)	(30)	(42)
# of items loading<0.50 to one factor	0	0	0	0
(loading)				

Table IV.4(c)
Reliability and Validity Results

COMPOSITE VARIABLES

	ATTOCHG	DECLEVEL	REALEXP
# of Items	9	8	7
(Var. #s)	(V148 to V156)	(V19 to V26)	(V34 to V40)
Cronbach a	0.798	0.272	0.792
(# of cases)	(39)	(43)	(43)
# of items loading<0.50 to one factor	2	4	2
# of items deleted	0	3	2
(Var. #s)		(V19,V24,V26)	(V39,V40)
New # of Items	9	5	5
(Var. #s)	(V148 to) (V156)	(V20 to V23) (V25)	(V34 to V38)
Cronbach a	0.798	0.324	0.933
(# of cases)	(39)	(44)	(44)
# of items loading<0.50 to one factor	2	1	0
(loading)	(0.31, 0.39)	(0.47)	

Table IV.4(d)
Reliability and Validity Results

in Appendix B). From the information provided in Table IV.4, it is possible to judge the reliability and validity of each composite variable.

As far as the scales borrowed from previous research are concerned, the above analysis was performed and is included in Table IV.4, but the scales were not changed in any way (These scales are for composite variables UIS, COGSTYLE, MGMTATT, and ATTOCHG).

The scales developed in this study were considered for item elimination by looking at the results of the three analyses described above. A Cronbach alpha of .80 or greater was considered satisfactory as long as all items had factor loadings of .50 or greater, and no negative inter-item correlations existed. It would have been preferable to qualify the last statement so that all inter-item correlations are positive <u>and significant</u>. Unfortunately, the relatively small sample size of this study does not permit this added restriction since many positive correlations in the .20 range are not significant at the .05 level when N = 40. In studies with the sole purpose of developing measuring instruments, much larger sample sizes are used, making much lower correlations significant at the .05 level. Because of that reason and because the added qualification would have resulted in the elimination of too many items and the loss of potentially valuable information, positive inter-item correlations were considered adequate, regardless of their significance.

The results of Table IV.4 show that only two out of twelve composite variable measures developed in this study show poor psychometric properties (DECLEVEL and PIONDEG). On the other hand, four out of these twelve, show exceptionally good properties (DSSFLEX, REALEXP, WILTOCHG, CHGCAUS). The remaining six show reasonably good characteristics (INVNEEDS, SUPNEEDS, MULTIP, DECSTRUC, ACTUINV, ACTUSUP). (Note: the foregoing analyses do not apply to the variables TURNOVER, CSFSUPP, and DSSSTRUC which were not measured with psychometric scales). In the case of WILTOCHG and DSSFLEX the subject to item ratios are less than 5 to 1 which is considered to be a minimum value when establishing internal consistency reliability of rating scales (Nunnally, 1978). Consequently, the statements regarding the "quality" of these scales are made with caution.

It will be noticed that certain composite variables in this study contain questions having one or more than one semantic differential adjective pairs. For example the composite variable WILTOCHG is measured with 10 questions and a total of 18 adjective pairs or items (V1 to V18). Questions 1 and 6 contain single adjective pairs while the remaining questions each contain two adjective pairs. In calculating Cronbach alpha, correlation coefficients and factor loadings, instead of treating each adjective pair as a variable, one could first average the adjective pairs belonging to one question, and then treat each question of a composite variable as one variable. For example, in the case of WILTOCHG, this would involve averaging V2 and V3, V4 and V5, V6 and V7, V8 and V9, V11 and V12, V13 and V14, V15 and V16, V17 and V18. Then, each of these 8 averages and the scores on V1 and V10 would be treated as ten items of the scale WILTOCHG. This procedure would have resulted in all questions having the same weight, but would have also resulted in the loss of some information. The procedure used here, i.e. treating each adjective pair as a variable, results in the assignment of a smaller weight to questions having single adjective pairs. This results in the use of all the available information and as can be seen from the questionnaire, there are few questions (in only some of the composite variables) that differ from the general pattern of the items in their corresponding measures. Furthermore, an examination of the questionnaire and Table IV.4 also shows that almost without exception, the underweighted adjective pairs satisfied the criterion of selection and have been included in the calculation of composite variable scores (thus making the question of bias due to unequal weighting, irrelevant).

C- DATA ANALYSIS

This Section of the chapter describes the statistical tests and the results obtained in the testing of the ten propositions described in Chapter II. The means and standard deviations of the composite variables are provided in Table IV.5. Table IV.6 gives the Pearson correlations between the three dependent variables and all the variables measured in this study. The full correlation matrix is listed in Appendix B.

For each composite variable (except SYSTUSE and CSFSUPP) the range of possible values varies from a low of 1 to a high of 7. For SYSTUSE the range is between 0 and 100, while for CSFSUPP it is between 0 and 3. For each variable (except DECSTRUC), the scale directions are consistent with the low-high interpretation. In the case of DECSTRUC the interpretation is from structured to unstructured as we move towards higher values in the scale.

Variable	Mean	Std. Dev.	Min.	Max.	Valid Cases
UIS	5.77	0.787	3.9	6.9	44
SATISFAC	5.67	1.367	1.0	7.0	46
SYSTUSE	69.08	30.921	5.0	100.0	39
WILTOCHG	6.01	0.714	2.9	7.0	44
DECLEVEL	3.75	0.908	1.6	5.6	44
DECSTRUC	4.92	0.917	2.8	7.0	44
REALEXP	4.83	1.176	2.2	6.6	44
TRANEEDS	5.12	1.418	1.0	7.0	43
INVNEEDS	6.04	0.780	4.0	7.0	42
SUPNEEDS	5.84	0.949	3.3	7.0	43
ACTUTRA	3.58	1.089	1.0	7.0	46
ACTUINV	5.62	1.520	2.0	7.0	42
ACTUSUP	4.95	1.171	2.0	7.0	45
CHGCAUS	4.72	1.165	1.3	6.8	44
DSSFLEX	4.60	1.362	1.0	6.8	44
CSFSUPP	0.89	0.568	0.0	1.9	42
MGMTATT	4.81	0.930	3.0	6.2	46
PIONDEG	5.08	1.175	1.7	7.0	46
MULTIP	3.82	1.675	1.2	7.0	44
ATTOCHG	3.83	0.565	2.0	4.7	40
COGSTYLE	5.09	3.476	0.0	12.0	45
TURNOVER	12.04	19.877	0.0	66.7	31
DSSSTRUC	3.52	1.353	1.0	6.0	29

Table IV.5
Distributional Statistics of Composite Variables

	UIS Correl. (Sig.)	SATISFAC Correl. (Sig.)	SYSTUSE Correl. (Sig.)
WILTOCHG	0.3990 (0.004)	0.6670 (0.000)	0.5315 (0.000)
DECLEVEL	-0.1165 (0.229)	-0.0052 (0.487)	-0.1670 (0.162)
DECSTRUC	-0.0643 (0.348)	-0.0262 (0.433)	0.1292 (0.223)
REALEXP	0.3963 (0.004)	0.6461 (0.000)	0.4260 (0.004)
TRANEEDS	-0.0042 (0.489)	0.1414 (0.183)	0.1119 (0.255)
INVNEEDS	0.6008 (0.000)	0.4216 (0.003)	0.3803 (0.012)
SUPNEEDS	0.3614 (0.009)	0.3935 (0.005)	0.1327 (0.217)
IMPNEEDS	0.5575 (0.000)	0.4883 (0.000)	0.3641 (0.013)
ACTUTRA	0.4807 (0.000)	0.4163 (0.002)	0.2558 (0.058)
ACTUINV	0.6798 (0.000)	0.5848 (0.000)	0.6369 (0.000)
ACTUSUP	0.3749 (0.007)	0.2937 (0.025)	0.1433 (0.192)
ACTUIMP	0.6786 (0.000)	0.5948 (0.000)	0.5263 (0.000)
CHGCAUS	0.2749 (0.037)	0.4697 (0.001)	0.2792 (0.047)
DSSFLEX	0.6929 (0.000)	0.5664 (0.000)	0.5722 (0.000)
CSFSUPP	0.2137 (0.093)	0.4238 (0.000)	0.4741 (0.000)
MGMTATT	0.2933 (0.027)	0.1723 (0.126)	0.1273 (0.220)
PIONDEG	0.1163 (0.226)	0.0870 (0.283)	-0.0735 (0.328)
MULTIP	-0.1583 (0.158)	-0.3002 (0.024)	-0.3214 (0.025)
COGSTYLE	-0.1548 (0.161)	-0.0741 (0.314)	0.1249 (0.224)
ATTOCHG	0.0230 (0.445)	-0.1377 (0.198)	-0.1491 (0.182)
TURNOVER	-0.3012 (0.053)	-0.0826 (0.329)	0.1409 (0.295)
SATISFAC	0.6215 (0.000)	-	0.6466 (0.000)
SYSTUSE	0.3938 (0.008)	0.6466 (0.000)	-

Table IV.6
Pearson Correlations of Main Effect Variables With Dependent Vars.

1- Testing Procedure

In Chapter III it was pointed out that the ten propositions described in Chapter II are hypotheses about the existence of significant multiplicative effects. Furthermore, with the research design used in this study, the most appropriate way of testing these effects was identified as significance testing of incremental variance accounted for by the multiplicative effects defined as cross-product (multiplicative) variables i.e. to test for the significance of the additional R-square accounted for by the multiplicative variables, over and above the main effects. The F test for the significance of the incremental variance explained by these variables, is the appropriate test in this case (Pedhazur, 1981).

In testing the propositions described in Chapter II, the following procedure was used. First, for each proposition, a multiplicative composite variable was formed by the multiplication of the two composite variables involved in that proposition. Then, for each proposition (excepting Proposition 8), a hierarchical regression was performed by first forcing the two composite variables involved, into the regression equation, and then entering the composite multiplicative variable. The test here is whether the additional R-square accounted for by the multiplicative variable is significant or not, and is given by

$$F = \frac{\text{incremental SS due to multiplicative variable}}{\text{residual SS}/(N-k-1)}$$

In the case of Proposition 8, the test is whether the composite fit variable formed (CSFSUPP), significantly correlates with the dependent variables.

Propositions 4, 5, 9, and 10 involve the variables ACTUIMP and/or IMPNEEDS. Both these variables contain the three components of training, involvement, and top management support. Since the dependent variable UIS also contains two of these components (training and involvement), it would be wrong to use ACTUIMP or IMPNEEDS as independent variables when UIS is the dependent variable. Consequently, in testing propositions 4, 5, 9, and 10 with UIS as the dependent variable, only the top management support component of ACTUIMP and IMPNEEDS was used (these components were called ACTUSUP and SUPNEEDS respectively. The training and involvement components of ACTUIMP and IMPNEEDS were called ACTUTRA, ACTUINV, TRANEEDS, and INVNEEDS respectively).

Subsequently, the testing of propositions 4, 5, 9, and 10 was done by splitting them into the three sub-propositions with respect to training, top management support, and involvement. The sub-propositions were then labelled 4.1, 4.2, 4.3, 5.1 etc.

The procedure described, i.e., testing the significance of the incremental R-square accounted for by the multiplicative variables via a separate regression run for each proposition, involves specification errors. Namely, because each regression includes only a subset of the variables in the total model, the F tests are too "liberal" in the sense that they tend to overstate the significance level of each variable in their respective regressions.

To eliminate the above mentioned specification errors, a hierarchical blockwise regression was performed where all of the main effect variables of the study were first entered stepwise as a block, following which the multiplicative variables were entered. The cut-off F probability to enter a variable was set at 0.20 (PIN= 0.20 in SPSS Update 9-7). In addition, the analysis was also carried out with PIN=0.05. Missing cases were handled with both the pairwise and the listwise options of SPSS. In the case of listwise deletion, the analysis is performed using only cases with nonmissing values on all variables in the variable list. Since this option is very restrictive and may cause severe reductions in the number of observations used in the analysis, the same regression run was repeated with the pairwise deletion procedure. In the case of pairwise deletion, correlation coefficients are calculated using cases with complete data on the pair of variables correlated, regardless of whether the cases have missing values on any other variables in the variable list.

After examining the variables in the hierarchical blockwise regression equations for multicollinearity, several highly correlating variables were removed from the variable lists and the regressions were repeated. The additional R-square accounted for by the multiplicative variables entering the regression, provides an indication of the significance of multiplicative effects.

All of the above regressions were run three times, once for each of the dependent variables UIS, SATISFAC, and SYSTUSE.

2- Regression Results

The detailed results of each individual regression run is provided in Appendix C. Table IV.7 below, summarizes the results of the first group of regressions where a separate hierarchical regression was run with two main and one multiplicative variable, for nine of the ten propositions.

	Dependent Variable		
	UIS	SATISFAC	SYSTUSE
PROPOSITION 1	-	-	-
PROPOSITION 2	0.28	-	-
PROPOSITION 3	-	-	-
PROPOSITION 4.1	a	-	-
PROPOSITION 4.2	-	-	-
PROPOSITION 4.3	a	-	-
PROPOSITION 5.1	a	-	0.30
PROPOSITION 5.2	-	-	-
PROPOSITION 5.3	a	-	-
PROPOSITION 6	0.20	-	-
PROPOSITION 7	0.10	0.26	0.12
PROPOSITION 8	a	a	a
PROPOSITION 9.1	a	0.04	0.05
PROPOSITION 9.2	0.06	0.01	0.04
PROPOSITION 9.3	a	-	0.21
PROPOSITION 10.1	a	-	-
PROPOSITION 10.2	-	-	-
PROPOSITION 10.3	a	-	0.03

(-) indicates less significant than .31
(a) indicates the test is inappropriate and was not performed.

Table IV.7
Significance Level of Incremental R-square
Accounted By Multiplicative Vars. Over Main Effects

The results of the regressions where all the variables used in this study were entered in two blocks (main effects and multiplicative effects) following the deletion of highly correlating variables are presented in Table IV.8. The correlation coefficients between the independent variables remaining in the regressions, are given in Table IV.9. The results obtained by repeating the same analysis with PIN=0.05 are displayed in Table IV.10.

Because 13 of the 32 DSS in the sample had more than one respondent, the results may have been biased by the characteristics of these 13 DSS (since they have more than one respondent, they end up being more heavily weighted than DSS that have only one respondent). In order to check whether the results had such a bias, the stepwise block regression with UIS as the dependent variable (and 21 predictors), and the analysis described in Table IV.7 was repeated with a sample containing 32 DSS and 32 respondents (one respondent per DSS). This sample was created by randomly selecting one respondent for each DSS that had more than one respondent, and pooling them with the remaining DSS which already had one respondent each. The results obtained with this new sample did not differ substantially from the results obtained with the original sample, indicating the absence of this particular bias. Consequently, the results reported from here on are based on the original sample of 46 questionnaires obtained from 42 respondents.

The regression results of Table IV.10 were obtained by blockwise regression of 21 predictors in the case of UIS, and 31 predictors in the case of SATISFAC AND SYSTUSE. Given the relatively small number of

Dependent Variable- UIS

Listwise Deletion			Pairwise Deletion		
Entering Variable	R-square Change	Signific. of Change	Entering Variable	R-square Change	Signific. of Change
DSSFLEX	0.3987	0.005	DSSFLEX	0.4802	0.000
CHGCAUS	0.1001	0.105			
COGSTYLE	0.0969	0.090			
COGSTYLE*DSSSTRUC	0.0792	0.100			
	0.6750			0.4802	
(Adjusted R-sq.=	0.5666)		(Adjusted R-sq.=0.4542)		

Dependent Variable- SATISFAC

Entering Variable	R-square Change	Signific. of Change	Entering Variable	R-square Change	Signific. of Change
WILTOCHG	0.5766	0.000	WILTOCHG	0.4450	0.000
CHGCAUS	0.2075	0.002	ACTUINV	0.1821	0.006
MULTIP	0.0976	0.005	CHGCAUS	0.0376	0.161
TRANEEDS	0.0398	0.025			
SUPNEEDS	0.0133	0.145			
	0.9348			0.6647	
(Adjusted R-sq.=	0.9051)		(Adjusted R-sq.=0.6089)		

Dependent Variable- SYSTUSE

Entering Variable	R-square Change	Signific. of Change	Entering Variable	R-square Change	Signific. of Change
MULTIP	0.4959	0.001	ACTUINV	0.4057	0.002
CHGCAUS	0.1961	0.008	WILTOCHG	0.1441	0.024
MGMTATT	0.0689	0.066			
CSFSUPP	0.0735	0.033	WILTOCHG*DECSTRUC	0.0439	0.181
	0.8344			0.5937	
(Adjusted R-sq.=	0.7792)		(Adjusted R-sq.=0.5220)		

Table IV.8
Results of Stepwise Block Regression
Without Multicollinearity (PIN=0.20)

	DSSFLEX	CHGCAUS	COGSTYLE	COGSTYLE*DECSTRUC
DSSFLEX	--			
CHGCAUS	0.22	--		
COGSTYLE	0.03	0.03	--	
COGSTYLE*DECSTRUC	-0.21	-0.34	0.52	--

	WILTOCHG	CHGCAUS	MULTIP	TRANEEDS	SUPNEEDS
WILTOCHG	--				
CHGCAUS	0.37	--			
MULTIP	-0.27	-0.12	--		
TRANEEDS	0.16	0.16	0.14	--	
SUPNEEDS	0.53	0.45	0.08	0.18	--

	WILTOCHG	ACTUINV	CHGCAUS
WILTOCHG	--		
ACTUINV	0.26	--	
CHGCAUS	0.37	0.20	--

	MULTIP	CHGCAUS	MGMTATT	CSFSUPP
MULTIP	--			
CHGCAUS	-0.12	--		
MGMTATT	0.26	-0.04	--	
CSFSUPP	-0.11	0.28	-0.12	--

	ACTUINV	WILTOCHG	WILTOCHG*DECSTRUC
ACTUINV	--		
WILTOCHG	0.26	--	
WILTOCHG*DECSTRUC	0.10	0.50	--

Table IV.9
Correlations Between Independent Variables
In Blockwise Regressions

Dependent Variable- UIS

Listwise Deletion Entering Variable	R-square Change	Signific. of Change	Pairwise Deletion Entering Variable	R-square Change	Signific. of Change
DSSFLEX	0.3987	0.005	DSSFLEX	0.4802	0.000
	0.3987			0.4802	
(Adjusted R-sq.=	0.3587)		(Adjusted R-sq.=	0.4542)	

Dependent Variable- SATISFAC

Entering Variable	R-square Change	Signific. of Change	Entering Variable	R-square Change	Signific. of Change
WILTOCHG	0.5766	0.000	WILTOCHG	0.4450	0.000
CHGCAUS	0.2075	0.002	ACTUINV	0.1821	0.006
MULTIP	0.0976	0.005			
TRANEEDS	0.0398	0.025			
	0.9214			0.6271	
(Adjusted R-sq.=	0.8952)		(Adjusted R-sq.=	0.5878)	

Dependent Variable- SYSTUSE

Entering Variable	R-square Change	Signific. of Change	Entering Variable	R-square Change	Signific. of Change
MULTIP	0.4959	0.001	ACTUINV	0.4057	0.002
CHGCAUS	0.1961	0.008	WILTOCHG	0.1441	0.024
	0.6920			0.5498	
(Adjusted R-sq.=	0.6480)		(Adjusted R-sq.=	0.4998)	

Table IV.10
Results of Stepwise Block Regression
Without Multicollinearity (PIN=0.05)

degrees of freedom in these regressions and given the fact that when a subset of predictors is selected through stepwise regression from a large pool of predictors, the F test for the overall regression tends

	Dependent Variable					
	UIS		SATISFAC		SYSTUSE	
	List.	Pair.	List.	Pair.	List.	Pair.
DSSFLEX	0.63	0.69	-	-	-	-
WILTOCHG	-	-	0.28	0.55	-	0.39
ACTUINV	-	-	-	0.44	-	0.54
CHGCAUS	-	-	0.41	-	0.45	-
MULTIP	-	-	-0.48	-	-0.60	-
TRANEEDS	-	-	-0.20	-	-	-

Table IV.11
Standardized Beta Coefficients For The Regression Equations Reported In Table IV.8

to overstate the significance of the results obtained, the significance levels of the overall F values reported in Appendix C are liberal. However, a bias free F test for stepwise regression is provided by the cumulative distributions of adjusted R-square derived from a Monte Carlo study (McIntyre, Montgomery, Srinivasan, and Weitz, 1981). Table 3 on page 27 of that study shows that five of the adjusted R-squares reported in Table IV.10 (blockwise regressions with PIN=0.05), are significant at a level better than 0.01, with one result (the UIS regression with the listwise deletion option) significant at a level better than 0.05 (for N=45, with 20 predictors, and inclusion criterion t=0.05).

For each of the three dependent variables, the predictors that enter the regression equations and their standardized beta coefficients are given in Table IV.11. These results show that, with the exception of DSSFLEX and WILTOCHG, the remaining four main effect variables do not enter the regression equation of a dependent variable in both Listwise and Pairwise deletion versions. Since the number of observations in Listwise deletion regressions are about 20 percent smaller than in Pairwise deletion regressions, conclusions regarding the explanatory power of these four variables have to be made with caution.

The power analysis of Chapter III which resulted in a targeted sample size of 100, was performed without any prior information regarding main and interactive effect sizes. Consequently, the sample size calculations were based on the assumption that all of the main effects combined would account

	alpha = 0.05	alpha = 0.10
UIS	0.71 (10)	0.81 (10)
SATISFAC	0.85 (16)	0.92 (16)
SYSTUSE	0.69 (16)	0.79 (16)

Numbers in parentheses indicate the number of multiplicative variables

Table IV.12

Power in Observing R-square of 0.15 for Multiplicative Effects with N=46 (based on Cohen, 1977, pp.417-418)

for roughly 20 to 30 percent of the observed variance in the dependent variables. The results reported in this Chapter provide us with the information that DSSFLEX accounts for nearly half the variance in UIS, and that WILTOCHG and ACTUINV account for more than half the variance in SATISFAC and SYSTUSE. Given this information, the testing of the multiplicative effects would be performed by entering DSSFLEX (or WILTOCHG and ACTUINV) first, and then entering the multiplicative effects as a second block. These stepwise blockwise regressions were also performed (with pairwise deletion and PIN=0.05 and PIN=0.10). In every case the results were identical to the results reported in Table IV.10 (for pairwise deletion). The power of these tests in observing a multiplicative R-square of 0.15 are given in Table IV.12.

CHAPTER V

INTERPRETATION AND DISCUSSION OF THE FINDINGS

This chapter presents a discussion of the survey results described in Chapter IV.

The main finding of the study is that multiplicative variables do not account for a significant proportion of the variance in the dependent variables, over and above the portion accounted for by the main effect variables. In addition, DSS flexibility is found to explain nearly half the observed variance in user information satisfaction (UIS).

A- VARIABLE DISTRIBUTIONS

From Table IV.5 it is apparent that the three dependent variables, user information satisfaction, system use, and user satisfaction, all have high means. This might be an indication that the sample of DSS drawn consists mostly of "successful" and "moderately successful" DSS to the exclusion of "failures". While this may be due to the bias of some respondents who chose to fill the questionnaire for a successful DSS instead of an unsuccessful one, two considerations make this possibility rather unlikely. First of all, the difficulties associated with finding respondents for unsuccessful DSS were in large part due to the fact that unsuccessful DSS, as they fall into disuse, are eventually "killed" or completely re-done. As such, it is very difficult to find "informed" decision maker/users who have used the old, "unsuccessful" system since such users either are no longer in that organization or substantial changes in both the DSS and the decision problem have since taken place. For these reasons, it would be inappropriate to include such DSS in the sample. Consequently, the sample of DSS was mostly drawn from systems that are currently being used, which partially explains the relatively high mean "success" scores obtained.

The second consideration concerns the strong empirical support for the fact that users are generally satisfied with DSS and similar types of applications they are using. As one recent survey showed, these systems address important managerial needs and user managers perceive them to be more appropriate than transaction processing type of systems (Alloway and Quillard, 1983). If that is correct, then we would expect a skewed distribution for DSS success.

B- CORRELATION AND REGRESSION RESULTS

1- The Dependent Variables

It is interesting to note that while the single item satisfaction measure SATISFAC correlates rather highly with both UIS and SYSTUSE (0.62 and 0.65 respectively), the correlation between UIS and SYSTUSE is considerably smaller (0.39). The high correlation between UIS and SATISFAC (0.62) is expected since UIS is supposed to be a more comprehensive and improved measure for SATISFAC. The relatively low correlation between UIS and SYSTUSE (0.39) is also expected and confirms the findings of previous studies indicating that system usage and satisfaction, while related, are measuring different things and therefore should both be used in measuring performance.

The high correlation between SATISFAC and SYSTUSE (0.65), however, was unexpected since

- SATISFAC is supposed to measure the "same thing" as UIS,
- UIS is measured with a reliable and validated instrument,
- UIS does not correlate highly with SYSTUSE.

Consequently, the expectation was that SATISFAC would correlate with SYSTUSE in the 0.40 range also. The fact that this correlation was 0.65 is surprising. One explanation is that it is due to sampling error. Another possible explanation, however, might be that SATISFAC, being a single item question which asks the respondent how satisfied he/she is with a particular system, is perceived as a global measure. As such, it is a unidimensional average of all the performance measures the respondents feel apply. If that is the case, then we might expect SATISFAC and similar global measures to correlate highly with all dimensions of performance or success.

The findings mentioned above imply that UIS and SATISFAC, although closely related, are not exactly the same thing. A further implication is that although SATISFAC would be an inadequate measure of DSS performance for research purposes (because it is a single item measure), it may still be useful in a practical setting, especially if one cannot afford to use a comparatively lengthy instrument, such as the UIS.

It is also interesting to note that different independent variables enter the respective regressions of UIS and SYSTUSE. Given the relatively low correlation between UIS and SYSTUSE, this is not very surprising. In the case of UIS, it appears that DSS characteristics e.g. DSS flexibility and extent of changes caused by the DSS, account for a large portion of the variance. Implementation related characteristics, while absent from the UIS regression, account for some of the variance in SYSTUSE. Although the present evidence is not strong enough to enable generalizations on this difference, the fact that different independent variables account for the variance in UIS and SYSTUSE, is consistent with the above reasoning.

The UIS measure, although including implementation dimensions, heavily taps into the information dimensions of a system. It is therefore reasonable to expect a variable such as DSSFLEX to correlate rather highly with information dimensions such as accuracy, timeliness, reliability etc. which are all included in UIS. As a matter of fact, one of the items in the 39 item user satisfaction instrument Pearson developed (Pearson, 1977), tapped the flexibility dimension (the short form version of this instrument which was used here, does not include the flexibility dimension). Flexibility is also reported to be the top ranked variable in importance, in a ranking of these 39 items by IS managers (Bailey and Pearson, 1983). Thus, the results obtained in this study are consistent with previous findings regarding flexibility.

It would also be natural to expect a high correlation between DSS flexibility and its usage, since ceteris paribus, users would tend to use a flexible system more often than an inflexible one. The correlation between DSSFLEX and SYSTUSE (0.57) is indeed quite high and confirms this expectation. However, the question then arises as to why DSSFLEX does not appear in the SYSTUSE regression equations. The answer to this question is found in the even higher correlations between user involvement (ACTUINV) and SYSTUSE (0.64), which results in ACTUINV to be selected for entry into the SYSTUSE regression equation rather than DSSFLEX.

The opposite occurs in the UIS regression equations since the 0.69 correlation coefficient between DSS flexibility and UIS is higher than actual user involvement's correlation of 0.68. Because these small differences in correlation coefficients may be due to sampling error, the argument that DSS flexibility is a better predictor of UIS than actual user involvement cannot be strongly supported. Furthermore, the high correlation between actual user involvement and DSS flexibility (0.67), and the fact that these two variables do not appear together in any of the regressions indicates that they are accounting for the same portion of the variance in the dependent variables.

2- DSS Flexibility

As described in Chapter III, DSS flexibility was operationalized along three of the four "levels" suggested by Sprague and Carlson (1982). Consequently, it would not have been too surprising to find two or perhaps three dimensions to DSSFLEX. Had more than one dimension been observed, it would have been necessary to test their respective reliabilities and to create a separate variable for each dimension before proceeding with the regression analysis. The results obtained in the reliability and validity analyses suggest that the 13-item-scale resulting from the 5 questions which were used to operationalize DSSFLEX all belong to a single dimension. The very high values obtained both for Cronbach alpha and the item-to-item correlations, and the fact that all items heavily loaded into a single factor, support the conclusion that the three "levels" of DSS flexibility described by Sprague and Carlson belong to the same dimension.

The most important results of this study (in terms of their contribution) concern the very high positive correlations between DSSFLEX and all three dependent variables together with the result showing that DSSFLEX accounts for almost half the observed variance in UIS (which is the most reliable of the three dependent variables used). These are very encouraging results especially in view of the Cronbach alpha, item-to-item correlations, and factor analysis results obtained for DSSFLEX that provide strong evidence for the internal consistency reliability of the DSS flexibility measure developed in this study. In addition, the fact that DSS flexibility was operationalized based on its existing theoretical conceptualizations, strengthen the contention that its domain has been adequately (if not sufficiently) specified in DSSFLEX. In view of these considerations it is tempting to conclude that, at least as far as DSS are concerned, system flexibility is a very important construct. At this stage of the research however, these conclusions can only be made tentatively since construct validation for DSSFLEX has not been achieved.

To demonstrate construct validity for DSSFLEX it would be critical to demonstrate convergent and discriminant validity. Since DSS flexibility has been measured with a single method, i.e., questionnaire, it is not possible to show evidence of convergent validity. In addition, the high correlations obtained between DSSFLEX and several other independent variables such as ACTUINV, INVNEEDS, and ACTUIMP pose serious threats to discriminant validity for DSSFLEX. In other words, if DSSFLEX measures something different, then it should not have correlated highly with the three independent variables mentioned. The fact that it did can be interpreted as evidence for lack of discriminant and therefore construct validity. Of course, the possibility also exists that given the way they were operationalized, it is ACTUINV, INVNEEDS, and ACTUIMP which lack discriminant validity (3 items for ACTUINV, 3 items for INVNEEDS, and 7 items for ACTUIMP three of which are those of ACTUINV).

In the light of these considerations regarding the construct validity of DSSFLEX, conclusions regarding its importance for user satisfaction and system usage have to be made with reservation. However, it should also be mentioned that the results obtained and the tentative conclusions that can be drawn from this study for DSSFLEX do lend support to other researchers' opinions about the importance of flexibility (Sprague and Carlson; Huber, 1983), and confirm the results of the only previous empirical study (Bailey and Pearson, 198[illegible]) that assessed this importance quantitatively.

3- Changes Caused by a DSS

In Chapter II it was pointed out that there is general agreement that DSS cause extensive changes. An interesting result of this study is the high correlations between the composite variable changes caused and the three dependent variables. In addition, changes caused appears in four of the six regression equations in Table IV.8, indicating that it significantly accounts for a portion of the variance in the dependent variables, other than the portion accounted for by DSS flexibility and actual user involvement. The conclusion is that decision maker/users were more satisfied and used more heavily DSS that were perceived to have caused changes in their task environments, than DSS that resulted in smaller changes. In other words, the decision maker/users surveyed in this study favor DSS that cause change over those that don't. It is difficult to infer causality in this situation since we can not determine if it is change causing satisfaction and usage or satisfaction and usage resulting in greater usage and a change because of that usage. Nonetheless, the close relationship between changes caused and the three measures of success is also indicated by the high positive correlations between the composite variables willingness to change and realization of expectations, i.e., decision maker/users with high willingness to change also tend to perceive their expectations as having been fulfilled. Since WILTOCHG and REALEXP also correlate highly with the three dependent variables, the conclusion that DSS cause changes is supported.

C- RESULTS OF PROPOSITION TESTING

As far as Proposition 8 is concerned, the testing of the proposition consists of significance testing of the correlation between CSFSUPP and the three dependent variables. From Table IV.6 it is seen that CSFSUPP correlates highly with both SATISFAC and SYSTUSE, with the correlation being significant at a level better than 0.001 in both cases. The correlation between CSFSUPP and UIS is considerably smaller, and is significant at 0.10 level. These results provide support for Proposition 8, and indicate that DSS that address key management issues are more heavily used than DSS that support relatively less important issues. The decision maker/users also feel more satisfied with DSS supporting key issues compared to DSS that do not. The fact that CSFSUPP does not correlate as highly with UIS can be interpreted as an indication of the fact that, while the support of key managerial issues contributes to user satisfaction and system use, it does not influence the information and implementation dimensions of a DSS which the UIS measures. DSS that support key management issues might be utilized more heavily because the decisions they support may be made more frequently and/or because the decisions are very important, every bit of support, "good" or "bad", is sought.

For the testing of the remaining nine propositions, the results displayed in Tables IV.7 and IV.8 are jointly considered.

The results displayed in Table IV.7 indicate that different multiplicative effects find significance depending on the dependent differences between the dependent variables, this is expected.

In the case of UIS, we see from Table IV.7 that Propositions 7 and 9.2 are supported at 0.10 and 0.06 significance levels, with no support for the remaining propositions. Table IV.8 shows that the multiplicative effect of Proposition 1, accounts for a portion of the variance in UIS, over and above the main effect variables that enter the regression, at 0.10 significance level.

In the case of SYSTUSE, Propositions 7, 9.1, 9.2 and 10.3 are supported at 0.12, 0.05, 0.04, and 0.03 significance levels respectively, when the multiplicative effects are regressed with their corresponding main effects only. When a hierarchical blockwise regression is performed using all the variables of the study, CSFSUPP of Proposition 8 accounts for a portion of the variance, at 0.03 significance level, once the main effect variables are entered.

In the case of SATISFAC, the multiplicative effects of Propositions 9.1 and 9.2 are supported at 0.04 and 0.01 significance levels when these variables are regressed in conjunction with their main effects only, but no multiplicative variable enters the hierarchical blockwise regression of SATISFAC.

Having broken down 4 of the 10 propositions described in Chapter II into three subpropositions each, a total of 17 multiplicative effects and 1 "fit" variable have been examined for significance. Out of these 18 relationships, 6 have been observed at least once (Tables IV.7 and better significance levels. Although the specific multiplicative effects exhibiting significance show some variation depending on the dependent variable being used and the type of the regression run, certain multiplicative effects appear in more than one type of regression and/or in the regression equation of more than one dependent variable. These are the multiplicative effects of Propositions 9.1, and 9.2. Proposition 9.1 concerns the multiplicative effect between user multiplicity and the extent of user training. Proposition 9.2 concerns the multiplicative effect between user multiplicity and the actual top management support provided during implementation.

These results provide strong, albeit indirect, evidence for the conclusion that, as far as DSS implementations are concerned, multiplicative effects are unimportant. The strength of the evidence comes from two considerations.

First, as earlier mentioned, because the regression runs whose results are displayed in Table IV.7 involve specification errors, the significance levels reported in that table are overstated. In other words, since each regression reported in Table IV.7 was run for only three independent variables at a time, the multiplicative variables were each given an "unfair" opportunity to become significant. In spite of this, only two out of 17 multiplicative effects were significant at a level better than 0.05.

Second, the hierarchical blockwise regression results displayed in Table IV.8 show that a small subset of the main effect variables account for a large proportion of the variance in the dependent variables. While it is possible that, in reality, the multiplicative effects account for the remaining portion of the variance, this is rather unlikely since main effect variables not measured in this study can be expected to account for at least some of the unexplained variance.

D- IMPLICATIONS OF THE FINDINGS

1- Implications For DSS Research

As far as the unobserved multiplicative effects are concerned, the research design utilized does not permit the drawing of nonconfirmatory conclusions. In other words, given the results obtained, one cannot say that the unobserved multiplicative effects are nonexistant. Such a nonconfirmatory conclusion can best be obtained with an experimental design. However, as pointed out earlier, given the crucial importance of external validity for the kinds of variables considered here, a laboratory experiment would be out of the question.

As far as doing a field experiment with a view to obtaining stronger evidence for the strength of multiplicative effects is concerned, it too seems unfeasible. The usual difficulties associated with field experiments aside, there are a number of difficulties stemming from the nature of the variables to be investigated. For example, it is hard to imagine how one could design a field experiment by assigning (either randomly or nonrandomly) subjects (middle to high level managers) to different treatment groups (e.g. to different DSS with different flexibilities) according to, say, the subjects' willingness to change or cognitive styles. The experiment would have to be carried without introducing much change in the subjects' work environment (for external validity) while at the same time developing a great variety of custom made DSS with differing degrees of flexibility, to be provided to each subject for the particular decision making tasks he/she is facing. In addition to methodological difficulties associated with such a project, the practical difficulties associated with getting organizational cooperation and the large amount of funding necessary, make such a project infeasible.

Given the near impossibility of either a lab or a field experiment, one alternative could be to employ a survey design on a much larger scale than the one used here. However, given the results obtained in this study, the usefulness of the expenditure that a large scale interview-plus-questionnaire survey (the necessity of conducting interviews in order to identify the "right" respondents was explained earlier) would require, is questionnable. Even though the results obtained here do not provide evidence for the absence of multiplicative effects, they provide an indication of their strength. In other words, even if multiplicative effects do exist, they appear to be too weak to have an important impact on DSS implementation success.

The implication for researchers, at least as far as DSS are concerned, is that the multiplicative effects measured in this study are not very critical for implementation success. On the other hand, the construct DSS flexibility appears as potentially a key concept for DSS implementations. The results obtained in this study for DSS flexibility are not conclusive. However, if DSS flexibility is indeed as important as it appears to be, then trying to establish construct validity for DSSFLEX should provide an area of research likely to be both promising and practically useful. The present study has made a first attempt at operationalizing the concept of DSS flexibility through the DSSFLEX scale. Taking the research from here, a follow up study could address the issues of convergent and discriminant validity. One way of achieving this would be to develop better measures for ACTUINV, INVNEEDS and ACTUIMP, a different method for measuring DSS flexibility, and conducting a survey of DSS to measure all of these variables both with the new and the old scales. SATISFAC, and SYSTUSE. Provided good reliability results are obtained for the new measures, it should be possible to test for convergent and discriminant validity for DSSFLEX by using the multi-trait multi-method matrix (Campbell and Fiske, 1959). In developing a better measure for user involvement one could greatly benefit from preliminary work in this area (Olson and Ives, 1980; 1981). Developing a maximally different method than the one used here to measure DSS flexibility may prove to be more difficult. One possibility lies in the development of a "hard" measure of DSS flexibility. The scales developed here using the flexibility dimensions suggested by Sprague and Carlson, are affective scales that ask the respondent how easy, convenient or simple the different flexibility aspects rate. As such, these measures are comparatively "soft". "Hard" measures, because they could be taken unobtrusively, would provide a very different method of measurement. For example, instead of asking respondents how easy it is to modify the configuration of the DSS, one might simply count the number of different operations required to implement certain standard modifications to a DSS. Alternatively, one could develop a weighted measure combining the number of operations with, say, the time required to implement them, and use this as a "harder" measure for one of the flexibility "levels".

In assessing the internal consistency reliability of scales it is suggested that an observation to item ratio of 5:1 be used at a minimum (Nunnally, 1978). For DSS flexibility, which has 13 items, this means a sample size of 65 decision maker/users. Obviously, the sample size of this study falls short of this number, and it would therefore be very useful to replicate the reliability results obtained here in future research. The development of an objective and reliable instrument measuring DSS flexibility would have important benefits for both DSS builders and the organizations implementing DSS.

Some other main effect variables, namely decision maker/user willingness to change and actual involvement in implementation, explain a significant portion of the variance in the dependent variables SATISFAC and SYSTUSE. Notwithstanding the importance attributed to these two variables in the literature, because these were both measured post fact, and because they do not explain a significant portion of the variance in UIS (the most reliable of the three dependent variables), one needs to exercise caution in interpreting the confirmatory results obtained here. Still, the enhancement of the "willingness to change" measure developed in this study should be a promising area for future research. As previously mentioned, "resistance to change" or "willingness to change" has, for a long time, been an important concept in the MIS implementation literature. Unfortunately, in spite of the critical importance attached to this concept, it still largely remains as an unmeasurable construct. The measure developed in this study is, to this investigator's knowledge, one of the first attempts at measuring it with respect to an information system. The constraints of the study not enabling before-the-fact measurements, the quality of the results obtained for WILTOCHG and its causal link to the three success measures used, are debatable. However, given the general agreement in the literature regarding this construct's importance, and the results obtained here, it would be safe to conclude that further research in this area is likely to be promising. It would especially be useful, for example, to empirically determine the effect of various implementation process variables on users' resistance to change. One such study, using the scales developed here, could measure these effects longitudinally, say, for user training, user involvement, and top management support.

2- Managerial Implications

The managerial implications of this study are that, for DSS implementations, life may be simpler than one might otherwise believe. In implementing DSS, it may not be necessary to take a wide range of variables into consideration. Specifically, the findings lead to two conclusions of managerial relevance.

First, the fact that the main effect variables account for a high proportion of the observed variance in the dependent variables indicates that, from a practical standpoint, the multiplicative effects are comparatively unimportant. In the case of UIS, for example, DSS flexibility alone, accounts for nearly half the observed variance. In all the regressions, the proportion of the variance accounted for by the main effects is also very high. This simplifies DSS implementation efforts since it means that a lot of effort need not be spent to determine the specific contingencies between the variables involved in a particular situation.

Second, the fact that some of the main effect variables account for such a large proportion of the variance in the dependent variables means that directing DSS implementation efforts towards the adequate handling of those key points should, in most instances, ensure a successful outcome. In particular, making a DSS flexible, involving decision maker/users in the implementation process, ensuring that decision maker/users have a high willingness to change, and making sure that the DSS does bring changes to the work environment, appear as the primary considerations to keep in mind when implementing DSS.

E- SUMMARY AND CONCLUSIONS

This study started with the main premise that the influence of many important variables on DSS implementations were contingent in nature. In other words, the primary hypothesis was that variables influence the eventual success or failure of DSS implementations depending on the values of other variables in a particular situation. This premise, as described in Chapter II, has been stated by many scholars in different ways, but with the exception of case studies, had not been subjected to empirical testing in a DSS context. In an effort to provide the needed empirical support, this study first developed a framework, in accordance with the stated premise, for studying DSS implementation success. Subsequently, based on previous findings and/or suggestions made in the MIS literature, and also from common sense relationships that stemmed from the framework developed, 10 propositions were suggested for a field study. These propositions all involve the contingent relationships between pairs of variables as they influence the outcome of DSS implementation efforts.

In order to test these propositions, multiplicative variables were created from each pair of main effect variables, and the significance level of the incremental proportion of the variance accounted for by these multiplicative variables were used as test statistics. The measurement of the main effect variables was carried out via a questionnaire developed for this study. Of the 57 questionnaires distributed, 46 were returned from 9 organizations in three industries.

The analysis of the survey data led to the conclusion that, as far as DSS implementation in the utility and financial industries is concerned, the contingent relationships examined are not as important as the main effects. Furthermore, as certain main effects, including DSS flexibility, user involvement, and willingness to change, explain more than half the variance in the dependent variables, directing DSS implementation efforts towards the attainment of high levels in these variables should, in many instances, be sufficient for success. It is therefore suggested that further research in DSS implementation focus on improving and perfecting the instruments used to measure these constructs so that the specific steps through which to handle these key points can be discovered.

APPENDIX

APPENDIX A

SURVEY QUESTIONNAIRE

The University of Western Ontario
School of Business Administration

DECISION SUPPORT SYSTEMS

Research Questionnaire

IT SHOULD TAKE LESS THAN 30 MINUTES OF YOUR TIME TO COMPLETE THIS QUESTIONNAIRE. THE QUESTIONS CAN BE ANSWERED VERY QUICKLY AND WILL NOT REQUIRE DETAILED NUMBERS OR RECORDS. THANK YOU FOR YOUR HELP.

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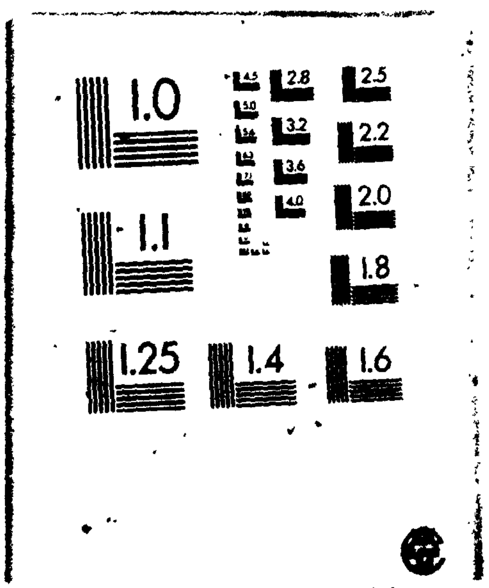

DEFINITIONS

PLEASE NOTE

This section contains definitions of terms which will be used in this study. Please read them carefully; this will permit you to complete the questionnaire faster and more accurately.

DEFINITION 1

For the purposes of this questionnaire the acronym DSS is used to describe the application called _______________ which you are using.

DEFINITION 2

Unless specified otherwise, please rate each item on the descriptive scales that follow it.

The scale positions are defined as follows:

```
adjective X :__:__:__:__:__:__:__: adjective Y
             (1) (2) (3) (4) (5) (6) (7)
```

(1) extremely X
(2) quite X
(3) slightly X
(4) neither X or Y; equally X or Y
(5) slightly Y
(6) quite Y
(7) extremely Y

The following example illustrates the scale positions and their meanings:

My vacation in the Bahamas was:

```
   restful :__:__:__:__:__:__:_X: hectic
   healthy :__:_X:__:__:__:__:__: unhealthy
 wonderful :__:__:__:_X:__:__:__: terrible
      long :__:__:__:__:_X:__:__: short.
```

According to the responses, the person's vacation was extremely hectic, quite healthy, neither wonderful nor terrible, and slightly short.

PLEASE NOTE

1. Each scale should be checked in the position that describes your evaluation of the item being judged.
2. Please check every scale.
3. Each scale should be checked at only one position.
4. Please check in the space, not between spaces. THIS :_X: NOT THIS :__X__:
5. Work rapidly. Rely on your first impressions.

PLEASE ANSWER BASED ON YOUR OWN FEELINGS. THERE ARE NO RIGHT OR WRONG ANSWERS. ONLY YOUR OPINION IS IMPORTANT.

THANK YOU VERY MUCH FOR YOUR COOPERATION.

SECTION I

The following are questions about the time period after the decision to go ahead with this DSS was made but before its development started. At that time

Q 1. the need you felt for a DSS was

weak :__:__:__:__:__:__:__: strong V 1 (F)

Q 2. your feelings about this particular DSS being able to answer your needs were

positive :__:__:__:__:__:__:__: negative V 2 (R)
definite :__:__:__:__:__:__:__: uncertain V 3 (R)

Q 3. you felt that the effects of this DSS on your relations with others would be

negative :__:__:__:__:__:__:__: positive V 4 (F)
unimportant :__:__:__:__:__:__:__: important V 5 (F)

Q 4. how ready were you to accept and undergo the various changes this DSS would bring

ready :__:__:__:__:__:__:__: not ready V 6 (R)
sure :__:__:__:__:__:__:__: hesitant V 7 (R)

Q 5. you felt that the old way of doing things was

sufficient :__:__:__:__:__:__:__: insufficient V 8 (F)
satisfactory :__:__:__:__:__:__:__: unsatisfactory V 9 (F)

Q 6. this DSS made you feel

threatened :__:__:__:__:__:__:__: supported V10 (F)

Q 7. your earlier experiences with other DSS were

Does Not Apply

positive :__:__:__:__:__:__:__: negative V11 (R)
satisfactory :__:__:__:__:__:__:__: unsatisfactory V12 (R) :__:

Q 8. from an overall cost-benefit point of view, this DSS seemed

unattractive :__:__:__:__:__:__:__: attractive V13 (F)
inferior :__:__:__:__:__:__:__: superior V14 (F)

Q 9. you felt that using computers to make decisions would be

useless :__:__:__:__:__:__:__: useful V15 (F)
a bad idea :__:__:__:__:__:__:__: a good idea V16 (F)

Q 10. you felt that for the kinds of decisions you made, your existing sources of information were

incomplete :__:__:__:__:__:__:__: complete V17 (R)
inadequate :__:__:__:__:__:__:__: adequate V18 (R)

The following questions refer to the characteristics of the information you used, in order to make the decisions this DSS now supports.

Before this DSS was developed

Q 1. The source of the information was

internal :__:__:__:__:__:__:__: external V19 (F)

Q 2. The scope and variety of the information was

well defined :__:__:__:__:__:__:__: broad V20 (F)

Q 3. The level of aggregation of the information was

detailed :__:__:__:__:__:__:__: aggregate V21 (F)

Q 4. The time horizon the information looked at was

historical :__:__:__:__:__:__:__: future oriented V22 (F)

Q 5. The data used to create the information was

current :__:__:__:__:__:__:__: old V23 (F)
objective :__:__:__:__:__:__:__: subjective V24 (F)

Q 6. The information was

precise :__:__:__:__:__:__:__: imprecise V25 (F)

Q 7. Whenever you made those particular decisions, you used the information

frequently :__:__:__:__:__:__:__: rarely V26 (F)

Before this DSS was developed, the decisions which it now supports had the following characteristics

Q 1. The existing procedures to handle the decisions were

clear :__:__:__:__:__:__:__: unclear V27 (F)

Q 2. The decisions were

routine :__:__:__:__:__:__:__: nonroutine V28 (F)
simple :__:__:__:__:__:__:__: complex V29 (F)

Q 3. Every time they occurred, the decisions had to be treated

similarly :__:__:__:__:__:__:__: differently V30 (F)

Q 4. Estimating the impact of the decisions was

easy :__:__:__:__:__:__:__: hard V31 (F)

Q 5. The information used in making the decisions was

sufficient :__:__:__:__:__:__:__: insufficient V32 (F)

Q 6. The objectives or criteria involved in the decision were

congruent :__:__:__:__:__:__:__: conflicting V33 (F)

Comparing the expectations you had from this DSS before it was developed, with what you are getting from it now, how different did the DSS in fact turn out to be for the following:

Q 1. The value of this DSS to me turned out to be

less than I expected :__:__:__:__:__:__:__: more than I expected   V34 (F)

Q 2. The overall success of this DSS turned out to be

less than I expected :__:__:__:__:__:__:__: more than I expected   V35 (F)

Q 3. The impact of this DSS on the way I make decisions turned out to be

less than I expected :__:__:__:__:__:__:__: more than I expected   V36 (F)

Q 4. The positive impact of this DSS on my performance turned out to be

less than I expected :__:__:__:__:__:__:__: more than I expected   V37 (F)

Q 5. The importance of this DSS in my job, turned out to be

less than I expected :__:__:__:__:__:__:__: more than I expected   V38 (F)

Q 6. The criteria by which this DSS is evaluated in the organization turned out to be

similar to what I expected :__:__:__:__:__:__:__: different from what I expected   V39 (F)

Q 7. What I am using this DSS for, turned out to be

similar to what I expected :__:__:__:__:__:__:__: different from what I expected   V40 (F)

SECTION II

The following are questions about the time period during which this DSS was being developed and also about the first couple of months when you first started using it. Looking back, please indicate the extent to which you feel

a- each aspect was actually present
b- in your opinion, each aspect should have been present in order to achieve the best result.

Q 1. Training received in the use of this DSS

Was Actually low :__:__:__:__:__:__:__: high   V41 (F)
Should have been low :__:__:__:__:__:__:__: high   V42 (F)

Q 2. Influence I had in the development of this DSS

Was Actually low :__:__:__:__:__:__:__: high   V43 (F)
Should have been low :__:__:__:__:__:__:__: high   V44 (F)

Q 3. Frequency of communications with the developers of this DSS

				Does Not Apply
Was Actually	low :__:__:__:__:__:__:__: high	V45	(F)	
Should have been	low :__:__:__:__:__:__:__: high	V46	(F)	:__:

Q 4. Your participation in the development of this DSS

				Does Not Apply
Was Actually	low :__:__:__:__:__:__:__: high	V47	(F)	
Should have been	low :__:__:__:__:__:__:__: high	V48	(F)	:__:

Q 5. The support given by top management to the development of this DSS

Was Actually	low :__:__:__:__:__:__:__: high	V49	(F)
Should have been	low :__:__:__:__:__:__:__: high	V50	(F)

Q 6. The priority top management placed on the development of this DSS

Was Actually	low :__:__:__:__:__:__:__: high	V51	(F)
Should have been	low :__:__:__:__:__:__:__: high	V52	(F)

Q 7. The resources allocated for the development of this DSS

Was Actually	low :__:__:__:__:__:__:__: high	V53	(F)
Should have been	low :__:__:__:__:__:__:__: high	V54	(F)

SECTION III

For each statement below please put an X in the space that you feel most accurately describes the extent of changes this DSS has caused in:

Q 1. your decision making activities

low :__:__:__:__:__:__:__: high V55 (F)

Q 2. the ways in which you communicate with others

low :__:__:__:__:__:__:__: high V56 (F)

Q 3. your interpersonal relations

low :__:__:__:__:__:__:__: high V57 (F)

Q 4. who your co-workers are

low :__:__:__:__:__:__:__: high V58 (F)

Q 5. your work routines and procedures

low :__:__:__:__:__:__:__: high V59 (F)

Q 6. the structure of your department

low :__:__:__:__:__:__:__: high V60 (F)

For each statement below, please put an X in the space that you believe is most appropriate

Q 1. With this DSS, asking "what if" type questions is

				Does Not Apply
easy	:__:__:__:__:__:__:__:	hard	V61 (R)	:__:
convenient	:__:__:__:__:__:__:__:	inconvenient	V62 (R)	:__:
simple	:__:__:__:__:__:__:__:	complex	V63 (R)	:__:

Q 2. With this DSS, exploring alternative ways of viewing or solving a problem is

easy	:__:__:__:__:__:__:__:	hard	V64 (R)
convenient	:__:__:__:__:__:__:__:	inconvenient	V65 (R)
simple	:__:__:__:__:__:__:__:	complex	V66 (R)

Q 3. Modifying this DSS's configuration so that it can handle a different or expanded set of problems, is

easy	:__:__:__:__:__:__:__:	hard	V67 (R)
convenient	:__:__:__:__:__:__:__:	inconvenient	V68 (R)
simple	:__:__:__:__:__:__:__:	complex	V69 (R)

Q 4. When this DSS has to be modified, changing the code is

				Don't Know
easy	:__:__:__:__:__:__:__:	hard	V70 (R)	:__:
simple	:__:__:__:__:__:__:__:	complex	V71 (R)	:__:

Q 5. In terms of its applicability and use in more than one type of application, this DSS is

rigid	:__:__:__:__:__:__:__:	flexible	V72 (F)
inferior	:__:__:__:__:__:__:__:	superior	V73 (F)

SECTION IV- GENERAL ATTITUDES TOWARDS THE DSS

Q 1. Your relationship with the developers of this DSS is

				Does Not Apply
harmonious	:__:__:__:__:__:__:__:	dissonant	V74 (R)	:__:
good	:__:__:__:__:__:__:__:	bad	V75 (R)	:__:

Q 2. Processing of requests for changes to this DSS is

				Don't Know	Does Not Apply
fast	:__:__:__:__:__:__:__:	slow	V76 (R)	:__:	:__:
timely	:__:__:__:__:__:__:__:	untimely	V77 (R)	:__:	:__:

Q 3. Degree of training provided to you in the use of this DSS is

				Does Not Apply
complete	:__:__:__:__:__:__:__:	incomplete	V78 (R)	:__:
high	:__:__:__:__:__:__:__:	low	V79 (R)	:__:

Q 4. Your understanding of this DSS is

sufficient	:__:__:__:__:__:__:__:	insufficient	V80 (R)
complete	:__:__:__:__:__:__:__:	incomplete	V81 (R)

Q 5. Your feelings of participation in the development of this DSS are

				Does Not Apply
positive	:__:__:__:__:__:__:__:	negative	V82 (R)	:__:
sufficient	:__:__:__:__:__:__:__:	insufficient	V83 (R)	:__:

Q 6. Attitude of the developers of this DSS was

				Don't Know
cooperative	:__:__:__:__:__:__:__:	belligerent	V84 (R)	:__:
positive	:__:__:__:__:__:__:__:	negative	V85 (R)	:__:

Q 7. Reliability of output information from this DSS is

high	:__:__:__:__:__:__:__:	low	V86 (R)
superior	:__:__:__:__:__:__:__:	inferior	V87 (R)

Q 8. Relevancy of output information from this DSS is

useful	:__:__:__:__:__:__:__:	useless	V88 (R)
relevant	:__:__:__:__:__:__:__:	irrelevant	V89 (R)

Q 9. Accuracy of output information from this DSS is

accurate	:__:__:__:__:__:__:__:	inaccurate	V90 (R)
high	:__:__:__:__:__:__:__:	low	V91 (R)

Q 10. Precision of output information from this DSS is

high	:__:__:__:__:__:__:__:	low	V92 (R)
definite	:__:__:__:__:__:__:__:	uncertain	V93 (R)

Q 11. Communication with the developers of this DSS is

				Does Not Apply
harmonious	:__:__:__:__:__:__:__:	dissonant	V94 (R)	:__:
productive	:__:__:__:__:__:__:__:	destructive	V95 (R)	:__:

Q 12. Time required to develop this DSS was

				Don't Know	Does Not Apply
reasonable	:__:__:__:__:__:__:__:	unreasonable	V96 (R)	:__:	:__:
acceptable	:__:__:__:__:__:__:__:	unacceptable	V97 (R)	:__:	:__:

Q 13. Completeness of output information from this DSS is

sufficient	:__:__:__:__:__:__:__:	insufficient	V98 (R)
adequate	:__:__:__:__:__:__:__:	inadequate	V99 (R)

SECTION V- GENERAL QUESTIONS

For any business, Critical Success Factors (CSFs) are the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where "things must go right" for the business to flourish. If results in these areas are not adequate, the organization's efforts for the period will be less than desired. The CSFs vary from industry to industry and from organization to organization. An example of the possible CSFs of two organizations is given below

An Organization In The Automotive Industry	An Organization In The Supermarket Industry
- Product Styling	- Product Mix
- Quality dealer system	- Inventory
- Cost control	- Sales promotion
- Meeting energy standards	- Price

Q 1. Please list below, in decreasing order of importance, your personal perception of the three critical success factors for

a- Your organization as a whole

1- __________
2- __________
3- __________

b- Your Department (Some CSFs may be same as in a above)

1- __________
2- __________
3- __________

Q 2. Does this DSS provide direct or indirect support for any of the CSFs you listed above?

Yes ____

No ____

Q 3. If your answer to the above question was No, please skip this question.

V100-V105

a- which critical success factors does this DSS support directly? a1 a2 a3 b1 b2 b3

b- which critical success factors does this DSS support indirectly? a1 a2 a3 b1 b2 b3

V106-V111

Q 4. In this organization, the managers who are the most influential to you, have a

low tendency to resist change :__:__:__:__:__:__:__: high tendency to resist change V112 (R)

Q 5. The organization's practices towards new management techniques can best be described as: (Please circle one number)

1- Never adopts new techniques V113 (R)
2- Usually among the last to adopt a new technique
3- Likes to adopt a new technique when it becomes more or less a general rule
4- Among the foremost to adopt a new technique, but not the leader
5- Leader in new techniques of management

Q 6. Your department's practices towards new management techniques can best be described as: (Please circle one number)

1- Never adopts new techniques
2- Usually among the last to adopt a new technique
3- Likes to adopt a new technique when it becomes more or less a general rule V114 (F)
4- Among the foremost to adopt a new technique, but not the leader
5- Leader in new techniques of management

Q 7. This DSS can best be described as: (Please circle one number)

1- A standard package used by many businesses
2- A standard package, but includes minor modifications to make it fit our requirements
3- Custom developed for our organization but similar applications do exist in other organizations V115 (F)
4- A standard package but includes major modifications to make it fit our requirements
5- Custom developed for our organization and is, as far as I know, significantly different from systems in other organizations.

Q 8. Overall, how would you assess the degree of pioneering involved in the design of this DSS at the time it was first implemented in this organization?

low :__:__:__:__:__:__:__: high V116 (F) Don't Know :__:

Q 9. To what extent does this DSS represent "a new way of doing things" for this organization?

small :__:__:__:__:__:__:__: large V117 (F)

Q 10. Number of functional departments using this DSS (Please circle one number) Don't Know :__:

1- one
2- two
3- three V118 (F)
4- four
5- five or more

Q 11. Total number of users of this DSS (Please circle one number) Don't Know :__:

1- One
2- Between 1 and 5
3- Between 5 and 10 V119 (F)
4- Between 10 and 20
5- More than 20

Q 12. If more than one user is using this DSS, to what extent are

a- their information requirements from the DSS different from each other

low :__:__:__:__:__:__:__: high V120 (F) Does Not Apply :__: Don't Know :__:

b- the purposes for which they use the DSS different from each other

low :__:__:__:__:__:__:__: high V121 (F) Does Not Apply :__: Don't Know :__:

Q 13. Total number of people that worked on the development team of this DSS

Does Not Apply :__: Don't Know :__:

__________ V122

Q 14. Number of personnel that discontinued working on the project during the development of this DSS

Does Not Apply :__: Don't Know :__:

__________ V123

Q 15. When you started using this DSS you felt

1- unprepared
2- unsure of how to respond in most situations
3- reasonably prepared for most situations
4- confident of how to respond in most situations
5- completely prepared for it

V124 (F)

Q 16. Overall, taking everything into consideration, how satisfied or dissatisfied are you with this DSS?

satisfied :__:__:__:__:__:__:__: dissatisfied V125 (R)

Q 17. When you have to make the decision(s) the system is supporting, what percentage of the time do you use it?

_______% V126

Q 18. Which of the following best describes the functional area in which you work?

Accounting ____ Marketing ____

Engineering ____ Personnel or Labor Relations ____ V127

Finance ____

General Management ____ Other (please specify)

Production ____ ____________________

Q 19. Your present title or position is:

____ V128

Q 20. How long have you been in this position?

____________________ V129

Q 21. Was this DSS developed or installed while you have been in this position?

Yes _____ No _____ V130

SECTION VI

The following questions are designed to show which way you have developed in your approach to dealing with work related problems. The answer you choose for any item is neither right or wrong. It simply helps to point out the way you study problems.
Please read each item carefully. Then indicate the extent to which you agree or disagree by circling the number that corresponds to your opinion for that question.

PLEASE GIVE YOUR OPINION ON EVERY STATEMENT

If you find that the answers do not adequately indicate your personal opinion, use the one which comes closest to the way you feel.

	Agree Strongly	Agree Slightly	Disagree Slightly	Disagree Strongly	
Q 1. In my daily work I usually plan so that I am not pressured for time in meeting a deadline.	1	2	3	4	V131 (F)
Q 2. If asked a few days before a holiday what you were going to do that day, you would have to wait and see.	1	2	3	4	V132 (R)
Q 3. Following a schedule cramps me.	1	2	3	4	V133 (R)
Q 4. The idea of making a list of what I should get done over the weekend appeals to me.	1	2	3	4	V134 (F)
Q 5. I am more a "planner" than a "doer".	1	2	3	4	V135 (F)
Q 6. I like to arrange my dates and parties some distance ahead.	1	2	3	4	V136 (F)
Q 7. When starting a big project that is due in a week, I like to list the things to be done and the order of doing them.	1	2	3	4	V137 (F)
Q 8. I can more easily cope with set routine than constant change	1	2	3	4	V138 (F)
Q 9. I am a spontaneous person.	1	2	3	4	V139 (R)
Q 10. I am at my best when following a plan.	1	2	3	4	V140 (F)
Q 11. When writing a report, I just sit down and start writing.	1	2	3	4	V141 (R)
Q 12. "Scheduled" has more appeal to me than "unplanned".	1	2	3	4	V142 (F)
Q 13. Where I live I seldom keep my letters and other personal things neatly arranged and filed.	1	2	3	4	V143 (R)
Q 14. I am at my best when dealing with the unexpected.	1	2	3	4	V144 (R)
Q 15. The idea of making a list of what I should get done over the weekend depresses me.	1	2	3	4	V145 (R)
Q 16. When there is an unfamiliar special job to be done, I like to find out what is necessary as I go along rather than attempting to organize it carefully before starting.	1	2	3	4	V146 (R)
Q 17. If asked a few days before a holiday what you were going to do that day, you would be able to tell pretty well.	1	2	3	4	V147 (F

For the following questions please circle the number that you feel best describes your attitudes

	Is Always The Same				Changes a Great Deal	
Q 1. The job that you would consider ideal for you would be one where the way you do your work	1	2	3	4	5	V148 (F)
	I Strongly Agree				I Strongly Disagree	
Q 2. If I could do as I pleased, I would change the kind of work I do every few months	1	2	3	4	5	V149 (R)
Q 3. One can never feel at ease on a job where the ways of doing things are always being changed	1	2	3	4	5	V150 (F)
Q 4. The trouble with most jobs is that you just get used to doing things in one way and then they want you to do them differently	1	2	3	4	5	V151 (F)
Q 5. I would prefer to stay with a job that I know I can handle than to change to one where most things would be new to me	1	2	3	4	5	V152 (F)
Q 6. The trouble with many people is that when they find a job they can do well, they don't stick with it	1	2	3	4	5	V153 (F)
Q 7. I like a job where I know that I will be doing my work about the same way from one week to the next	1	2	3	4	5	V154 (F)
Q 8. When I get used to doing things in one way it is disturbing to have to change to a new method	1	2	3	4	5	V155 (F)
Q 9. It would take a sizeable raise in pay to get me to voluntarily transfer to another job	1	2	3	4	5	V156 (F)

Thank you very much for filling out this questionnaire. If there is anything else you would like to mention about your experience with this DSS, please use this page for that purpose. These comments will be most appreciated.

APPENDIX B

CORRELATION MATRIX FOR THE COMPOSITE VARIABLES

APPENDIX B.1

SPSS PROGRAM FOR THE CALCULATION OF COMPOSITE AND

MULTIPLICATIVE VARIABLES

FILE NAME SUMSCALES1

```
FILE NAME       SUMSCALES1
GET FILE        [*>DATA SPSS]DATA SPSS
COMPUTE         WILTOCHG=0
IF              (V1 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V1
IF              (V2 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V2
IF              (V3 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V3
IF              (V6 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V6
IF              (V7 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V7
IF              (V10 NE 0 AND.8 AND 9) WILTOCHG=WILTOCHG+V10
IF              (V13 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V13
IF              (V14 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V14
IF              (V15 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V15
IF              (V16 NE 0 AND 8 AND 9) WILTOCHG=WILTOCHG+V16
COUNT           NMISSG11=V1 TO V3, V6, V7, V10, V13 TO V16 (0, 8, 9)
COMPUTE         NVALID11=10-NMISSG11
IF              (NVALID11 GE 7) WILTOCHG=WILTOCHG/NVALID11
IF              (NVALID11 LT 7) WILTOCHG=99
MISSING VALUES  WILTOCHG(99)
COMPUTE         WILTOCH2=0
IF              (V4 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V4
IF              (V5 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V5
IF              (V8 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V8
IF              (V9 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V9
IF              (V11 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V11
IF              (V12 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V12
IF              (V17 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V17
IF              (V18 NE 0 AND 8 AND 9) WILTOCH2=WILTOCH2+V18
COUNT           NMISSG12=V4, V5, V8, V9, V11, V12, V17, V18 (0, 8, 9)
COMPUTE         NVALID12=8-NMISSG12
IF              (NVALID12 GE 5) WILTOCH2=WILTOCH2/NVALID12
IF              (NVALID12 LT 5) WILTOCH2=99
MISSING VALUES  WILTOCH2(99)
COMPUTE         DECLEVEL=0
IF              (V20 NE 0 AND 8 AND 9) DECLEVEL=DECLEVEL+V20
IF              (V21 NE 0 AND 8 AND 99 DECLEVEL=DECLEVEL+V21
IF              (V22 NE 0 AND 8 AND 9) DECLEVEL=DECLEVEL+V22
IF              (V23 NE 0 AND 8 AND 9) DECLEVEL=DECLEVEL+V23
IF              (V25 NE 0 AND 8 AND 9) DECLEVEL=DECLEVEL+V25
COUNT           NMISSG2=V20 TO V23, V25 (0, 8, 9)
COMPUTE         NVALID2=5-NMISSG2
IF              (NVALID2 GE 4) DECLEVEL=DECLEVEL/NVALID2
IF              (NVALID2 LT 4) DECLEVEL=99
MISSING VALUES  DECLEVEL(99)
COMPUTE         DECSTRUC=0
IF              (V27 NE 0 AND 8 AND 9) DECSTRUC=DECSTRUC+V27
IF              (V28 NE 0 AND 8 AND 9) DECSTRUC=DECSTRUC+V28
IF              (V29 NE 0 AND 8 AND 9) DECSTRUC=DECSTRUC+V29
IF              (V30 NE 0 AND 8 AND 9) DECSTRUC=DECSTRUC+V30
IF              (V31 NE 0 AND 8 AND 9) DECSTRUC=DECSTRUC+V31
IF              (V32 NE 0 AND 8 AND 9) DECSTRUC=DECSTRUC+V32
COUNT           NMISSG3=V27 TO V32 (0, 8, 9)
COMPUTE         NVALID3=6-NMISSG3
IF              (NVALID3 GE 4) DECSTRUC=DECSTRUC/NVALID3
IF              (NVALID3 LT 4) DECSTRUC=99
MISSING VALUES  DECSTRUC(99)
COMPUTE         REALEXP=0
IF              (V34 NE 0 AND 8 AND 9) REALEXP=REALEXP+V34
IF              (V35 NE 0 AND 8 AND 9) REALEXP=REALEXP+V35
IF              (V36 NE 0 AND 8 AND 9) REALEXP=REALEXP+V36
IF              (V37 NE 0 AND 8 AND 9) REALEXP=REALEXP+V37
```

FILE NAME SUMSCALES1

```
IF              (V38 NE 0 AND 8 AND 9) REALEXP=REALEXP+V38
COUNT           NMISSG4=V34 TO V38 (0,8,9)
COMPUTE         NVALID4=5-NMISSG4
IF              (NVALID4 GE 3) REALEXP=REALEXP/NVALID4
IF              (NVALID4 LT 3) REALEXP=99
MISSING VALUES  REALEXP(99)
COMPUTE         REALEXP2=0
IF              (V39 NE 0 AND 8 AND 9) REALEXP2=REALEXP2+V39
IF              (V40 NE 0 AND 8 AND 9) REALEXP2=REALEXP2+V40
COUNT           NMISSG42=V39 V40 (0,8,9)
COMPUTE         NVALID42=2-NMISSG42
IF              (NVALID42 GE 1) REALEXP2=REALEXP2/NVALID42
IF              (NVALID42 LT 1) REALEXP2=99
MISSING VALUES  REALEXP2(99)
COMPUTE         ACTUTRA=0
IF              (V41 NE 0 AND 8 AND 9) ACTUTRA=ACTUTRA+V41
IF              (V124 NE 0 AND 8 AND 9) ACTUTRA=ACTUTRA+V124
COUNT           NMISSG51=V41.V124(0,8,9)
COMPUTE         NVALID51=2-NMISSG51
IF              (NVALID51 GE 1) ACTUTRA=ACTUTRA/NVALID51
IF              (NVALID51 LT 1) ACTUTRA=99
MISSING VALUES  ACTUTRA(99)
COMPUTE         ACTUINV=0
IF              (V43 NE 0 AND 8 AND 9) ACTUINV=ACTUINV+V43
IF              (V45 NE 0 AND 8 AND 9) ACTUINV=ACTUINV+V45
IF              (V47 NE 0 AND 8 AND 9) ACTUINV=ACTUINV+V47
COUNT           NMISSG52=V43,V45,V47 (0,8,9)
COMPUTE         NVALID52=3-NMISSG52
IF              (NVALID52 GE 2) ACTUINV=ACTUINV/NVALID52
IF              (NVALID52 LT 2) ACTUINV=99
MISSING VALUES  ACTUINV(99)
COMPUTE         ACTUSUP=0
IF              (V49 NE 0 AND 8 AND 9) ACTUSUP=ACTUSUP+V49
IF              (V51 NE 0 AND 8 AND 9) ACTUSUP=ACTUSUP+V51
IF              (V53 NE 0 AND 8 AND 9) ACTUSUP=ACTUSUP+V53
COUNT           NMISSG53=V49,V51,V53 (0,8,9)
COMPUTE         NVALID53=3-NMISSG53
IF              (NVALID53 GE 2) ACTUSUP=ACTUSUP/NVALID53
IF              (NVALID53 LT 2) ACTUSUP=99
MISSING VALUES  ACTUSUP(99)
COMPUTE         ACTUIMP=0
IF              (V41 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V41
IF              (V43 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V43
IF              (V45 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V45
IF              (V47 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V47
IF              (V49 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V49
IF              (V51 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V51
IF              (V53 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V53
IF              (V124 NE 0 AND 8 AND 9) ACTUIMP=ACTUIMP+V124
COUNT           NMISSGAI=V41,V43,V45,V47,V49,V51,V53,V124(0,8,9)
COMPUTE         NVALIDAI=8-NMISSGAI
IF              (NVALIDAI GE 5) ACTUIMP=ACTUIMP/NVALIDAI
IF              (NVALIDAI LT 5) ACTUIMP=99
MISSING VALUES  ACTUIMP(99)
COMPUTE         TRANEEDS=0
IF              (V42 NE 0 AND 8 AND 9) TRANEEDS=TRANEEDS+V42
IF              (V42 EQ 0 OR 8 OR 9) TRANEEDS=99
MISSING VALUES  TRANEEDS(99)
COMPUTE         INVNEEDS=0
IF              (V44 NE 0 AND 8 AND 9) INVNEEDS=INVNEEDS+V44
```

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FILE NAME       SUMSCALES1

IF              (V46 NE 0 AND 8 AND 9) INVNEEDS=INVNEEDS+V46
IF              (V48 NE 0 AND 8 AND 9) INVNEEDS=INVNEEDS+V48
COUNT           NMISSG61=V44.V46,V48 (0,8,9)
COMPUTE         NVALID61=3-NMISSG61
IF              (NVALID61 GE 2) INVNEEDS=INVNEEDS/NVALID61
IF              (NVALID61 LT 2) INVNEEDS=99
MISSING VALUES  INVNEEDS(99)
COMPUTE         SUPNEEDS=0
IF              (V50 NE 0 AND 8 AND 9) SUPNEEDS=SUPNEEDS+V50
IF              (V52 NE 0 AND 8 AND 9) SUPNEEDS=SUPNEEDS+V52
IF              (V54 NE 0 AND 8 AND 9) SUPNEEDS=SUPNEEDS+V54
COUNT           NMISSG62=V50,V52,V54 (0,8,9)
COMPUTE         NVALID62=3-NMISSG62
IF              (NVALID62 GE 2) SUPNEEDS=SUPNEEDS/NVALID62
IF              (NVALID62 LT 2) SUPNEEDS=99
MISSING VALUES  SUPNEEDS(99)
COMPUTE         IMPNEEDS=0
IF              (V44 NE 0 AND 8 AND 9) IMPNEEDS=IMPNEEDS+V44
IF              (V46 NE 0 AND 8 AND 9) IMPNEEDS=IMPNEEDS+V46
IF              (V48 NE 0 AND 8 AND 9) IMPNEEDS=IMPNEEDS+V48
IF              (V50 NE 0 AND 8 AND 9) IMPNEEDS=IMPNEEDS+V50
IF              (V52 NE 0 AND 8 AND 9) IMPNEEDS=IMPNEEDS+V52
IF              (V54 NE 0 AND 8 AND 9) IMPNEEDS=IMPNEEDS+V54
COUNT           NMISSGIN=V44,V46,V48,V50,V52,V54(0,8,9)
COMPUTE         NVALIDIN=6-NMISSGIN
IF              (NVALIDIN GE 4) IMPNEEDS=IMPNEEDS/NVALIDIN
IF              (NVALIDIN LT 4) IMPNEEDS=99
MISSING VALUES  IMPNEEDS(99)
COMPUTE         CHGCAUS=0
IF              (V55 NE 0 AND 8 AND 9) CHGCAUS=CHGCAUS+V55
IF              (V56 NE 0 AND 8 AND 9) CHGCAUS=CHGCAUS+V56
IF              (V57 NE 0 AND 8 AND 9) CHGCAUS=CHGCAUS+V57
IF              (V58 NE 0 AND 8 AND 9) CHGCAUS=CHGCAUS+V58
IF              (V59 NE 0 AND 8 AND 9) CHGCAUS=CHGCAUS+V59
IF              (V60 NE 0 AND 8 AND 9) CHGCAUS=CHGCAUS+V60
COUNT           NMISSG7=V55 TO V60 (0,8,9)
COMPUTE         NVALID7=6-NMISSG7
IF              (NVALID7 GE 4) CHGCAUS=CHGCAUS/NVALID7
IF              (NVALID7 LT 4) CHGCAUS=99
MISSING VALUES  CHGCAUS(99)
COMPUTE         DSSFLEX=0
IF              (V61 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V61
IF              (V62 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V62
IF              (V63 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V63
IF              (V64 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V64
IF              (V65 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V65
IF              (V66 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V66
IF              (V67 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V67
IF              (V68 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V68
IF              (V69 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V69
IF              (V70 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V70
IF              (V71 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V71
IF              (V72 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V72
IF              (V73 NE 0 AND 8 AND 9) DSSFLEX=DSSFLEX+V73
COUNT           NMISSG8=V61 TO V73 (0,8,9)
COMPUTE         NVALID8=13-NMISSG8
IF              (NVALID8 GE 8) DSSFLEX=DSSFLEX/NVALID8
IF              (NVALID8 LT 8) DSSFLEX=99
MISSING VALUES  DSSFLEX(99)
SAVE FILE       [*>SCALE SPSS1]SCALE SPSS1
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FILE NAME       SUMSCALES2

FILE NAME       SUMSCALES2
GET FILE        [*>SCALE SPSS1]SCALE SPSS1
COMPUTE         UIS=0
IF              (V74 NE 9 AND 8 AND 0) UIS=UIS+V74
IF              (V75 NE 9 AND 8 AND 0) UIS=UIS+V75
IF              (V76 NE 9 AND 8 AND 0) UIS=UIS+V76
IF              (V77 NE 9 AND 8 AND 0) UIS=UIS+V77
IF              (V78 NE 9 AND 8 AND 0) UIS=UIS+V78
IF              (V79 NE 9 AND 8 AND 0) UIS=UIS+V79
IF              (V80 NE 9 AND 8 AND 0) UIS=UIS+V80
IF              (V81 NE 9 AND 8 AND 0) UIS=UIS+V81
IF              (V82 NE 9 AND 8 AND 0) UIS=UIS+V82
IF              (V83 NE 9 AND 8 AND 0) UIS=UIS+V83
IF              (V84 NE 9 AND 8 AND 0) UIS=UIS+V84
IF              (V85 NE 9 AND 8 AND 0) UIS=UIS+V85
IF              (V86 NE 9 AND 8 AND 0) UIS=UIS+V86
IF              (V87 NE 9 AND 8 AND 0) UIS=UIS+V87
IF              (V88 NE 9 AND 8 AND 0) UIS=UIS+V88
IF              (V89 NE 9 AND 8 AND 0) UIS=UIS+V89
IF              (V90 NE 9 AND 8 AND 0) UIS=UIS+V90
IF              (V91 NE 9 AND 8 AND 0) UIS=UIS+V91
IF              (V92 NE 9 AND 8 AND 0) UIS=UIS+V92
IF              (V93 NE 9 AND 8 AND 0) UIS=UIS+V93
IF              (V94 NE 9 AND 8 AND 0) UIS=UIS+V94
IF              (V95 NE 9 AND 8 AND 0) UIS=UIS+V95
IF              (V96 NE 9 AND 8 AND 0) UIS=UIS+V96
IF              (V97 NE 9 AND 8 AND 0) UIS=UIS+V97
IF              (V98 NE 9 AND 8 AND 0) UIS=UIS+V98
IF              (V99 NE 9 AND 8 AND 0) UIS=UIS+V99
COUNT           NMISSG9=V74 TO V99 (0 8,9)
COMPUTE         NVALID9=26-NMISSG9
IF              (NVALID9 GE 15) UIS=UIS/NVALID9
IF              (NVALID9 LT 15) UIS=99
MISSING VALUES  UIS(99)
COMPUTE         CSFSUPP=0
IF              (V100 NE 9) CSFSUPP=CSFSUPP+6*V100
IF              (V101 NE 9) CSFSUPP=CSFSUPP+4*V101
IF              (V102 NE 9) CSFSUPP=CSFSUPP+2*V102
IF              (V103 NE 9) CSFSUPP=CSFSUPP+6*V103
IF              (V104 NE 9) CSFSUPP=CSFSUPP+4*V104
IF              (V105 NE 9) CSFSUPP=CSFSUPP+2*V105
IF              (V106 NE 9) CSFSUPP=CSFSUPP+3*V106
IF              (V107 NE 9) CSFSUPP=CSFSUPP+2*V107
IF              (V108 NE 9) CSFSUPP=CSFSUPP+V108
IF              (V109 NE 9) CSFSUPP=CSFSUPP+3*V109
IF              (V110 NE 9) CSFSUPP=CSFSUPP+2*V110
IF              (V111 NE 9) CSFSUPP=CSFSUPP+V111
COUNT           NMISSG10=V100 TO V111 (9)
COMPUTE         NVALID10=12-NMISSG10
IF              (NVALID10 GE 8) CSFSUPP=CSFSUPP/NVALID10
IF              (NVALID10 LT 8) CSFSUPP=99
MISSING VALUES  CSFSUPP(99)
COMPUTE         MOMTATT=0
IF              (V112 NE 0 AND 8 AND 9) MOMTATT=MOMTATT+V112
IF              (V113 NE 0 AND 8 AND 9) MOMTATT=MOMTATT+V113*1 4
IF              (V114 NE 0 AND 8 AND 9) MOMTATT=MOMTATT+V114*1 4
COUNT           NMISSG11=V112 TO V114 (0,8,9)
COMPUTE         NVALID11=3-NMISSG11
IF              (NVALID11 GE 2) MOMTATT=MOMTATT/NVALID11
IF              (NVALID11 LT 2) MOMTATT=99
```

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FILE NAME       SUMSCALES2

MISSING VALUES MGMTATT(99)
COMPUTE        PIONDEG=0
IF             (V115 NE 0 AND 8 AND 9) PIONDEG=PIONDEG+V115*1 4
IF             (V116 NE 0 AND 8 AND 9) PIONDEG=PIONDEG+V116
IF             (V117 NE 0 AND 8 AND 9) PIONDEG=PIONDEG+V117
COUNT          NMISSG12=V115 TO V117 (0,8,9)
COMPUTE        NVALID12=3-NMISSG12
IF             (NVALID12 GE 2) PIONDEG=PIONDEG/NVALID12
IF             (NVALID12 LT 2) PIONDEG=99
MISSING VALUES PIONDEG(99)
COMPUTE        MULTIP=0
IF             (V118 NE 0 AND 8 AND 9) MULTIP=MULTIP+V118*1 4
IF             (V119 NE 0 AND 8 AND 9) MULTIP=MULTIP+V119*1 4
IF             (V120 NE 0 AND 8 AND 9) MULTIP=MULTIP+V120
IF             (V121 NE 0 AND 8 AND 9) MULTIP=MULTIP+V121
COUNT          NMISSG13=V118 TO V121 (0,8,9)
COMPUTE        NVALID13=4-NMISSG13
IF             (NVALID13 GE 2) MULTIP=MULTIP/NVALID13
IF             (NVALID13 LT 2) MULTIP=99
MISSING VALUES MULTIP(99)
COMPUTE        COGSTYLE=0
IF             (V131 NE 9) COGSTYLE=COGSTYLE+V131
IF             (V132 NE 9) COGSTYLE=COGSTYLE+V132
IF             (V133 NE 9) COGSTYLE=COGSTYLE+V133
IF             (V134 NE 9) COGSTYLE=COGSTYLE+V134
IF             (V135 NE 9) COGSTYLE=COGSTYLE+V135
IF             (V136 NE 9) COGSTYLE=COGSTYLE+V136
IF             (V137 NE 9) COGSTYLE=COGSTYLE+V137
IF             (V138 NE 9) COGSTYLE=COGSTYLE+V138
IF             (V139 NE 9) COGSTYLE=COGSTYLE+V139
IF             (V140 NE 9) COGSTYLE=COGSTYLE+V140
IF             (V141 NE 9) COGSTYLE=COGSTYLE+V141
IF             (V142 NE 9) COGSTYLE=COGSTYLE+V142
IF             (V143 NE 9) COGSTYLE=COGSTYLE+V143
IF             (V144 NE 9) COGSTYLE=COGSTYLE+V144
IF             (V145 NE 9) COGSTYLE=COGSTYLE+V145
IF             (V146 NE 9) COGSTYLE=COGSTYLE+V146
IF             (V147 NE 9) COGSTYLE=COGSTYLE+V147
COUNT          NMISSG14=V131 TO V147 (9)
COMPUTE        NVALID14=17-NMISSG14
IF             (NVALID14 LT 17) COGSTYLE=99
MISSING VALUES COGSTYLE(99)
COMPUTE        ATTOCHG=0
IF             (V148 NE 9) ATTOCHG=ATTOCHG+V148
IF             (V149 NE 9) ATTOCHG=ATTOCHG+V149
IF             (V150 NE 9) ATTOCHG=ATTOCHG+V150
IF             (V151 NE 9) ATTOCHG=ATTOCHG+V151
IF             (V152 NE 9) ATTOCHG=ATTOCHG+V152
IF             (V153 NE 9) ATTOCHG=ATTOCHG+V153
IF             (V154 NE 9) ATTOCHG=ATTOCHG+V154
IF             (V155 NE 9) ATTOCHG=ATTOCHG+V155
IF             (V156 NE 9) ATTOCHG=ATTOCHG+V156
COUNT          NMISSG15=V148 TO V156 (9)
COMPUTE        NVALID15=9-NMISSG15
IF             (NVALID15 GE 5) ATTOCHG=ATTOCHG/NVALID15
IF             (NVALID15 LT 5) ATTOCHG=99
MISSING VALUES ATTOCHG(99)
COMPUTE        TURNOVER=100*V123/V122
ASSIGN MISSING TURNOVER(99)
SAVE FILE      [*>SCALE SPSS2]SCALE SPSS2
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```
FILE NAME       SUMSCALES3A
GET FILE        [*>SCALE SPSS2]SCALE SPSS2
COMPUTE         INTWCCC=0
IF              (WILTOCHG NE 99 AND CHGCAUS NE 99)INTWCCC=WILTOCHG*CHGCAUS
IF              (WILTOCHG EQ 99 OR CHGCAUS EQ 99)INTWCCC=99
COMPUTE         INTWC2CC=0
IF              (WILTOCH2 NE 99 AND CHGCAUS NE 99)INTWC2CC=WILTOCH2*CHGCAUS
IF              (WILTOCH2 EQ 99 OR CHGCAUS EQ 99)INTWC2CC=99
COMPUTE         INTWCDS=0
IF              (WILTOCHG NE 99 AND DECSTRUC NE 99)INTWCDS=WILTOCHG*DECSTRU
IF              (WILTOCHG EQ 99 OR DECSTRUC EQ 99)INTWCDS=99
COMPUTE         INTWC2DS=0
IF              (WILTOCH2 NE 99 AND DECSTRUC NE 99)INTWC2DS=WILTOCH2*DECSTR
IF              (WILTOCH2 EQ 99 OR DECSTRUC EQ 99)INTWC2DS=99
COMPUTE         INTINAI=0
IF              (IMPNEEDS NE 99 AND ACTUIMP NE 99)INTINAI=IMPNEEDS*ACTUIMP
IF              (IMPNEEDS EQ 99 OR ACTUIMP EQ 99)INTINAI=99
COMPUTE         INTTNAT=0
IF              (TRANEEDS NE 99 AND ACTUTRA NE 99)INTTNAT=TRANEEDS*ACTUTRA
IF              (TRANEEDS EQ 99 OR ACTUTRA EQ 99)INTTNAT=99
COMPUTE         INTSNAS=0
IF              (SUPNEEDS NE 99 AND ACTUSUP NE 99)INTSNAS=SUPNEEDS*ACTUSUP
IF              (SUPNEEDS EQ 99 OR ACTUSUP EQ 99)INTSNAS=99
COMPUTE         INTVNAV=0
IF              (INVNEEDS NE 99 AND ACTUINV NE 99)INTVNAV=INVNEEDS*ACTUINV
IF              (INVNEEDS EQ 99 OR ACTUINV EQ 99)INTVNAV=99
COMPUTE         INTWCAI=0
IF              (WILTOCHG NE 99 AND ACTUIMP NE 99)INTWCAI=WILTOCHG*ACTUIMP
IF              (WILTOCHG EQ 99 OR ACTUIMP EQ 99)INTWCAI=99
COMPUTE         INTWCAT=0
IF              (WILTOCHG NE 99 AND ACTUTRA NE 99)INTWCAT=WILTOCHG*ACTUTRA
IF              (WILTOCHG EQ 99 OR ACTUTRA EQ 99)INTWCAT=99
COMPUTE         INTWCAS=0
IF              (WILTOCHG NE 99 AND ACTUSUP NE 99)INTWCAS=WILTOCHG*ACTUSUP
IF              (WILTOCHG EQ 99 OR ACTUSUP EQ 99)INTWCAS=99
COMPUTE         INTWCAV=0
IF              (WILTOCHG NE 99 AND ACTUINV NE 99)INTWCAV=WILTOCHG*ACTUINV
IF              (WILTOCHG EQ 99 OR ACTUINV EQ 99)INTWCAV=99
COMPUTE         INTWC2AS=0
IF              (WILTOCH2 NE 99 AND ACTUSUP NE 99)INTWC2AS=WILTOCH2*ACTUSUP
IF              (WILTOCH2 EQ 99 OR ACTUSUP EQ 99)INTWC2AS=99
COMPUTE         INTMAPD=0
IF              (MGMTATT NE 99 AND PIONDEC NE 99)INTMAPD=MGMTATT*PIONDEC
IF              (MGMTATT EQ 99 OR PIONDEC EQ 99)INTMAPD=99
COMPUTE         INTDFDS=0
IF              (DSSFLEX NE 99 AND DECSTRUC NE 99)INTDFDS=DSSFLEX*DECSTRUC
IF              (DSSFLEX EQ 99 OR DECSTRUC EQ 99)INTDFDS=99
COMPUTE         INTMLAI=0
IF              (MULTIP NE 99 AND ACTUIMP NE 99)INTMLAI=MULTIP*ACTUIMP
IF              (MULTIP EQ 99 OR ACTUIMP EQ 99)INTMLAI=99
COMPUTE         INTMLAT=0
IF              (MULTIP NE 99 AND ACTUTRA NE 99)INTMLAT=MULTIP*ACTUTRA
IF              (MULTIP EQ 99 OR ACTUTRA EQ 99)INTMLAT=99
COMPUTE         INTMLAS=0
IF              (MULTIP NE 99 AND ACTUSUP NE 99)INTMLAS=MULTIP*ACTUSUP
IF              (MULTIP EQ 99 OR ACTUSUP EQ 99)INTMLAS=99
COMPUTE         INTMLAV=0
IF              (MULTIP NE 99 AND ACTUINV NE 99)INTMLAV=MULTIP*ACTUINV
IF              (MULTIP EQ 99 OR ACTUINV EQ 99)INTMLAV=99
COMPUTE         INTDSAI=0
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IF              (DECSTRUC NE 99 AND ACTUIMP NE 99)INTDSAI=DECSTRUC*ACTUIMP
IF              (DECSTRUC EQ 99 OR ACTUIMP EQ 99)INTDSAI=99
COMPUTE         INTDSAT=0
IF              (DECSTRUC NE 99 AND ACTUTRA NE 99)INTDSAT=DECSTRUC*ACTUTRA
IF              (DECSTRUC EQ 99 OR ACTUTRA EQ 99)INTDSAT=99
COMPUTE         INTDSAS=0
IF              (DECSTRUC NE 99 AND ACTUSUP NE 99)INTDSAS=DECSTRUC*ACTUSUP
IF              (DECSTRUC EQ 99 OR ACTUSUP EQ 99)INTDSAS=99
COMPUTE         INTDSAV=0
IF              (DECSTRUC NE 99 AND ACTUINV NE 99)INTDSAV=DECSTRUC*ACTUINV
IF              (DECSTRUC EQ 99 OR ACTUINV EQ 99)INTDSAV=99
COMPUTE         INTCSDS=0
IF              (COGSTYLE NE 99 AND V157 NE 9)INTCSDS=COGSTYLE*V157
IF              (COGSTYLE EQ 99 OR V157 EQ 99)INTCSDS=99
COMPUTE         INTMUTO=0
IF              (MULTIP NE 99 AND TURNOVER NE 99)INTMUTO=MULTIP*TURNOVER
IF              (MULTIP EQ 99 OR TURNOVER EQ 99)INTMUTO=99
MISSING VALUES  INTWCCC, INTWCDS, INTSNAS, INTWCAS, INTMAPD, INTDFDS, INTMLAS,
                INTINAI, INTTNAT, INTVNAV, INTWCAI, INTWCAT, INTWCAV,
                INTMLAI, INTMLAT, INTMLAV, INTDSAI, INTDSAT, INTDSAS, INTDSAV,
                INTCSDS, INTMUTO, INTWC2CC, INTWC2DS, INTWC2AS (99)
SAVE FILE       [*>SCALE SPSS3A]SCALE SPSS3A
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APPENDIX B.2

CORRELATION MATRIX

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SPSS BATCH SYSTEM                                                        12 51 02  09/04/83  PAGE   1

SPSS                     FOR PRIME 400/500, VERSION M. RELEASE 9 1, AUGUST 1? 1982

                                   CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM
ORDER FROM MCGRAW-HILL   SPSS, 2ND ED  (PRINCIPAL TEXT)        ORDER FROM SPSS INC     SPSS STATISTICAL ALGORITHMS
                         SPSS UPDATE 7-9 (USE W/SPSS,2ND FOR REL  7, 8, 9)              KEYWORDS  THE SPSS INC  NEWSLETTER
                         SPSS POCKET GUIDE, RELEASE 9
                         SPSS INTRODUCTORY GUIDE   BASIC STATISTICS AND OPERATIONS
                         SPSS PRIMER (BRIEF INTRO TO SPSS)

DEFAULT SPACE ALLOCATION       ALLOWS FOR      163 TRANSFORMATIONS
WORKSPACE     114688 BYTES                     655 RECODE VALUES + LAG VARIABLES
TRANSPACE      16384 BYTES                    2624 IF/COMPUTE OPERATIONS

                  1 FILE NAME       PEARSONCORR
                  2 GET FILE        [*]SCALE SPSS3]SCALE SPSS3

                           FILE SCALE SP HAS 253 VARIABLES

                           THE SUBFILES ARE

                                      NO OF
                           NAME       CASES

                           SCALE SP      46

CPU-TIME REQUIRED         0 33 SECONDS
DISK TIME REQUIRED        0 24 SECONDS
CONNECT TIME REQUIRED     0 01 MINUTES
                            12 51 03

                  3 PEARSON CORR   UIS, V125 V126, WILTOCHG, DECLEVEL DECSTRUC REALEXP, ACTUTRA,
                  4                ACTUINV, ACTUSUP, ACTUIMP, TRANEEDS, INVNEEDS, SUPNEEDS, IMPNEEDS,
                  5                CHGCAUS, DSSFLEX, CSFSUPP, MGMTATT, PIONDEG, MULTIP, COGSTYLE,
                  6                TURNOVER, ATTOCHG, WILTOCH2, REALEXP2, INTWCCC, INTWCDS, INTSNAS,
                  7                INTWCAS, INTMAPD, INTDFDS, INTMLAS, INTINAI, INTTNAT, INTVNAV
                  8                INTWCAI, INTWCAT, INTWCAV, INTMLAI  INTMLAT, INTMLAV, INTDSAI,
                  9                INTDSAT, INTDSAS, INTDSAV, INTCSDS  INTMUTO
                 10 OPTION         6

  ***** PEARSON CORR PROBLEM REQUIRES    54144 BYTES WORKSPACE *****
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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
UIS WITH V125	0 6215 N(44) SIG 000	UIS WITH V126	0 3938 N(37) SIG 008	UIS WITH WILTOCHG	0 3990 N(43) SIG 004	UIS WITH DECLEVEL	0 1165 N(43) SIG 229	UIS WITH DECSTRUC	-0 0613 N(43) SIG 348	UIS WITH REALEXP	0 3963 N(43) SIG 004
UIS WITH ACTUTRA	0 4807 N(44) SIG 000	UIS WITH ACTUINV	0 6798 N(42) SIG 000	UIS WITH ACTUSUP	0 3749 N(43) SIG 007	UIS WITH ACTUIMP	0 6786 N(43) SIG 000	UIS WITH TRANEEDS	-0 0042 N(42) SIG 489	UIS WITH INVNEEDS	0 6008 N(42) SIG 000
UIS WITH SUPNEEDS	0 3614 N(42) SIG 009	UIS WITH IMPNEEDS	0 5575 N(42) SIG 000	UIS WITH CHGCAUS	0 2749 N(43) SIG 037	UIS WITH DSSFLEX	0 6929 N(43) SIG 000	UIS WITH CSFSUPP	0 2137 N(40) SIG 093	UIS WITH MGMTATT	0 2933 N(44) SIG 027
UIS WITH PIONDEC	0 1163 N(44) SIG 226	UIS WITH MULTIP	-0 1583 N(42) SIG 158	UIS WITH COGSTYLE	-0 1548 N(43) SIG 161	UIS WITH TURNOVER	0 3012 N(30) SIG 053	UIS WITH ATTOCHG	0 0230 N(38) SIG 445	UIS WITH WILTOCH2	0 1801 N(43) SIG 124
UIS WITH REALEXP2	0 0676 N(43) SIG 333	UIS WITH INTWCCC	0 3757 N(43) SIG 007	UIS WITH INTWCDS	0 1744 N(43) SIG 132	UIS WITH INTENAS	0 4344 N(42) SIG 002	UIS WITH INTWCAS	0 4443 N(42) SIG 002	UIS WITH INTMAPD	0 4141 N(43) SIG 233
UIS WITH INTDFDS	0 5220 N(43) SIG 000	UIS WITH INTMLAS	0 1316 N(40) SIG 209	UIS WITH INTINAI	0 7245 N(42) SIG 000	UIS WITH INTTNAI	0 3942 N(42) SIG 005	UIS WITH INTVNAV	0 6986 N(42) SIG 000	UIS WITH INTWCAI	0 6961 N(43) SIG 000
UIS WITH INTWCAT	0 5426 N(43) SIG 000	UIS WITH INTWCAV	0 7132 N(42) SIG 000	UIS WITH INTMLAI	0 2532 N(40) SIG 057	UIS WITH INTMLAT	0 2292 N(41) SIG 075	UIS WITH INTMLAV	0 3262 N(40) SIG 020	UIS WITH INTDSAI	0 4966 N(43) SIG 000
UIS WITH INTDSAT	0 4044 N(43) SIG 004	UIS WITH INTDSAS	0 2664 N(42) SIG 044	UIS WITH INTDSAV	0 5266 N(42) SIG 000	UIS WITH INTCSDS	0 2149 N(43) SIG 083	UIS WITH INTMLUD	-0 3994 N(25) SIG 024	V125 WITH V126	0 6466 N(39) SIG 000

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE   SCALE SP (CREATION DATE = 09/04/83)

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- - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE              VARIABLE              VARIABLE              VARIABLE              VARIABLE              VARIABLE
PAIR                  PAIR                  PAIR                  PAIR                  PAIR                  PAIR
-------               --------              ------                ------                --------              --------

V125       0 6670     V125      -0 0052     V125      -0 0262     V125       0 6461     V125       0 4163     V125       0 5848
WITH      N(   44)    WITH      N(   44)    WITH      N(   44)    WITH      N(   44)    WITH      N(   46)    WITH      N(   42)
WILTOCHG  SIG  000    DECLEVEL  SIG  487    DECSTRUC  SIG  433    REALEXP   SIG  000    ACTUTRA   SIG  002    ACTUINV   SIG  000

V125       0 2937     V125       0 5948     V125       0 1414     V125       0 4216     V125       0 3935     V125       0 4883
WITH      N(   45)    WITH      N(   41)    WITH      N(   43)    WITH      N(   41)    WITH      N(   43)    WITH      N(   43)
ACTUSUP   SIG  025    ACTUIMP   SIG  000    TRANEEDS  SIG  183    INVNEEDS  SIG  003    SUPNEEDS  SIG  005    IMPNEEDS  SIG  000

V125       0 4597     V125       0 5664     V125       0 4238     V125       0 1723     V125       0 0870     V125      -0 3002
WITH      N(   44)    WITH      N(   44)    WITH      N(   42)    WITH      N(   46)    WITH      N(   46)    WITH      N(   44)
CHOCAUS   SIG  001    DSSFLEX   SIG  000    CSFSUPP   SIG  003    MGMTATT   SIG  126    PIONDEC   SIG  283    MULTIP    SIG  024

V125      -0 0741     V125      -0 0826     V125      -0 1377     V125      -0 0156     V125       0 0411     V125       0 5870
WITH      N(   45)    WITH      N(   31)    WITH      N(   40)    WITH      N(   44)    WITH      N(   44)    WITH      N(   44)
COGSTYLE  SIG  314    TURNOVER  SIG  329    ATTOCHG   SIG  198    WILTOCH2  SIG  460    REALEXP2  SIG  396    INTWCCC   SIG  000

V125       0 3842     V125       0 3732     V125       0 4653     V125       0 1260     V125       0 4402     V125       0 0075
WITH      N(   44)    WITH      N(   43)    WITH      N(   43)    WITH      N(   45)    WITH      N(   44)    WITH      N(   41)
INTWCDS   SIG  005    INTSNAS   SIG  007    INTWCAS   SIG  001    INTMAPD   SIG  205    INTDFDS   SIG  001    INTMLAS   SIG  481

V125       0 5983     V125       0 3686     V125       0 5510     V125       0 6958     V125       0 5369     V125       0 7099
WITH      N(   43)    WITH      N(   43)    WITH      N(   42)    WITH      N(   44)    WITH      N(   44)    WITH      N(   42)
INTINAI   SIG  000    INTTNAT   SIG  008    INTVNAV   SIG  000    INTWCAI   SIG  000    INTWCAT   SIG  000    INTWCAV   SIG  000

V125       0 0935     V125       0 0696     V125       0 1296     V125       0 4446     V125       0 3522     V125       0 2591
WITH      N(   41)    WITH      N(   41)    WITH      N(   40)    WITH      N(   44)    WITH      N(   44)    WITH      N(   43)
INTMLAI   SIG  281    INTMLAT   SIG  284    INTMLAV   SIG  213    INTDSAI   SIG  001    INTDSAT   SIG  010    INTDSAS   SIG  047

V125       0 4555     V125      -0 2245     V125       0 5140     V126       0 5315     V126      -0 1670     V126       0 1291
WITH      N(   42)    WITH      N(   45)    WITH      N(   25)    WITH      N(   37)    WITH      N(   37)    WITH      N(   37)
INIDSAV   SIG  001    INICSDS   SIG  069    INTMUTO   SIG  004    WILTOCHG  SIG  000    DECLEVEL  SIG  162    DECSTRUC  SIG  223

           A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
V126 WITH REALEXP	0 4260 N(37) SIG 004	V126 WITH ACTUTRA	0 2558 N(39) SIG 058	V126 WITH ACTUINV	0 6369 N(35) SIG 000	V126 WITH ACTUSUP	0 1433 N(39) SIG 192	V126 WITH ACTUIMP	0 5263 N(37) SIG 000	V126 WITH TRANEEDS	-0 1119 N(37) SIG 255
V126 WITH INVNEEDS	0 3803 N(35) SIG 012	V126 WITH SUPNEEDS	0 1327 N(37) SIG 217	V126 WITH IMPNEEDS	0 3641 N(37) SIG 013	V126 WITH CHGCAUS	0 2792 N(37) SIG 047	V126 WITH DSSFLEX	0 5722 N(37) SIG 000	V126 WITH CSFSUPP	0 4771 N(36) SIG 002
V126 WITH MOMTATT	0 1273 N(39) SIG 220	V126 WITH PIONDEG	-0 0735 N(39) SIG 328	V126 WITH MULTIP	-0 3214 N(38) SIG 025	V126 WITH COGSTYLE	0 1249 N(39) SIG 224	V126 WITH TURNOVER	0 1109 N(26) SIG 295	V126 WITH ATTOCHG	-0 1491 N(39) SIG 182
V126 WITH WILTOCH2	-0 2125 N(37) SIG 103	V126 WITH REALEXP2	0 0935 N(37) SIG 312	V126 WITH INTWCCC	0 3958 N(37) SIG 008	V126 WITH INTWCDS	0 4333 N(37) SIG 004	V126 WITH INTSNAS	0 1715 N(37) SIG 155	V126 WITH INTWCAS	0 3060 N(37) SIG 033
V126 WITH INTMAPD	0 0425 N(38) SIG 400	V126 WITH INTDFDS	0 5180 N(37) SIG 001	V126 WITH INTMLAS	-0 0837 N(35) SIG 316	V126 WITH INTINAI	0 4985 N(37) SIG 001	V126 WITH INITNAT	0 2340 N(37) SIG 082	V126 WITH INTVNAV	0 5808 N(35) SIG 000
V126 WITH INTWCAI	0 5979 N(37) SIG 000	V126 WITH INTWCAT	0 3979 N(37) SIG 007	V126 WITH INTWCAV	0 6957 N(35) SIG 000	V126 WITH INTMLAI	0 0337 N(35) SIG 424	V126 WITH INTMLAT	0 0009 N(37) SIG 498	V126 WITH INTMLAV	0 1699 N(34) SIG 168
V126 WITH INTDSAI	0 4706 N(37) SIG 002	V126 WITH INTDSAT	0 3066 N(37) SIG 032	V126 WITH INTDSAS	0 2132 N(37) SIG 103	V126 WITH INTDSAV	0 5604 N(35) SIG 000	V126 WITH INTCSDS	0 0067 N(39) SIG 484	V126 WITH INTMUTO	-0 1880 N(21) SIG 207
WILTOCHG WITH DECLEVEL	0 0405 N(44) SIG 397	WILTOCHG WITH DECSTRUC	-0 1173 N(44) SIG 224	WILTOCHG WITH REALEXP	0 4257 N(44) SIG [illegible]	WILTOCHG WITH ACTUTRA	0 3037 N(44) SIG 023	WILTOCHG WITH ACTUINV	0 2586 N(42) SIG 049	WILTOCHG WITH ACTUSUP	0 1869 N(43) SIG 115

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
WILTOCHG	0 4293	WILTOCHG	0 1602	WILTOCHG	0 3279	WILTOCHG	0 5318	WILTOCHG	0 5911	WILTOCHG	0 3693
WITH	N(44)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(43)	WITH	N(44)
ACTUIMP	SIG 002	TRANEEDS	SIG 152	INVNEEDS	SIG 017	SUPNEEDS	SIG 000	IMPNEEDS	SIG 000	CHGCAUS	SIG 007
WILTOCHG	0 4525	WILTOCHG	0 2873	WILTOCHG	0 1445	WILTOCHG	0 0078	WILTOCHG	-0 2706	WILTOCHG	-0 1071
WITH	N(44)	WITH	N(40)	WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(43)
DSSFLEX	SIG 001	CSFSUPP	SIG 036	MGMTATT	SIG 175	PIONDEG	SIG 480	MULTIP	SIG 042	COGSTYLE	SIG 247
WILTOCHG	0 0883	WILTOCHG	-0 1053	WILTOCHG	0 0896	WILTOCHG	0 0047	WILTOCHG	0 6111	WILTOCHG	0 5064
WITH	N(30)	WITH	N(38)	WITH	N(44)	WITH	N(44)	WITH	N(44)	WITH	N(44)
TURNOVER	SIG 324	ATTOCHG	SIG 265	WILTOCH2	SIG 281	REALEXP	SIG 488	INTWCC	SIG 000	INTWCDS	SIG 000
WILTOCHG	0 4035	WILTOCHG	0 5553	WILTOCHG	0 1658	WILTOCHG	0 3304	WILTOCHG	0 0378	WILTOCHG	0 5088
WITH	N(43)	WITH	N(43)	WITH	N(43)	WITH	N(44)	WITH	N(41)	WITH	N(43)
INTSNAS	SIG 004	INTWCAS	SIG 000	INTMAFD	SIG 142	INTDFDS	SIG 014	INTMLAS	SIG 407	INTINAI	SIG 000
WILTOCHG	0 2780	WILTOCHG	0 2999	WILTOCHG	0 6768	WILTOCHG	0 5060	WILTOCHG	0 5357	WILTOCHG	0 0390
WITH	N(43)	WITH	N(42)	WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(41)
INTTNAT	SIG 036	INTVNAV	SIG 027	INTWCAI	SIG 000	INTWCAT	SIG 000	INTWCAV	SIG 000	INTMLAI	SIG 404
WILTOCHG	0 0713	WILTOCHG	-0 0015	WILTOCHG	-0 2685	WILTOCHG	0 2243	WILTOCHG	0 1910	WILTOCHG	0 1546
WITH	N(41)	WITH	N(40)	WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(42)
INTMLAT	SIG 329	INTMLAV	SIG 496	INTDSAI	SIG 039	INTDSAT	SIG 072	INTDSAS	SIG 110	INTDSAV	SIG 164
WILTOCHG	-0 2579	WILTOCHG	-0 5149	DECLEVEL	0 0283	DECLEVEL	-0 0814	DECLEVEL	-0 1542	DECLEVEL	-0 1868
WITH	N(43)	WITH	N(25)	WITH	N(44)	WITH	N(44)	WITH	N(44)	WITH	N(42)
INTCSDS	SIG 047	INTMUTO	SIG 004	DECSTRUC	SIG 428	REALEXP	SIG 300	ACTUTRA	SIG 159	ACTUINV	SIG 118
DECLEVEL	-0 2187	DECLEVEL	-0 2968	DECLEVEL	-0 0730	DECLEVEL	-0 0938	DECLEVEL	0 0097	DECLEVEL	-0 1202
WITH	N(43)	WITH	N(44)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(43)
ACTUSUP	SIG 079	ACTUIMP	SIG 025	TRANEEDS	SIG 321	INVNEEDS	SIG 277	SUPNEEDS	SIG 475	IMPNEEDS	SIG 221

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

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SPSS BATCH SYSTEM                                                                          12 51 02  09/04/83  PAGE.   6

FILE   SCALE SP  (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE               VARIABLE               VARIABLE               VARIABLE               VARIABLE               VARIABLE
PAIR                   PAIR                   PAIR                   PAIR                   PAIR                   PAIR
--------               --------               --------               --------               --------               --------

DECLEVEL   0 1219      DECLEVEL  -0 0438      DECLEVEL   0 0819      DECLEVEL   0 0084      DECLEVEL  -0 1538      DECLEVEL  -0 0080
WITH     N(   44)      WITH     N(   44)      WITH     N(   40)      WITH     N(   44)      WITH     N(   44)      WITH     N(   42)
CHGCAUS  SIG  215      DSSFLEX  SIG  389      CSFSUPP  SIG  308      MGMTATT  SIG  479      PIONDEG  SIG  160      MULTIP   SIG  480

DECLEVEL   0 1614      DECLEVEL  -0 1009      DECLEVEL  -0 1453      DECLEVEL   0 1675      DECLEVEL   0 0880      DECLEVEL   0 0400
WITH     N(   43)      WITH     N(   30)      WITH     N(   38)      WITH     N(   44)      WITH     N(   44)      WITH     N(   44)
COGSIYLE SIG  151      TURNOVER SIG  298      ATTOCHG  SIG  192      WILTOCH2 SIG  139      REALEXP2 SIG  285      INTWCCC  SIG  398

DECLEVEL   0 0831      DECLEVEL  -0 2443      DECLEVEL   0 2456      DECLEVEL  -0 1342      DECLEVEL  -0 0018      DECLEVEL  -0 1456
WITH     N(   44)      WITH     N(   43)      WITH     N(   41)      WITH     N(   43)      WITH     N(   44)      WITH     N(   41)
INTWCDS  SIG  296      INTSNAS  SIG  057      INTWCAS  SIG  055      INTMAPD  SIG  195      INTDFDS  SIG  495      INTMLAS  SIG  182

DECLEVEL  -0 2929      DECLEVEL  -0 1896      DECLEVEL  -0 1728      DECLEVEL   0 2495      DECLEVEL  -0 1441      DECLEVEL  -0 1543
WITH     N(   43)      WITH     N(   43)      WITH     N(   42)      WITH     N(   44)      WITH     N(   44)      WITH     N(   42)
INTINAI  SIG  028      INTTNAT  SIG  112      INTVNAV  SIG  137      INTWCAI  SIG  051      INTWCAT  SIG  175      INTWCAV  SIG  165

DECLEVEL  -0 0860      DECLEVEL  -0 0357      DECLEVEL   0 0488      DECLEVEL   0 1885      DECLEVEL  -0 0970      DECLEVEL  -0 1902
WITH     N(   41)      WITH     N(   41)      WITH     N(   40)      WITH     N(   44)      WITH     N(   44)      WITH     N(   43)
INTMLAI  SIG  297      INTMLAT  SIG  412      INTMLAV  SIG  393      INTDSAI  SIG  110      INTDSAT  SIG  266      INTDSAS  SIG  111

DECLEVEL  -0 1135      DECLEVEL   0 0736      DECLEVEL  -0 2935      DECSTRUC  -0 0375      DECSTRUC  -0 0240      DECSTRUC  -0 0519
WITH     N(   42)      WITH     N(   43)      WITH     N(   25)      WITH     N(   44)      WITH     N(   44)      WITH     N(   42)
INTDSAV  SIG  237      INTCSDS  SIG  320      INTMUTO  SIG  077      REALEXP  SIG  405      ACTUTRA  SIG  438      ACTUINV  SIG  372

DECSTRUC   0 2009      DECSTRUC  -0 1338      DECSTRUC   0 0789      DECSTRUC  -0 0678      DECSTRUC  -0 1033      DECSTRUC  -0 0920
WITH     N(   43)      WITH     N(   44)      WITH     N(   43)      WITH     N(   42)      WITH     N(   43)      WITH     N(   43)
ACTUSUP  SIG  098      ACTUIMP  SIG  193      TRANEEDS SIG  308      INVNEEDS SIG  335      SUPNEEDS SIG  255      IMPNEEDS SIG  279

DECSTRUC   0 1045      DECSTRUC  -0 0040      DECSTRUC   0 1643      DECSTRUC   0 0433      DECSTRUC  -0 1230      DECSTRUC  -0 0761
WITH     N(   44)      WITH     N(   44)      WITH     N(   40)      WITH     N(   44)      WITH     N(   44)      WITH     N(   42)
CHGCAUS  SIG  250      DSSFLEX  SIG  490      CSFSUPP  SIG  155      MGMTATT  SIG  390      PIONDEG  SIG  213      MULTIP   SIG  316

          A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
DECSTRUC WITH COGSTYLE	0 0780 N(43) SIG 310	DECSTRUC WITH TURNOVER	-0 1197 N(30) SIG 264	DECSTRUC WITH ATTDCHG	0 0002 N(38) SIG 500	DECSTRUC WITH WILTDCH2	0 0947 N(44) SIG 270	DECSTRUC WITH REALEXP2	-0 1627 N(44) SIG 146	DECSTRUC WITH INTWCCC	-0 1028 N(44) SIG 253
DECSTRUC WITH INTWCDS	0 7936 N(44) SIG 000	DECSTRUC WITH INTSNAS	-0 1661 N(43) SIG 144	DECSTRUC WITH INTWCAS	-0 1680 N(43) SIG 141	DECSTRUC WITH INTMAPD	-0 0967 N(43) SIG 269	DECSTRUC WITH INTDFDS	0 5285 N(44) SIG 000	DECSTRUC WITH INTMLAS	-0 1580 N(41) SIG 162
DECSTRUC WITH INTINAI	-0 1290 N(43) SIG 205	DECSTRUC WITH INTTNAT	-0 0521 N(43) SIG 370	DECSTRUC WITH INTVNAV	-0 0604 N(42) SIG 352	DECSTRUC WITH INTWCAI	-0 1475 N(44) SIG 170	DECSTRUC WITH INTWCAT	0 1514 N(44) SIG 163	DECSTRUC WITH INTWCAV	-0 0827 N(42) SIG 301
DECSTRUC WITH INTMLAI	-0 1322 N(41) SIG 205	DECSTRUC WITH INTMLAT	-0 2035 N(41) SIG 101	DECSTRUC WITH INTMLAV	-0 0554 N(40) SIG 367	DECSTRUC WITH INTDSAI	0 5902 N(44) SIG 000	DECSTRUC WITH INTDSAT	0 3949 N(44) SIG 004	DECSTRUC WITH INTDSAS	0 4751 N(43) SIG 001
DECSTRUC WITH INTDSAV	0 5569 N(42) SIG 000	DECSTRUC WITH INTCSDS	[illegible] 2359 N(43) SIG 064	DECSTRUC WITH INTMUTD	-0 0228 N(25) SIG 457	REALEXP WITH ACTUIRA	0 1769 N(44) SIG 125	REALEXP WITH ACTUINV	0 2955 N(42) SIG 029	REALEXP WITH ACTUSUP	0 1389 N(43) SIG 187
REALEXP WITH ACTUIMP	0 3412 N(44) SIG 012	REALEXP WITH TRANEEDS	0 1425 N(43) SIG 181	REALEXP WITH INVNEEDS	0 2698 N(42) SIG 042	REALEXP WITH SUPNEEDS	0 3497 N(43) SIG 011	REALEXP WITH IMPNEEDS	0 4216 N(43) SIG 002	REALEXP WITH CHGCAUS	0 5411 N(44) SIG 000
REALEXP WITH DSSFLEX	0 3598 N(44) SIG 007	REALEXP WITH CSFSUPP	0 1971 N(40) SIG 111	REALEXP WITH MGMTATT	0 1728 N(44) SIG 131	REALEXP WITH PIONDEG	0 2971 N(44) SIG 025	REALEXP WITH MULTIP	-0 2016 N(42) SIG 100	REALEXP WITH COGSTYLE	-0 1709 N(43) SIG 137
REALEXP WITH TURNOVER	0 0855 N(30) SIG 327	REALEXP WITH ATTDCHG	-0 3724 N(38) SIG 011	REALEXP WITH WILTDCH2	-0 0211 N(44) SIG 446	REALEXP WITH REALEXP2	0 0050 N(44) SIG 487	REALEXP WITH INTWCCC	0 5879 N(44) SIG 000	REALEXP WITH INTWCDS	0 2282 N(44) SIG 068

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
REALEXP	0 2817	REALEXP	0 3099	REALEXP	0 2264	REALEXP	0 2782	REALEXP	0 0792	REALEXP	0 4045
WITH	N(43)	WITH	N(43)	WITH	N(43)	WITH	N(44)	WITH	N(41)	WITH	N(43)
INTSNAS	SIG 034	INTWCAS	SIG 022	INTMAPD	SIG 072	INTDFDS	SIG 034	INTMLAS	SIG 311	INTINAI	SIG 004
REALEXP	0 2077	REALEXP	0 3064	REALEXP	0 4153	REALEXP	0 2979	REALEXP	0 3837	REALEXP	-0 0389
WITH	N(43)	WITH	N(42)	WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(41)
INTTNAT	SIG 091	INIVNAV	SIG 024	INTWCAI	SIG 003	INTWCAT	SIG 025	INTWCAV	SIG 006	INTMLAI	SIG 405
REALEXP	-0 0058	REALEXP	-0 0237	REALEXP	0 2264	REALEXP	0 1703	REALEXP	0 1603	REALEXP	0 1880
WITH	N(41)	WITH	N(40)	WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(42)
INTMLAT	SIG 486	INTMLAV	SIG 442	INTDSAI	SIG 070	INTDSAT	SIG 135	INTDSAS	SIG 152	INTDSAV	SIG 117
REALEXP	-0 3537	REALEXP	-0 1589	ACTUTRA	0 3632	ACTUTRA	0 4429	ACTUTRA	0 6559	ACTUTRA	0 2182
WITH	N(43)	WITH	N(25)	WITH	N(42)	WITH	N(45)	WITH	N(44)	WITH	N(43)
INTCSDS	SIG 010	INTMUTO	SIG 224	ACTUINV	SIG 009	ACTUSUP	SIG 001	ACTUIMP	SIG 000	TRANEEDS	SIG 080
ACTUTRA	0 3506	ACTUTRA	0 3946	ACTUTRA	0 4524	ACTUTRA	0 2528	ACTUTRA	0 4291	ACTUTRA	0 4865
WITH	N(42)	WITH	N(43)	WITH	N(43)	WITH	N(44)	WITH	N(44)	WITH	N(42)
INVNEEDS	SIG 011	SUPNEEDS	SIG 004	IMPNEEDS	SIG 001	CHGCAUS	SIG 049	DSSFLEX	SIG 002	CSFSUPP	SIG 001
ACTUTRA	0 1636	ACTUTRA	0 0826	ACTUTRA	-0 1283	ACTUTRA	0 1121	ACTUTRA	-0 3990	ACTUTRA	0 0210
WITH	N(46)	WITH	N(46)	WITH	N(44)	WITH	N(45)	WITH	N(31)	WITH	N(40)
MGMTATT	SIG 139	PIONDEG	SIG 293	MULTIP	SIG 203	COGSTYLE	SIG 23[illegible]	TURNOVER	SIG 013	ATTOCHG	SIG 449
ACTUTRA	0 1110	ACTUTRA	0 1623	ACTUTRA	0 3105	ACTUTRA	0 1571	ACTUTRA	0 4388	ACTUTRA	0 4019
WITH	N(44)	WITH	N(44)	WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(43)
WILTOCH2	SIG 237	REALEXP2	SIG 146	INTWCCC	SIG 020	INTWCDS	SIG 154	INTSNAS	SIG 002	INTWCAS	SIG 004
ACTUTRA	0 1239	ACTUTRA	0 3623	ACTUTRA	0 1078	ACTUTRA	0 6634	ACTUTRA	0 8409	ACTUTRA	0 3899
WITH	N(45)	WITH	N(44)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(42)
INTMAPD	SIG 209	INTDFDS	SIG 008	INTM AS	SIG 251	INTINAI	SIG 000	INTTNAT	SIG 000	INTVNAV	SIG 005

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/83)

PEARSON CORRELATION COEFFICIENTS

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
ACTUTRA WITH INIWCAI	0 6242 N(44) SIG 000	ACTUTRA WITH INTWCAT	0 9091 N(44) SIG 000	ACTUTRA WITH INTWCAV	0 4102 N(42) SIG 003	ACTUTRA WITH INTMLAI	0 2006 N(41) SIG 104	ACTUTRA WITH INTMLAT	0 4235 N(43) SIG 002	ACTUTRA WITH INTMLAV	0 1319 N(40) SIG 209
ACTUTRA WITH INTDSAI	0 5195 N(44) SIG 000	ACTUTRA WITH INTDSAT	0 8349 N(44) SIG 000	ACTUTRA WITH INTDSAS	0 3144 N(43) SIG 020	ACTUTRA WITH INTDSAV	0 2945 N(42) SIG 029	ACTUTRA WITH INTCSDS	-0 2734 N(45) SIG 035	ACTUTRA WITH INTMUTO	-0 4653 N(25) SIG 010
ACTUINV WITH ACTUSUP	0 2744 N(41) SIG 041	ACTUINV WITH ACTUIMP	0 7509 N(42) SIG 000	ACTUINV WITH TRANEEDS	0 0802 N(41) SIG 309	ACTUINV WITH INVNEEDS	0 7130 N(42) SIG 000	ACTUINV WITH SUPNEEDS	0 0277 N(41) SIG 432	ACTUINV WITH IMPNEEDS	0 3956 N(41) SIG 005
ACTUINV WITH CHGCAUS	0 1957 N(42) SIG 107	ACTUINV WITH DSSFLEX	0 6565 N(42) SIG 000	ACTUINV WITH CSFSUPP	0 3925 N(38) SIG 007	ACTUINV WITH MGMTATT	0 0999 N(42) SIG 265	ACTUINV WITH PIONDEC	0 0817 N(42) SIG 304	ACTUINV WITH MULTIP	-0 1481 N(40) SIG 181
ACTUINV WITH COGSTYLE	0 1265 N(41) SIG 215	ACTUINV WITH TURNOVER	0 0462 N(30) SIG 404	ACTUINV WITH ATTOCHG	-0 0422 N(36) SIG 404	ACTUINV WITH WILTOCHG	-0 1473 N(42) SIG 176	ACTUINV WITH REALEXP2	0 1542 N(42) SIG 165	ACTUINV WITH INTWCCC	0 2398 N(42) SIG 063
ACTUINV WITH INTWCDS	0 1003 N(42) SIG 264	ACTUINV WITH INISNAS	0 2426 N(41) SIG 063	ACTUINV WITH INTWCAS	0 3369 N(41) SIG 016	ACTUINV WITH INTMAPD	0 0114 N(41) SIG 472	ACTUINV WITH INTDFDS	0 4841 N(42) SIG 001	ACTUINV WITH INTMLAS	0 1245 N(40) SIG 222
ACTUINV WITH INTINAI	0 7069 N(41) SIG 000	ACTUINV WITH INTTNAT	0 2240 N(41) SIG 080	ACTUINV WITH INTVNAV	0 9616 N(42) SIG 000	ACTUINV WITH INTWCAI	0 7080 N(42) SIG 000	ACTUINV WITH INTWLAT	0 3792 N(42) SIG 007	ACTUINV WITH INTWCAV	0 9510 N(42) SIG 000
ACTUINV WITH INTMLAI	0 3071 N(40) SIG 027	ACTUINV WITH INTMLAT	0 2073 N(40) SIG 100	ACTUINV WITH INTM AV	0 4802 N(40) SIG 001	ACTUINV WITH INTDSAI	0 5452 N(42) SIG 000	ACTUINV WITH INTDSAT	0 2713 N(42) SIG 041	ACTUINV WITH INTDSAS	0 2128 N(41) SIG 091

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

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SPSS BATCH SYSTEM                                                        12 51 02  09/04/83  PAGE   10

FILE    SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE              VARIABLF              VARIABLE              VARIABLE              VARIABLE              VARIABLE
PAIR                  PAIR                  PAIR                  PAIR                  PAIR                  PAIR
--------              --------              --------              --------              --------              --------

ACTUINV    0 7884     ACTUINV   -0 0552     ACTUINV    0 2069     ACTUSUP    0 6889     ACTUSUP    0 3904     ACTUSUP    0 2198
WITH      N(   42)    WITH      N(   41)    WITH      N(   25)    WITH      N(   43)    WITH      N(   42)    WITH      N(   41)
INTDSAV   SIG  000    INTCSDS   SIG  366    INTMUTO   SIG  161    ACTUIMP   SIG  000    TRANEEDS  SIG  005    INVNEEDS  SIG  084

ACTUSUP    0 3832     ACTUSUP    0 3398     ACTUSUP    0 1854     ACTUSUP    0 4098     ACTUSUP    0 0430     ACTUSUP    0 1884
WITH      N(   43)    WITH      N(   43)    WITH      N(   43)    WITH      N(   43)    WITH      N(   42)    WITH      N(   45)
SUPNEEDS  SIG  006    IMPNEEDS  SIG  013    CHGCAUS   SIG  117    DSSFLE<   SIG  003    CSFSUPP   SIG  393    MGMTATT   SIG  108

ACTUSUP    0 3072     ACTUSUP   -0 0064     ACTUSUP   -0 1078     ACTUSUP    0 1397     ACTUSUP    0 0059     ACTUSUP    0 2458
WITH      N(   45)    WITH      N(   44)    WITH      N(   45)    WITH      N(   91)    WITH      N(   59)    WITH      N(   43)
PIONDEG   SIG  020    MULTIP    SIG  483    COGSTYLE  SIG  240    TURNOVER  SIG  227    ATTOCHG   SIG  486    WILTOCH2  SIG  056

ACTUSUP    0 0846     ACTUSUP    0 2362     ACTUSUP   -0 0829     ACTUSUP    0 8047     ACTUSUP    0 7791     ACTUSUP    0 2414
WITH      N(   43)    WITH      N(   43)    WITH      N(   43)    WITH      N(   43)    WITH      N(   43)    WITH      N(   44)
REALEXP2  SIG  295    INTWCCC   SIG  064    INTWCDS   SIG  298    INTSNAS   SIG  000    INTWCAS   SIG  000    INTMAPD   SIG  057

ACTUSUP    0 2397     ACTUSUP    0 4184     ACTUSUP    0 6595     ACTUSUP    0 5220     ACTUSUP    0 2698     ACTUSUP    0 6274
WITH      N(   43)    WITH      N(   41)    WITH      N(   43)    WITH      N(   42)    WITH      N(   41)    WITH      N(   43)
INTDFDS   SIG  061    INTMLAS   SIG  003    INTINAI   SIG  000    INTINAT   SIG  000    INTVNAV   SIG  044    INTWCAI   SIG  000

ACTUSUP    0 4187     ACTUSUP    0 3252     ACTUSUP    0 3065     ACTUSUP    0 2424     ACTUSUP    0 1508     ACTUSUP    0 4014
WITH      N(   43)    WITH      N(   41)    WITH      N(   41)    WITH      N(   41)    WITH      N(   40)    WITH      N(   43)
INTWCAT   SIG  003    INTWCAV   SIG  019    INTMLAI   SIG  026    INTMLAT   SIG  059    INTMLAV   SIG  176    INTDSAI   SIG  004

ACTUSUP    0 2732     ACTUSUP    0 5847     ACTUSUP    0 1095     ACTUSUP   -0 2210     ACTUSUP    0 0707     ACTUIMP    0 2684
WITH      N(   43)    WITH      N(   43)    WITH      N(   41)    WITH      N(   45)    WITH      N(   25)    WITH      N(   43)
INTDSAT   SIG  038    INTDSAS   SIG  000    INTDSAV   SIG  249    INTCSDS   SIG  072    INTMUTO   SIG  369    TRANEEDS  SIG  041

ACTUIMP    0 5095     ACTUIMP    0 3808     ACTUIMP    0 5646     ACTUIMP    0 2105     ACTUIMP    0 6272     ACTUIMP    0 3777
WITH      N(   42)    WITH      N(   43)    WITH      N(   43)    WITH      N(   44)    WITH      N(   44)    WITH      N(   40)
INVNEEDS  SIG  000    SUPNEEDS  SIG  006    IMPNEEDS  SIG  000    CHGCAUS   SIG  085    DSSFLE<   SIG  000    CSFSUPP   SIG  008

            A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
ACTUIMP WITH MOMTATT	0 2033 N(44) SIG 093	ACTUIMP WITH PIONDEG	0 1800 N(44) SIG 121	ACTUIMP WITH MULTIP	-0 1343 N(42) SIG 198	ACTUIMP WITH COGSTYLE	-0 0902 N(43) SIG 283	ACTUIMP WITH TURNOVER	-0 0399 N(30) SIG 417	ACTUIMP WITH ATTOCHG	-0 0513 N(38) SIG 380
ACTUIMP WITH WILTOCH2	-0 0141 N(44) SIG 464	ACTUIMP WITH REALEXP2	0 1019 N(44) SIG 255	ACTUIMP WITH INTWCCC	0 3178 N(44) SIG 018	ACTUIMP WITH INTWCDS	0 1253 N(44) SIG 209	ACTUIMP WITH INTSNAS	0 7521 N(43) SIG 000	ACTUIMP WITH INTWCAS	0 7991 N(43) SIG 000
ACTUIMP WITH INTMAPD	0 2272 N(43) SIG 071	ACTUIMP WITH INTDFDS	0 4395 N(44) SIG 001	ACTUIMP WITH INTMLAS	0 3387 N(41) SIG 015	ACTUIMP WITH INTINAI	0 9494 N(43) SIG 000	ACTUIMP WITH INTTNAT	0 6445 N(43) SIG 000	ACTUIMP WITH INTVNAV	0 7208 N(42) SIG 000
ACTUIMP WITH INTWCAI	0 9517 N(44) SIG 000	ACTUIMP WITH INTWCAT	0 7065 N(44) SIG 000	ACTUIMP WITH INTWCAV	0 7902 N(42) SIG 000	ACTUIMP WITH INTMLAI	0 3556 N(41) SIG 011	ACTUIMP WITH INTMLAT	0 3120 N(41) SIG .024	ACTUIMP WITH INTMLAV	0 3156 N(40) SIG 024
ACTUIMP WITH INTDSAI	0 7034 N(44) SIG 000	ACTUIMP WITH INTDSAT	0 5355 N(44) SIG 000	ACTUIMP WITH INTDSAS	0 5913 N(43) SIG 000	ACTUIMP WITH INTDSAV	0 5408 N(42) SIG 000	ACTUIMP WITH INTCSDS	0 2747 N(43) SIG 037	ACTUIMP WITH INTMUTO	-0 2973 N(25) SIG 074
TRANEEDS WITH INVNEEDS	-0 0377 N(41) SIG 408	TRANEEDS WITH SUPNEEDS	0 1842 N(42) SIG 121	TRANEEDS WITH IMPNEEDS	0 1378 N(42) SIG 192	TRANEEDS WITH CHGCAUS	0 1610 N(43) SIG 151	TRANEEDS WITH DSSFLE	0 0951 N(43) SIG 272	TRANEEDS WITH CSFSUPP	0 1924 N(39) SIG 120
TRANEEDS WITH MOMTATT	0 2433 N(43) SIG 058	TRANEEDS WITH PIONDEG	0 3523 N(43) SIG 010	TRANEEDS WITH MULTIP	0 1359 N(41) SIG 198	TRANEEDS WITH COGSTYLE	-0 2090 N(42) SIG 092	TRANEEDS WITH TURNOVER	0 2109 N(29) SIG 136	TRANEEDS WITH ATTOCHG	-0 2283 N(38) SIG 084
TRANEEDS WITH WILTOCH2	-0 1292 N(43) SIG 205	TRANEEDS WITH REALEXP2	-0 0709 N(43) SIG 326	TRANEEDS WITH INTWCCC	0 1780 N(43) SIG 127	TRANEEDS WITH INTWCDS	0 1600 N(43) SIG 153	TRANEEDS WITH INTSNAS	0 3797 N(42) SIG 007	TRANEEDS WITH INTWCAS	0 4130 N(42) SIG 003

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FILE   SCALE SP  (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE              VARIABLE              VARIABLE              VARIABLE              VARIABLE              VARIABLE
PAIR                  PAIR                  PAIR                  PAIR                  PAIR                  PAIR
--------              --------              --------              --------              --------              --------

TRANEEDS   0 3126     TRANEEDS   0 1098     TRANEEDS   0 3296     TRANEEDS   0 2437     TRANEEDS   0 6557     TRANEEDS  -0 0666
WITH     N(   42)     WITH     N(   43)     WITH     N(   40)     WITH     N(   42)     WITH     N(   43)     WITH     N(   41)
INTMAPD  SIG  022     INTDFDS  SIG  242     INTMLAS  SIG  019     INTINAI  SIG  060     INTINAJ  SIG  000     INTVNAV  SIG  340

TRANEEDS   0 2579     TRANEEDS   0 2495     TRANEEDS  -0 0418     TRANEEDS   0 2197     TRANEEDS   0 2031     TRANEEDS   0 0904
WITH     N(   43)     WITH     N(   43)     WITH     N(   41)     WITH     N(   40)     WITH     N(   40)     WITH     N(   39)
INTWCAI  SIG  047     INTWCAT  SIG  053     INTWCAV  SIG  398     INTMLAI  SIG  087     INTMLAT  SIG  104     INTMLAV  SIG  292

TRANEEDS   0 2382     TRANEEDS   0 2398     TRANEEDS   0 3851     TRANEEDS  -0 0433     TRANEEDS  -0 2554     TRANEEDS   0 1053
WITH     N(   43)     WITH     N(   43)     WITH     N(   42)     WITH     N(   41)     WITH     N(   42)     WITH     N(   24)
INTDSAI  SIG  062     INTDSAT  SIG  061     INTDSAS  SIG  006     INTDSAV  SIG  394     INTCSDS  SIG  051     INTMUTO  SIG  312

INVNEEDS   0 2916     INVNEEDS   0 7278     INVNEEDS   0 2860     INVNEEDS   0 5785     INVNEEDS   0 2426     INVNEEDS   0 1458
WITH     N(   41)     WITH     N(   41)     WITH     N(   42)     WITH     N(   42)     WITH     N(   38)     WITH     N(   42)
SUPNEEDS SIG  032     IMPNEEDS SIG  000     CHGCAUS  SIG  033     DSSFLEX  SIG  000     CSFSUPP  SIG  071     MGMTATT  SIG  178

INVNEEDS   0 1052     INVNEEDS   0 0805     INVNEEDS  -0 0161     INVNEEDS   0 0405     INVNEEDS  -0 0923     INVNEEDS   0 1057
WITH     N(   42)     WITH     N(   40)     WITH     N(   41)     WITH     N(   30)     WITH     N(   36)     WITH     N(   42)
PIONDEC  SIG  254     MULTIP   SIG  311     COGSTYLE SIG  460     TURNOVER SIG  416     ATTOCHG  SIG  296     WILTOCH2 SIG  253

INVNEEDS   0 2373     INVNEEDS   0 3628     INVNEEDS   0 1297     INVNEEDS   0 1952     INVNEEDS   0 2203     INVNEEDS  -0 0244
WITH     N(   42)     WITH     N(   42)     WITH     N(   42)     WITH     N(   41)     WITH     N(   41)     WITH     N(   41)
REALEXP2 SIG  065     INTWCCC  SIG  009     INTWCDS  SIG  206     INTSNAS  SIG  111     INTWCAS  SIG  083     INTMAPD  SIG  440

INVNEEDS   0 4395     INVNEEDS   0 1935     INVNEEDS   0 6534     INVNEEDS   0 2436     INVNEEDS   0 8682     INVNEEDS   0 5429
WITH     N(   42)     WITH     N(   40)     WITH     N(   41)     WITH     N(   41)     WITH     N(   42)     WITH     N(   42)
INTDFDS  SIG  002     INTMLAS  SIG  116     INTINAI  SIG  000     INTINAT  SIG  062     INTVNAV  SIG  000     INTWCAI  SIG  000

INVNEEDS   0 3986     INVNEEDS   0 7239     INVNEEDS   0 3879     INVNEEDS   0 3836     INVNEEDS   0 5160     INVNEEDS   0 3593
WITH     N(   42)     WITH     N(   42)     WITH     N(   40)     WITH     N(   40)     WITH     N(   40)     WITH     N(   42)
INIWCAT  SIG  004     INIWCAV  SIG  000     INTMLAI  SIG  007     INTMLAT  SIG  007     INTMLAV  SIG  000     INTDSAI  SIG  010

          A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
INVNEEDS	0 2797	INVNEEDS	0 0626	INVNEEDS	0 5559	INVNEEDS	0 0467	INVNEEDS	0 1356	SUPNEEDS	0 8540
WITH	N(42)	WITH	N(41)	WITH	N(42)	WITH	N(41)	WITH	N(25)	WITH	N(43)
INIDSAT	SIG 036	INIDSAS	SIG 349	INIDSAV	SIG 000	INICSDS	SIG 386	INIMUTO	SIG 259	IMPNEEDS	SIG 000
SUPNEEDS	0 4475	SUPNEEDS	0 3084	SUPNEEDS	0 2551	SUPNEEDS	0 2204	SUPNEEDS	0 2981	SUPNEEDS	-0 0784
WITH	N(43)	WITH	N(43)	WITH	N(40)	WITH	N(43)	WITH	N(43)	WITH	N(42)
CHOCAUS	SIG 001	DSSFLEX	SIG 022	CSFSUPP	SIG 056	MGMTATT	SIG 078	PIONDEG	SIG 026	MULTIP	SIG 311
SUPNEEDS	-0 2239	SUPNEEDS	-0 0880	SUPNEEDS	0 0347	SUPNEEDS	0 4532	SUPNEEDS	-0 0896	SUPNEEDS	0 5376
WITH	N(43)	WITH	N(30)	WITH	N(37)	WITH	N(43)	WITH	N(43)	WITH	N(43)
COGSTYLE	SIG 074	TURNOVER	SIG 322	ATTOCHG	SIG 419	WILTOCH2	SIG 001	REALEXP2	SIG 284	INTWCCC	SIG 000
SUPNEEDS	0 2373	SUPNEEDS	0 6779	SUPNEEDS	0 4781	SUPNEEDS	0 2755	SUPNEEDS	0 2239	SUPNEEDS	0 2962
WITH	N(43)	WITH	N(43)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(41)
INTWCDS	SIG 063	INTBNAS	SIG 000	INTWCAS	SIG 001	INIMAPD	SIG 039	INIDFDS	SIG 074	INTMLAS	SIG 030
SUPNEEDS	0 6061	SUPNEEDS	0 3727	SUPNEEDS	0 1252	SUPNEEDS	0 4694	SUPNEEDS	0 4627	SUPNEEDS	0 1729
WITH	N(43)	WITH	N(42)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(41)
INTINAI	SIG 000	INTINAT	SIG 008	INTVNAV	SIG 218	INTWCAI	SIG 001	INTWCAT	SIG 001	INTWCAV	SIG 140
SUPNEEDS	0 2830	SUPNEEDS	0 3317	SUPNEEDS	0 1637	SUPNEEDS	0 2302	SUPNEEDS	0 3076	SUPNEEDS	0 2519
WITH	N(41)	WITH	N(41)	WITH	N(40)	WITH	N(43)	WITH	N(43)	WITH	N(43)
INTMLAI	SIG 036	INTMLAT	SIG 017	INTMLAV	SIG 155	INTDSAI	SIG 069	INTDSAT	SIG 022	INTDSAS	SIG 052
SUPNEEDS	0 0324	SUPNEEDS	-0 4048	SUPNEEDS	-0 2868	IMPNEEDS	0 4172	IMPNEEDS	0 4979	IMPNEEDS	0 3518
WITH	N(41)	WITH	N(43)	WITH	N(25)	WITH	N(43)	WITH	N(43)	WITH	N(40)
INIDSAV	SIG 420	INICSDS	SIG 004	INIMUTO	SIG 082	CHOCAUS	SIG 003	DSSFLEX	SIG 000	CSFSUPP	SIG 013
IMPNEEDS	0 2340	IMPNEEDS	0 2412	IMPNEEDS	0 0307	IMPNEEDS	-0 1835	IMPNEEDS	-0 0330	IMPNEEDS	-0 0335
WITH	N(43)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(30)	WITH	N(37)
MGMTATT	SIG 065	PIONDEG	SIG 060	MULTIP	SIG 424	COGSTYLE	SIG 119	TURNOVER	SIG 431	ATTOCHG	SIG 422

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FILE SCALE SP (CREATION DATE = 09/04/83)

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- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE              VARIABLE              VARIABLE              VARIABLE              VARIABLE              VARIABLE
PAIR                  PAIR                  PAIR                  PAIR                  PAIR                  PAIR
--------              --------              --------              --------              --------              --------

IMPNEEDS   0 2972     IMPNEEDS   0 0582     IMPNEEDS   0 5527     IMPNEEDS   0 2719     IMPNEEDS   0 5752     IMPNEEDS   0 4636
WITH     N(   43)     WITH     N(   43)     WITH     N(   43)     WITH     N(   43)     WITH     N(   43)     WITH     N(   43)
WILTOCH2 SIG  026     REALEXP2 SIG  355     INTWCCC  SIG  000     INTWCDS  SIG  039     INTSNAS  SIG  000     INTWCAS  SIG  001

IMPNEEDS   0 1902     IMPNEEDS   0 3787     IMPNEEDS   0 2902     IMPNEEDS   0 7845     IMPNEEDS   0 4071     IMPNEEDS   0 5437
WITH     N(   42)     WITH     N(   43)     WITH     N(   41)     WITH     N(   43)     WITH     N(   42)     WITH     N(   41)
INTMAPD  SIG  114     INTDFDS  SIG  006     INTMLAS  SIG  033     INTINAI  SIG  000     INTTNAT  SIG  004     INTVNAV  SIG  000

IMPNEEDS   0 6448     IMPNEEDS   0 5584     IMPNEEDS   0 5114     IMPNEEDS   0 3788     IMPNEEDS   0 4116     IMPNEEDS   0 3578
WITH     N(   43)     WITH     N(   43)     WITH     N(   41)     WITH     N(   41)     WITH     N(   41)     WITH     N(   40)
INTWCAI  SIG  000     INTWCAT  SIG  000     INTWCAV  SIG  000     INTMLAI  SIG  007     INTMLAT  SIG  004     INTMLAV  SIG  012

IMPNEEDS   0 3848     IMPNEEDS   0 3856     IMPNEEDS   0 2174     IMPNEEDS   0 2721     IMPNEEDS  -0 3301     IMPNEEDS  -0 2856
WITH     N(   43)     WITH     N(   43)     WITH     N(   43)     WITH     N(   41)     WITH     N(   43)     WITH     N(   25)
INTDSAI  SIG  005     INTDSAT  SIG  005     INTDSAS  SIG  081     INTDSAV  SIG  043     INTCSDS  SIG  015     INTMUTO  SIG  083

CHGCAUS    0 2249     CHGCAUS    0 2750     CHGCAUS   -0 0367     CHGCAUS    0 3340     CHGCAUS   -0 1156     CHGCAUS    0 0273
WITH     N(   44)     WITH     N(   40)     WITH     N(   44)     WITH     N(   44)     WITH     N(   42)     WITH     N(   43)
DSSFLE(  SIG  071     CSFSUPP  SIG  043     MGMTATT  SIG  407     PIONDEG  SIG  013     MULTIP   SIG  233     COOSTYLE SIG  431

CHGCAUS   -0 0701     CHGCAUS   -0 1791     CHGCAUS    0 1093     CHGCAUS    0 0434     CHGCAUS    0 9451     CHGCAUS    0 1439
WITH     N(   30)     WITH     N(   38)     WITH     N(   44)     WITH     N(   44)     WITH     N(   44)     WITH     N(   44)
TURNOVER SIG  356     ATTOCHG  SIG  141     WILTOCH2 SIG  242     REALEXP2 SIG  390     INTWCCC  SIG  000     INTWCDS  SIG  176

CHGCAUS    0 2344     CHGCAUS    0 2029     CHGCAUS    0 0735     CHGCAUS    0 1169     CHGCAUS    0 0137     CHGCAUS    0 3112
WITH     N(   43)     WITH     N(   43)     WITH     N(   43)     WITH     N(   44)     WITH     N(   41)     WITH     N(   43)
INTSNAS  SIG  065     INTWCAS  SIG  096     INTMAPD  SIG  320     INTDFDS  SIG  225     INTMLAS  SIG  466     INTINAI  SIG  021

CHGCAUS    0 2334     CHGCAUS    0 2455     CHGCAUS    0 2873     CHGCAUS    0 3023     CHGCAUS    0 2856     CHGCAUS    0 1065
WITH     N(   43)     WITH     N(   42)     WITH     N(   44)     WITH     N(   44)     WITH     N(   42)     WITH     N(   41)
INTTNAT  SIG  066     INTVNAV  SIG  059     INTWCAI  SIG  029     INTWCAT  SIG  023     INTWCAV  SIG  033     INTMLAI  SIG  254

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SPSS BATCH SYSTEM                                                                            12 53 02   09/04/83   PAGE    15

FILE    SCALE SP  (CREATION DATE = 09/04/83)

- -  - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE                 VARIABLE                 VARIABLE                 VARIABLE                 VARIABLE                 VARIABLE
PAIR                     PAIR                     PAIR                     PAIR                     PAIR                     PAIR
--------                 --------                 --------                 --------                 --------                 --------

CHGCAUS     0 1830       CHGCAUS     0 1330       CHGCAUS     0 0816       CHGCAUS     0 1414       CHGCAUS     0 0392       CHGCAUS     0 0763
WITH     N(    41)       WITH     N(    40)       WITH     N(    44)       WITH     N(    44)       WITH     N(    43)       WITH     N(    42)
INTMLAT  SIG   126       INTMLAV  SIG   207       INTDSAI  SIG   299       INTDSAT  SIG   180       INTDSAS  SIG   401       INTDSAV  SIG   316

CHGCAUS    -0 3383       CHGCAUS    -0 1412       DSSFLEX     0 2357       DSSFLEX     0 2812       DSSFLEX     0 0152       DSSFLEX    -0 1545
WITH     N(    43)       WITH     N(    25)       WITH     N(    40)       WITH     N(    44)       WITH     N(    44)       WITH     N(    42)
INTCSDS  SIG   013       INTMUTO  SIG   250       CSFSUPP  SIG   072       MGMTATT  SIG   032       PIONDEG  SIG   451       MULTIP   SIG   164

DSSFLEX     0 0343       DSSFLEX    -0 1681       DSSFLEX    -0 1013       DSSFLEX    -0 0682       DSSFLEX     0 3325       DSSFLEX     0 3666
WITH     N(    43)       WITH     N(    30)       WITH     N(    33)       WITH     N(    44)       WITH     N(    44)       WITH     N(    44)
COGSTYLE SIG   414       TURNOVER SIG   187       ATTOCHG  SIG   272       WILTOCH2 SIG   330       REALEXP2 SIG   014       INTWCCC  SIG   007

DSSFLEX     0 2551       DSSFLEX     0 3648       DSSFLEX     0 4186       DSSFLEX     0 0547       DSSFLEX     0 8353       DSSFLEX     0 1087
WITH     N(    44)       WITH     N(    43)       WITH     N(    43)       WITH     N(    43)       WITH     N(    44)       WITH     N(    41)
INTWCDS  SIG   047       INTSNAS  SIG   008       INTWCAS  SIG   003       INTMAPD  SIG   364       INTDFDS  SIG   000       INTMLAS  SIG   249

DSSFLEX     0 6572       DSSFLEX     0 3952       DSSFLEX     0 6630       DSSFLEX     0 6696       DSSFLEX     0 5143       DSSFLEX     0 7107
WITH     N(    43)       WITH     N(    43)       WITH     N(    42)       WITH     N(    44)       WITH     N(    44)       WITH     N(    42)
INTINAI  SIG   000       INTTNAT  SIG   004       INTVNAV  SIG   000       INTWCAI  SIG   000       INTWCAT  SIG   000       INTWCAV  SIG   000

DSSFLEX     0 2326       DSSFLEX     0 2457       DSSFLEX     0 3245       DSSFLEX     0 4850       DSSFLEX     0 4048       DSSFLEX     0 2485
WITH     N(    41)       WITH     N(    41)       WITH     N(    40)       WITH     N(    44)       WITH     N(    44)       WITH     N(    43)
INTMLAI  SIG   072       INTMLAT  SIG   061       INTMLAV  SIG   021       INTDSAI  SIG   000       INTDSAT  SIG   003       INTDSAS  SIG   054

DSSFLEX     0 5260       DSSFLEX    -0 2135       DSSFLEX    -0 5035       CSFSUPP    -0 1193       CSFSUPP     0 1123       CSFSUPP    -0 1147
WITH     N(    42)       WITH     N(    43)       WITH     N(    25)       WITH     N(    42)       WITH     N(    42)       WITH     N(    41)
INTDSAV  SIG   000       INTCSDS  SIG   085       INTMUTO  SIG   005       MGMTATT  SIG   226       PIONDEG  SIG   239       MULTIP   SIG   238

CSFSUPP     0 0852       CSFSUPP    -0 0400       CSFSUPP    -0 0797       CSFSUPP    -0 0480       CSFSUPP     0 0092       CSFSUPP     0 3113
WITH     N(    42)       WITH     N(    28)       WITH     N(    36)       WITH     N(    40)       WITH     N(    40)       WITH     N(    40)
COGSTYLE SIG   296       TURNOVER SIG   420       ATTOCHG  SIG   322       WILTOCH2 SIG   384       REALEXP2 SIG   477       INTWCCC  SIG   025

                    A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
CSFSUPP	0 3258	CSFSUPP	0 0935	CSFSUPP	0 0892	CSFSUPP	-0 0248	CSFSUPP	0 2986	CSFSUPP	0 0455
WITH	N(40)	WITH	N(40)	WITH	N(40)	WITH	N(41)	WITH	N(40)	WITH	N(38)
INTWCDS	SIG 020	INTSNAS	SIG 283	INTWCAS	SIG 292	INTMAPD	SIG 439	INTDFDS	SIG 031	INTMLAS	SIG 393
CSFSUPP	0 3900	CSFSUPP	0 4032	CSFSUPP	0 3610	CSFSUPP	0 3819	CSFSUPP	0 4959	CSFSUPP	0 4061
WITH	N(40)	WITH	N(39)	WITH	N(38)	WITH	N(40)	WITH	N(40)	WITH	N(38)
INTINAI	SIG 006	INTTNAT	SIG 005	INTVNAV	SIG 013	INTWCAI	SIG 008	INTWCAT	SIG 001	INTWCAV	SIG 006
CSFSUPP	0 2049	CSFSUPP	0 2548	CSFSUPP	0 2691	CSFSUPP	0 4642	CSFSUPP	0 5519	CSFSUPP	0 1352
WITH	N(38)	WITH	N(40)	WITH	N(37)	WITH	N(40)	WITH	N(40)	WITH	N(40)
INTMLAI	SIG 109	INTMLAT	SIG 056	INTMLAV	SIG 054	INTDSAI	SIG 001	INTDSAT	SIG 000	INTDSAS	SIG 203
CSFSUPP	0 4458	CSFSUPP	-0 1777	CSFSUPP	-0 2595	MGMTATT	0 2811	MGMTATT	0 2592	MGMTATT	-0 2849
WITH	N(38)	WITH	N(42)	WITH	N(22)	WITH	N(46)	WITH	N(44)	WITH	N(45)
INTDSAV	SIG 003	INTCSDS	SIG 130	INTMUTO	SIG 122	PIONDEG	SIG 029	MULTIP	SIG 045	COGSTYLE	SIG 029
MGMTATT	-0 1832	MGMTATT	0 3481	MGMTATT	0 3028	MGMTATT	-0 0885	MGMTATT	0 0308	MGMTATT	0 0480
WITH	N(31)	WITH	N(40)	WITH	N(44)	WITH	N(44)	WITH	N(44)	WITH	N(44)
TURNOVER	SIG 162	ATTDCHG	SIG 014	WILTOCH2	SIG 023	REALEXP2	SIG 284	INTWCCC	SIG 421	INTWCDS	SIG 379
MGMTATT	0 2438	MGMTATT	0 2161	MGMTATT	0 6660	MGMTATT	0 2092	MGMTATT	0 2592	MGMTATT	0 2410
WITH	N(43)	WITH	N(43)	WITH	N(45)	WITH	N(44)	WITH	N(41)	WITH	N(43)
INTSNAS	SIG 058	INTWCAS	SIG 082	INTMAPD	SIG 000	INTDFDS	SIG 087	INTMLAS	SIG 051	INTINAI	SIG 060
MGMTATT	0 2715	MGMTATT	-0 1101	MGMTATT	0 2202	MGMTATT	0 1833	MGMTATT	0 1089	MGMTATT	0 2736
WITH	N(43)	WITH	N(42)	WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(41)
INTTNAT	SIG 039	INTVNAV	SIG 244	INTWCAI	SIG 075	INTWCAI	SIG 117	INTWCAV	SIG 246	INTMLAI	SIG 042
MGMTATT	0 2498	MGMTATT	0 2740	MGMTATT	0 1186	MGMTATT	0 1061	MGMTATT	0 1195	MGMTATT	0 0351
WITH	N(43)	WITH	N(40)	WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(42)
INTMLAT	SIG 053	INTMLAV	SIG 044	INTDSAI	SIG 222	INTDSAT	SIG 247	INTDSAS	SIG 223	INTDSAV	SIG 413

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/93)

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VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
MGMTATT	-0 0831	MGMTATT	-0 1678	PIONDEG	0 0872	PIONDEG	0 0850	PIONDEG	0 2488	PIONDEG	0 1515
WITH	N(45)	WITH	N(25)	WITH	N(44)	WITH	N(45)	WITH	N(31)	WITH	N(40)
INTCSDS	SIG 294	INTMUTO	SIG 211	MULTIP	SIG 287	COGSTYLE	SIG 289	TURNOVER	SIG 089	ATTOCHG	SIG 175
PIONDEG	0 1098	PIONDEG	-0 2276	PIONDEG	0 2834	PIONDEG	-0 1023	PIONDEG	0 3289	PIONDEG	0 2360
WITH	N(44)	WITH	N(44)	WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(43)
WILTOCH2	SIG 239	REALEXP2	SIG 069	INTWCCC	SIG 031	INTWCDS	SIG 254	INTSNAS	SIG 016	INTWCAS	SIG 064
PIONDEG	0 7022	PIONDEG	-0 0378	PIONDEG	0 1685	PIONDEG	0 2576	PIONDEG	0 2171	PIONDEG	0 1083
WITH	N(45)	WITH	N(44)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(42)
INTMAPD	SIG 000	INTOFDS	SIG 404	INTMLAS	SIG 146	INTINAI	SIG 048	INTTNAT	SIG 081	INTVNAV	SIG 247
PIONDEG	0 1522	PIONDEG	0 0631	PIONDEG	0 0691	PIONDEG	0 1613	PIONDEG	0 1179	PIONDEG	0 1498
WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(41)	WITH	N(43)	WITH	N(40)
INTWCAI	SIG 162	INTWCAT	SIG 342	INTWCAV	SIG 332	INTMLAI	SIG 157	INTMLAT	SIG 226	INTMLAV	SIG 178
PIONDEG	0 0476	PIONDEG	-0 0068	PIONDEG	0 1412	PIONDEG	0 0308	PIONDEG	0 3806	PIONDEG	0 1950
WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(42)	WITH	N(45)	WITH	N(25)
INTDSAI	SIG 379	INTDSAT	SIG 483	INTDSAS	SIG 183	INTDSAV	SIG 423	INTCSDS	SIG 005	INTMUTO	SIG 175
MULTIP	-0 0246	MULTIP	-0 0623	MULTIP	0 2687	MULTIP	0 1600	MULTIP	-0 1724	MULTIP	-0 1644
WITH	N(44)	WITH	N(31)	WITH	N(38)	WITH	N(42)	WITH	N(42)	WITH	N(42)
COGSTYLE	SIG 437	TURNOVER	SIG 370	ATTOCHG	SIG 051	WILTOCH2	SIG 156	REALEXP2	SIG 137	INTWCCC	SIG 149
MULTIP	-0 2476	MULTIP	0 0401	MULTIP	-0 0651	MULTIP	0 0937	MULTIP	0 2072	MULTIP	0 8278
WITH	N(42)	WITH	N(42)	WITH	N(42)	WITH	N(43)	WITH	N(42)	WITH	N(41)
INTWCDS	SIG 057	INTSNAS	SIG 400	INTWCAS	SIG 341	INTMAPD	SIG 275	INTOFDS	SIG 094	INTMLAS	SIG 000
MULTIP	-0 0728	MULTIP	-0 0188	MULTIP	-0 0752	MULTIP	0 1894	MULTIP	0 1614	MULTIP	-0 1979
WITH	N(42)	WITH	N(41)	WITH	N(40)	WITH	N(42)	WITH	N(42)	WITH	N(40)
INTINAI	SIG 323	INTTNAT	SIG 454	INTVNAV	SIG 322	INTWCAI	SIG 115	INTWCAT	SIG 154	INTWCAV	SIG 110

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

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SPSS BATCH SYSTEM                                                              12 51 02   09 04 83   PAGE   18

FILE   SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - -

VARIABLE               VARIABLE               VARIABLE               VARIABLE               VARIABLE               VARIABLE
PAIR                   PAIR                   PAIR                   PAIR                   PAIR                   PAIR

MULTIP     0 8324      MULTIP     0 7469      MULTIP     0 7393      MULTIP     0 1764      MULTIP     0 1880      MULTIP    -0 0566
WITH     N(   41)      WITH     N(   43)      WITH     N(   40)      WITH     N(   42)      WITH     N(   42)      WITH     N(   42)
INTMLAI  SIG  000      INTMLAT  SIG  000      INTMLAV  SIG  000      INTDSAI  SIG  132      INTDSAT  SIG  117      INTDSAS  SIG  361

MULTIP     0 1616      MULTIP     0 1280      MULTIP     0 1143      COGSTYLE   0 2281      COGSTYLE   0 1742      COGSTYLE  -0 4221
WITH     N(   40)      WITH     N(   44)      WITH     N(   25)      WITH     N(   31)      WITH     N(   39)      WITH     N(   43)
INTDSAV  SIG  160      INTCSDS  SIG  204      INTMUTO  SIG  293      TURNOVER SIG  109      ATTUCHG  SIG  144      WILTOCH2 SIG  002

COGSTYLE   0 0408      COGSTYLE  -0 0263      COGSTYLE   0 0009      COGSTYLE  -0 2196      COGSTYLE  -0 1763      COGSTYLE  -0 1342
WITH     N(   43)      WITH     N(   43)      WITH     N(   43)      WITH     N(   43)      WITH     N(   43)      WITH     N(   44)
REALEXP2 SIG  398      INTWCCC  SIG  434      INTWCDS  SIG  498      INTSNAS  SIG  079      INTWCAS  SIG  129      INTMAPD  SIG  193

COGSTYLE   0 0682      COGSTYLE  -0 0717      COGSTYLE   0 1479      COGSTYLE  -0 2433      COGSTYLE   0 0680      COGSTYLE  -0 1047
WITH     N(   43)      WITH     N(   41)      WITH     N(   43)      WITH     N(   40)      WITH     N(   41)      WITH     N(   43)
INTDFDS  SIG  332      INTMLAS  SIG  328      INTINAI  SIG  172      INTTNAT  SIG  060      INTVNAV  SIG  336      INTWCAI  SIG  252

COGSTYLE  -0 2006      COGSTYLE   0 0770      COGSTYLE  -0 0133      COGSTYLE   0 0415      COGSTYLE   0 0863      COGSTYLE   0 0146
WITH     N(   43)      WITH     N(   41)      WITH     N(   41)      WITH     N(   43)      WITH     N(   40)      WITH     N(   43)
INTWCAT  SIG  099      INTWCAV  SIG  316      INTMLAI  SIG  467      INTMLAT  SIG  396      INTMLAV  SIG  298      INTDSAI  SIG  463

COGSTYLE  -0 1248      COGSTYLE   0 0660      COGSTYLE   0 1630      COGSTYLE   0 5190      COGSTYLE   0 1422      TURNOVER   0 0078
WITH     N(   43)      WITH     N(   43)      WITH     N(   41)      WITH     N(   45)      WITH     N(   25)      WITH     N(   26)
INTDSAT  SIG  213      INTDSAS  SIG  337      INTDSAV  SIG  120      INTCSDS  SIG  000      INTMUTO  SIG  249      ATTUCHG  SIG  485

TURNOVER  -0 3579      TURNOVER  -0 0215      TURNOVER  -0 0952      TURNOVER  -0 1612      TURNOVER   0 0645      TURNOVER   0 1025
WITH     N(   30)      WITH     N(   30)      WITH     N(   30)      WITH     N(   30)      WITH     N(   30)      WITH     N(   30)
WILTOCH2 SIG  026      REALEXP2 SIG  455      INTWCCC  SIG  303      INTWCDS  SIG  197      INTSNAS  SIG  367      INTWCAS  SIG  295

TURNOVER   0 0280      TURNOVER  -0 2119      TURNOVER  -0 0267      TURNOVER   0 0502      TURNOVER   0 2368      TURNOVER   0 0278
WITH     N(   30)      WITH     N(   30)      WITH     N(   30)      WITH     N(   30)      WITH     N(   29)      WITH     N(   30)
INTMAPD  SIG  442      INTDFDS  SIG  131      INTMLAS  SIG  444      INTINAI  SIG  396      INTTNAT  SIG  108      INTVNAV  SIG  442

         A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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SPSS BATCH SYSTEM

FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE PAIR	VARIABLE PAIR	VARIABLE PAIR	VARIABLE PAIR	VARIABLE PAIR	VARIABLE PAIR
TURNOVER -0 0539 WITH N(30) INTWCAI SIG 389	TURNOVER -0 3701 WITH N(30) INTWCAI SIG 022	TURNOVER 0 0085 WITH N(30) INTWCAV SIG 482	TURNOVER 0 1155 WITH N(30) INTMLAI SIG 272	TURNOVER 0 2607 WITH N(31) INTMLAI SIG 078	TURNOVER -0 0925 WITH N(30) INTMLAV SIG 313
TURNOVER -0 1138 WITH N(30) INTDSAI SIG 275	TURNOVER -0 3839 WITH N(30) INTDSAT SIG 018	TURNOVER 0 0465 WITH N(30) INTDSAS SIG 404	TURNOVER 0 0289 WITH N(30) INTDSAV SIG 440	TURNOVER 0 0834 WITH N(31) INTCSDS SIG 328	TURNOVER 0 8221 WITH N(25) INTMUTO SIG 000
ATTOCHG 0 1368 WITH N(38) WILTOCH2 SIG 206	ATTOCHG -0 2174 WITH N(38) REALEXP2 SIG 095	ATTOCHG -0 1633 WITH N(38) INTWCCC SIG 164	ATTOCHG -0 0690 WITH N(38) INTWCDS SIG 340	ATTOCHG 0 0213 WITH N(37) INTSNAS SIG 450	ATTOCHG -0 0295 WITH N(37) INTWCAS SIG 431
ATTOCHG 0 3789 WITH N(39) INTMAPD SIG 009	ATTOCHG -0 0748 WITH N(38) INTDFDS SIG 328	ATTOCHG 0 1784 WITH N(35) INTMLAS SIG 153	ATTOCHG 0 0334 WITH N(37) INTINAI SIG 422	ATTOCHG 0 1071 WITH N(38) INTTNAT SIG 261	ATTOCHG -0 0549 WITH N(36) INTVNAV SIG 375
ATTOCHG -0 0600 WITH N(38) INTWCAI SIG 360	ATTOCHG -0 0675 WITH N(38) INTWCAT SIG 344	ATTOCHG 0 0635 WITH N(36) INTWCAV SIG 356	ATTOCHG 0 2320 WITH N(35) INTMLAI SIG 090	ATTOCHG 0 1662 WITH N(37) INTMLAT SIG 163	ATTOCHG 0 2738 WITH N(34) INTMLAV SIG 059
ATTOCHG 0 0048 WITH N(38) INTDSAI SIG 489	ATTOCHG -0 0473 WITH N(38) INTDSAT SIG 389	ATTOCHG 0 0052 WITH N(37) INTDSAS SIG 488	ATTOCHG 0 0073 WITH N(36) INTDSAV SIG 491	ATTOCHG 0 1453 WITH N(19) INTCSDS SIG 187	ATTOCHG 0 2464 WITH N(21) INTMUTO SIG 141
WILTOCH2 -0 1464 WITH N(44) REALEXP2 SIG 171	WILTOCH2 0 1398 WITH N(44) INTWCCC SIG 183	WILTOCH2 0 1474 WITH N(44) INTWCDS SIG 170	WILTOCH2 0 2444 WITH N(43) INTSNAS SIG 057	WILTOCH2 0 0900 WITH N(43) INTWCAS SIG 283	WILTOCH2 0 0941 WITH N(43) INTMAPD SIG 274
WILTOCH2 0 0115 WITH N(44) INTDFDS SIG 470	WILTOCH2 0 1780 WITH N(41) INTMLAS SIG 133	WILTOCH2 0 1386 WITH N(43) INTINAI SIG 189	WILTOCH2 0 0110 WITH N(43) INTTNAT SIG 472	WILTOCH2 -0 0711 WITH N(42) INTVNAV SIG 327	WILTOCH2 0 0213 WITH N(44) INTWCAI SIG 445

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

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FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
WILTOCH2	0 1095	WILTOCH2	-0 0825	WILTOCH2	0 1805	WILTOCH2	0 2094	WILTOCH2	0 1077	WILTOCH2	0 0418
WITH	N(44)	WITH	N(42)	WITH	N(41)	WITH	N(41)	WITH	N(40)	WITH	N(44)
INTWCAT	SIG 240	INTWCAV	SIG 302	INTMLAI	SIG 129	INTMLAT	SIG 094	INTMLAV	SIG 254	INTDSAI	SIG 394
WILTOCH2	0 1264	WILTOCH2	0 1055	WILTOCH2	-0 0725	WILTOCH2	-0 0766	WILTOCH2	-0 2051	REALEXP2	0 0714
WITH	N(44)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(25)	WITH	N(44)
INTDSAT	SIG 207	INTDSAS	SIG 250	INTDSAV	SIG 324	INTCSDS	SIG 313	INTMUTO	SIG 163	INTWCCC	SIG 323
REALEXP2	-0 1562	REALEXP2	-0 0764	REALEXP2	-0 0422	REALEXP2	-0 3365	REALEXP2	0 1850	REALEXP2	-0 1996
WITH	N(44)	WITH	N(43)	WITH	N(43)	WITH	N(43)	WITH	N(44)	WITH	N(41)
INTWCDS	SIG 156	INTSNAS	SIG 313	INTWCAS	SIG 394	INTMAPD	SIG 014	INTDFDS	SIG 115	INTMLAS	SIG 105
REALEXP2	0 0946	REALEXP2	0 1057	REALEXP2	0 2112	REALEXP2	0 0953	REALEXP2	0 1657	REALEXP2	0 1408
WITH	N(43)	WITH	N(43)	WITH	N(42)	WITH	N(44)	WITH	N(44)	WITH	N(42)
INTINAI	SIG 273	INTTNAT	SIG 250	INTVNAV	SIG 090	INTWCAI	SIG 269	INTWCAT	SIG 141	INTWCAV	SIG 187
REALEXP2	0 1025	REALEXP2	0 0198	REALEXP2	-0 0354	REALEXP2	-0 0676	REALEXP2	0 0676	REALEXP2	-0 1942
WITH	N(41)	WITH	N(41)	WITH	N(40)	WITH	N(44)	WITH	N(44)	WITH	N(43)
INTMLAI	SIG 262	INTMLAT	SIG 451	INTMLAV	SIG 414	INTDSAI	SIG 331	INTDSAT	SIG 331	INTDSAS	SIG 106
REALEXP2	-0 0078	REALEXP2	-0 0042	REALEXP2	0 0777	INTWCCC	0 2834	INTWCCC	0 3268	INTWCCC	0 3498
WITH	N(42)	WITH	N(43)	WITH	N(25)	WITH	N(44)	WITH	N(43)	WITH	N(43)
INTDSAV	SIG 480	INTCSDS	SIG 489	INTMUTO	SIG 356	INTWCDS	SIG 031	INTSMAS	SIG 016	INTWCAS	SIG 011
INTWCCC	0 0977	INTWCCC	0 2350	INTWCCC	0 0452	INTWCCC	0 4359	INTWCCC	0 2854	INTWCCC	0 3012
WITH	N(43)	WITH	N(44)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(42)
INTMAPD	SIG 267	INTDFDS	SIG 062	INTMLAS	SIG 389	INTINAI	SIG 002	INTTNAT	SIG 032	INTVNAV	SIG 026
INTWCCC	0 4624	INTWCCC	0 4199	INTWCCC	0 3995	INTWCCC	0 1240	INTWCCC	0 1942	INTWCCC	0 1331
WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(41)	WITH	N(41)	WITH	N(40)
INTWCAI	SIG 001	INTWCAT	SIG 002	INTWCAV	SIG 004	INTMLAI	SIG 220	INTMLAT	SIG 112	INTMLAV	SIG 206

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/83)

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VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
INTWCCC	0 1621	INTWCCC	0 1946	INTWCCC	0 0971	INTWCCC	0 1134	INTWCCC	-0 3826	INTWCCC	-0 2172
WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(25)
INTDSAI	SIG 147	INTDSAT	SIG 103	INTDSAS	SIG 268	INTDSAV	SIG 237	INTCSDS	SIG 006	INTMUTO	SIG 148
INTWCDS	0 0887	INTWCDS	0 1755	INTWCDS	0 0243	INTWCDS	0 6417	INTWCDS	-0 1379	INTWCDS	0 1797
WITH	N(43)	WITH	N(43)	WITH	N(43)	WITH	N(44)	WITH	N(41)	WITH	N(43)
INTSNAS	SIG 286	INTWCAS	SIG 130	INTMAPD	SIG 439	INTDFDS	SIG 000	INTMLAS	SIG 195	INTINAI	SIG 124
INTWCDS	0 1125	INTWCDS	0 1183	INTWCDS	0 2651	INTWCDS	0 1642	INTWCDS	0 2374	INTWCDS	-0 1131
WITH	N(43)	WITH	N(42)	WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(41)
INTTNAT	SIG 236	INTVNAV	SIG 228	INTWCAI	SIG 041	INTWCAT	SIG 143	INTWCAV	SIG 065	INTMLAI	SIG 241
INTWCDS	-0 1539	INTWCDS	-0 0663	INTWCDS	0 6589	INTWCDS	0 4695	INTWCDS	0 5135	INTWCDS	0 5736
WITH	N(41)	WITH	N(40)	WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(42)
INTMLAT	SIG 168	INTMLAV	SIG 342	INTDSAI	SIG 000	INTDSAT	SIG 001	INTDSAS	SIG 000	INTDSAV	SIG 000
INTWCDS	0 0504	INTWCDS	-0 3938	INTSNAS	0 9271	INTSNAS	0 4235	INTSNAS	0 2161	INTSNAS	0 4887
WITH	N(43)	WITH	N(25)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(41)
INTCSDS	SIG 374	INTMUTO	SIG 026	INTWCAS	SIG 000	INTMAPD	SIG 003	INTDFDS	SIG 082	INTMLAS	SIG 001
INTSNAS	0 7873	INTSNAS	0 5113	INTSNAS	0 2518	INTSNAS	0 7454	INTSNAS	0 4714	INTSNAS	0 3518
WITH	N(43)	WITH	N(42)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(41)
INTINAI	SIG 000	INTTNAT	SIG 000	INTVNAV	SIG 056	INTWCAI	SIG 000	INTWCAT	SIG 001	INTWCAV	SIG 012
INTSNAS	0 3246	INTSNAS	0 2366	INTSNAS	0 1333	INTSNAS	0 4868	INTSNAS	0 3037	INTSNAS	0 7028
WITH	N(41)	WITH	N(41)	WITH	N(40)	WITH	N(43)	WITH	N(43)	WITH	N(43)
INTMLAI	SIG 019	INTMLAT	SIG 068	INTMLAV	SIG 206	INTDSAI	SIG 000	INTDSAT	SIG 024	INTDSAS	SIG 000
INTSNAS	0 1127	INTSNAS	-0 3619	INTSNAS	-0 1041	INTWCAS	0 3957	INTWCAS	0 2500	INTWCAS	0 4282
WITH	N(41)	WITH	N(43)	WITH	N(25)	WITH	N(42)	WITH	N(43)	WITH	N(41)
INTDSAV	SIG 242	INTCSDS	SIG 009	INTMUTO	SIG 310	INTMAPD	SIG 005	INTDFDS	SIG 053	INTMLAS	SIG 003

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
INTWCAS	0 7672	INTWCAS	0 4902	INTWCAS	0 3291	INTWCAS	0 8418	INTWCAS	0 4766	INTWCAS	0 4896
WITH	N(43)	WITH	N(42)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(41)
INTINAI	SIG 000	INTTNAT	SIG 000	INTVNAV	SIG 018	INTWCAI	SIG 000	INTWCAT	SIG 001	INTWCAV	SIG 001
INTWCAS	0 2594	INTWCAS	0 1456	INTWCAS	0 0928	INTWCAS	0 5270	INTWCAS	0 2649	INTWCAS	0 7321
WITH	N(41)	WITH	N(41)	WITH	N(40)	WITH	N(43)	WITH	N(43)	WITH	N(43)
INTMLAI	SIG 051	INTMLAT	SIG 182	INTMLAV	SIG 284	INTDSAI	SIG 000	INTDSAT	SIG 043	INTDSAS	SIG 000
INTWCAS	0 1930	INTWCAS	-0 3013	INTWCAS	-0 1543	INTMAPD	0 0076	INTMAPD	0 1988	INTMAPD	0.2572
WITH	N(41)	WITH	N(43)	WITH	N(25)	WITH	N(43)	WITH	N(40)	WITH	N(42)
INTDSAV	SIG 113	INTCSDS	SIG 025	INTMUTO	SIG 231	INTDFDS	SIG 481	INTMLAS	SIG 109	INTINAI	SIG 050
INTMAPD	0 2300	INTMAPD	0 0094	INTMAPD	0 2457	INTMAPD	0 0923	INTMAPD	0 0496	INTMAPD	0 1121
WITH	N(42)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(41)	WITH	N(40)
INTTNAT	SIG 071	INTVNAV	SIG 477	INTWCAI	SIG 056	INTWCAT	SIG 278	INTWCAV	SIG 379	INTMLAI	SIG 246
INTMAPD	0 0144	INTMAPD	0 0602	INTMAPD	0 1351	INTMAPD	0 0175	INTMAPD	0 3000	INTMAPD	-0 0444
WITH	N(42)	WITH	N(39)	WITH	N(43)	WITH	N(43)	WITH	N(42)	WITH	N(41)
INTMLAT	SIG 464	INTMLAV	SIG 358	INTDSAI	SIG 194	INTDSAT	SIG 456	INTDSAS	SIG 027	INTDSAV	SIG 391
INTMAPD	-0 1831	INTMAPD	-0 0841	INTDFDS	-0 0428	INTDFDS	0 4760	INTDFDS	0 3144	INTDFDS	0 4959
WITH	N(44)	WITH	N(24)	WITH	N(41)	WITH	N(43)	WITH	N(43)	WITH	N(42)
INTCSDS	SIG 117	INTMUTO	SIG 348	INTMLAS	SIG 395	INTINAI	SIG 001	INTTNAT	SIG 020	INTVNAV	SIG 000
INTDFDS	0 4699	INTDFDS	0 3710	INTDFDS	0 5157	INTDFDS	0 0738	INTDFDS	0 0709	INTDFDS	0 1822
WITH	N(44)	WITH	N(44)	WITH	N(42)	WITH	N(41)	WITH	N(41)	WITH	N(40)
INTWCAI	SIG 001	INTWCAT	SIG 007	INTWCAV	SIG 000	INTMLAI	SIG 323	INTMLAT	SIG 330	INTMLAV	SIG 130
INTDFDS	0 7202	INTDFDS	0 5873	INTDFDS	0 4584	INTDFDS	0 7257	INTDFDS	-0 0652	INTDFDS	-0 4057
WITH	N(44)	WITH	N(44)	WITH	N(43)	WITH	N(42)	WITH	N(43)	WITH	N(25)
INTDSAI	SIG 000	INTDSAT	SIG 000	INTDSAS	SIG 001	INTDSAV	SIG 000	INTCSDS	SIG 339	INTMUTO	SIG 022

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
INTMLAS	0 3693	INTMLAS	0 2494	INTMLAS	0 1536	INTMLAS	0 2970	INTMLAS	0 1161	INTMLAS	0 1383
WITH	N(41)	WITH	N(40)	WITH	N(40)	WITH	N(41)	WITH	N(41)	WITH	N(40)
INTINAI	SIG 009	INTTNAT	SIG 060	INTVNAV	SIG 172	INTWCAI	SIG 030	INTWCAT	SIG 235	INTWCAV	SIG 197
INTMLAS	0 9284	INTMLAS	0 7822	INTMLAS	0 7601	INTMLAS	0 1239	INTMLAS	-0 0343	INTMLAS	0 2766
WITH	N(41)	WITH	N(41)	WITH	N(40)	WITH	N(41)	WITH	N(41)	WITH	N(41)
INTMLAI	SIG 000	INTMLAT	SIG 000	INTMLAV	SIG 000	INTDSAI	SIG 220	INTDSAT	SIG 416	INTDSAS	SIG 040
INTMLAS	0 0119	INTMLAS	-0 0471	INTMLAS	0 0365	INTINAI	0 6302	INTINAI	0 7426	INTINAI	0 9371
WITH	N(40)	WITH	N(41)	WITH	N(25)	WITH	N(4[illegible])	WITH	N(41)	WITH	N(43)
INTDSAV	SIG 471	INTCSDS	SIG 385	INTMUTO	SIG 431	INTTNAT	SIG 000	INTVNAV	SIG 000	INTWCAI	SIG 000
INTINAI	0 7260	INTINAI	0 7729	INTINAI	0 4121	INTINAI	0 3915	INTINAI	0 3723	INTINAI	0 6646
WITH	N(43)	WITH	N(41)	WITH	N(41)	WITH	N(41)	WITH	N(40)	WITH	N(43)
INTWCAT	SIG 000	INTWCAV	SIG 000	INTMLAI	SIG 004	INTMLAT	SIG 006	INTMLAV	SIG 009	INTDSAI	SIG 000
INTINAI	0 5419	INTINAI	0 5290	INTINAI	0 5074	INTINAI	-0 3357	INTINAI	0 2936	INTTNAT	0 2544
WITH	N(43)	WITH	N(43)	WITH	N(41)	WITH	N(43)	WITH	N(25)	WITH	N(41)
INTDSAT	SIG 000	INTDSAS	SIG 000	INTDSAV	SIG 000	INTCSDS	SIG 014	INTMUTO	SIG 077	INTVNAV	SIG 054
INTTNAT	0 6002	INTTNAT	0 8559	INTTNAT	0 2671	INTTNAT	0 2657	INTTNAT	0 4666	INTTNAT	0 1361
WITH	N(43)	WITH	N(43)	WITH	N(41)	WITH	N(40)	WITH	N(40)	WITH	N(39)
INTWCAI	SIG 000	INTWCAT	SIG 000	INTWCAV	SIG 046	INTMLAI	SIG 049	INTMLAT	SIG 001	INTMLAV	SIG 204
INTTNAT	0 4697	INTTNAT	0 7697	INTTNAT	0 3769	INTTNAT	0 1441	INTTNAT	0 3375	INTTNAT	-0 3219
WITH	N(43)	WITH	N(43)	WITH	N(42)	WITH	N(41)	WITH	N(42)	WITH	N(24)
INTDSAI	SIG 001	INTDSAT	SIG 000	INTDSAS	SIG 007	INTDSAV	SIG 184	INTCSDS	SIG 014	INTMUTO	SIG 063
INTVNAV	0 7018	INTVNAV	0 4180	INTVNAV	0 9329	INTVNAV	0 3552	INTVNAV	0 2849	INTVNAV	0 5269
WITH	N(42)	WITH	N(42)	WITH	N(42)	WITH	N(40)	WITH	N(40)	WITH	N(40)
INTWCAI	SIG 000	INTWCAT	SIG 003	INTWCAV	SIG 000	INTMLAI	SIG 012	INTMLAT	SIG 037	INTMLAV	SIG 000

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
INTVNAV WITH INTDSAI	0 5218 N(42) SIG 000	INTVNAV WITH INTDSAT	0 3016 N(42) SIG 026	INTVNAV WITH INTDSAS	0 1856 N(41) SIG 123	INTVNAV WITH INTDSAV	0 7575 N(42) SIG 000	INTVNAV WITH INTCSDS	-0 0590 N(41) SIG 357	INTVNAV WITH INTMUTO	-0 2006 N(25) SIG 168
INTWCAI WITH INTWCAT	0 7307 N(44) SIG 000	INTWCAI WITH INTWCAV	0 8357 N(42) SIG 000	INTWCAI WITH INTMLAI	0 3096 N(41) SIG 024	INTWCAI WITH INTMLAT	0 2777 N(41) SIG 039	INTWCAI WITH INTMLAV	0 2669 N(40) SIG 048	INTWCAI WITH INTDSAI	0 6583 N(44) SIG 000
INTWCAI WITH INTDSAT	0 4941 N(44) SIG 000	INTWCAI WITH INTDSAS	0 5481 N(43) SIG 000	INTWCAI WITH INTDSAV	0 5008 N(42) SIG 000	INTWCAI WITH INTCSDS	0 3033 N(43) SIG 024	INTWCAI WITH INTMUTO	0 3869 N(25) SIG 028	INTWCAT WITH INTWCAV	0 4813 N(42) SIG 001
INTWCAT WITH INTMLAI	0 2064 N(41) SIG 098	INTWCAT WITH INTMLAT	0 4658 N(41) SIG 001	INTWCAT WITH INTMLAV	0 1220 N(40) SIG 227	INTWCAT WITH INTDSAI	0 4694 N(44) SIG 001	INTWCAT WITH INTDSAT	0 8119 N(44) SIG 000	INTWCAT WITH INTDSAS	0 2534 N(43) SIG 051
INTWCAT WITH INTDSAV	0 2246 N(42) SIG 076	INTWCAT WITH INTCSDS	-0 3429 N(43) SIG 012	INTWCAT WITH INTMUTO	0 4989 N(25) SIG 006	INTWCAV WITH INTMLAI	0 2911 N(40) SIG 034	INTWCAV WITH INTMLAT	0 2106 N(40) SIG 096	INTWCAV WITH INTMLAV	0 4215 N(40) SIG 003
INTWCAV WITH INTDSAI	0 5590 N(42) SIG 000	INTWCAV WITH INTDSAT	0 2960 N(42) SIG 028	INTWCAV WITH INTDSAS	0 2696 N(41) SIG 045	INTWCAV WITH INTDSAV	0 7372 N(42) SIG 000	INTWCAV WITH INTCSDS	-0 1222 N(41) SIG 223	INTWCAV WITH INTMUTO	-0 3504 N(25) SIG 043
INTMLAI WITH INTMLAT	0 9025 N(41) SIG 000	INTMLAI WITH INTMLAV	0 9341 N(40) SIG 000	INTMLAI WITH INTDSAI	0 1524 N(41) SIG 171	INTMLAI WITH INTDSAT	0 0594 N(41) SIG 356	INTMLAI WITH INTDSAS	0 1217 N(41) SIG 224	INTMLAI WITH INTDBAV	0 1770 N(40) SIG 137
INTMLAI WITH INTCSDS	-0 0050 N(41) SIG 489	INTMLAI WITH INTMUTO	-0 0526 N(25) SIG 401	INTMLAT WITH INTMLAV	0 8119 N(40) SIG 000	INTMLAT WITH INTDSAI	0 0815 N(41) SIG 306	INTMLAT WITH INTDSAT	0 2855 N(41) SIG 035	INTMLAT WITH INTDSAS	-0 0217 N(41) SIG 446

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

FILE SCALE SP (CREATION DATE = 09/04/83)

- - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
INTMLAT	0 0537	INTMLAT	-0 0500	INTMLAT	0 2218	INTMLAV	0 1728	INTMLAV	0 0216	INTMLAV	0 0082
WITH	N(40)	WITH	N(43)	WITH	N(25)	WITH	N(40)	WITH	N(40)	WITH	N(40)
INTDSAV	SIG 371	INTCSDS	SIG 375	INTMUTO	SIG 143	INTDSAI	SIG 143	INTDSAT	SIG 447	INTDSAS	SIG 480
INTMLAV	0 3615	INTMLAV	0 0875	INTMLAV	-0 0114	INTDSAI	0 7724	INTDSAI	0 8357	INTDSAI	0 8373
WITH	N(40)	WITH	N(40)	WITH	N(25)	WITH	N(44)	WITH	N(43)	WITH	N(42)
INTDSAV	SIG 011	INTCSDS	SIG 296	INTMUTO	SIG 478	INTDSAT	SIG 000	INTDSAS	SIG 000	INTDSAV	SIG 000
INTDSAI	-0 0370	INTDSAI	-0 2805	INTDSAT	0 4796	INTDSAT	0 4804	INTDSAT	-0 1666	INTDSAT	-0 4123
WITH	N(43)	WITH	N(25)	WITH	N(43)	WITH	N(43)	WITH	N(43)	WITH	N(25)
INTCSDS	SIG 407	INTMUTO	SIG 087	INTDSAS	SIG 001	INTDSAV	SIG 001	INTCSDS	SIG 143	INTMUTO	SIG 020
INTDSAS	0 4924	INTDSAS	-0 0631	INTDSAS	-0 0874	INTDSAV	0 1263	INTDSAV	0 2147	INTCSDS	0 1233
WITH	N(41)	WITH	N(43)	WITH	N(25)	WITH	N(41)	WITH	N(25)	WITH	N(25)
INTDSAV	SIG 001	INTCSDS	SIG 344	INTMUTO	SIG 339	INTCSDS	SIG 216	INTMUTO	SIG 151	INTMUTO	SIG 279

A VALUE OF 99 0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

APPENDIX C

DETAILS OF REGRESSION RUNS

```
SPSS BATCH SYSTEM                                                          13 08 29  09/04/83  PAGE    1

SPSS                    FOR PRIME 400/500, VERSION M  RELEASE 9 1, AUGUST 1, 1982

                                  CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM
ORDER FROM MCGRAW-HILL  ,SPSS, 2ND ED  (PRINCIPAL TEXT)'     ORDER FROM SPSS INC   SPSS STATISTICAL ALGORITHMS
                         SPSS UPDATE 7-9 (USE W/SPSS,2ND FOR REL  7, 8, 9)          KEYWORDS  THE SPSS INC  NEWSLETTER
                         SPSS POCKET GUIDE  RELEASE 9
                         SPSS INTRODUCTORY GUIDE   BASIC STATISTICS AND OPERATIONS
                         SPSS PRIMER (BRIEF INTRO TO SPSS)

DEFAULT SPACE ALLOCATION      ALLOWS FOR      163 TRANSFORMATIONS
WORKSPACE    114688 BYTES                     655 RECODE VALUES + LAG VARIABLES
TRANSPACE     16384 BYTES                    2624 IF/COMPUTE OPERATIONS

          1 FILE NAME       REGRESSION BLOCK
          2 GET FILE        [*>SCALE SPSS3]SCALE SPSS3

               FILE SCALE SP HAS 257 VARIABLES

               THE SUBFILES ARE

                            NO OF
               NAME         CASES

               SCALE SP       46

CPU TIME REQUIRED          0 33 SECONDS
DISK TIME REQUIRED         0 09 SECONDS
CONNECT TIME REQUIRED      0 01 MINUTES
                             13 08 30

          3 NEW REGRESSION MISSING=PAIRWISE/
          4                 VARIABLES=WILTOCHG CHGCAUS UIS V125 V126
          5                 COGSTYLE DECSTRUC SUPNEEDS INVNEEDS ACTUINV TRANEEDS
          6                 ACTUSUP PIONDEG MGMTATT DSSFLEX CSFSUPP MULTIP ACTUTRA
          7                 INTCSDS INTWCDS INTINAT INISNAS INIVNAV INTWCAT INTWCC
          8                 INTWCAS INTWCAV INTMAPD INTDFDS INIMLAT INTMLAS INIMLAV
          9                 INTMUTO INTDSAT INTDSAS INIDSAV/
         10                     CRITERIA=PIN( 20)/
         11                     STATISTICS DEFAULTS CHA ZPP HISTORY/
         12                     DEPENDENT-UIS/
         13                     FORWARD WILTOCHG CHGCAUS COGSTYLE DECSTRUC
         14                     SUPNEEDS ACTUSUP PIONDEG
         15                     MGMTATT DSSFLEX CSFSUPP MULTIP/
         16                     FORWARD INTWCC INTCSDS INTWCDS INISNAS
         17                     INTWCAS INTMAPD INTDFDS
         18                     INTMLAS INIDSAS INTMUTO/
         19                     DEPENDENT-V125 V126/
         20                     FORWARD WILTOCHG CHGCAUS COGSTYLE DECSTRUC SUPNEEDS
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          21                INVNEEDS ACTUINV TRANEEDS
          22                ACTUSUP PIONDEG MGMTATT DSSFLEX CSFSUPP MULTIP ACTUTRA/
          23                FORWARD INTWCDS INTTNAT INTSNAS INTWCAT INTWCCC
          24                INTWCAS INTWCAV INTMAPD INIDFDS INTMLAT INTMLAS INTMLAV
          25                INTCSDS INTMUTO INTDSAT INTDSAS/

*WARNING* #1  POUT LT PIN.
              RESET POUT = THE SMALLER OF 1.1*PIN AND 1.0

                 PIN =      0.20000
              POUT WAS =    0.10000   POUT NOW =     0.22000

REGRESSION PROCEDURE REQUIRES    31956 BYTES OF WORKSPACE
```

SPSS BATCH SYSTEM 13 08 29 09/04/83 PAGE 4

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

EQUATION NUMBER 1

DEPENDENT VARIABLE UIS

BEGINNING BLOCK NUMBER 1 METHOD FORWARD WILTOCHS CHGCAUS LOGSTYLE DECSTRUC SUPNEEDS ACTUSUP PIONDEG MGMTATT DSSFLEX CSFSUPP MULTIP

VARIABLE(S) ENTERED ON STEP NUMBER 1 DSSFLEX

MULTIPLE R	0 69294			ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
R SQUARE	0 48016	R SQUARE CHANGE	0 48016	REGRESSION	1	6 25324	6 25324
ADJUSTED R SQUARE	0 45417	F CHANGE	19 37732	RESIDUAL	20	6 76991	0 33850
STANDARD ERROR	0 58180	SIGNIF F CHANGE	0 0003				

F = 18 47364 SIGNIF F = 0 0004

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
DSSFLEX	0 40067	0 09322	0 69294	0 69294	0 69294	0 69294	4 298	0 0004
(CONSTANT)	3 92605	0 44638					8 795	0 0000

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * MULTIPLE REGRESSION * * * *

DEPENDENT VARIABLE UIS

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	F	SIG F
WILTOCHG	0 09789	0 12284	0 78605	0 540	0 5950
CHGCAUS	0 12548	0 16957	0 94944	0 750	0 4524
COGSTYLE	-0 17881	-0 24786	0 99882	-1 115	0 2787
DECSTRUC	-0 05859	-0 08127	0 99998	-0 355	0 7262
SUPNEEDS	0 16323	0 21536	0 90490	0 951	0 3485
ACTUSUP	0 10928	0 13826	0 83204	0 608	0 5501
PIONDEC	0 10577	0 14669	0 99977	0 646	0 5258
MGMTATT	0 10696	0 14237	0 92094	0 627	0 5382
CSFSUPP	0 05333	0 07188	0 94446	0 314	0 7569
MULTIP	-0 05251	-0 07195	0 97614	-0 314	0 7566
INTCSDS	-0 07013	-0 09503	0 95441	-0 416	0 6820
INTHCDS	-0 00248	-0 00333	0 93493	-0 015	0 9886
INTSNAS	0 20952	0 27056	0 86688	1 225	0 2355
INTHCCC	0 14056	0 18138	0 86564	0 804	0 4314
INTHCAS	0 18696	0 23550	0 82479	1 056	0 3041
INTMAPD	0 07643	0 10584	0 99701	0 463	0 6479
INTDFDS	-0 18814	-0 14346	0 30224	-0 632	0 5350
INTMLAS	0 05695	0 07852	0 98819	0 343	0 7351
INTMUTO	-0 06764	-0 08105	0 74644	-0 354	0 7269
INTDSAS	0 10042	0 13492	0 93827	0 594	0 5598

FOR BLOCK NUMBER 1 PIN = 0 200 LIMITS REACHED

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FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE UIS

BEGINNING BLOCK NUMBER 2 METHOD FORWARD INTWCCC INTCSDS INTWCDS INTSNAS INTWCAS INTMAPD INTDFDS INTMLAS INTDSAS INTMOTO

FOR BLOCK NUMBER 2 PIN = 0 200 LIMITS REACHED
NO VARIABLES ENTERED FOR THIS BLOCK

* *

SUMMARY TABLE

STEP	MULTR	RSQ	ADJRSQ	F(EQU)	SIGF	RSQCH	FCH	SIGCH		VARIABLE	BETAIN	CORREL	LABEL
1	0 6929	0 4802	0 4542	18 474	0 000	0 4802	19 397	0 000	IN	DISFLEX	0 5929	0 6929	

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

EQUATION NUMBER 2

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

BEGINNING BLOCK NUMBER 1 METHOD FORWARD WILTOCHG CHGCAUS LOGSTYLE DECSTRUC SUPNEEDS INVNEEDS ACTUINV TRANEEDS ACTUSUP PIONDEG MGMTAT1 DSSFLEX CSFSUPP MULTIP ACTUIRA

VARIABLE(S) ENTERED ON STEP NUMBER 1 WILTOCHG

MULTIPLE R	0 66705	R SQUARE CHANGE	0 44495
R SQUARE	0 44495	F CHANGE	16 03451
ADJUSTED R SQUARE	0 41720	SIGNIF F CHANGE	0 0006
STANDARD ERROR	1 04370		

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	17 46472	17 46472
RESIDUAL	20	21 78601	1 08930

F = 16 03297 SIGNIF F = 0 0007

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
WILTOCHG	1 27643	0 31878	0 66705	0 66705	0 66705	0 66705	4 004	0 0007
(CONSTANT)	-2 00205	1 92989					1 037	0 3119

FILE SCALE SP (CREATION DATE - 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
CHOCAUS	0 25867	0 32265	0 86361	1 495	0 1537
COGSTYLE	-0 00275	-0 00367	0 98054	-0 016	0 9874
DECSTRUC	0 05281	0 07040	0 98624	0 308	0 7617
SUPNEEDS	0 05402	0 06140	0 71723	0 268	0 7915
INVNEEDS	0 22729	0 28821	0 89248	1 31[illegible]	0 2052
ACTUINV	0 44182	0 57286	0 93310	3 04[illegible]	0 0066
TRANEEDS	0 03541	0 04692	0 97434	0 205	0 8399
ACTUSUP	0 17509	0 23087	0 96505	1 031	0 3140
PIONDEC	0 08185	0 10984	0 99794	0 482	0 6355
MGMTATT	0 07749	0 10292	0 97911	0 451	0 6571
DSBFLEX	0 32801	0 39034	0 78606	1 848	0 0802
CSFSUPP	0 25305	0 32534	0 91747	1 500	0 1501
MULTIP	-0 12920	-0 16696	0 92679	-0 738	0 4695
ACTUTRA	0 23547	0 30113	0 90776	1 377	0 1847
INTCSDS	-0 05625	-0 07295	0 93348	-0 319	0 7533
INTWCDS	0 06237	0 07219	0 74356	0 315	0 7558
INTTNAT	0 19846	0 25580	0 92270	1 154	0 2629
INTSNAS	0 12436	0 15274	0 83723	0 674	0 5086
INTWCAT	0 26795	0 31022	0 74396	1 4[illegible]	0 1711
INTWCCC	0 28622	0 30410	0 62656	1 391	0 1802
INTWCAS	0 13974	0 15488	0 69169	0 681	0 5026
INTWCAV	0 49448	0 56047	0 71806	2 950	0 0082
INTMAPD	0 01517	0 02002	0 97217	0 080	0 9312
INTDFOS	0 24678	0 31265	0 89086	1 4[illegible]	0 1676
INTMLAT	0 04226	0 05650	0 99491	0 24[illegible]	0 8075
INTMLAS	-0 01775	-0 02381	0 99857	-0 104	0 9184
INTMLAV	0 13066	0 17537	1 00000	0 776	0 4470
INTMUTO	-0 23203	-0 26699	0 73490	-1 208	0 2420
INTDSAT	0 21336	0 27909	0 94969	1 267	0 2205
INTDSAS	0 13663	0 18001	0 96350	0 798	0 4349

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

VARIABLE(S) ENTERED ON STEP NUMBER 2 ACTUINV

MULTIPLE R	0 79190		
R SQUARE	0 62710	R SQUARE CHANGE	0 18215
ADJUSTED R SQUARE	0 58785	F CHANGE	9 76913
STANDARD ERROR	0 87770	SIGNIF F CHANGE	0 0056

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	2	24 61408	12 30704
RESIDUAL	19	14 63664	0 77035

F = 15 97591 SIGNIF F = 0 0001

------------------------------ VARIABLES IN THE EQUATION ------------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
WILTOCHC	1 05775	0 27752	0 55277	0 66705	0 53196	0 65025	3 811	0 0012
ACTUINV	0 39736	0 13044	0 44182	0 58479	0 42679	0 57286	3 046	0 0066
(CONSTANT)	-2 91984	1 65066					1 769	0 0930

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
CHOCAUS	0 21006	0 31767	0 82748	1 421	0 1723
COGSTYLE	-0 07355	-0 11819	0 90906	-0 505	0 6197
DECSTRUC	0 06249	0 10160	0 92228	0 433	0 6700
SUPNEEDS	0 12392	0 17030	0 65768	0 733	0 4728
INVNEEDS	-0 15910	-0 17853	0 46954	-0 770	0 4514
TNANEEDS	0 09209	0 14764	0 90015	0 633	0 5345
ACTUSUP	0 07589	0 11856	0 88013	0 507	0 6186
PIONDEG	0 04697	0 07665	0 92675	0 326	0 7481
MOMTATT	0 04951	0 08005	0 91887	0 341	0 7373
DSSFLEX	0 04325	0 04893	0 47719	0 208	0 8377
CSFSUPP	0 11318	0 16670	0 80893	0 717	0 4824
MULTIP	-0 09261	-0 14549	0 87794	-0 624	0 5405
ACTUTRA	0 10717	0 15901	0 82091	0 683	0 5031
INTCSDS	-0 06169	-0 09760	0 87357	-0 416	0 6823
INTWCDS	0 08068	0 11385	0 69993	0 486	0 6327
INTTNAT	0 12908	0 20030	0 88211	0 867	0 3971
INTSNAS	0 05271	0 07801	0 80976	0 332	0 7437
INTWCAT	0 13221	0 17825	0 67786	0 769	0 4521
INTWCCC	0 23123	0 29801	0 61323	1 325	0 2019
INTWCAS	0 01626	0 02149	0 65168	0 091	0 9263
INTWCAV	-1 14226	-0 13979	0 00558	-0 599	0 5567
INTMAPD	0 02965	0 04785	0 90524	0 203	0 8412
INTDFDS	0 06069	0 08437	0 72058	0 359	0 7236
INTMLAT	-0 04327	-0 06931	0 89725	-0 295	0 7715
INTMLAS	-0 06947	-0 11287	0 91993	-0 481	0 6357
INTMLAV	-0 10954	-0 15418	0 70215	-0 662	0 5163
INTMUTO	-0 18921	-0 26456	0 71073	1 164	0 2597
INTDSAT	0 12031	0 18700	0 88520	0 808	0 4298
INTDSAS	0 06358	0 10066	0 90538	0 429	0 6728

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FILE SCALE SP (CREATION DATE = 09/04/83)

*** * * * M U L T I P L E R E G R E S S I O N * * * ***

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

VARIABLE(S) ENTERED ON STEP NUMBER 3 CHGCAUS

MULTIPLE R	0 81531		
R SQUARE	0 66473	R SQUARE CHANGE	0 03753
ADJUSTED R SQUARE	0 60885	F CHANGE	2 13260
STANDARD ERROR	0 85504	SIGNIF F CHANGE	0 1614

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	3	26 09114	8 69705
RESIDUAL	18	13 15958	0 73109

F = 11 89604 SIGNIF F = 0 0002

------------------------------ VARIABLES IN THE EQUATION ------------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
WILTOCHC	0 92046	0 28709	0 48102	0 62705	0 43757	0 60291	3 206	0 0049
ACTUINV	0 37709	0 12787	0 41928	0 58479	0 40248	0 57076	2 949	0 0086
CHGCAUS	0 24659	0 17348	0 21006	0 46974	0 19399	0 31767	1 421	0 1723
(CONSTANT)	-3 14413	1 61577					-1 946	0 0675

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FILE   SCALE SP (CREATION DATE = 09/04/83)

* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

DEPENDENT VARIABLE   V125   SINGLE ITEM SATISF

------------- VARIABLES NOT IN THE EQUATION - -- - -- -

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
COOSTYLE	-0 08478	-0 14347	0 80738	-0 598	0 5579
DECSTRUC	0 07538	0 12898	0 82215	0 536	0 5987
SUPNEEDS	0 05142	0 07011	0 62325	0 290	0 7755
INVNEEDS	-0 20765	-0 24281	0 45839	-1 032	0 3165
TRANEEDS	0 06801	0 11406	0 81190	0 473	0 6420
ACTUSUP	0 05523	0 09050	0 82172	0 375	0 7125
PIONDEC	-0 02422	-0 03905	0 74812	-0 161	0 8739
MOMTATT	0 07116	0 12066	0 80937	0 501	0 6227
DSSFLEX	0 04483	0 05349	0 47717	0 221	0 8278
CSFSUPP	0 08030	0 12308	0 78763	0 511	0 6157
MULTIP	-0 09095	-0 15067	0 78478	0 628	0 5301
ACTUTRA	0 08040	0 12472	0 80065	0 518	0 6110
INTCSDS	-0 00727	-0 01156	0 78994	-0 048	0 9522
INTWCDS	0 09219	0 13702	0 62935	0 570	0 5759
INTTNAT	0 10410	0 16891	0 80038	0 707	0 4894
INTSNAS	0 03482	0 05415	0 74159	0 224	0 8257
INTWCAT	0 10614	0 14980	0 66061	0 [illegible]	0 5402
INTWCCC	-0 22187	-0 06327	0 02727	-0 261	0 7969
INTWCAS	0 02365	0 03296	0 62138	0 136	0 8934
INTWCAV	-1 16477	-0 15033	0 00558	-0 627	0 5390
INTMAPD	0 02634	0 04462	0 80770	0 185	0 8554
INTDFDS	0 07494	0 10965	0 71789	0 455	0 6550
INTMLAT	-0 07492	-0 12511	0 82655	-0 520	0 6048
INTMLAS	-0 06679	-0 11444	0 82740	-0 475	0 6409
INTMLAV	-0 13281	-0 19793	0 70062	-0 833	0 4166
INTMUTO	-0 20667	-0 30398	0 63398	-1 316	0 2059
INTDSAT	0 11217	0 18373	0 81050	0 771	0 4515
INTDSAS	0 07478	0 12468	0 80788	0 518	0 6110

FOR BLOCK NUMBER 1   PIN = 0 200 LIMITS REACHED

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

BEGINNING BLOCK NUMBER 2 METHOD FORWARD INTWCDS INTTNAT INTSNAS INTWCAT INTWCC[illegible] INTWCAS INTWCAV INTMAPD INTDFDS INTMLAT INTMLAS INTMLAV INTCSDS INTMUT[illegible] INTDSAT INTDSAS

FOR BLOCK NUMBER 2 PIN = 0 200 LIMITS REACHED
NO VARIABLES ENTERED FOR THIS BLOCK

* *

SUMMARY TABLE

STEP	MULTR	RSQ	ADJRSQ	F(EQU)	SIGF	RSQCH	FCH	SIGCH		VARIABLE	BETAIN	CORREL	LABEL
1	0 6670	0 4450	0 4172	16 033	0 001	0 4450	16 835	0 001	IN	WILLOCHG	0 6670	0 6670	
2	0 7919	0 6271	0 5878	15 976	0 000	0 1821	9 769	0 006	IN	A[illegible]IOINV	0 4418	0 5849	
3	0 8153	0 6647	0 6089	11 896	0 000	0 0376	2 13[illegible]	0 1[illegible]1	IN	CHGCAUS	0 2101	0 4697	

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

EQUATION NUMBER 3

DEPENDENT VARIABLE V126 SYSTEM USE

BEGINNING BLOCK NUMBER 1 METHOD FORWARD WILTOCHG CHGCAUS COGSTYLE DECSTRUC SUPNEEDS INVNEEDS ACTUINV TRANEEDS ACTUSUP PIONDEG MGMTATI DSSFLEX CSFSUPP MULTIP ACTUTRA

VARIABLE(S) ENTERED ON STEP NUMBER 1 ACTUINV

MULTIPLE R	0 63691	R SQUARE CHANGE	0 40566
R SQUARE	0 40566	F CHANGE	13 65079
ADJUSTED R SQUARE	0.37438	SIGNIF F CHANGE	0 0015
STANDARD ERROR	24 45755		

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	7757 24268	7757 24268
RESIDUAL	19	11365 26744	598 17197

F = 12 96825 SIGNIF F = 0 0019

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
ACTUINV	12 95592	3 59772	0 63691	0 63691	0 63691	0 63691	3 601	0 0019
(CONSTANT)	-3 72301	20 90842					-0 178	0 8606

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------------- VARIABLES NOT IN THE EQUATION ------ ---

VARIABLE	BETA IN	PARTIAL	MIN TOLER	F	SIG T
WILTOCHG	0 39302	0 49245	0 93310	2 401	0 0274
CHCCAUS	0 16069	0 20841	0 96172	0 88[illegible]	0 3874
COGSTYLE	0 04509	0 05802	0 98401	0 247	0 8030
DECSTRUC	0 16253	0 21053	0 99731	0 911	0 3730
SUPNEEDS	0 11515	0 14931	0 99923	0 641	0 5248
INVNEEDS	-0 15027	0 13665	0 49160	-0 585	0 5656
TRANEEDS	0 16406	0 21212	0 99356	0 921	0 3693
ACTUSUP	-0 03409	-0 04252	0 92468	-0 181	0 8387
PIONDEC	-0 12639	-0 16339	0 99333	-0 703	0 4913
MGMTATT	0 06435	0 08306	0 99003	0 354	0 7277
DSSFLEX	0 27069	0 26486	0 56903	1 165	0 2591
CSFSUPP	0 26846	0 32027	0 84590	1 431	0 1686
MULTIP	-0 23211	-0 29776	0 97806	-1 3[illegible]	0 2023
ACTUTRA	0 02816	0 03403	0 86906	0 144	0 8867
INTCSDS	0 04197	0 05436	0 99695	0 231	0 8199
INTWCDS	0 37311	0 48152	0 98993	2 331	0 0316
INTTNAT	0 09610	0 12148	0 94980	0 519	0 6099
INTSNAS	0 01810	0 02278	0 94116	0 097	0 9240
INTWCAT	0 18259	0 21915	0 85618	0 953	0 3532
INTWCCC	0 25786	0 32471	0 94250	1 457	0 1625
INTWCAS	0 10314	0 12596	0 88654	0 537	0 5967
INTWCAV	0 94158	0 37747	0.09552	1 729	0 1009
INTMAPD	0 03531	0 04580	0 99987	0 194	0 8480
INTDFDS	0 27393	0 31092	0 76569	1 388	0 1821
INTMLAT	-0 13893	-0 17630	0 95702	-0 760	0 4572
INTMLAS	-0 16554	-0 21305	0 98451	-0 925	0 3671
INTMLAV	-0 17667	-0 20102	0 76942	-0 871	0 3954
INTMUTO	-0 05873	-0 07454	0 95719	-0 317	0 7549
INTDSAT	0 14444	0 18033	0 92639	0 778	0 4468
INTDSAS	0 08132	0 10306	0 95470	0 440	0 6655

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FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

VARIABLE(S) ENTERED ON STEP NUMBER 2 WILTOCHG

MULTIPLE R	0 74148			
R SQUARE	0 54979	R SQUARE CHANGE	0 14413	
ADJUSTED R SQUARE	0 49977	F CHANGE	6 08261	
STANDARD ERROR	21 86976	SIGNIF F CHANGE	0 0239	

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	2	10513 35595	5256 67797
RESIDUAL	18	8609 15417	478 28634

F = 10 99055 SIGNIF F = 0 0008

------------------------------ VARIABLES IN THE EQUATION ------------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
ACTUINV	10 88812	3 33038	0 53526	0 63691	0 51705	0 61039	3 269	0 0043
WILTOCHG	17 00959	7 08580	0 39302	0 53146	0 37464	0 49245	2 401	0 0274
(CONSTANT)	-94 39338	42 14510					2 240	0 0380

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------- --- VARIABLES NOT IN THE EQUATION ----- -------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
CHOCAUS	0 03434	0 04726	0 82748	0 195	0 8176
COOSTYLE	0 10311	0 15081	0 90906	0 629	0 5377
DECSTRUC	0 20585	0 30460	0 92228	1 319	0 2048
SUPNEEDS	-0 12937	-0 16181	0 65768	-0 676	0 5081
INVNEEDS	-0 27742	-0 28331	0 46954	-1 218	0 2399
TRANEEDS	0 09587	0 13989	0 90015	0 58?	0 5679
ACTUSUP	-0 08469	-0 12042	0 88013	0 500	0 6234
PIONDEC	-0 12114	-0 17992	0 92675	0 754	0 4611
MGMTATT	0 01750	0 02575	0 91887	0 106	0 9167
DSSFLEX	0 08169	0 08410	0 47719	0 340	0 7381
CSFSUPP	0 19048	0 25533	0 80893	1 089	0 2914
MULTIP	-0 14750	-0 21088	0 87794	-0 889	0 3862
ACTUTRA	-0 07064	-0 09539	0 82091	-0 395	0 6977
INTCSDS	0 14742	0 21226	0 87357	0 896	0 3830
INTWCDS	0 24311	0 31223	0 69993	1 355	0 1931
INTTNAT	0 00532	0 00752	0 88211	0 031	0 9756
INTSNAS	-0 14309	-0 19272	0 80976	-0 810	0 4292
INTWCAT	-0 00588	-0 00721	0 67786	-0 030	0 9766
INTWCCC	0 04397	0 05157	0 61323	0 213	0 8339
INTWCAS	-0 14202	-0 17086	0 65168	-0 715	0 4843
INTWCAV	-4 28178	-0 47690	0 00558	2 237	0 0390
INTMAPD	-0 02998	-0 04402	0 90624	-0 18?	0 8580
INTDFDS	0 17918	0 22668	0 72058	0 960	0 3507
INTMLAT	-0 14625	-0 21319	0 89725	-0 900	0 3809
INTMLAS	-0 16779	-0 24813	0 91993	-1 056	0 3057
INTMLAV	-0 11499	-0 14866	0 70215	-0 620	0 5436
INTMUTO	0 17159	0 21836	0 71073	0 921	0 3691
INTDSAT	0 08128	0 11498	0 88520	0 477	0 6393
INTDSAS	0 02587	0 03729	0 90530	0 154	0 8795

FOR BLOCK NUMBER 1 PIN = 0 200 LIMITS REACHED

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

BEGINNING BLOCK NUMBER 2 METHOD FORWARD INTWCDS INTTNAT INTSNAS INTWCAT INTWCCC INTWCAS INTWCAV INTMAPD INTDFDS INTMLAT INTMLAS INTMLAV INTCSDS INTMUTO INTDSAT INTDSAS

VARIABLE(S) ENTERED ON STEP NUMBER 3 INTWCDS

MULTIPLE R	0 77051
R SQUARE	0 59368
ADJUSTED R SQUARE	0 52197
STANDARD ERROR	21 37879

R SQUARE CHANGE	0 04389
F CHANGE	1 94425
SIGNIF F CHANGE	0 1812

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	3	11352 61465	3784 20488
RESIDUAL	17	7769 89547	457 05267

F = 8 27958 SIGNIF F = 0 0013

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
ACTUINV	11 05050	3 25782	0 54324	0 63691	0 52440	[illegible]	3 3920	0 0035
WILTOCHG	11 59201	7 99771	0 26784	0 53146	0 22403	[illegible]	1 449	0 1654
INTWCDS	1 14798	0 84717	0 24311	0 43326	0 20950	[illegible]	1 355	0 1931
(CONSTANT)	-96 65595	41 23278					2 344	0 0315

FILE SCALE SP (CREATION DATE - 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
CHOCAUS	0 04581	0 06629	0 62935	0 266	0 7918
COGSTYLE	0 08837	0 13571	0 68167	0 548	0 5913
DECSTRUC	-0 57092	-0 07760	0 00565	-0 311	0 7596
SUPNEEDS	-0 11736	-0 15432	0 52110	-0 625	0 5409
INVNEEDS	-0 26949	-0 28959	0 46921	1 240	0 2138
TRANEEDS	0 07748	0 11853	0 68970	0 477	0 6395
ACTUSUP	-0 04099	-0 06003	0 66841	0 241	0 8130
PIONDEC	-0 09719	-0 15084	0 69827	-0 610	0 5502
MGMTATT	0 02329	0 03607	0 68976	0 144	0 8870
DSSFLEX	0 06234	0 06741	0 47519	0 270	0 7904
CSFSUPP	0 14175	0 19385	0 69706	0 790	0 4409
MULTIP	-0 11986	-0 17868	0 68451	-0 726	0 4781
ACTUTRA	-0 07440	-0 10574	0 67313	-0 425	0 6763
INTCSDS	0 10516	0 15555	0 62614	0 630	0 5377
INTINAT	0 01164	0 01730	0 66688	0 069	0 9457
INTSNAS	-0 11232	-0 15761	0 59772	-0 638	0 5322
INTWCAT	0 02456	0 03150	0 55685	0 126	0 9012
INTWCCC	0 05320	0 06564	0 49514	0 263	0 7958
INTWCAS	-0 10714	-0 13430	0 51581	0 542	0 5952
INTWCAV	-4 01911	-0 46826	0 00552	2 120	0 0500
INTMAPD	-0 01472	-0 02270	0 67661	-0 091	0 9288
INTDFDS	0 02644	0 02626	0 40053	0 105	0 9176
INTMLAT	-0 10451	-0 15651	0 68859	0 634	0 5351
INTMLAS	-0 13425	-0 20558	0 69350	-0 840	0 4131
INTMLAV	-0 09934	-0 13489	0 69342	-0 545	0 5936
INTMUTO	0 22436	0 29540	0 60369	1 237	0 2340
INTDSAT	-0 02073	-0 02766	0 59638	-0 111	0 9112
INTDSAS	-0 11285	-0 14758	0 55200	-0 597	0 5590

FOR BLOCK NUMBER 2 PIN = 0 200 LIMITS REACHED

FILE SCALE SP (CREATION DATE = 09/04/83)

**** MULTIPLE REGRESSION ****

DEPENDENT VARIABLE V126 SYSTEM USE

SUMMARY TABLE

STEP	MULTR	RSQ	ADJRSQ	F(EQU)	SIGF	RSQCH	FCH	SIGCH		VARIABLE	BETAIN	CORREL	LABEL
1	0 6369	0 4057	0 3744	12 968	0 002	0 4057	13 651	0 002	IN	ACTUINV	0 6369	0 6369	
2	0 7415	0 5498	0 4998	10 991	0 001	0 1441	5 083	0 024	IN	WILTOCHG	0 3930	0 5315	
3	0 7705	0 5937	0 5220	8 280	0 001	0 0439	1 944	0 181	IN	INTWCDS	0 2431	0 4333	

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                         SPSS POCKET GUIDE  RELEASE 9
                         SPSS INTRODUCTORY GUIDE   BASIC STATISTICS AND OPERATIONS
                         SPSS PRIMER (BRIEF INTRO TO SPSS)

DEFAULT SPACE ALLOCATION        ALLOWS FOR      163 TRANSFORMATIONS
WORKSPACE     114688 BYTES                      655 RECODE VALUES + LAG VARIABLES
TRANSPACE      16384 BYTES                     2624 IF/COMPUTE OPERATIONS

             1 FILE NAME       REGRESSION BLOCK
             2 GET FILE        (*.SCALE SPSS3)SCALE SPSS3

                  FILE SCALE SP HAS 253 VARIABLES

                  THE SUBFILES ARE

                             NO OF
                  NAME       CASES

                  SCALE SP      46

CPU TIME REQUIRED           0 33 SECONDS
DISK TIME REQUIRED          0 18 SECONDS
CONNECT TIME REQUIRED       0 01 MINUTES
                              13 08 14

             3 NEW REGRESSION MISSING LISTWISE
             4                 VARIABLES-WILTOCHG CHGCAUS UIS V125 V126
             5                 COGSTYLE DECSTRUC SUPNEEDS INVNEEDS ACTOINV TRANEEDS
             6                 ACTUSUP PIONDEG MGMTATT DSSFLEX CSFSUPP MULTIP ACTOTRA
             7                 INTCSDS INTWCDS INTINAT INTSNAS INTVNAV INTWCAT INTUCC
             8                 INTWCAS INTWCAV INTMAPD INTDFDS INIMCAT INIMLAS INIMLAV
             9                 INIMUTO INIDSAT INIDSAS INIDSAV
            10                      CRITERIA=PIN(.20)/
            11                      STATISTICS DEFAULTS CHA ZPP HISTORY/
            12                      DEPENDENT UIS
            13                      FORWARD WILTOCHG CHGCAUS COGSTYLE DECSTRUC
            14                      SUPNEEDS ACTUSUP PIONDEG
            15                      MGMTATT DSSFLEX CSFSUPP MULTIP/
            16                      FORWARD INTWCCC INTCSDS INTWCDS INTSNAS
            17                      INTWCAS INIMAPD INTDFDS
            18                      INIMLAS INIDSAS INIMUTO/
            19                      DEPENDENT V125 V126/
            20                      FORWARD WILTOCHG CHGCAUS COGSTYLE DECSTRUC SUPNEEDS
```

```
INVNEEDS ACTUINV TRANEEDS
ACTUSUP PIONDEG MGMTATT DSSFLEX CSFSUPP MULTIP ACTUTRA/
FORWARD INTWCDS INTTNAT INTSNAS INIWCAT INTWCCC
INTWCAS INTWCAV INTMAPD INTDFDS INIMIAT INTMLAS INTMLAV
INTCSDS INIMUTO INTDSAT INTDSASY

*WARNING* #1  POUT LT PIN.
              RESET POUT = THE SMALLER OF 1 1*PIN AND 1 0

                   PIN =    0 20000
              POUT WAS =    0-10000   POUT NOW =    0 22000

REGRESSION PROCEDURE REQUIRES    17596 BYTES OF WORKSPACE
```

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FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E   R E G R E S S I O N * * * *

EQUATION NUMBER 1

DEPENDENT VARIABLE UIS

BEGINNING BLOCK NUMBER 1 METHOD FORWARD WITTDCHG CHSCAUS LDGSTYLE DECSTRUC SUPNEEDS ACTUSUP PIONDEG MGMTATT DSSFLEX CSFSUPP MULTIP

VARIABLE(S) ENTERED ON STEP NUMBER 1 DSSFLEX

MULTIPLE R	0 63146	R SQUARE CHANGE	0 39874
R SQUARE	0 39874	F CHANGE	10 51067
ADJUSTED R SQUARE	0 35865	SIGNIF F CHANGE	0 0053
STANDARD ERROR	0 64369		

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	4 12165	4 12165
RESIDUAL	15	6 21510	0 41434

F = 9 94750 SIGNIF F = 0 0066

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
DSSFLEX	0 45037	0 14597	0 63146	0 63146	0 63146	0 63146	3 154	0 0066
(CONSTANT)	3 59231	0 71625					5 015	0 0002

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE UIS

-------- --- VARIABLES NOT IN THE EQUATION ----- ------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	F	SIG F
WILTOCHG	0 11158	0 12303	0 73097	0 454	0 6499
CHGCAUS	0 36419	0 40810	0 75501	1 673	0 1166
CBGSTYLE	-0 21079	-0 27127	0 99582	-1 055	0 3095
DECSTRUC	0 01302	0 01673	0 99344	0 063	0 9510
SUPNEEDS	0 33585	0 40635	0 88020	1 654	0 1183
ACTUSUP	-0 03365	-0 04052	0 87157	-0 152	0 8816
PIONDEG	0 02221	0 02850	0 99584	0 107	0 9163
MGMTATT	0 20233	0 25617	0 96381	0 992	0 3392
CSFSUPP	0 03919	0 04791	0 89075	0 179	0 8601
MULTIP	0 08033	0 09724	0 88112	0 366	0 7201
INTCSDS	0 13254	0 12503	0 53505	0 472	0 6445
INTHCDS	0 13527	0 14524	0 69310	0 549	0 5915
INTSNAS	0 11317	0 13563	0 85358	0 512	0 6165
INTWCCC	0 42883	0 44319	0 64223	1 850	0 0855
INTWCAS	-0 02496	-0 02926	0 82656	-0 110	0 9143
INTMAPD	-0 03025	-0 03893	0 99607	0 146	0 8862
INTDFDS	0 03743	0 02109	0 19077	0 079	0 9382
INTMLAS	0 10571	0 13477	0 97664	0 507	0 6189
INTMUTO	-0 10720	-0 12756	0 85003	-0 481	0 6378
INTDSAS	-0 07456	-0 09006	0 87737	-0 338	0 7401

* *

VARIABLE(S) ENTERED ON STEP NUMBER 2 CHGCAUS

MULTIPLE R	0 70631		
R SQUARE	0 49889	R SQUARE CHANGE	0 10014
ADJUSTED R SQUARE	0 42729	F CHANGE	2 99745
STANDARD ERROR	0 60828	SIGNIF F CHANGE	0 1054

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	2	5 15676	2 57838
RESIDUAL	14	5 17998	0 37000

F 6 96862 SIGNIF F = 0 0079

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE UIS

---------------------------- VARIABLES IN THE EQUATION ----------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
DSSFLEX	0 32895	0 15874	0 45119	0 63146	0 39205	0 48440	2 07[illegible]	0 0572
CHOCAUS	0 19322	0 11552	0 36419	0 58752	0 31645	0 40810	1 67[illegible]	0 11[illegible]
(CONSTANT)	3 38439	0 68816					4 918	0 0002

---------- -- VARIABLES NOT IN THE EQUATION -- ----

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTOCHG	0 03798	0 04491	0 63455	0 1[illegible]	0 8[illegible]
COGSTYLE	-0 32486	-0 43967	0 69597	-1 7[illegible]	0 1010
DECSTRUC	0 08693	0 11941	0 71860	0 434	0 671[illegible]
SUPNEEDS	0 22551	0 26165	0 57866	0.977	0 3462
ACTUSUP	-0 07127	-0 09344	0 69957	-0 330	0 7405
PIONDEG	-0 12023	-0 15598	0 63948	-0 569	0 5788
MOMTATT	0 18666	0 25855	0 73972	0 965	0 3521
CSFSUPP	-0 13784	-0 [illegible]07	0 60374	-0 603	0 5566
MULTIP	0 10160	0 1[illegible]47	0 69679	0 489	0 6328
INTCSDS	0 09160	0 09421	0 43322	0 341	0 7384
INTWCDS	0 10900	0 12787	0 58229	0 465	0 6497
INTSNAS	0 04825	0 06211	0 70952	0 224	0 8259
INTWCCC	0 69046	0 20587	0 04455	0 759	0 4617
INTWCAS	-0 05255	-0 06729	0 66824	-0 243	0 8117
INTMAPD	-0 07241	-0 10124	0 74241	-0 367	0 7196
INTDFDS	0 21116	0 12694	0 15708	0 461	0 6521
INTMLAS	0 12393	0 17274	0 74546	0 632	0 5301
INTMUTO	-0 11215	-0 14605	0 66323	-0 532	0 6035
INTDSAS	-0 06510	-0 08611	0 67722	-0 312	0 7603

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE UIS

VARIABLE(S) ENTERED ON STEP NUMBER 3 COGSTYLE

MULTIPLE R	0 77165			ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
R SQUARE	0 59575	R SQUARE CHANGE	0 09687	REGRESSION	3	6 15812	2 05271
ADJUSTED R SQUARE	0 50246	F CHANGE	3 35495	RESIDUAL	13	4 17862	0 32143
STANDARD ERROR	0 56695	SIGNIF F CHANGE	0 0900				

F 6 38613 SIGNIF F = 0 0058

------------------------------ VARIABLES IN THE EQUATION ------------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
DSSFLEX	0 27599	0 15097	0 37855	0 63146	0 32236	0 45621	1 828	0 0906
CHOCAUS	0 24857	0 11215	0 46951	0 58752	0 39086	0 52170	2 216	0 0451
COGSTYLE	-0 06949	0 03937	-0 32486	-0 25074	-0 31125	-0 43967	-1 765	0 1010
(CONSTANT)	3 83967	0 69133					5 554	0 0001

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTOCHC	-0 00746	-0 00975	0 62265	-0 034	0 9736
DECSTRUC	0 20197	0 29440	0 63306	1 067	0 3068
SUPNEEDS	0 11117	0 13533	0 48404	0 473	0 6446
ACTUSUP	-0 11345	-0 16439	0 68132	-0 577	0 5744
PIONDEC	-0 17745	-0 25319	0 57559	0 907	0 3825
MOMTATT	0 05146	0 07046	0 66942	0 245	0 8108
CSFSUPP	-0 13491	-0 17987	0 56637	-0 633	0 5383
MULTIP	0 03481	0 05020	0 65350	0 174	0 8647
INTCSDS	0 46090	0 44272	0 37298	1 740	0 1129
INTWCDS	0 16982	0 21924	0 54708	0 778	0 4514
INTSNAS	-0 06451	-0 08785	0 64067	-0 305	0 7652
INTWCCC	0 43467	0 14185	0 04305	0 496	0 6286
INTWCAS	-0 14020	-0 19435	0 65752	-0 685	0 5055
INTMAPD	-0 14670	-0 22302	0 67184	-0 793	0 4434
INTDFDS	0 43412	0 28030	0 14088	1 012	0 3317
INTMLAS	0 01743	0 02540	0 69454	0 088	0 9313
INTMUTO	-0 10618	-0 15393	0 64153	-0 540	0 5993
INTDSAS	-0 08175	-0 12023	0 65678	-0 420	0 6822

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE UIS

FOR BLOCK NUMBER 1 PIN = 0 200 LIMITS REACHED

* *

BEGINNING BLOCK NUMBER 2 METHOD FORWARD INTWCCC INTCSDS INIWKDS INTSNAS INTWCAS INTMAPD INTDFDS INTMLAS INTDSAS INTMUTO

VARIABLE(S) ENTERED ON STEP NUMBER 4 INTCSDS

MULTIPLE R	0 82157			ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
R SQUARE	0 67498	R SQUARE CHANGE	0 07923				
ADJUSTED R SQUARE	0 56664	F CHANGE	3 16914	REGRESSION	4	6 97713	1 74428
STANDARD ERROR	0 52912	SIGNIF F CHANGE	0 1004	RESIDUAL	12	3 35961	0 27997
				F = 6 23030		SIGNIF F = 0 0060	

------------------------------ VARIABLES IN THE EQUATION ------------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
DSSFLE(	0 48755	0 18749	0 66874	0 63146	0 42796	0 60034	2 600	0 0232
CHOCAUS	0 26117	0 10492	0 49225	0 58752	0 40965	0 58053	2 489	0 0285
COGSTYLE	-0 11028	0 04380	-0 51551	-0 25074	-0 41432	-0 58789	-2 518	0 0270
INTCSDS	0 02343	0 01370	0 45090	-0 35966	0 28148	0 44.72	1 710	0 1129
(CONSTANT)	2 72506	0 91704					2 972	0 0117

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE UIS

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTOCHG	-0 01351	-0 01968	0 37218	-0 066	0 9471
DECSTRUC	0 06790	0 09583	0 28096	0 319	0 7555
SUPNEEDS	0 17990	0 24053	0 36169	0 822	0 4286
ACTUSUP	-0 16746	-0 26702	0 36315	-0 919	0 3778
PIONDEC	0 02157	0 02706	0 23186	0 090	0 9301
MGMTATT	0 24514	0 33477	0 29638	1 178	0 2635
CSFSUPP	-0 05535	-0 07970	0 34967	-0 265	0 7958
MULTIP	0 14898	0 22687	0 33102	0 773	0 4560
INTWCDS	0 03818	0 05034	0 26015	0 167	0 8703
INTSNAS	-0 03423	-0 05176	0 36968	-0 172	0 8656
INTWCCC	0 39323	0 14305	0 04301	0 479	0 6411
INTWCAS	-0 13910	0 21506	0 37298	-0 730	0 4804
INTMAPD	0 04925	0 06494	0 23503	0 216	0 8331
INTDRDS	0 16283	0 10517	0 07989	0 351	0 7324
INTMLAS	0 09880	0 15554	0 35007	0 522	0 6119
INTMUTD	-0 10250	-0 16570	0 37293	-0 557	0 5885
INTDSAS	-0 13459	-0 21779	0 36300	-0 740	0 4747

FOR BLOCK NUMBER 2 PIN = 0 200 LIMITS REACHED

* *

SUMMARY TABLE

STEP	MULTR	RSQ	ADJRSQ	F(EQU)	SIGF	RSQCH	FCH	SIGCH		VARIABLE	BETAIN	CORREL	LABEL
1	0 6315	0 3987	0 3587	9 948	0 007	0 3987	10 611	0 005	IN	DOSFLEX	0 6315	0 6315	
2	0 7063	0 4989	0 4273	6 969	0 008	0 1001	2 997	0 105	IN	CHGCAUS	0 3642	0 5875	
3	0 7718	0 5958	0 5025	6 386	0 007	0 0969	3 355	0 090	IN	COGSTYLE	-0 3249	-0 2507	
4	0 8216	0 6750	0 5656	6 230	0 005	0 0792	3 169	0 100	IN	INTCSDS	0 4609	0 3597	

FILE SCALE SP (CREATION DATE = 09/04/83)

**** MULTIPLE REGRESSION ****

EQUATION NUMBER 2

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

BEGINNING BLOCK NUMBER 1 METHOD FORWARD WILTOCHG CHGCAUS LOGSTYLE DECSTRUC SUPNEEDS INVNEEDS ACTUINV TRANEEDS ACTUSUP PIONDEG MGMTATT DSSFLEX CSFSUPP MULTIP ACTUTRA

VARIABLE(S) ENTERED ON STEP NUMBER 1 WILTOCHG

MULTIPLE R	0 75932	R SQUARE CHANGE	0 57657
R SQUARE	0 57657	F CHANGE	21 78629
ADJUSTED R SQUARE	0 54834	SIGNIF F CHANGE	0 0003
STANDARD ERROR	1 00644		

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	20 68854	20 68854
RESIDUAL	15	15 19381	1 01292

F = 20 42465 SIGNIF F = 0 0004

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
WILTOCHG	1 24497	0 27549	0 75932	0 75932	0 75932	0 75932	4 519	0 0004
(CONSTANT)	-1 73653	1 65190					-1 051	0 3098

FILE SCALE SP (CREATION DATE - 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

---------- VARIABLES NOT IN THE EQUATION ----------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
CHCCAUS	0 49881	0 69999	0 83386	3 667	0 0025
COGSTYLE	0 25482	0 39025	0 99313	1 586	0 1321
DECSTRUC	0 15481	0 22344	0 88211	0 850	0 4075
SUPNEEDS	0 11965	0 15173	0 68091	0 574	0 5748
INVNEEDS	0 08492	0 12957	0 98562	0 489	0 6325
ACTUINV	0 42252	0 61896	0 90868	2 949	0 0106
TRANEEDS	-0 15418	-0 23336	0 97009	-0 898	0 3941
ACTUSUP	0 00372	0 00550	0 92678	0 021	0 9839
PIONEEC	0 10446	0 16000	0 99436	0 607	0 5537
MGMTATT	-0 03403	-0 05210	0 99251	-0 197	0 8400
DSSFLEX	0 30066	0 39503	0 73097	1 607	0 1299
CSFSUPP	0 34861	0 51110	0 91018	2 259	0 0430
MULTIP	-0 37258	-0 50374	0 77406	-2 182	0 0467
ACTUTRA	0 25225	0 36455	0 88441	1 465	0 1651
INTCSDS	0 03559	0 05077	0 85101	0 190	0 8519
INTWCDS	0 26919	0 27416	0 43923	1 067	0 3042
INTTNAT	0 07604	0 11066	0 89680	0 417	0 6833
INTSNAS	-0 10443	-0 12949	0 65109	-0 489	0 6327
INTWCAT	0 23029	0 28579	0 65211	1 116	0 2833
INTWCCC	0 52814	0 65024	0 66175	3 287	0 0054
INTWCAS	-0 22853	-0 24573	0 48757	-1 949	0 3589
INTWCAV	0 50724	0 59645	0 50549	2 700	0 0147
INTMAPD	-0 04210	-0 06450	0 99413	-0 242	0 8124
INTDFDS	0 26189	0 38507	0 89180	1 537	0 1465
INTMLAT	-0 03791	-0 05821	0 99768	0 218	0 8303
INTMLAS	-0 37760	-0 57970	0 99799	-2 657	0 0186
INTMLAV	0 05896	0 08915	0 96787	0 335	0 7427
INTMUTD	-0 11042	-0 14224	0 70315	-0 540	0 5971
INTDSAT	0 20045	0 29280	0 90199	1 136	0 2710
INTDSAS	-0 04799	-0 06630	0 85757	-0 256	0 8016

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

VARIABLE(S) ENTERED ON STEP NUMBER 2 CHCCAUS

MULTIPLE R	0 88546			ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
R SQUARE	0 78404	R SQUARE CHANGE	0 20748	REGRESSION	2	28 13328	14 06664
ADJUSTED R SQUARE	0 75319	F CHANGE	14 41090	RESIDUAL	14	7 74907	0 55351
STANDARD ERROR	0 74398	SIGNIF F CHANGE	0 0020				

F = 25 41376 SIGNIF F = 0 0000

------------------------------ VARIABLES IN THE EQUATION ------------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
WILTOCHG	0 91162	0 22300	0 55600	0 75932	0 50772	[illegible]	4 038	0 0011
CHCCAUS	0 49308	0 13445	0 49881	0 72544	0 45550	[illegible]	3 [illegible]	0 0025
(CONSTANT)	-1 89616	1 22189					1 552	0 1430

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
COGSTYLE	0 14241	0 29419	0 77380	1 110	0 2872
DECSTRUC	0 16057	0 32451	0 75241	1 237	0 2380
SUPNEEDS	-0 15679	-0 24937	0 54629	-0 920	0 3701
INVNEEDS	-0 29505	-0 50515	0 53555	-2 110	0 0548
ACTUINV	0 21161	0 34669	0 53193	1 331	0 2055
TRANEEDS	-0 17291	-0 36618	0 81688	-1 419	0 1795
ACTUSUP	-0 08233	-0 16787	0 80549	-0 614	0 5498
PIONDEG	-0 12052	-0 23208	0 67157	-0 860	0 4052
MGMTATT	-0 12502	-0 26318	0 80401	-0 984	0 3413
DSSFLEX	0 12345	0 21160	0 63455	0 781	0 4490
CSFSUPP	0 16202	0 29469	0 65449	1 112	0 2863
MULTIP	-0 35531	-0 67228	0 67787	-3 274	0 0060
ACTUTRA	0 13415	0 26192	0 77619	0 979	0 3457
INTCSDS	0 10987	0 21702	0 76053	0 803	0 4372
INTWCDS	0 24672	0 35167	0 40914	1 354	0 1987
INITNAT	-0 00773	-0 01552	0 78749	-0 056	0 9562
INTSNAS	-0 18476	-0 31782	0 60302	-1 209	0 2483
INTWCAT	0 09085	0 15253	0 60873	0 556	0 5873
INTWCCC	-0 70314	-0 22110	0 02135	-0 817	0 4284
INTWCAS	-0 20519	-0 30875	0 43927	1 170	0 2629
INTWCAV	0 24356	0 32637	0 38778	1 215	0 2351
INTMAPD	-0 09970	-0 21229	0 82129	0 781	0 4475
INTDFDS	0 14559	0 28553	0 77670	1 074	0 3023
INTMIAT	-0 20127	-0 41103	0 75122	-1 626	0 1280
INTMIAS	-0 32940	-0 70339	0 82277	-1 568	0 0034
INTMIAV	-0 19172	-0 35132	0 66084	-1 397	0 1858
INTMUTO	-0 14043	-0 25302	0 60425	-0 941	0 3629
INTDSAT	0 10747	0 215[illegible]	0 79560	0 775	0 4410
INTDSAS	-0 04601	-0 [illegible]	0 73164	-0 332	0 7452

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FILE SCALE SP (CREATION DATE - 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

VARIABLE(S) ENTERED ON STEP NUMBER 3 MULTIP

MULTIPLE R	0 93896		
R SQUARE	0 88165	R SQUARE CHANGE	0 09761
ADJUSTED R SQUARE	0 85434	F CHANGE	11 54589
STANDARD ERROR	0 57155	SIGNIF F CHANGE	0 0018

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	3	31 63560	10 54520
RESIDUAL	13	4 24675	0 32667

F = 32 28060 SIGNIF F = 0 0000

VARIABLES IN THE EQUATION

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
WILTOCHG	0 64253	0 19001	0 39188	0 75932	0 32265	0 68408	3 382	0 0049
CHGCAUS	0 48152	0 10335	0 48712	0 72544	0 44456	0 79085	4 659	0 0004
MULTIP	-0 31354	0 09576	-0 35531	-0 64932	-0 31242	-0 67228	-3 274	0 0060
(CONSTANT)	0 81834	1 25238					0 653	0 5249

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FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

-------- -- VARIABLES NOT IN THE EQUATION -- - - - - - -

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
COGSTYLE	0 06560	0 17733	0 62528	0 624	0 5442
DECSTRUC	0 09289	0 24757	0 58445	0 885	0 3935
SUPNEEDS	0 19651	0 32321	0 32015	1 181	0 2597
INVNEEDS	-0 15586	-0 32600	0 48790	-1 195	0 2453
ACTUINV	0 06136	0 12512	0 49205	0 437	0 6700
TRANEEDS	-0 20353	-0 57981	0 67231	2 465	0 0178
ACTUSUP	-0 08233	-0 22676	0 65900	-0 807	0 4356
PIONDEC	-0 02652	-0 06632	0 65519	-0 230	0 8218
MGMTATT	-0 08652	-0 24409	0 67237	-0 872	0 4004
DSSFLEX	0 07486	0 17195	0 60738	0 605	0 5567
CSFSUPP	0 02585	0 05878	0 61209	0 204	0 8418
ACTUTRA	0 05223	0 13349	0 67052	-0 467	0 6492
INTCSDS	0 02429	0 06265	0 58267	0 217	0 8315
INTWCDS	0 14042	0 26225	0 39795	0 941	0 3551
INTTNAT	-0 08692	-0 22966	0 66739	-0 817	0 4296
INTSNAS	-0 08280	-0 18486	0 45266	-0 652	0 5269
INTHCAT	0 00291	0 00644	0 56795	0 022	0 9826
INTWCCC	-0 39309	-0 16511	0 02088	-0 580	0 5727
INTWCAS	-0 18385	-0 37324	0 38329	-1 394	0 1887
INTWCAV	0 06731	0 11321	0 13480	0 395	0 7000
INTMAPD	-0 05307	-0 15088	0 67103	-0 519	0 6067
INTDFDS	0 08909	0 23248	0 66749	0 811	0 4238
INTMLAT	0 05768	0 11354	0 39366	0 396	0 6991
INTMLAS	-0 25297	-0 29607	0 12729	-1 074	0 3040
INTMLAV	0 14160	0 24810	0 36334	0 887	0 [illegible]
INTMUTO	-0 16860	-0 40925	0 50328	-1 554	0 1452
INTDSAT	0 02821	0 07408	0 67164	0 257	0 8013
INTDSAS	-0 07597	-0 20371	0 62173	-0 721	0 4848

FILE SCALE SP (CREATION DATE - 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

VARIABLE(S) ENTERED ON STEP NUMBER 4 TRANEEDS

MULTIPLE R	0 95991			ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
R SQUARE	0 92144	R SQUARE CHANGE	0 03979				
ADJUSTED R SQUARE	0 89525	F CHANGE	6 58356	REGRESSION	4	33 06327	8 26582
STANDARD ERROR	0 48469	SIGNIF F CHANGE	0 0247	RESIDUAL	12	2 81909	0 23492

F = 35 18510 SIGNIF F = 0 0000

------------------------------ VARIABLES IN THE EQUATION ------------------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
WILTOCHG	0 67867	0 16180	0 41392	0 [illegible]	0 33939	[illegible]	4 19[illegible]	[illegible]
CHGCAUS	0 48950	0 09770	0 49520	0 72[illegible]44	0 4[illegible]	[illegible]64[illegible]	5 [illegible]	[illegible]
MULTIP	-0 33186	0 08[illegible]	-0 3760[illegible]	-0 64932	-0 32[illegible]	[illegible]14[illegible]	4 0[illegible]	[illegible]
TRANEEDS	-0 18865	0 07[illegible]	-0 2035[illegible]	-0 01823	-0 19947	[illegible]	-2 45[illegible]	0 0[illegible]98
(CONSTANT)	1 55287	1 10305					1 408	0 1846

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
COGSTYLE	-0 03937	-0 11651	0 62412	-0 387	0 7046
DECSTRUC	0 08853	0 28953	0 58101	1 031	0 3373
SUPNEEDS	0 20420	0 41212	0 32001	1 500	0 1617
INNEEDS	-0 14235	-0 36498	0 48789	-1 300	0 2201
ACTUINV	-0 08152	-0 18265	0 39436	-0 616	0 5503
ACTUSUP	0 02346	0 06971	0 65891	0 232	0 8210
PIONDEC	0 04693	0 13749	0 64732	0 4[illegible]0	0 6542
MOMTATT	-0 02396	-0 07872	0 66195	-0 26[illegible]	0 7982
DSSFLEX	0 08175	0 23037	0 60376	0 78[illegible]	0 4489
CBFSUPP	0 05732	0 15885	0 603[illegible]	0 534	0 6042
ACTUTRA	0 11443	0 34807	0 6675[illegible]	1 231	0 2438
INTCSDS	-0 04924	-0 14838	0 58207	0 49[illegible]	0 6[illegible]
INTWCDS	0 13227	0 30311	0 39498	1 0[illegible]	0 3141
INTTNAT	0 11280	0 26973	0 44921	0 9[illegible]	0 3728
INTSNAS	0 03745	0 09238	0 43565	0 308	0 7[illegible]
INTWCAT	0 06810	0 17976	0 54744	0 606	0 5568
INTWCCC	-0 40336	-0 20793	0 02088	-0 705	0 4954
INTWCAS	-0 03004	-0 06133	0 32757	-0 204	0 8422
INTWCAV	-0 11015	-0 20305	0 26599	-0 689	0 5058
INTMAPD	0 01703	0 05599	0 67010	0 186	0 8558
INTDFDS	0 09870	0 31584	0 66269	1 104	0 2931
INTMLAT	0 07272	0 17547	0 38970	0 591	0 5664
INTMLAS	-0 08651	-0 11602	0 11043	-0 387	0 7059
INTMLAV	0 03736	0 07592	0 32447	0 253	0 8053
INTMUTO	-0 13221	-0 38830	0 48979	-1 398	0 1898
INTDSAT	0 08293	0 26026	0 66832	0 894	0 3905
INTDSAS	0 04359	0 12407	0 61901	0 415	0 6863

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

VARIABLE(S) ENTERED ON STEP NUMBER 5 SUPNEEDS

MULTIPLE R	0 96681			
R SQUARE	0 93478	R SQUARE CHANGE	0 01334	
ADJUSTED R SQUARE	0 90513	F CHANGE	2 45515	
STANDARD ERROR	0 46125	SIGNIF F CHANGE	0 1454	

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	5	33 54208	6 70842
RESIDUAL	11	2 34028	0 21275

F = 31 53158 SIGNIF F = 0 0000

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
MILTOCHG	0 46118	0 21149	0 28128	0 75932	0 16792	0 54979	2 181	0 0518
CHGCAUS	0 40490	0 10073	0 40961	0 72544	0 30954	0 77135	4 020	0 0020
MULTIP	-0 42964	0 10130	-0 48676	-0 64932	-0 32651	-0 78767	-4 240	0 0014
TRANEEDS	-0 19101	0 07284	-0 20607	-0 01823	-0 20191	-0 62020	-2 622	0 0237
SUPNEEDS	0 27131	0 18089	0 20420	0 51040	0 11552	0 41217	1 500	0 1617
(CONSTANT)	2 01094	1 09321					1 839	0 0930

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
COGSTYLE	-0 01257	-0 04005	0 30773	-0 127	0 9017
DECSTRUC	0 09228	0 33109	0 31973	1 110	0 2932
INVNEEDS	-0 12593	-0 35213	0 31599	-1 190	0 2616
ACTUINV	-0 03861	-0 09202	0 30064	-0 292	0 7761
ACTUSUP	-0 03170	-0 09615	0 27693	-0 305	0 7663
PIONDEC	0 02438	0 07731	0 31129	0 245	0 8113
MOMTATT	-0 05635	-0 19755	0 30254	-0 637	0 5383
DSSFLEX	0 08607	0 26609	0 31974	0 873	0 4032
CSFSUPP	0 01165	0 03364	0 28829	-0 106	0 9173
ACTUTRA	0 04994	0 13138	0 19870	0 419	0 6840
INTCSDS	-0 04372	-0 14446	0 31947	-0 462	0 6542
INTWCDS	0 14125	-0 35485	0 25195	1 200	0 2577
INTTNAT	0 03369	0 07607	0 23683	0 241	0 8142
INTSNAS	-0 10599	-0 22579	0 19819	-0 733	0 4804
INTWCAT	-0 00951	-0 02412	0 24539	-0 076	0 9407
INTWCCC	-0 37575	-0 21246	0 02085	-0 680	0 5074
INTWCAS	-0 08053	-0 17566	0 26481	0 564	0 5850
INTWCAV	-0 05975	-0 11732	0 25148	-0 374	0 7165
INTMAPD	-0 418E-03	-0 00149	0 31381	-0 005	0 9963
INTDEDS	0 10241	0 35954	0 31975	1 218	0 2510
INTMLAT	0 02405	0 06079	0 29169	0 193	0 8511
INTMLAS	-0 12870	-0 18782	0 10619	-0 605	0 5589
INTMLAV	0 05582	0 12401	0 25172	0 395	0 7010
INTMUTO	-0 10454	-0 32710	0 30154	-1 095	0 2994
INTDSAT	0 03587	0 11310	0 28013	0 360	0 7264
INTDSAS	0 02163	0 06674	0 31229	0 212	0 8367

FOR BLOCK NUMBER 1 PIN = 0 200 LIMITS REACHED

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FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V125 SINGLE ITEM SATISF

BEGINNING BLOCK NUMBER 2 METHOD FORWARD INTWLDS INTTNAT INTSNAS INTWCAT INTWCCC INTWLAS INTWCAV INTMAPD INTDFDS INTMLAT INTMLAS INTMLAV INTCSDS INTMUTU INTDSAT INTDSAS

FOR BLOCK NUMBER 2 PIN = 0 200 LIMITS REACHED
NO VARIABLES ENTERED FOR THIS BLOCK

* *

SUMMARY TABLE

STEP	MULTR	RSQ	ADJRSQ	F(EQU)	SIGF	RSQCH	FCH	SIGCH		VARIABLE	BETAIN	CORREL	LABEL
1	0 7593	0 5766	0 5483	20 425	0 000	0 5766	21 786	0 000	IN	WILTOCHG	0 7593	0 7593	
2	0 8855	0 7840	0 7532	25 414	0 000	0 2075	14 411	0 002	IN	CHGCAUS	0 4988	0 7254	
3	0 9390	0 8816	0 8543	32 281	0 000	0 0976	11 546	0 005	IN	MULTIP	-0 3553	-0 6493	
4	0 9599	0 9214	0 8952	35 185	0 000	0 0398	6 584	0 025	IN	TRANEEDS	-0 2035	-0 0182	
5	0 9668	0 9348	0 9051	31 532	0 000	0 0133	2 455	0 145	IN	SUPNEEDS	0 2042	0 5104	

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

EQUATION NUMBER 3

DEPENDENT VARIABLE V126 SYSTEM USE

BEGINNING BLOCK NUMBER 1 METHOD FORWARD WILTOCHG CHGCAUS LOGSTYLE DECSTRUC SUPNEEDS INVNEEDS ACTUINV TRANEEDS ACTUSUP PIONDEG MGMTATT DSSFLEX CDFSUPP MULTIP ACTUTRA

VARIABLE(S) ENTERED ON STEP NUMBER 1 MULTIP

MULTIPLE R	0 70422		
R SQUARE	0 49593	R SQUARE CHANGE	0 49593
ADJUSTED R SQUARE	0 46232	F CHANGE	15 74138
STANDARD ERROR	22 22372	SIGNIF F CHANGE	0 0012

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	1	7288 65486	7288 65486
RESIDUAL	15	7408 40396	493 89360

F = 14 75754 SIGNIF F = 0 0016

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
MULTIP	-12 57690	3 27391	-0 70422	-0 70422	-0 70422	-0 70422	-3 842	0 0016
(CONSTANT)	119 62481	12 39074					9 654	0 0000

FILE SCALE.SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------------ VARIABLES NOT IN THE EQUATION ------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTOCHG	0 29423	0 36461	0 77406	1 4[illegible]	0 1650
CHOCAUS	0 45403	0 62366	0 95108	2 985	0 0098
COGSTYLE	0 19021	0 26362	0 96819	1 023	0 3239
DECSTRUC	-0 14254	-0 20074	0.99977	-0 767	0 4560
SUPNEEDS	0 22900	0 31943	0 98079	1 261	0 2278
INVNEEDS	0 27449	0 37681	0 94995	1 522	0 1502
ACTUINV	0 37797	0 48286	0 82265	2 063	0 0582
TRANEEDS	-0 17827	-0 24776	0 97368	-0 957	0 3549
ACTUSUP	-0 00937	-0.01308	0 98212	-0 049	0 9617
PIONDEC	0 02749	0 03760	0 94294	0 141	0 8900
MOHTATT	-0 18308	-0 25522	0 97960	-0 989	0 3401
DSSFLE(	0 20037	0 26491	0 88[illegible]2	1 0[illegible]8	0 3214
CSFSUPP	0 01530	0 01959	0 80909	0 073	0 9432
ACTUTRA	-0 00769	-0 01008	0 86588	-0 038	0 9704
INTCSDS	-0 00314	-0 00442	0 99935	-0 017	0 9870
INTWCDS	0 17715	0 21635	0 75188	0 829	0 4209
INTTNAT	-0 12113	-0 16039	0 88382	-0 608	0 5529
INTSNAS	0 10624	0 14905	0 99203	0 564	0 5817
INTWCAT	0 07877	0 09976	0 80857	0 375	0 7132
INTWCCC	0 45730	0 61809	0 92085	2 942	0 0107
INTWCAS	0 11619	0 15565	0 90460	0 590	0 5649
INTWCAV	0 46738	0 56158	0 72774	2 540	0 0236
INTMAPD	-0 03132	-0 04393	0 99158	-0 165	0 8717
INTDFDS	0 07788	0 10457	0 90975	0 393	0 6999
INTMLAT	0 18397	0 21351	0 67896	0 810	0 4272
INTMLAS	0 00765	0 00613	0 32388	0 023	0 9820
INTMLAV	0 34773	0 38019	0 60258	1 538	0 1463
INTMUTO	0 537E-03	0 00074	0 95847	0 003	0 9978
INTDSAT	-0 03780	-0 04987	0 87720	-0 187	0 8545
INTDSAS	-0 00415	-0 00566	0 93741	-0 021	0 9834

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FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

VARIABLE(S) ENTERED ON STEP NUMBER 2 CHOCAUS

MULTIPLE R	0 83186		
R SQUARE	0 69198	R SQUARE CHANGE	0 19606
ADJUSTED R SQUARE	0 64798	F CHANGE	9 54782
STANDARD ERROR	17 98198	SIGNIF F CHANGE	0 0080

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	2	10170 13756	5085 06878
RESIDUAL	14	4526 92126	323 35152

F = 15 72613 SIGNIF F = 0 0003

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
MULTIP	-10 78336	2 71631	-0 60379	-0 70422	-0 58884	-0 72771	-3 970	0 0014
CHOCAUS	9 08314	3 04274	0 45403	0 58758	0 44278	0 62166	2 985	0 0098
(CONSTANT)	74 15244	18 23600					4 066	0 0012

FILE . SCALE.SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTOCHO	0 13339	0 19789	0 67787	0 728	0 4746
COGSTYLE	0 11363	0 19824	0 92088	0 729	0 4708
DECSTRUC	-0 07468	-0 13288	0 92751	-0 483	0 6369
SUPNEEDS	-0 07570	-0 10630	0 58896	-0 385	0 7061
INVNEEDS	-0 05805	-0 07532	0 51848	-0 272	0 7896
ACTUINV	0 11894	0 15156	0 50016	0 551	0 5897
TRANEEDS	-0 21228	-0 37642	0 93161	-1 465	0 1667
ACTUSUP	-0 12588	-0 21799	0 89445	-0 805	0 4351
PIONDEO	-0 22091	-0 34563	0 75397	-1 328	0 2070
MOMTATT	-0 26935	-0 47290	0 92054	-1 936	0 0750
DBSFLE4	-0 01945	-0 02926	0 69679	-0 106	0 9176
CBFSUPP	-0 29698	-0 41965	0 61503	-1 667	0 1194
ACTUTRA	-0 17320	-0 27587	0 78142	-1 035	0 3196
INTCSDS	0 13623	0 23492	0 87165	0 871	0 3993
INTWCDS	0 05054	0 07637	0 70325	0 276	0 7868
INTTNAT	-0 23885	-0 39427	0 83931	-1 547	0 1459
INTSNAS	-0 04588	-0 07770	0 84695	-0 281	0 7831
INTWCAT	-0 12711	-0 19044	0 69140	-0 699	0 4966
INTWCCC	0 16972	0 07402	0 05858	0 268	0 7932
INTWCAS	0 01672	0 02799	0 86267	0 101	0 9211
INTWCAV	0 21922	0 25173	0 40615	0 938	0 3654
INTMAPD	-0 10920	-0 19314	0 92417	-0 710	0 4904
INTDFDS	-0 07609	-0 12404	0 81846	-0 451	0 6596
INTMLAT	-0 13341	-0 16886	0 49341	-0 618	0 5475
INTMLAS	-0 07506	-0 07654	0 30934	-0 277	0 7863
INTMLAV	-0 01756	-0 01911	0 36475	-0 069	0 9461
INTMUTO	0 06594	0 11515	0 92331	0 418	0 6828
INTDSAT	-0 16445	-0 26894	0 82381	-1 007	0 3324
INTDSAS	-0 05072	-0 08804	0 90294	-0 319	0 7550

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

VARIABLE(S) ENTERED ON STEP NUMBER 3 MGMTATT

MULTIPLE R	0 87229		
R SQUARE	0 76089	R SQUARE CHANGE	0 06891
ADJUSTED R SQUARE	0 70571	F CHANGE	4 03461
STANDARD ERROR	16 44146	SIGNIF F CHANGE	0 0658

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE
REGRESSION	3	11182 87657	3727 62552
RESIDUAL	13	3514 18226	270 32171

F = 13 78959 SIGNIF F = 0.0002

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
MULTIP,	-9 90786	2 52446	-0 55477	-0 70422	-0 53228	-0 73642	-3 925	0 0017
CHOCAUS	10 03752	2 82543	0 50174	0 58758	0 48180	0 70185	3 553	0 0035
MGMTATT	-10 61196	5 48261	-0 26935	-0 27992	-0 26250	-0 47298	-1 936	0 0750
(CONSTANT)	115 36967	27 04579					4 266	0 0009

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------------- VARIABLES NOT IN THE EQUATION ----------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTOCNO	0 10554	0 17698	0 67237	0 629	0 5450
COOSTYLE	-0 01472	-0 02585	0 73749	-0 090	0 9301
DECSTRUC	-0 17769	-0 34002	0 85294	-1 250	0 2342
SUPNEEDS	-0 04137	-0 06558	0 58557	-0 234	0 8237
INVNEEDS	-0 15224	-0 21789	0 47680	-0 771	0 4543
ACTUINV	0 01108	0 01532	0 45717	0 053	0 9585
TRANEEDS	-0 14430	-0 27654	0 86124	-0 997	0 3385
ACTUSUP	-0 11915	-0 23410	0 87051	-0 834	0 4205
PIONDEO	-0 06107	-0 08660	0 48079	-0 301	0 7685
DBSFLEX	0 04637	0 07750	0 66801	0 269	0 7923
CSFSUPP	-0 34898	-0 55448	0 60364	-2 308	0 0396
ACTUTRA	-0 17485	-0 31609	0 78139	-1 154	0 2709
INTCSDS	-0 01060	-0 01766	0 66376	-0 061	0 9522
INTWCDS	-0 06457	-0 10400	0 62032	-0 362	0 7235
INTTNAT	-0 19024	-0 34959	0 80745	-1 293	0 2205
INTSNAS	0 00632	0 01194	0 83726	0 041	0 9677
INTWCAT	-0 12447	-0 21165	0 69135	-0 750	0 4676
INTWCCC	0 09653	0 04767	0 05631	0 165	0 8714
INTWCAS	0 04425	0 08365	0 84931	0 291	0 7762
INTWCAV	0 08668	0 10594	0 35721	0 369	0 7185
INTMAPD	0 25354	0 31859	0 37217	1 164	0 2669
INTDFDS	-0 06719	-0 12426	0 81768	[illegible] 404	0 6721
INTMLAT	-0 26102	-0 35942	0 45339	-1 334	0 2069
INTMLAS	-0 11957	-0 13778	0 29946	-0 482	0 6386
INTMLAV	-0 14078	-0 16783	0 33983	-0 590	0 5663
INTMUTO	0 07617	0 15086	0 89642	0 579	0 6064
INTDSAT	-0 18317	-0 33934	0 82062	-1 250	0 2353
INTDSAS	-0 05572	-0 10974	0 87659	-0 382	0 7088

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FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

VARIABLE(S) ENTERED ON STEP NUMBER 4 CSFSUPP

					ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
MULTIPLE R	0 91346		R SQUARE CHANGE	0 07351				
R SQUARE	0 83441		F CHANGE	5 77124	REGRESSION	4	12263 31598	3065 82900
ADJUSTED R SQUARE	0 77921		SIGNIF F CHANGE	0 0334	RESIDUAL	12	2433 74284	202 81190
STANDARD ERROR	14 24120				F = 15 11661		SIGNIF F = 0 0001	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
MULTIP	-11 88463	[illegible]34837	-0 66546	-0 70422	-0 59450	-0 8[illegible]20	5 061	0 0003
CHOCAUS	13 32605	2 63185	0 66612	0 58758	0 55279	0 80533	4 706	0 0005
MONTATT	-12 11719	4 79348	-0 30756	-0 27992	-0 29695	-0 58947	2 528	0 0265
CSFSUPP	-16 46321	7 13281	-0 34898	0 32012	-0 27113	-0 55448	-2 308	0 0396
(CONSTANT)	131 09455	24 39699					5 373	0 0002

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTOCHG	0 07880	0 15825	0 59954	0 532	0 6056
COOBTYLE	-0 06272	-0 13092	0 59047[illegible]	-0 438	0 6699
DECBTRUC	-0 14924	-0 34134	0 59715	-1 204	0 2537
SUPNEEDS	0 02888	0 05392	0 52118	0 179	0 8611
INVNEEDS	-0 15617	-0 26857	0 40366	-0 925	0 3750
ACTUINV	0 05469	0 09035	0 45192	0 301	0 7691
TRANEEDS	-0 09953	-0 22609	0 58741	-0 770	0 4576
ACTUSUP	-0 14457	-0 34005	0 59715	1 197	0 2556
PIONDEC	0 11707	0 18228	0 40147	0 615	0 5512
[illegible]FLEX	0 04455	0 08948	0 58606	0 290	0 7713
ACTUTRA	-0 05493	-0 10812	0 49562	-0 361	0 7251
INTCSDS	-0 16931	-0 31114	0 50860	-1 086	0 3008
INTWCDS	-0 06162	-0 11926	0 60360	-0 398	0 6980
INTTNAT	-0 09655	-0 19976	0 52987	-0 676	0 5129
INTSNAS	-0 02063	-0 04663	0 59862	-0 155	0 8798
INTWCAT	-0 02060	-0 03981	0 53980	-0 132	0 8973
INTWCCC	0 00585	0 00346	0 05684	0 011	0 9911
INTWCAS	-0 01907	-0 04233	0 57627	-0 141	0 8908
INTWCAV	0 10152	0 14903	0 356[illegible]	0 500	0 6270
INTMAPD	0 27628	0 41665	0 3664[illegible]	1 520	0 1567
INTDFDS	-0 04914	-0 10899	0 60141	-0 364	0 7230
INTMLAT	-0 06499	-0 09101	0 28840	-0 303	0 7675
INTMLAS	-0 17173	-0 23648	0 29384	-0 807	0 4366
INTMLAV	-0 01082	-0 01488	0 28621	-0 049	0 9615
INTMUTO	0 03808	0 08976	0 5[illegible]04	0 297	0 7706
INTDSAT	-0 08649	-0 17957	0 52515	-0 605	0 5572
INTDSAS	-0 10648	-0 24836	0 58631	-0 850	0 4133

FOR BLOCK NUMBER 1 PIN = 0 200 LIMITS REACHED

SPSS BATCH SYSTEM 13 08 13 09/04/83 PAGE 29

FILE SCALE SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

BEGINNING BLOCK NUMBER 2 METHOD FORWARD INTWCDS INTTNAT INTSNAS INTWCAT INTWCCC INTWCAS INTWCAV INTMAPD INTDFDS INTMCAT INTMLAS INTMLAV INTCSDS INTMUTD INTDSAT INTDSAS

VARIABLE(S) ENTERED ON STEP NUMBER 5 INTMAPD

				ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE
MULTIPLE R	0 92906						
R SQUARE	0 86315	R SQUARE CHANGE	0 02875	REGRESSION	5	12685 80678	2537 16136
ADJUSTED R SQUARE	0 80095	F CHANGE	2 52076	RESIDUAL	11	2011 25204	182 84109
STANDARD ERROR	13 52187	SIGNIF F CHANGE	0 1407				

F = 13 87632 SIGNIF F = 0 0002

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	SE B	BETA	CORREL	PART COR	PARTIAL	T	SIG T
MULTIP	-11 88142	2 22975	-0 66528	-0 70422	-0 59434	-0 84098	-5 329	0 0002
CHGCAUS	13 24866	2 68929	0 66225	0 58758	0 54948	0 82453	4 926	0 0005
MGMTATT	-20 71377	7 25927	-0 52576	-0 27992	-0 31826	-0 65219	-2 853	0 0157
CSFSUPP	-16 97827	6 78100	-0 35989	0 32012	-0 27927	-0 60051	-2 504	0 0293
INTMAPD	0 78481	0 51629	0 27628	-0 09569	0 16955	0 41665	1 520	0 1567
(CONSTANT)	153 17171	27 34109					5 602	0 0002

FILE SCALE.SP (CREATION DATE = 09/04/83)

* * * * M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE V126 SYSTEM USE

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	MIN TOLER	T	SIG T
WILTUCHG	0 02802	0 05987	0 34160	0 190	0 8534
COGSTYLE	-0 13782	-0 30085	0 25677	-0 998	0 3420
DECSTNUC	-0 12465	-0 31004	0 36379	1 031	0 3267
SUPNEEDS	0 00275	0 00561	0 36641	0 010	0 9862
INVNEEDS	-0 08362	-0 14881	0 33330	-0 476	0 6444
ACTUINV	0 17923	0 30029	0 32014	0 996	0 3429
TRANEEDS	-0 13326	-0 32848	0 36354	-1 100	0 2972
ACTUSUP	-0 12835	-0 33050	0 36379	1 107	0 2941
PIONDEC	-0 21580	-0 23667	0 15441	0 770	0 4569
DSOFLEX	0 09320	0 20114	0 33579	0 649	0 5308
ACTUTRA	-0 03230	-0 069[illegible]	0 36111	-0 220	0 8300
INTCSDS	-0 15432	-0 31[illegible]2	0 31571	-1 035	0 3248
INTWCDS	-0 10453	-0 21879	0 32119	-0 709	0 4945
INITNAT	-0 081[illegible]	-0 18451	0 34877	-0 594	0 5659
INTSNAS	-0 05027	-0 12348	0 36640	0 393	0 7022
INTWCAT	0 00480	0 01013	0 36060	0 032	0 9751
INTWCCC	0 06241	0 04048	0 05646	0 128	0 9006
INTWCAS	-0 06365	-0 15159	0 35623	-0 485	0 6381
INTWCAV	0 18659	0 29122	0 33336	0 963	0 3584
INTDFDS	-0 00976	-0 02326	0 35315	-0 074	0 9428
INTMLAT	0 06883	0 09668	0 25540	0 307	0 7650
INTMLAS	-0 16211	-0 24544	0 29366	-0 801	0 4419
INTMLAV	0 13983	0 19220	0 25229	0 619	0 5495
INTMUTO	0 02687	0 06953	0 36590	0 220	0 8300
INTDSAT	-0 05642	-0 12728	0 36166	-0 406	0 6914
INTDSAS	-0 13915	-0 35231	0 35787	-1 190	0 2614

FOR BLOCK NUMBER 2 PIN = 0 200 LIMITS REACHED

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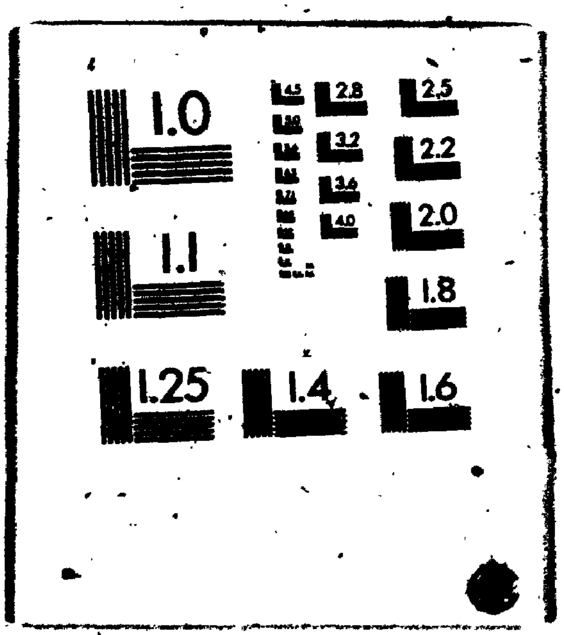

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