A SURVEY OF CANADIAN MIDDLE MANAGERS' ATTITUDES TOWARDS MANAGEMENT INFORMATION SYSTEMS

by

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PREFACE

This report presents the results of a large-scale survey of Canadian managers, undertaken by the author between April and October, 1972. The report is necessarily long and detailed; possibly over-long for many readers. For this reason, an attempt has been made to structure the presentation in such a way that the reader can skim some parts and read other parts (which particularly interest him) in detail.

It is suggested that most readers will want to read Chapter one and the Introductions to Chapters two through five. The chapter Introductions should steer readers to sections which contain detail of interest to them. Chapter six is made up of reports on the seventeen organizations which participated in the survey, and these individual reports presumably will be of interest only to those concerned with the particular organizations. Limited interest in individual reports may be partially due to the fact that participating organizations are identified only by code number. The appendices will probably be of interest only to researchers, and others who are technically-minded.

It is suggested that all readers give some attention to Chapter four, which contains extensive and colorful quotations from study respondents. These quotations are relatively independent of the structure of the questionnaire and forcefully present the viewpoints of many managers with respect to MIS.

A large number of people contributed to the completion of this study and the researcher gratefully acknowledges their help and assistance. Almost 2,000 Canadian middle managers took the necessary one-half hour to complete and return the questionnaires. Thanks are due to the management of participating organizations and especially to the organizations' executives who gave tangible support by writing covering memoranda and disseminating the questionnaires to their middle management personnel.

Jacques Viau, President and Roy Schultz, Vice-President of the National Council of the Canadian Institute of Management (CIM) were enthusiastic and unfailingly helpful, both in endorsing the study to their association and in over-coming the difficult logistical problems of cross-Canada questionnaire distribution through the individual CIM branch associations.

Doug Cole, the research assistant, completed the massive coding and computing work almost single-handedly. Doug's diligence and accuracy plus his enthusiasm and interest were and invaluable asset. The speedy, "super-accurate" key-punching of the data by Kaethe Ambrozas and the patient, careful typing of the report (with its interminable sets of tables) by Lesley Shaughnessy were of real assistance in completing the project.

This study was funded by the Social Environment Planning Unit of the Department of Communications. A survey of this size and scope is costly and would not be possible without such tangible research support. Special thanks are due to Tom McPhail, who supervised the beginning of the study, and to Garth Jowett, who saw the project through to the end. These two Department of Communications representatives, along with Director-General R. Gwyn were always available to advise the researcher as the needs arose.

A. Guthrie
December 5, 1972

CONTENTS

CHAPTER ONE

INTRODUCTION

INTRODUCTION

> ... the development of Management Information Systems cannot be said to have achieved the success originally envisaged ... results thus far have fallen short of expectations, and the real use of computers for managerial decision-making has not yet reached an advanced level...[1]

The above assessment on the state of MIS development from Branching Out is further developed in chapters 2 and 3. The underlying assumption of this study is that the low level of MIS development is due to managerial attitude problems, rather than to computer technical problems.

Ill-conceived and unsuccessful systems efforts have contributed to unfavorable managerial attitudes. Everyone knows of systems failures, either through hearsay or experience, and these failures have spawned a kind of managerial cynicism, nicely expressed by one respondent to this study:

> A machine which takes twenty workers to operate but only does the work of one would eliminate unemployment.[2]

Even successful MIS development will not be universally accepted without reservations. Many people are uncomfortable about the encroachment of computers and associated technology on our daily lives:

> On the other hand, the growth of computer/communications systems could impose rigid constraints on the development of a free society and on the life-styles of the people involved.[3]

In the context of organizations, MIS concepts promise to have profound effects on the environment of middle managers and it is reasonable to expect some reservations on the part of these managers. This study was designed to gather data on middle managers' attitudes and expectations about the effects on them of MIS development. Obviously, some managers fear development; as one respondent commented when he had completed the study questionnaire:

> This has been a traumatic experience -- computers scare the hell out of me![4],

but how general is this fear among middle managers?

*Numbered references are found at the end of the chapter.

This survey was designed as a large-scale replication of a smaller study, which was conducted in British Columbia in 1970-71, and is subject to underlying assumptions and definitions which are outlined in chapter 3. Hypotheses were developed for testing the data gathered and variables to be measured were specifically defined.[5]

If the results are to be any more than what Andreski calls "quantified trivialities,"[6] both the hypotheses and the underlying assumptions must relate to the real world situation. Therefore, close attention was given to the unstructured comments made by the respondents, many of which are quoted in chapter 4. General support was found for the research assumptions, but, of course, some MIS problems which were not specifically considered in this study were articulated by respondents.

The often negative role of top management with respect to MIS development was frequently mentioned and this is clearly fertile ground for future study. Also, many managers complained of "information overload," while few complained of an actual lack of information. Conceptually, MIS should provide managers with timely, relevant information but, in practice, many systems inundate managers with paper. This a key, unsolved problem in most organizations and should be seriously studied.

The total study results indicate that middle managers perceive a relatively low need for information systems development, so that one should not expect busy managers to give serious time and attention to the matter. However, the results indicate that most managers expect MIS will increase their job satisfactions; the hypothesized fear of MIS is not general in the population surveyed.

Perhaps the most interesting part of the study is in the analysis of response scores, when managers are grouped according to their experience and familiarity with MIS concepts. Classification of respondents by several experience dimensions produced significant differences among the groups (see chapter 5, section 5.5) and four of the apparent key dimensions are summarized here.

1) The degree of middle managers' exposure to successful information systems change seems to be an important MIS attitude determinant. Managers who reported a static information systems environment or unsuccessful change experience scored significantly lower than those in a positive change environment. This may seem like a "ponderous restatement of the obvious" masked by a "smoke screen of jargon"[7], but all results of the survey are not so intuitively obvious. For example, exposure to MIS development seems to operate as a negative influence on MIS attitudes. In chapter 5, this result is reasoned to be due to the poor design and operation of many "so-called" MIS projects and the MIS result is therefore consistent with the successful change result.

2) The positive results of recent management training on MIS attitudes is very evident from the results. Given the small number of respondents from participating organizations who reported significant recent management training, this result should be considered carefully by those interested in improving their organization's information system.

3) Attitude scores differed significantly between respondents from the separate organizations which participated in the study. This confirms the pilot study finding that the organizational environment, rather than the background of individual middle managers, is the key factor in attitude formation. It is also significant that both the high-scoring and the low-scoring respondents were in organizations which had undertaken a relatively high degree of information systems development. Once again, positive development results in positive middle manager attitudes and negative experience results in negative attitudes.

4) Middle managers' philosophy with respect to participation in MIS development was another significant finding of this study. Almost 80% of responding managers expressed a desire for heavy user-manager participation and this feeling is graphically illustrated by a large number of comments, which are quoted in chapter 4. Somewhat paradoxically, the need for information systems development expressed by answers to the questions (Section A of the questionnaire) was interpreted to be of a low magnitude. Accordingly, systems development activity would be expected to receive a low priority by middle managers. Perhaps managers want to have a lot of influence in the MIS design and implementation, but are unwilling to devote the study, time and effort required to make their participation meaningful.

As might be expected in such an early stage of the study of a highly complex subject, these results raise more questions than they provide conclusive answers. The data gathered could be "mined" for higher-order interactions between the experience/familiarity dimensions. The researcher hopes to investigate the feasibility of multi-way analysis of variances in the near future.

Also, the problem of "information overload" (so often mentioned by respondents) should be seriously investigated as soon as possible. Properly structured and summarized information for managers seems to be sadly lacking in to-day's organizations. It is possible that so-called "exception reports" or "triggered reports" are not the answer to information overload. A better course of action might be the investigation of the manager-machine interface. Can managers inter-act with computer based data banks in order to obtain "score-keeping information" when they want it; and in order to be made aware of out-of-control situations which require their attention? Can managers blend data from the organization's formal information system with personal, intuitive and external knowledge and thereby extend their capacities by use of the new technology? If not, then the computer will remain a surrogate clerk and perhaps too much is being expected of MIS. The researcher hopes to investigate these questions in the near future, by conducting experiments into the manager-machine interface through terminals which are remote from the actual computer installation.

FOOTNOTES:*

1 Computer Communications Task Force, (Vol. 1), p. 16.

2 By a personnel manager in the federal government.

3 Bowen, Cole, and George, (1972), p. 2.

4 By a public relations manager in the federal government.

5 Guthrie, (1972).

6 Andreski, (1972), as reviewed in Time, (September 25, 1972), p. 55.

7 Andreski, (1972).

*For key to abbreviated references, please see the bibliography at the end of this study.

CHAPTER TWO

STUDY DESCRIPTION

2.1 INTRODUCTION

In this chapter, the general scope and design of the study is explained. Attitudes of managers regarding the need for and the effects of Management Information Systems (MIS) are surveyed because negative middle management attitudes are seen as a key constraint to MIS progress. A questionnaire survey of a relatively large sample of Canadian middle managers was carried out in the Summer and Fall of 1972. A two-phased sample was taken; one from managers in the Ottawa region, and one from a Canada-wide management organization. The reasons for this structure and details of the two samples are given in this chapter.

The procedures for the dissemination of the questionnaires, for their return to the researcher, and of any follow-up for returns are outlined. Finally, details on the origin of the almost 2,000 useable returns received from the distribution of approximately 8,200 questionnaires are provided.

2.2 PURPOSE AND SIGNIFICANCE

This study was undertaken to show whether or not managers hold certain negative attitudes towards the development of Management Information Systems. In particular, the answers in two managerial attitude dimensions are sought. First, do middle managers perceive information systems development as being important to them (or to their organizations)? Second, do middle managers expect to receive a lower level of satisfaction after the introduction of MIS than they receive with more conventional information systems? In addition, investigation is undertaken to identify possible determinants of managers' perceptions and expectations regarding MIS development.

Most people are aware of the truly spectacular advancement in computers and computer related technology. Organizations of any reasonable size either have their own computer or have computer services available to them. However, in most instances, computers are being operated as "surrogate clerks", engaged in routine, transaction-based, high volume activities. Although there has been a great deal of publicity about MIS advantages and MIS implementation, managers in today's organizations are still operating to a large extent with the same tools which were used by their grandfathers.

The reasons for the lack of managerial use of the computer and the new information technology are not simple. Certainly, technical problems are still encountered when trying to set up a computer-based MIS in an organization. Also, it is true that in many instances a conservative or disinterested top management acts as a constraint to MIS implementation. One might view MIS development as an evolutionary step, which will follow the large scale utilization of computers for the performance of technical tasks. Nevertheless, the progress towards MIS seems agonizingly slow. Concern with middle management attitudes towards MIS is based upon a rationale which states that the key constraint to MIS progress is the lack of interest, and in fact actual resistance, on the part of operating middle managers who are the main users of the system. Without the active support and aggressive participation by these user managers, little progress can be expected. This rationale is developed in more detail in Chapter 3.

If negative middle management attitudes can be shown, then it would seem desirable for organizations to undertake to change these negative attitudes in order to facilitate successful implementation of sophisticated MIS concepts. On the other hand, if favourable attitudes can be shown, then intensive work on the manager-machine interface can be logically undertaken. It is expected that managers' attitudes will vary according to their history and environment. Therefore, inquiry is made into possible attitude determinants, so that organizations will know what steps may be taken in cases of established negative attitudes.

2.3 STUDY DESIGN AND SCOPE

Data for this study was gathered by a questionnaire survey of a large sample of Canadian managers. The study was financed by a grant from the Social Environment Planning Unit of the Department of Communications, Ottawa, Ontario. Questionnaires were distributed to managers in the period May through August 1972, all returns were received by mid-October 1972, and statistical analysis completed by the end of October 1972. Respondents can be divided into two groups, a cross Canada survey of managers and an Ottawa regional survey.

A particular region was chosen in order to get as large a sample as possible from complex organizations operating in a particular environment. The Ottawa region was chosen primarily as a matter of convenience, because the researcher was living and working in the area. Necessarily, the Ottawa region sample will include a very heavy proportion of Federal Government managers and this limits the generality of any results. However, any region would be expected to have it's own peculiarities, which would influence the generality of the results obtained.

The cross Canada survey of managers was undertaken in an attempt to get a more general reading of Canadian managerial attitudes. The Canadian Institute of Management (CIM) provides a cross section of managers in industry, government and other services in all regions of Canada. Therefore, the results obtained might be assumed to be representative of Canadian management. Also, the results can be tested to see whether there are significant differences in the cross Canada sample and the regional sample. The plan was to survey approximately 3,000 managers in the Ottawa region and 5,000 managers in the cross Canada CIM group so that, in total, 8,000 Canadian managers would be surveyed.

2.4 OTTAWA REGION PROCEDURES

Organizations within the Ottawa region were chosen in two phases for possible participation in the study. First, the researcher defined 20 organizations which appeared to be potentially useful for the study purposes. The organizations where chosen both from government and non-government sectors and appeared to be in varying stages of MIS implementation and computer utilization. This procedure served to get the study underway, but was obviously subject to the researcher's bias in the choice of potential organizations. The second phase of organizational choice was a mail-out request to any other regional organization, which appeared to be large and complex enough to have a reasonable sized management group.

In the first phase, the researcher, contacted the 20 organizations by telephone and subsequently met personally with appropriate officials in order to discuss the possibility of the organization's participation. This operation took place in May and June of 1972 and resulted in the agreement to participate by 9 organizations. The other 11 organizations declined to participate for various good reasons which were usually communicated to the researcher by letter. The 20 organizations are as follows:

Participating Organizations

1) Bell Canada
2) Bell Northern Research
3) Agriculture Canada
4) Consumer & Corporate Affairs Department
5) Ministry of Transport
6) National Health & Welfare Department
7) National Revenue & Taxation
8) Statistics Canada
9) Veterans Affairs Department

Questionnaires distributed, 2,717; Useable returns, 1,088; Response rate, 40%.

Declined to Participate

1) Central Mortgage & Housing Corporation
2) E.B. Eddy Ltd.
3) Metropolitan Life Insurance Company
4) Microsystems International Ltd.
5) Canadian Transport Commission
6) Indian & Northern Affairs Department
7) National Defence Department
8) National Revenue, Customs & Excise
9) Post Office Department
10) Public Works Department
11) Supply & Services Department

In the second phase, 17 organizations were contacted by mail about mid-July 1972. Of these 17 organizations, 7 agreed to participate, 3 made a token participation, and 7 either declined to participate or did not respond to the letter. These 17 organizations are as follows:

Agreed to Participate

1) Canadian Broadcasting Corporation
2) Canadian International Development Agency
3) Department of the Environment
4) Energy Mines & Resources
5) External Affairs Department
6) Labour Department
7) Manpower & Immigration

Questionnaires distributed, 501; Useable returns, 240; Response rate, 48%.

Token Participation

1) Eldorado Nuclear Ltd. (1 response)
2) Canadian Radio & T.V. Commission (1 response)
3) Information Canada (4 responses)

Declined to Participate

1) Department of Regional Economic Expansion
2) Finance Department
3) Industry Trade & Commerce
4) Ministry of State for Urban Affairs
5) Secretary of State Department
6) Soliciter General Department
7) Unemployment Insurance Commission

The procedure which was followed in the above 16 participating organizations was quite consistent throughout. Organization officials and the researcher conferred in order to determine who within the organization would be surveyed and how many questionnaires would be required. Questionnaires and return envelopes were supplied by the researcher, then distributed to the individual managers through the organization's own mailing service. Each questionnaire was accompanied by a memorandum, written by an organization official, which generally explained the purpose, endorsed the study and requested the respondents' co-operation in completing and returning the questionnaires directly to the researcher. The return envelopes were addressed to the researcher at the School of Commerce, Carleton University and postage was paid by the addressee. No particular follow-up procedures were undertaken. In some instances, slight variations in the above procedures are noted in individual organization reports.

2.5 CANADIAN INSTITUTE OF MANAGEMENT PROCEDURES

The Canadian Institute of Management is a national organization of Canadian managers which is organized into 23 branches, operating out of industrial and administrative centers across the country. Membership is drawn from managers in various industrial and government organizations, so that the association seems to represent a good cross section of middle managers in Canada. The national executive of the CIM was very enthusiastic about the purposes and scope of the study and co-operated actively in an attempt to get significant participation on the part of the membership.

The procedure followed was to send in bulk to each of the 23 branches the required number of questionnaires. An endorsing letter by the national president and a return envelope, addressed directly to the researcher at Carleton University, was attached to each questionnaire. Each branch was to disseminate the forms to individual members via their local mailing list. This procedure paralleled the distribution system for the organization's journal and the membership counts for each branch were provided by the CIM executive in charge of the journal distribution. The bulk mail-out to the branches was accomplished by May 31, 1972 in the expectation that questionnaires would be in the hands of members before the summer holiday period and before the date of the national CIM convention. At the June CIM convention, further publicity was given to the study by the national executive.

As the summer progressed, it became evident that the return rate from CIM members was disappointingly low. In fact, it was established that some branches had not gotten the questionnaires into the hands of individual members. This was in-spite of the fact that the national president had written to branch executives asking for their co-operation and pointing out that the researcher should be billed for the cost of mailing questionnaires to individual members. On July 26, 1972, the national president sent a strongly worded follow-up letter to branch presidents wherein he requested that they admonish members to complete and return the questionnaires. A final follow-up was instituted August 25, 1972, when approximately 1,000 questionnaires were prepared and delivered to some Ontario branch executives for distribution at CIM Education Program meetings to be held at the beginning of September.

In total, 640 useable returns were received from the approximately 5,000 members of the Canadian Institute of Management (a return rate of approximately 13%). On the one hand, this response rate is disappointing, in light of the extensive effort made by CIM national executives on behalf of the study. In particular, the response from the Atlantic and Western provinces was too low to enable significant regional analyses to be made. On the other hand, a response from 640 managers across Canada can be deemed as quite a useful sample from a voluntary, decentralized organization such as the CIM. The CIM provided a vehicle for the obtaining of 640 responses from managers in various sectors and regions of Canada that would have been otherwise unobtainable within the cost and time constraints of the study.

CHAPTER THREE

BACKGROUND TO THE STUDY

3.1 INTRODUCTION

This background chapter is written to define terms, to set the study in a frame of reference with respect to other work, and to provide a rationale for the study's purposes and scope.

The term "MIS" is defined to be a system which "supports managerial decision-making by supplying relevant information when required". The extensive literature on MIS implementation problems is classified and some pertinent problem articles are briefly summarized.

Middle managers are defined as a distinct group within an organization and reasons for the study of their attitudes are given. The impacts of MIS on organization members are explored and it is concluded that the real impacts are yet to come because, extensive MIS implementation is yet to come. Nevertheless, definite impending effects on middle managers can be established and, more important, definite expected effects can be detected in middle managers' perceptions of MIS.

This leads to a discussion of attitudes and how attitudes are formed. Attitudes do not completely specify or precede actual performance. However, attitudes are one determinant of performance and it is clear that easier MIS implementation can be expected in the face of positive, rather than negative, attitudes towards MIS.

The well established concept of a "felt need" as a prerequisite to organizational change is presented as justification for the inquiry into managers' perceived needs for information systems developement. Aspects of the satisfaction which managers obtain from their positions are outlined and related to their perception of the expected effects of MIS implementation. Various dimensions of managers' experience and familiarity with MIS are predicted to relate to their attitude scores and the reasoning behind this contention is specified.

This chapter is somewhat theoretical in nature, but is included to set the study in the context of the behavioral and organizational literature and the related research work; work which clearly influenced the scope and nature of this study.

3.2 DEFINITION OF MIS

A common question asked by officials of many organizations who were approached about this study is, "What do you mean by MIS?" It is clear that there is no generally accepted meaning of the term and certainly there is no established theory of MIS. This is true inspite of the fact that many organizations already have MIS groups at work and have MIS projects under-way. Many writers have proposed definitions of MIS, but no one definition seems to have found general acceptance.[1]

In the questionnaire (see Appendix A), MIS was defined in a purposely vague manner (as an extended information system) so that the respondents' own concept of MIS would be biased as little as possible. Answers were desired in the light of the respondents' perception of MIS, not in the light of the researcher's "enlightened" view.

For purposes of this report, Robert Head's definition is useful:

> A management information system is one that supports managerial decision making by supplying relevant information when required.[2]

Note that MIS supports rather than supplants the manager. It is concerned with non-routine, higher-level managerial decisions rather than routine, lower level functions which are the concern of EDP. It supplies relevant information and, accordingly, is capable of screening data in order to report key information, rather than uncritically reporting all information. Finally, MIS is able to supply information when required by managers rather than when convenient for the system.

MIS should not be construed as one total "super-system", fully integrated and completely consistent. At the current state of the art, MIS is necessarily a set of sub-systems. Some sub-systems may be closely integrated by the sharing of common computer facilities and common data bases, or by the merging of previously distinct functions (e.g. payroll and personnel record-keeping). Other sub-systems may be at best loosely coupled (e.g. economic forecasting and production scheduling). In some situations, managers may treat the MIS as a major input into their decision process, while in other situations, managers may have to rely almost entirely on their experience and intuition.[3]

A single-flow, total MIS may be the ideal or goal, but for the present, MIS means that a manager has better information available in the required format and time-frame. This information is produced in sub-systems which are as integrated as is possible, so that inconsistencies and redundant effort are kept to a minimum. Development is in the direction of greater total-system integration, but this development will never be finished, because technology, organizational skills, and external conditions will continue to evolve.

3.3 PROBLEMS IN MIS IMPLEMENTATION

MIS is a concept of the computer age which has, on the one hand, excited the enthusiasm and imagination of many managers, yet on the other hand, has been very frustrating in its realization. Many writers have described MIS problems and have attempted to suggest solutions which would lead to successful implementation.[4] Unfortunately, many prescriptive solutions tend to deal with symptoms rather than with the underlying problems. Classification of these MIS articles into three categories helps to concentrate on the real problem areas.

In the first category, are studies and prescriptive articles which attempt to deal with MIS problems as one would deal with clerical systems conversion problems. Ernick's article is quite typical of some of the excellent work which attempts to explain MIS failures and defines steps to success.[5] Failure is blamed on insufficient pre-planning, on systems engineering, development cost or time factors, and insufficient follow-up evaluation. To assure success, guidelines are set up to effect an evolution from single automated systems to full MIS. These guidelines for MIS implementation tend to deal only with technical problems and to miss the underlying behavioral implications. The solutions which work for EDP problems are proposed for MIS problems without sufficient emphasis on the difference in nature between MIS and EDP. For this reason, the technical literature is not particularly relevant to this study.

In the second category, are a considerable number of studies dealing with problems of workers when production and clerical systems are automated. Mann and Williams' study of clerical automation is a good example because of its identification and treatment of relevant variables.[6] However, MIS will have more far-reaching effects on the organization than simple automation has had, so that the many automation-and-the worker studies are useful only to the extent that they suggest methods of studying the problems that will arise with MIS development.

The third category of the literature on MIS installation problems is definitely relevant to this study because the authors have specifically considered MIS and its related behavioral problems. Three case studies that have been reported in the literature are reviewed here for their contribution to the field.

Sollenberger investigated the problems caused by the implementation of MIS in an organization.[7] His description indicates that his concept of MIS is consistent with the foregoing definition. Inspite of differences between companies and industries, Sollenberger was able to describe the rise of information-handling as an organizational

function in its own right. He concluded that MIS needed encouragement from top management and then participation by the middle management users. He identified effects of MIS on management and speculated on the future effects by reference to the forecasts of Whisler and Diebold. He discussed the personnel problems of retraining management and clerical employees and of assuring all employees that they would not face an economic loss because of MIS. Basically, Sollenberger treated behavioral problems in terms of training and placement in the new situation; problems that were transitory and not too serious. Although he started out with a broad concept of the nature of MIS, Sollenberger apparently saw MIS's problems as similar to the problems of clerical automation.

Huse found indications of more serious problems in his study of the installation of MIS in an integrated manufacturing company.[8] His report on a two-year longtitudinal study showed that operating managers had acted as liaisons with the system task-force, but were not actually on the task-force. The new system encountered massive resistance from middle management and was not successful. Huse proposed that more effective user-manager participation is a prerequisite for successful MIS implementation. The necessity for manager participation will be discussed later, but the key problem of the observed manager resistance is an important result of Huse's work.

Employee resistance to MIS conversion is documented in Dickson, Simmons and Anderson's study of MIS in the Minneapolis Post Office.[9] A pilot project had been run in one office and, once the system was debugged, it was broadly implemented. A large part of the input came from workers' insertion of identification cards into terminals in order to record their time. The system had not been going well and there were even reports of sabotage to the input terminals. Because of these dysfunctional behavioral reactions and because the system had been pre-tested by the pilot project, variables other than technical, system factors seemed to be involved. Following the procedures of the earlier Mann and Williams study, Dickson et al identified four categories of variables that underlay the implementation problems:

1) Technical factors are obviously important. Post Office employees complained about the loss of visual records and managers claimed report turn-around time was too long. Equipment malfunctions mentioned were established to be more imaginary than real, however.

2) Work relationships must be considered. If MIS alters work groups, changes job patterns, or eliminates certain jobs, the consequences must be planned for. The Post Office MIS did not change these relationships so that this class of variable was not a factor in the study.

3) Environmental variables concerning organizational and managerial climate were considered. The extremely bad morale of Post Office management and employees is generally known.

4) Introduction methods for the new system are vital to its success. The Post Office MIS was designed without local management participation and then introduced in what proved to be an ineffective manner. Neither workers nor management seemed to be clear on just what the MIS was supposed to do.

It could be argued that the Post Office study did not represent a real MIS project, but only a partial system conversion. Certainly, most of the concern of the study was with workers and their input problems. But, wherever on the automation-MIS continuum the system falls, consideration of the relationship between the system and the human components of the organization represents a forward step.

MIS problems can only be solved by reference to the nature of MIS and its impact upon the organization's members. The impact of computer technology and the MIS concept on organizations has been the topic of considerable work and speculation that is distinct from the foregoing studies of MIS installation problems. Of particular interest for this study is the literature regarding the effect of MIS on middle managers. However, before reviewing the impact literature, middle managers will be operationally defined for this study and their role in MIS development will be clarified.

3.4 MIDDLE MANAGERS AND THEIR ROLE

Other obvious questions asked by officials of organizations who participated in this survey are, "Who are middle managers?", and "Why concentrate on middle managers' attitudes?"

For the purposes of this study, a taxonomy was chosen which recognized four levels of participants in an organization: top managers, middle managers, first line supervisors, and workers. Top managers are defined as chief executives of organizations or decentralized divisions; first line supervisors are defined as those who supervise workers and basically have no other responsibilities. Middle managers occupy the structural area between the above two classifications. The classification "middle managers" includes functional line managers (e.g. Sales, Marketing, Production) and also staff specialists (e.g. Planners, Analysts). Middle managers may or may not be in charge of subordinate first line supervisors or workers. The study objective was to survey the whole middle management group of each participating organization. However, for various reasons, some organizations decided to restrict their participation to certain sections or levels of middle managers. Details of these restrictions are incorporated in the separate organizational reports.

Middle managers have been isolated for study partly because the literature cited below states that MIS will have its heaviest impact on middle managers. But the main reason for specific study of middle managers is that they have such a vital role to play in MIS development. Their role is critical in the design, conversion, and operation of the MIS. Many writers refer to the need for middle management participation, but token participation is not enough. A few meetings and consultations with the MIS designers (or the assignment of sub-ordinates to the systems team) do not constitute adequate participation by the user-middle-manager.

Davison best defined what real user-manager participation means when he addressed himself to problems of misunderstandings between the systems team and line management.[10] He concluded that a strict condition of a project's success was that the line manager play the role of "straw-boss". He meant a "shirtsleeves" participation,

where the executive treats the project as a major management undertaking. The middle manager cannot expect the project to lighten his decision load. In both the design and implementation stages, there will be many demands for executive intuition. Unplanned difficulties and unusual questions will arise continuously during the conversion period and the manager, not the technical systems people, must make the decisions.

"Shirtsleeves" executive participation in an MIS project will have several implications. The systems team will be slowed down by the necessity of doing some education-work with the manager. The focus of the project will usually be narrowed by the manager to favor an effective attack on a definite problem. Most important, the project will become the property of the sponsoring executive, not the technical team. Obviously, this approach has problems. Characteristically, the systems team will not want to give up proprietorship of "their" project. More serious, is the key problem of finding the sponsoring middle-managers willing to make the intensive and sincere effort of participation envisioned by Davison. As has been pointed out, this study predicts that managers' willingness is constrained by the lack of a felt need and by an expectation of adverse effects which will result from MIS development.

3.5 IMPACTS OF MIS ON ORGANIZATION MEMBERS

The extensive literature on the effects of MIS on organization members has been reviewed in detail elsewhere, so that individual studies and articles will not be cited here.[11] When assessing the actual impact of MIS upon managers, the literature presents a confusing pattern and indicates no general agreement. The confusion can be explained in two ways. First, few arguments are demonstratively based on empirical observations and it is often impossible to ascertain whether the writer's comments are the result of his research or are mere speculation. Second, changes brought about by computer technology evolve and therefore results will vary depending upon the stage of the implementation cycle that is observed.

In summary, the empirical evidence on the implications of MIS for organization members indicates that operational levels have felt a definite impact but that middle (and top) management levels have felt little or no effects. These findings seem to be in conflict with many of the speculations which state that MIS will have its heaviest impact at the middle management level. However, the speculation is not necessarily wrong, but merely predictive. Up until this date, computer applications have concentrated on clerical and other transaction-based operations. No research study was found which had investigated a before-and-after MIS situation. The MIS concept is still not widely implemented and so its impact on middle managers cannot be assessed from empirical evidence.

Reference to the integrative concept of MIS which was developed above (Section 3.2) gives credence to the predictions of changes in the organization structure and consequent heavy impact on middle managers when MIS is introduced. Centralized facilities and data bases will cut across organization lines and inevitably mean changes in the organization structure. These changes mean the managers will increasingly feel an impact on their positions. Argyris discusses five major areas of impact:

1) Effective MIS includes the dysfunctional, the informal, and the unwritten, as well as the formal elements of a system. Top management is now more aware and middle management is hemmed-in and threatened.

2) MIS gives middle management the capability to make "correct" decisions. Thus they will be criticized for wrong decisions caused because their model was incomplete. In effect, the manager will be expected to be super-rational and, to the extent that he succeeds as a rational manager, he tends to fail as a self-actualizing man.

3) Successful managers gain power by their ability to take an ambiguous situation and force action in order to attain pre-set objectives. MIS relies on sophisticated quantitative models so that valid information and technical competence, rather than formal organizational rank, means power.

4) Sub-units with a tradition of interdepartmental competition are suddenly required to cooperate under the demands of the interdependent, integrative views of MIS.

5) MIS makes rigorous intellectual and conceptual demands on managers. Managers are expected to deal with interrelationships and models in an innovative way. However, "management-by-exception" has effectively weeded out all but confirmed risk-averters in management.[12]

The views of Argyris regarding MIS's impact on managers are recorded at some length because his conclusions relate closely to the predicted lack of felt need and perceived need satisfaction reduction on the part of middle managers.

3.6 ATTITUDES AND THEIR MEASUREMENT

According to the rationale of this study, negative middle manager attitudes operate as a key constraint to MIS progress. An attitude is a well established psychological concept, and can be defined as a predisposition to approach (positively value) or to avoid (negatively value) a certain class of objects.[13] There is evidence to support both rational and irrational formulation of attitudes. It is assumed in this study that middle managers form attitudes towards MIS both rationally (through logic and experience) and irrationally (through prejudice and speculation). As a consequence, middle managers do not need to have personal experience with or a clear understanding of MIS in order to form their attitudes.

It is necessary to show that the identification of managers' attitudes will be of some assistance in determining behavior. Otherwise there would be little justification for this study. The relationship between attitudes and behavior is complex and subtle, rather than simple and direct. This is because attitudes are not the only determinant of overt behavior and because some attitudes have more impact on behavior than others. In addition, it is important to note that behavior may precede rather than follow attitudes. A person's involuntary or inadvertent participation in a new experience or system may alter his attitudes towards the experience or system.

It follows that a middle manager's behavior with respect to MIS is not completely prescribed by the attitudes he holds, particularly in the short run. For example, a manager may participate actively in the design of an MIS project toward which he holds very negative attitudes. The manager's participation may be due to the fact that his superior demands his participation and holds him responsible for an efficient and successful system. Still other considerations are that the manager's participation may be a result of the pressure from his peers; his desire to achieve group membership; or, more accurately, his perception of how he can best satisfy his own reward-cost equation.

Despite the complexity of the relationships between attitudes and performance, it is possible to say that attitudes are one determinant of manager's behavior, and that knowledge of just what these attitudes are is a useful initial stage which could eventually lead to procedures for acceleration of MIS progress.

The opinions on the need for and effects of MIS are part of a middle manager's value system and have been labelled as attitudes; in particular negative attitudes towards MIS. Because a manager's attitudes are mainly a product of his environment, it is to be expected that they will tend to vary according to his experience and familiarity with MIS. Therefore, attitude scores are analysed along various dimensions of respondents' histories.

A fundamental problem with this kind of study is that attitudes are difficult to measure. Subjects often do not consciously know their attitudes, are ambivalent, or are inclined to respond in socially acceptable terms, rather than reveal their true feelings. Consequently, various artificial constructs and devices are used, or indirect responses (from which attitudes can be inferred) are obtained. Attitude measurement is a highly technical process that will not be treated intensively in this study.[14]

It was decided to develop a questionnaire by starting with the research tool developed by Porter, which has by now been utilized in studies of over 5,000 managers.[15] The scale is an adaptation of the Likert technique and was designed to measure job satisfaction. It is unique, in that the questionnaire process elicits both a measure of perceived satisfaction and dissatisfaction. The Porter scale can be called the "building block" of the scale developed for this study.

3.7 PERCEIVED NEEDS FOR MIS

The meaning, nature, and impact of MIS which has been described so far indicates that extensive changes in the organization structure and in the work environment of middle managers can be expected. From this point of view, MIS development can be considered as a particular class of organization change. Accordingly, the known techniques of organizational change might be employed to expedite MIS's progress.

Upon examination of the "change" literature, it soon becomes apparent that, before change can be successfully brought about in an organization, there is a prerequisite requirement -- a felt need. Almost universally, the so-called "change agents" specify a felt need as a necessary condition for organizational change and their contention is based on sound theory and adequate practical experience.[16]

MIS development, as a class of organization change, requires a felt need on the part of the user-managers who must devote significant time and effort to the MIS project. Delehanty recognized the requirement for a felt need when he attempted to relate changes in information technology to changes in organizational structure.[17] Because of inter-departmental rivalry and resistance by old-line managers, Delehanty concluded that MIS systems were not installed until competitive or other pressures forced the issue.

The question to be resolved is whether or not middle managers do perceive a felt need for MIS. The first research hypothesis states that middle managers do not perceive information systems development as an important need that should demand much of their time and that will bring them significant rewards.

The rationale for this hypothesis is based on the researcher's observation that sales managers are interested in sales and little else, production managers in production, and so on. Anything as abstract, or long-range as an MIS proposal will not capture managers' attention and will tend to be postponed indefinitely. This intuitive conclusion is partially supported by some work by Churchman, in his study on the lack of managerial acceptance of management science proposals. Churchman, through a series of experiments, concluded that:

> If we are to learn more about the implementation of recommendations, we must learn more about how people decide where to direct their attention.[18]

Churchman found that the prime vehicles for gaining managerial acceptance of scientific proposals were neither knowledge of the manager's decision process nor improved manager-systems communications. Rather, Churchman concluded that the manager's coalition (in the Thompson sense of the term) actually determined where and how he directed his attention. In the words of this study, "Do the managers perceive a strong felt need for management science proposals?"

Churchman's findings may also apply to MIS proposals. The first hypothesis is designed to test the contention that his findings can be extrapolated to MIS and predicts that managers do not perceive a strong need for information systems development; a need which would prompt their active participation in the development.

3.8 PERCEIVED EFFECTS OF MIS

As has been pointed out, little empirical evidence is available to assess the impact of MIS on middle managers, because MIS is not implemented to any real extent. Discussion of MIS' effects is necessarily speculative rather than empirical.

It is hypothesized that middle managers have already formed opinions about MIS's effects and these opinions are, in fact, negative attitudes. The fact that the opinions are based on prejudice or speculation makes them no less real or significant in determining behavior.

The middle managers are those who have become successful in the traditional, limited systems environment, and it is reasonable that they may perceive MIS development, as not only unnecessary, but as a threat to their status or future. As Argyris puts it, "waves of fear, insecurity, and tenacious resistance arise unbidden from the bowels of the organization".[19] Argyris maintains that middle managers feel MIS will rationalize the management environment just as Industrial Engineering rationalized the production environment. Also, information can flow up directly to top management, rather than first being "filtered" by middle managers.[20]

Changes in the information system (particularly those which increase the amount and complexity of information available for use) afford opportunity for new controls and checks on performance. Managers sense or recognize these control opportunities, although they rarely would articulate their feelings. Argyris implies that managers will resist all attempts at closer control, but it can be argued that people will accept controls as long as they are considered as legitimate.

To uncover the causes of slow MIS progress, it is necessary to determine middle managers' perception of the effects of MIS on them personally. The best way to determine these effects is to investigate within the framework of the basic need satisfactions that managers expect to get from their work.

The second research hypothesis states that middle managers feel that MIS development will reduce the need satisfactions obtained in their management positions. Inquiry is based on Maslow's theory of motivation which begins with the formulation of five basic human needs: physiological, safety, belongingness and love, self-esteem, and self-actualization.[21] Maslow's theory states that there are basic

(primary) needs (i.e. food, rest, protection from the elements) that an individual satisfies minimumly at first. When the basic (most prepotent) needs are reasonably satisfied, man then shifts his attention to the so-called higher order, less prepotent needs (i.e. safety, security, affection, esteem, self-respect, self-actualization). Maslow points out that, although the hierarchy is not fixed and individual behavior differs, there is a general tendency to look for satisfaction of higher order needs when the lower order needs are fulfilled.[22]

If middle managers indicate that they expect reductions in their need satisfactions as a result of MIS, it is logical to conclude that they would fear MIS development. Conversely, if managers expect MIS to increase the need satisfactions obtained from their jobs, then it is evident that they would welcome MIS development. Two points should be noted. First, respondents may expect differing effects on the various need satisfaction factors. Second, as Porter and Lawler point out,[23] it has been shown that the higher order needs (related to factors intrinsic to the job) are of key importance to managers because their lower order (extrinsic) needs are largely fulfilled.

Even if the expected effects are not homogeneous over all five need satisfaction factors, it is evident that managers will fear development if any significant reduction is forecasted. For example, if middle managers feel that MIS will restrict their self-actualization (due to the programmed nature of the decision models they will have to use under MIS) then they can be expected to fear MIS even though they expect no effects on their physiological needs.

3.9 DETERMINANTS OF MIS ATTITUDES

As was pointed out in the discussion of attitudes and their measurement (Section 3.6), the attitude scores can be expected to vary according to the histories and experiences of the respondents. Although the direction of causation can rarely be proven, it is generally known that certain attitudes correlate with certain

experiences. For this study, it is predicted that familiarity and successful experience with MIS (and MIS-related development) will correlate with more positive attitudes and, vice versa, lack of familiarity will correlate with more negative attitudes. Dimensions of MIS familiarity are defined as:

1) size of organization
2) functional training and experience
3) seniority, in present position, present organization, and in total
4) computer/systems experience
5) the level of recent information systems (IS) change
6) participation in IS change: experience and philosophy
7) MIS development experience
8) recent managerial training.

Also, regional and organizational differences in the attitude scores are investigated for possible clues to attitude determinants. The attitude score variances along organizational or experience dimensions are perhaps the most interesting part of the study. Because study in MIS attitudes is new, the scores can not be compared to any "norm" or to other findings. Consequently, the relative value analysis of scores among the separate groups, defined along the various dimensions, is perhaps the most useful analysis possible with the data which has been gathered.

FOOTNOTES:

1 For a more complete review of the history and meaning of MIS, see Guthrie, (1971), p. 12.

2 Head, (1972), p. 4.

3 For a good description of this realistic view of MIS, see Emery and Spraque, (1972).

4 For a very complete bibliography of MIS concepts and problems, see Society for Management Information Systems, President's Reading List, (1971).

5 Ernick, (1969).

6 Mann and Williams, (1960).

7 Sollenberger, (1968).

8 Huse, in Myers, (1967).

9 Dickson, et al, (69-3).

10 Davison, (1965).

11 see Guthrie, (1971), p. 26.

12 Argyris, (1969), p. 28.

13 For two published definitions of attitudes, see Edwards, (1957), p. 2 and Katz, (1960), p. 163.

14 For a fuller treatment of attitude measurement and the choice of the Porter scale, see Guthrie, (1971), p. 50.

15 Porter and Lawler, (1968), p. 131.

16 The concept of "felt need" in organizational change is well developed in the behavioral science literature and will not be covered in detail here. For a fuller discussion on felt needs and organizational change, the reader is referred to the organizational behavior literature.

17 Delehanty, in Myers, (1967), p. 61.

18 Churchman, (1964), p. 31.

19 Argyris, (1969).

20 Argyris claims that middle managers filter information to conceal the maze of cover-ups and manipulations, which he labels organizational "dry-rot". See: Argyris, Ibid., p. 31, for a full discussion on this point.

21 Maslow, (1954), Ch. 5.

22 Maslow's concept of a need satisfaction hierarchy has had a profound impact on much of the work on motivation. See, for example:

1) F. Herzberg, B. Mausner, and B. Snyderman, The Motivation to Work, (Wiley, 1959)

2) Chris Argyris, Interpersonal Competence and Organizational Effectiveness, (Richard D. Irwin, 1962).

With few qualifications, his concepts are still respected and useful.

23 Porter and Lawler, (1968), Ch. 6.

CHAPTER FOUR

RESPONDENTS' COMMENTS RELATED TO THE STUDY ASSUMPTIONS

4.1 INTRODUCTION

On the last page of the questionnaire, respondents were invited to write down any comments which they wished to make about MIS. As a result, a large number of interesting and thoughtful comments were received. It is the purpose of this chapter to present a sample of these comments and to relate the sentiments expressed to the study assumptions and predictions. The sources of the quotations presented below are kept deliberately vague because all respondents were assured of the anonymity of their replies and comments.

Top management constraints to MIS development are not considered in this study, but it is clear that top management often poses a serious constraint to progress in today's organizations. Many respondents mentioned this point and some comments are quoted below. A "hardware" or technical orientation, instead of a user orientation, has been mentioned as another problem in the development of newer information system concepts and this problem is well brought out by some respondents. The need for user-manager education, in order to allay fears or uncertainty, and in order to assist in rational step-by-step systems progress, is clear from some respondents' comments.

User-participation in the planning, design and implementation of systems was by far the most frequently mentioned subject. Many respondents feel that they, as the operating managers, should specify systems development and that top management and systems experts should perform a more supportive and less initiating role.

The study predicted that managers would not perceive a degree of need for systems development which would prompt their active participation. Comments by respondents indicated that many managers are really concerned about "information-overload", rather than about a shortage of information. Hindsight dictates that, if questions in Section A of the questionnaire had qualified the word "information" with adjectives like "better", "relevant", etc., the answers might have been somewhat different. Excessive information-gathering and report-reading operates as a real burden to some managers, a burden they see as an interference in getting their jobs done.

In general, comments on expected effects of MIS development were negative, a reinforcement of the study prediction. Managers' experience with or knowledge of over-ambitious, ill-planned, hardware oriented developments seemed to be an important cause of these negative perceptions. It is clear that an organization should carefully plan and execute MIS development, by consideration of the real user needs, before proceeding with technical considerations. Some dysfunctional effects of inadequate systems developments are documented in the quotations below.

The bulk of this chapter consists of direct quotations from respondents' comments. Good editorial practice might dictate that fewer quotations be reproduced or that longer comments be condensed. However, after the initial selection of the most quotable comments, the number was reduced several times and those reproduced below are all thoughtful and deemed worthy of the reader's attention. The comments are not necessarily representative of the views of all 2,000 managers who responded in the study. But, the quotations offer down-to-earth viewpoints which compliment the statistical analysis of the total sample; which follows in Chapter 5.

4.2 MIS IMPLEMENTATION PROBLEMS: RESPONDENTS' VIEWS

The study of middle managers' attitudes towards MIS is based on the assertation that their negative attitudes constitute a key constraint to MIS progress. It is acknowledged that technical and top management problems exist, but these problems are considered to be secondary to user middle manager behavioral constraints. While the foregoing is a valid general statement, the role of top management in setting up a suitable climate should not be understated. Several comments by respondents refer to the sometimes negative role of top management:

> Unfortunately, the "Profit Picture" and Sales & Cost curves are so far in front in the minds of top management (because they naturally are trying to impress those that pay them; the fat purses) that people are but machines that are renewed at the drop of a hat.
>
> (by a middle manager in manufacturing)

> Most of the "problems" related to my position are not caused by MIS constraints, but by the attitude of top management towards the function.
>
> (by a middle manager in government)

> My experiences in the use of EDP equipment in a medium sized manufacturing plant are that the benefits are limited and costly. Computers appear to be a "president's status symbol".
>
> (by a middle manager in manufacturing).

It is unreasonable to expect middle managers to adapt to the new information technology when they are questioned and judged in the context of traditional, limited information systems concepts. Some managers obviously feel that they are forced to simply contend with automation of existing manual routines due to the "old type" top managers:

> Generally speaking, the old type management and computers have not accepted one another yet. A department manager who has a poor result compared to forecast has to justify his position to the general manager, usually in a matter of hours. The general manager wants a detailed list of expenses, sales, inventory, etc. and is not going to be put off by being presented with a total figure for each classification. If the (department)* manager is going to utilize the computer to its full potential he is going to have to adjust and pay more attention to his

*Parentheses within the quotations indicate editorial additions by the researcher.

forecasting. However, since his superior is an old type manager, he accepts the department manager's reasons (for a poor result compared to forecast) and it usually ends up with the system man having to re-program. The system man argues that he (the manager) is making excessive demands on computer time and is defeating the purpose of standardization and of the system.

(by a middle manager in manufacturing)

Middle management doesn't have a darn thing to say about it, and senior management is introducing it because "it is the thing to have". They don't really give a darn whether it works or not. In organizations where senior management have never really thought out their manual MIS systems, except in the very basic area of budget expenditures, computers are not going to help them think out a new MIS or develop a really useful data base.

I guess it is true that we are just going to have to outlive those old guys before we make any progress. Meanwhile the "Peter Principle" is still bringing a great many loyal number two men to the surface and I do not see where the systems will change. Not in government organizations at any rate.

Sorry for getting so wound up on the subject!

(a middle manager in government)

I am convinced that, to the majority of management, the selling of EDP has been a fiasco. EDP has not realized its potential because of the failure of (top) management to recognize this potential and effectively use it as a management tool. System designs are system oriented and not user oriented. This is changing, but the dollar value lost will be hard to recoup. "Time to think about designing tomorrow's patterns rather than continue to patch today's garments".

(by a middle manager in telecommunications).

It seems trite to state that top management support and commitment to MIS is a necessary prerequisite to successful development. Never-the-less, it appears that often top management have not succeeded in creating the necessary favorable environment, and top managers should seriously consider this situation in the context their own organizations.

A tendency towards a systems orientation, rather than a user orientation was noted in the last quotation and this was a common reaction by respondents. The causes might be any combination of poor direction and control by top management, excessive zeal on the part of systems people, and default in participation by user middle managers. Whatever, the causes, symptoms of technical, systems over-emphasis were commented upon by many respondents:

> In the past, too many systems were developed by the whim of the MIS "experts" who were attempting to enhance their own reputations. Usually this back fires - as it has here. Ignoring the actual requirements of the user, without sufficient research into exactly what is involved, without training those who will be involved in making the system go when it's completed, they go charging off into the wild blue yonder. The result is vast sums of money wasted in developing unnecessarily complicated messes full of 'garbage', printing mountains of paper (or not nearly enough!), which no one reads or needs to read.
>
> (by a middle manager in communications)

> The hardest part of introducing EDP, I found, was to convince programmers that a program written for another client was not precisely what I wanted. There was a tendency for programmers to be, shall I say, lazy, because it was easier to adapt a program already written, than to write a new one to my specifications.
>
> (by a middle manager in government)

> Appreciate computer MIS but, the system staff are dehumanized to the point of thinking of themselves as infallible - unable to appreciate practical approach to problems - facts do not tell the people - story.
>
> (by a middle manager in retailing).

> ... my experience with computer and EDP personnel is that they are inclined to tell me what they are prepared to do for me, rather than being prepared to supply me with what I want.
>
> (by a middle manager in manufacturing),

Problems of communication between the systems/computer specialists and the users of the systems are frequently referred to in the "problem" literature cited in Chapter 3. Evidence of these communication barriers is found in the following two quotations, one from a systems man and one from a user manager, both working in the same organization:

> Have been engaged for past six months in developing completely revised total planning system incorporating satisfactory portions of previous systems, simplifying procedures, standardizing data bank information, improving communications and developing full involvement of all levels of management. Basic plan fully endorsed. Receiving excellent co-operation including sound proposals from user-department managers. Program on schedule. Final system will integrate fully with financial and operating MIS.
>
> (by a systems man)

> Bookeepers and accountants have got control of the computers and they use them like big adding and accounting machines. We are deluged by a huge volume of data which is only useful to clerical minds. Besides, no one really cares about the output - good or bad - it is too much - too late to do any good and if good or bad performance is indicated you are not judged on this, but on whether you make "waves" or not - if a poor performance causes waves then notice is taken of the poor performance - a good performance that make "waves" is equally bad. The prime purpose of the computer system is to be able to say, "Yes, we are modern; we use a computer".
>
> (by a user).

Given such a dichotomy of view points from members of the same organization, the obvious question is "Who is kidding whom?" The above user's perception of the managerial climate refers again to the earlier quotations respecting top management's role. The user is not alone in his view that accountants are controlling computer applications; this view was taken by other respondents, and the point is well put by one:

> Most companies have started computer applications with accounting systems when other applications are far more lucrative i.e., process control by computers.
>
> (by a middle manager in manufacturing).

The important technical problem of getting up-to-date, accurate input data into the system at a reasonable cost must be faced. It has been stated that,"40% of the EDP dollar is still being spent on data entry."[1] This point was brought out by several respondents, for example:

> I favour mechanical input and update to most systems. From my experience, too often systems are developed and implemented without solving the manual data accumulation area...
>
> (by a middle manager in manufacturing)

> Another beef is the input problem. Nobody wants to be bothered with all the paper work necessary for a fully fledged info-system that can provide half decent output. Advances in input hardware could help, hut until the "phone-in" terminal is availahle I suppose we are stuck with paper, cards, or tape.
>
> (by a middle manager in research).

Many middle managers feel unprepared for the MIS concept. Their years of experience appear to be negated by the new concepts and technology, so that they are, in effect, forced into a race between obsolescence and retirement:

> One of the major problems in the installation of information systems seems to me to be the lack of knowledge in the field, on the part of line people, such as myself. Much as I recognize this deficiency in myself, I find it extraordinarily difficult to acquire the knowledge I believe is essential if one is to participate effectively in a decision making process relating to the acquisition and implementation of a system.
>
> (by a middle manager in government)

> Although considerable training preceded the introduction of EDP, financial limitations and other duties made it difficult to continue an effective post conversion training program with the result that acceptance by the lower echelons took longer than expected. Also, the older staff approaching retirement did not adapt as well or as quickly as the younger staff.
>
> (a middle manager in government).

A symptom of lack of MIS knowledge on the part of middle (and top) managers is found in the mistaken image of MIS as a total "super-system". As pointed out in Chapter 3, such impractical approaches to MIS can only serve to retard useful progress. Some of the respondents commented on this problem:

I expect that the futility of developing total MIS systems will be realized by managements and more economical, specialized systems will be developed.

(a middle manager in communications)

There is a great need for improvement in this system. I have grave doubts on the feasibility of total Management Information Systems. I haven't heard of one yet that is on the air successfully. The U.S. Air Force has been working on one now for 6 years and they aren't at all sure they'll implement it because of the cost - benefit ratio. In my opinion,free standing systems are more logical, with provision for interface. Finally, the state of the art and technical know-how hasn't yet caught up with hardware. Let's learn to use what we do know first. "He who leans too far into the future - often falls flat on his face."

(a middle manager in communications)

More use of data base processing on an integrated basis with de-centralization of source data gathering and use of teleprocessing. More acceptance by operational departments of management reports by exception - can only be accomplished by a slow process of management education and understanding of computer capabilities,along with acceptance of change without fear of loss of status.

(a middle manager in manufacturing).

A step-by-step approach towards MIS should be made explicit by top management, with due recognition of both the technical problems and the user education needs which will arise. To enlist the active participation of the user middle manager, top management must create a climate of openness and confidence which does not exist in many organizations to-day:

Hopefully the MIS concept will be adopted completely. However, it must be <u>honest</u> and this requires high confidence levels by users to ensure useful input. It's the chicken and egg syndrome - will people trust it enough to fully divulge their jealously guarded department secrets?

(by a middle manager in manufacturing)

From the point of view of management, plenty of information is presently available but not fully put to use, primarily because the people responsible for input treat the output as privileged information. It seems that the main objective of an MIS would be not only to centralize the processing of information from disparate sources, but also to ensure that potential users are aware of its availability and are entitled to use such information.

(by a middle manager in manufacturing)

... there is still an attitude in many organizations that MIS is used to control managers' decision making rather than to assist them in decision making!

(by a middle manager in manufacturing).

4.3 COMMENTS ON PARTICIPATION IN MIS DEVELOPMENT

In Section C of the questionnaire, respondents were asked for their views on the correct balance between "experts" and the users. The number of articulate responses to the question on participation was very significant. More clear, concise responses were offered with respect to participation than for any other topic. Many managers saw a need for an appropriate balance between user and specialist inputs into the system:

Only the user dept. can determine what information is essential - BUT systems people with their understanding of computer capabilities, costs, systems integration possibilities, etc. must be expected to lead and exert the greatest influence. It's easier to train a systems specialist in what goes on in a department than it is to start with a departmental representative and make a systems specialist out of him.

(by a middle manager in communications)

Managers should have more input than now. Naturally we need co-operation between both organizations. In past, most managers knew nothing about any change until it was in effect.

(by a middle manager in government)

Recent trends in management information systems seem to provide for more centralized control. Not enough concern seems to be given to the requirements of lower level or middle level managers.

(by a middle manager in government)

> There will be major changes and rightly so but do let the "EXPERT"??? consult the people who have to provide "input" and "output" for his ideas. This would prove very enlightening.
>
> (by a middle manager in government)

> I do distrust and dislike, however, systems which require "experts" to translate the data for the user. The best of all possible worlds would be to achieve the right balance of "experts" assisting managers to specify information systems meeting the managers' needs, at reasonable cost and without undue complexity.
>
> (by a middle manager in government).

The possibility of using outside consultants was suggested in the question, but only a few managers advocated outsider participation, usually along the following lines:

> The systems staff should probably have the major voice, along with advice from outside consultants and close consultation with user-departments. I think the "outside" view is particularly important in the public service.
>
> (by a middle manager in government)

> While I have no objection to in-house introduction of an MIS, this particular organization does not have the expertise necessary. Therefore, I favour outside consultants.
>
> (by a middle manager in government).

By far the majority of comments advocated user participation to the extent that the system would become the user's, rather than the systems specialist's. It is doubtful if many organizations design and implement information systems with the high level of user participation recommended by many respondents. The lengthy set of quotations which follow are intended to underscore the emphatic views expressed:

> Computer applications should always be subordinated to the service of the line manager. I've seen the opposite far too much; where it becomes an end to itself, where the computer technicians designed costly unworkable systems based on their interpretations of what was required. It is a delusion that senior executives have that the control promised by accounting (and computers), will make their operation successful. Success comes from knowledgeable, intelligent, forward planning, and risk taking, (management) in which the computer is only a tool.
>
> (by middle manager in a utility)

User-department managers must participate actively in the development and implementation of MIS; first by stating their requirements in operational terms, then in seeing to it that the specialists do not get away with designing the system (i.e., a system for its own sake or the specialist's satisfaction). MIS must serve the purposes and needs of the manager for whom it is designed.

(by a middle manager in government)

A basic problem with MIS, as it seems to be in use in this and related industries, seems to be a tendency to allow the programmer to determine the input, instead of the user.

(by a middle manager in manufacturing)

User-department managers should always be consulted when new systems are planned. Information produced should be only information that is needed.

(by a middle manager in government)

Design of MIS by computer experts usually results in a system which is tailored to capability of hardware, not requirements of user. Results in too much quantity and too little quality of information and tends to waste a lot of time.

(by a middle manager in government)

Yes, I prefer that managers be consulted, even if they are laymen with regard to MIS. Only managers know with precision the kind of information they need.

(by a middle manager in government)

User-departments should ideally play a large part in planning and implementation. Too much is devised by those who have only superficial knowledge of objectives and work in field.

(by a middle manager in government)

The user-department must be in on the early planning to specify what they need - not to end up with a lot of useless, costly reports, which for the most part, we have.

(a middle manager in manufacturing)

People whose only business experience is a course in EDP have minds narrowed to the tapes, discs, and systems they have seen. People with a long and varied business experience have had to learn many systems and adapt to many changes. They can learn new ways with EDP and still retain business objectives. The former often cannot see the system as a tool for others to use. They make the finest tool a paper pollutant to destroy its own objective. Lets train the right people in EDP and MIS!

(by a middle manager in manufacturing)

MIS should be completely user oriented. MIS initiated by top management and designed and installed by experts and outside consultants often results in excessive information and information which is meaningless.

(by a middle manager in government)

Good systems fail because of poor implementation process. Superimposition breeds contempt! Systems are best developed and implemented - and indeed welcomed and used contructively when the "user group" is involved (SKILLFULLY) from the outset.

(by a middle manager in government)

The user managers must have the opportunity to participate. After the consultants leave, what then happens to the system? There must be complete involvement by line managers. This is not a take-over by machines, this is an information system, a management tool.

(by a middle manager in government)

Users must participate and be ensured that MIS is for their benefit, not just another "watching over the shoulder" by management.

(by a middle manager in government).

Clearly, many middle managers strongly advocate a very active participation by the users of the system and this viewpoint reinforces the study's contention that "shirtsleeves" participation by the users of the system is a necessary condition for the successful development of MIS (see Chapter 3, Section 3.4). Whether the above strong participation views are representative of the total population of middle managers and whether the views will hold up under the real stress of active system design and implementation are questions which will be considered in Chapter 5. Some systems people are skeptical about user motivation:

> Ideally, the user departments should participate to a very great extent. They are the ones who need the data. However, I find most user departments are lazy, ignorant of the computer and in general do not want to change the status quo.
>
> (by a systems man).

4.4 THE NEED FOR INFORMATION SYSTEMS DEVELOPMENT: RESPONDENTS' COMMENTS

Many comments by respondents related to the degree of felt need for information systems development. "Felt need" for development can be translated into the question, "Do managers see a need for better information to enable them to better perform their job?" The magnitude of the need measured and its significance are discussed in Chapter 5, but it is interesting to note that no comments specified the existence of too little information. Rather, the overwhelming reaction was that there is too much, unrelated, unhighlighted information:

> The problem at my level is, not lack of information, but the lack of high quality, condensed and relevant information. The necessary information is generally available now, although the gathering of it is slower and more difficult at the level where this job is done.
>
> (by a middle manager in government)

> Managers are being overwhelmed with unsolicited, cumbersome management tools which take priority over the prime function of their purpose in the service.
>
> (by a middle manager in government)

> In the past few years, systems have been developed to turn out massive computer reports that are difficult to read, difficult to follow, and difficult to understand. Often there is not time to study the reports, or (the available) staff to review them and prepare abstracts or summaries for administrative purposes. Sometimes, the reports are produced so frequently that to spend time on each report would not be an efficient use of management time.
>
> Systems are worthwhile, and computers can be programmed to produce only the required information at the proper intervals in useable form, and, over the next few years, I forsee reductions of up to 90% in the use of printers, print out paper, filing space, and management headaches with computer management systems.
>
> (by a middle manager in government)

> There is one problem that merits considerable attention with respect to MIS - the ability of humans to utilize the information that can be generated by the system. Volumes of data can be generated, however, a manager can only make decisions based on certain related information displayed in a form that allows for ready interpretation.
>
> (by a middle manager in communications).

This problem of "information overload" was seen, not only as a barrier to proper decision making, by as a real burden to managers in attempting to perform their proper functions. Some respondents were very explicit on this point:

> I regret that the growth of MIS has lead many senior management people to regard these reports as ends in themselves instead of means to do the job. In other words there is a great deal of scurrying to make sure that the input to the MIS is absolutely as it ought to be so that the output will look good!!!
>
> (a middle manager in communications)

> The volume of information of all kinds supplied to management at all levels far exceeds the needs for effective and efficient controls. As a matter of fact, so much time is devoted to obtaining information that the proportion of man-hours left for essential functions is being progressively reduced. In other words, information is no longer an instrument of efficiency but a contributory cause of inefficiency.
>
> (a middle manager in government)

> I note the reams of statistics which are constantly produced, which must result from some form of information system, but which appear to have very little overall significance to "doing the job".
>
> The tendency of this type of information is to identify areas of a routine nature which stray from the norm of objectives so that corrective action can be taken. In so doing, middle and lower management are encouraged to concentrate on routine matters for the sake of survival, rather than being encouraged to accept the challenge of tomorrow.
>
> (a middle manager in communications)

> Computerized Information Systems are a Parkinsonian Panacea for organizations incapable of understanding themselves.

> The existence of a formal information system tends to rigidify an organization structure around the data collected, making it less able to cater to changes in information requirements. Delays in the synthesis of the information occur, weakening the decision process.
>
> In a well motivated organization, the organization and the information system tend to be synonymous, it all depends on the people. A poorly motivated organization needs an MIS like a hole in the head: a formal data capture of information that should be flowing freely and isn't, doesn't encourage anyone!
>
> (a middle manager in telecommunications).

Some of the dysfunctional effects of cumbersome information systems, both on the individual managers and on the whole organization, are well-stated in the above quotations. The cause of such inappropriate information systems is poor systems planning:

> They (information systems) will probably continue to proliferate in an unnecessarily wasteful fashion. This is because we take the view that the computer can give us any information we want. Information saturation results simply because management has not adequately examined and specified what it wants; i.e. bad planning is rampant.
>
> (a middle manager in government)

and a cost-squeeze may be the only cure:

> (Future) emphasis on integration of information - more selectivity and possibly more visual presentation. Today there is still a fascination for information for its own sake, this will disappear as limited resources will force the producers of information to be more selective.
>
> (a middle manager in government).

The comments received and reproduced above may not be entirely representative of all middle managers' perceived information needs, but certainly they represent the majority opinion of the managers who offered comments. When needs for "better" information are stated, managers are generally not asking for more information, new information, or even more current information. They are asking for selective and clearly understandable information upon which they can base their analyses and decisions.

4.5 RESPONDENTS' COMMENTS ON EXPECTED EFFECTS OF MIS DEVELOPMENT

The expected effects of MIS implementation tended to reinforce the proposals made by Argyris with respect to impacts on managers (see Chapter 3, Section 3.5). While there was some expectation of favorable effects:

> I expect, and hope that qualitative factors can increasingly be incorporated into the system in order to make them less quantitatively crude and impersonal and more practical and productive as instruments of management.
>
> (by a middle manager in government),

more comments predicted a dehumanization and a loss of personal involvement:

> .... I feel that, when my statistics and reports reach the computerized level at Head Office, as I understand is possible, they must then lose their individualism. In social work, I feel all could be lost should computers be substituted for the humanities.
>
> (a middle manager in government)

> I suspect, perhaps without cause, that a tendency will develop, with the advent of MIS, for managers to allow computers to make decisions for them, relying on the "black and white" logic presented to them, rather than using the human abilities such as intuition, personal appraisal and contact, especially in such areas as personnel assessment.
>
> (by a middle manager in government)

> MIS may remove some of the personal involvement in that information may simply be produced like link-sausages.
>
> (by a middle manager in government).

Some of the negative feelings towards MIS development are caused by a perception of a threatening top management and by lack of user participation. Whatever the causes, the expressed negative effects must surely operate as a constraint to progress:

.... Based on the demands of the budget programme, not on common sense. To do the things I want to do, I have to juggle things around so that my performance record will at least resemble the programme dreamed up by arm-chair theorists. Another resentment I have, is that I am required to take time out from the work I should be doing to provide statistics and fill out complicated forms so that management can find some justification for their existence, which is to find fault and criticize the production workers.

Filling out this questionnaire has taken one half hour of my time that I should have spent on preparing a report of my activities of two days ago.

(a middle manager in government)

Installation of new information systems is useless unless those who are to use it know and agree with the usefulness and are given assistance with developing skills for use of systems. Otherwise it is just another threat in the work situation to cause unrest and low morale.

(by a middle manager in government)

I foresee more and more control systems being introduced, creating greater centralization of controls and in the responsibility for decisions on a day-to-day basis; thus making the manager in the field a "robot", but responsible for his actions.

(by a middle manager in government).

It was pointed out that today's middle managers are usually people who became successful in the pre-computer, pre-MIS age and it should not be surprising that they should resist changes in the score-keeping system:

(Future changes will be) fantastic, but in all probability not user oriented. Information systems with true operational efficiencies would tend to destroy kingdoms, and self-preservation is man's greatest ambition.

(by a middle manager in government).

To the extent that this is true, MIS progress will have to wait for the rise to managerial rank of the younger generation:

> The trend toward more information systems will become more marked as the computer-oriented younger generation takes over management of the work force. Current errors and insufficiencies in these systems tend to turn-off my generation, although we contribute to the problems.
>
> (by a middle manager in communications).

While the above negative comments indicate negative expected effects from MIS implementation, their impact should not be exaggerated. Only one respondent echoed Leavitt and Whisler's 1958 predictions of the virtual elimination of middle managers in organizations:[2]

> Information systems of the future will be extremely sophisticated, to the point of elimination of middle management.
>
> (by a middle manager in manufacturing)

and possibly he expects to be promoted or retired before that day arrives! Analysis of the expected effects scores for all of the managers sampled follows in Chapter 5.

4.6 COMMENTS DRAWN FROM RESPONDENTS' DIRECT EXPERIENCES

It is expected that familiarity and experience with MIS will have a significant effect on respondents' attitude scores. Some of the above comments may have been inspired by experiences of the managers and some by heresay and speculation. Several comments were clearly made in the light of either current or past experience. It is unfortunate (but perhaps natural) that most comments were inspired by bad experiences and contacts with computerized information systems:

> It has been my experience that when systems were originally set up the user-department managers and the systems staff readily understood one another. However, as these people were replaced over the years neither person could understand one another.
>
> When the manager receives a sales report he may know that the total figure represents his total sales, but he does not know how the report is structured and he may not be able to isolate sales by areas as by-product. For some undetermined reason neither can the system staff.

I have known several cases where information was extracted and recorded manually over the years, and then by some chance event, it was discovered that this information was on the machine all the time and could be had by merely requesting it. In the case of standard costing, the systems staff seem to have no idea what figures go into selling expenses or manufacturing expenses. I know that a programmer should be able to tell this, however, they never seem to be available 90% of the time, as they always seem to be setting up new systems for other departments.

(by a middle manager in manufacturing)

The development of information systems is only the first phase. What must go with it is the development of an analytical capacity to enable managers to utilize the vast amount of information spewed out by the computers. The development of this capacity should be kept within the specific program and not centralized within a framework of disparate programs, otherwise the manager only receives what other persons, who do not have a program responsibility, consider appropriate. A lesson should have been learned by the overcentralization of personnel, financial and records services which have all resulted in a deterioration of services to the program manager. In theory this should not be so but, in practice, the smaller program usually suffers in the constant competition for priorities.

(by a middle manager in government)

Mechanization has the potential to be a valuable, cost reducing aid; however, my experience in business indicates that computer programs lack the flexibility to be economically modified to meet changing requirements:

1) Invariably, design flexibility is lost in the translation of the user's requirements by the system programmers.
2) Systems become so large that a request for a simple change is denied, based on reprogramming costs.
3) Planners must have more than 20/20 foresight. Before a Go decision is given to system design, future reprogramming costs must be considered.

(by a middle manager in communications)

In my operation, the girls manually prepare statistical reports and have them on my desk within 4 days after each month end.

In talking to systems consultants, they tell me that the girls would have to make up source documents for the computer, and could promise no clerical time saving over our present methods. They say that, once the information is put into the computer, I could have any kind of reports required, within 3 to 6 weeks after the month end. 3 to 6 weeks as compared to 4 days? No thank you!

(by a middle manager in government)

The organization has progressed during last 10 years from card input to a tape oriented system, to a projected tape and online system. Implementation of the total system was on a piece-meal basis, with direct and almost complete control by systems staff. Testing was performed to identify anticipated problem areas with carefully prepared test material and limited post audit of output. Systems changes occured by patching live production systems (programs) with consequential production area problems. Little systems - production staff liaison was performed except on a post-implementation basis.

This situation has not changed but has resulted in a morass of control agencies being established in the Head Office. Production schedules are monitored on a manual basis, without full usage of EDP capabilities. MIS system implementation dead-lines have not been met. System credibility and production manager support suffers under totalitarian development and implementation concepts.

(by a middle manager in government)

I consider the MIS currently being installed to be a total snow-job, and doubt that it will ever serve a useful purpose. The system was inflicted upon the organization from on high, without user needs being identified, and hardware was acquired before the system was defined. The system is currently consuming vast resources, both human and material. Even worse, the effort and commitments made to implement it (<u>not</u> the functioning of the system itself) have robbed the organization of most of its freedom of action in EDP for many years to come.

I do not expect the system to be scrapped, lethargy being what it is! I do, however, believe that, at the first convenient stopping point (about a year from now), it will be reduced to maintenance status.

(by a middle manager in government)

> In my organization, information systems have provided employment for many non-productive hangers-on who are glib, knowing all the "in" words. My own view is that most could not manage a party in a brewery; yet they tell competent people how to fill out forms, in their frantic efforts to remove the need for judgement in management.
>
> The robots of reporting should be given experience in having responsibility for results in line with their authority to pester producers.
>
> (by a middle manager in government).

The above lengthy quotations are reproduced here to emphasize the serious effects of systems failures. Approaches to MIS implementation should be well-planned and progress should be sure, rather than spectacular. Again, the impracticality of a "one-shot" total system approach in a complex organization is revealed:

> I feel that your concept of MIS implies a "total systems approach" and possibly a common data base with a centralized control over the complete system. We have found that the large number of activities on an organization simply cannot be brought together in this manner. No one person (or area) seems capable of retaining an informed control over development as the work proceeds and its scope increases, taking in more and more diverse activities.
>
> Instead, we are now developing information systems for the various functional areas in modular form using experts (users) in each functional area with overall co-ordination effected by a corporate financial systems group and a corporate MIS computer group who, in turn, work closely together. As we proceed, related modules are designed to interface and the data base is standardized as much as possible. Eventually we will have what amounts to a total system and a commom data base.
>
> (by a middle manager in communications).

On the positive side, managers with wide experience are not necessarily "turned off" by one systems failure, but are inclined to learn lessons from the mistakes of their and other organizations:

> My experience has been 20 years with large national and international companies with well defined MIS packages. The information provided was often not very useful for local production management decision making but it did provide consistent comparisons of one plant with another. There was a feeling of being "procedure bound".

> It is refreshing now to be in a company which has grown rapidly and which has experienced extreme difficulties in financial and production management because of lack of management information, and which recognizes the problem and is doing something very practical to obtain helpful operating information. It has been two years since the decision was made to improve MIS.
>
> Priority was given to rather rough basic inventory control and financial control information. This has proven to be a wise approach and the company has recovered well from its serious problems. It will be another two years before the benefits of more sophisticated operating information for production will be felt. In the introduction stages currently being undertaken, there is often a feeling of frustration at being conscientious in providing accurate input, but receiving nothing or little of the benefits out of the system. Hopefully, some beneficial effects will be felt during the next year.
>
> (by a middle manager in manufacturing).

One respondent summarized the experiences of two corporations with which he was familiar and used them as an object lesson:

> (X Ltd.) took the attitude that the machinery was costing x dollars per month and should be run 24 hours a day. The result was a 20% increase in the accounting staff; a complete computer staff; a second office manager; a computer; reams of paper that was glanced at but not tied into any function or overall information; and a back-log of data to be processed.
>
> (Y Ltd.) studied carefully the input and desired output of their IBM. Each desired output had to be approved by a committee before the input could be started. The result was a well-controlled flow of pertinent information with idle time for the machine. This idle time was jealously guarded.
>
> Examples such as (X Ltd.) and (Y Ltd.) are probably endless. My point is that with so many changes in personnel, ideas, forms, systems, etc., we appear to be heading the same way as (X Ltd.) rather than following the slower smooth way of (Y Ltd.)
>
> (by a middle manager in government).

The close of this last quotation indicates another point with respect to user participation. In not enlisting active participation of user-managers, organizations are not properly utilizing the experience and expertise available to them. Also, these knowledgeable managers will naturally be their system's severest critics.

FOOTNOTES:

1 Conference report, "First National Annual Government Data Systems Conference", Modern Data, (August 1972), p. 42.

2 Leavitt and Whisler (1958).

CHAPTER FIVE

ANALYSIS OF QUESTIONNAIRE RESULTS

5.1 Introduction

5.2 Methodology

5.3 Perceived Needs for Information Systems Development

5.4 Perceived Effects of MIS Development

5.5 Differences in Scores Among Various Classifications of the Respondents

5.1 INTRODUCTION

In this chapter, the statistical tests of the attitude scores obtained from the 1991 managers who responded to the survey are presented, along with the researcher's interpretations of these results. The main objective of this study was to obtain a measure of middle managers' attitudes towards MIS development. Necessarily, measurement effort was confined to two dimensions of managerial attitudes; perceived needs for and perceived effects of MIS development. Because no other empirical data on user-manager's attitudes towards MIS appears to be available, this objective is worthwhile as an early step in the study of behaviorial constraints to MIS progress. Without data from a large sample which can be generalized to some extent, information on middle manager attitudes is necessarily confined to speculation and personal contacts with a particular small group of managers.

Analysis of the questionnaires received shows that responding middle managers do perceive a need for information systems development. The magnitude of this need is interpreted to be low, confirming the research prediction that, in general, the user managers can not be expected to give information systems development significant time and effort. However, on the positive side, managers perceive that MIS development will have somewhat positive effects on their job satisfactions. The notion of managerial apprehension over MIS is not supported by the measures of this study.

When respondents are classified according to various dimensions of their experience and familiarity with MIS, significant differences in the attitude scores result. For analysis, the respondents were classified into each of 14 different experience dimensions and several classifications produced significant differences between groups. These tests are detailed in Section 5.5, and particular attention should be given to the obvious positive effect on attitude scores of successful information systems change experience and of recent managerial training. As might be expected, attitudes of respondents differ among organizations and it appears that the organizational climate, rather than the manager's personal background is the key to attitude scores.

In the presentation which follows, reasons for some of the results are suggested. These reasons are clearly speculative; supplied by the researcher and subject to his biases. In so far as possible, however, the reasons supplied are a reflection of impressions received from the many contacts during the study with middle managers in the participating organizations. The reader is invited to speculate on the reasons for the reported results and any comments will be welcomed.

5.2 METHODOLOGY

The use of the survey technique (rather than an interview or case study technique) meant that a broad, cross-sectional sample of the middle manager population could be asked to respond to an identical set of questions. This process is particularly useful in an exploratory study into an area where no other empirical data is available. For a more complete discussion of both the strengths and weaknesses of the survey technique, refer to Appendix B.

The questionnaire instrument itself is vital in the acquisition of reliable, useful data and copies of the complete questionnaires used in this study are found in Appendix A. The structure, operation, and advantages of questionnaire are detailed in Appendix B.

Meaningful results can come from the study only if suitable analysis methods are applied to the data. For this study, non-parametric (or rank-order) statistical tests have been employed, because of the low order of measurement and the unknown distribution characteristics of the sampled population. Again, Appendix B contains details and justification for the statistical tests used and therefore the reader who has methodological questions should refer to this appendix.

5.3 PERCEIVED NEEDS FOR INFORMATION SYSTEMS DEVELOPMENT

The first research hypothesis was designed to test the need dimension of managers' attitudes towards MIS:

> H1: Middle managers do not perceive information systems development as an important need which should demand much of their time and which will bring them significant rewards.

Analysis was made against three testable sub-hypotheses which relate: 1. to managers' personal information needs (H1-A), 2. their expectation of rewards for information systems development work (H1-B), and 3. their concept of total systems needs (H1-C). These three dimensions were each tested by five statements which appeared in random order in Section A of the questionnaire.

The statistical model for the first hypothesis is a matched two-sample case. It is necessary to test answers to question (a) (How much is there?) against answers to question (b) (How much should there be?) to ascertain if there are significant differences in the scores. That is, do the respondents report significant differences between perceived "is now" and perceived "should be"? The non-parametric test chosen is the Wilcoxon Matched-Pairs, Signed-Ranks Test and the results are shown in TABLE 5.1.

Because the results from non-parametric tests are not as familiar as the results of parametric techniques (e.g., the t test), some interpretation of Table 5.1 is desirable. A statistic is calculated for each question as well as for the sub-hypotheses in order to verify that all items in each sub-hypothesis were answered in a reasonably consistent manner. The reason for the varying number of cases (N) is that the algorithm does not count zero difference scores. A low N indicates a large number of instances where the respondents circled the same number for "is now" as for "should be". A z value has been calculated as the test statistic because, when the number of cases exceeds 25, the sum of ranks is practically normally distributed.

The z values are uniformly high (according to the probability table, a z value over 4.0 means a probability of practically zero that the two scores are the same). This means that respondents do perceive a need for information systems development. In the Wilcoxon model, the "null" hypothesis tested is that the difference score population is symmetrical, and the effectiveness of the test is somewhat weakened because intuitively, few negative difference scores should be expected. Some respondents did report negatively on some Section A questions, but it seems unreasonable that many managers would report a negative need for information, i.e., a need for less information (possibly, some of those suffering from the "information overload" refered to in Chapter 4). Therefore, the Wilcoxon test is not entirely appropriate for testing the magnitude of perceived needs and attention should be given to the average values and the range of need-scores.

TABLE 5.1

Results of Wilcoxon Matched-Pairs Signed-Ranks Tests on Difference Scores for Section A of Questionnaire

Variable No.	Reference	N	Z
1	Q. 1	1765	35.0
2	Q. 6	1708	34.9
3	Q. 7	1681	34.0
4	Q.12	1527	33.2
5	Q.13	1622	34.4
6	H1-A	1945	37.9
7	Q. 2	1712	35.3
8	Q. 5	1683	34.9
9	Q. 8	1688	34.3
10	Q.11	1287	30.4
11	Q.14	1320	31.0
12	H1-B	1940	37.9
13	Q. 3	1694	35.1
14	Q. 4	1435	30.8
15	Q. 9	1822	36.4
16	Q.10	1813	36.2
17	Q.15	1713	34.8
18	H1-C	1972	38.3
19	H1	1986	38.5

No. of Observations = 1991

Median = 29.7; 1st quartile = 20.3; 3rd quartile = 39.9;
Semi-interquartile range = 9.8

The median is calculated as 29.7, with a first quartile of 20.3, a third quartile of 39.9 and thus a semi-interquartile range of 9.8. Does this mean that managers perceive information systems development as "an important need which should demand much of their time and which will bring them significant rewards"? The answer must come from comparison of the median of 29.7 against some absolute scale and one is proposed below.

The median value should be interpreted with a view to "response-set"; that is, some positive value can be expected just because the managers were asked the questions. Few managers can be expected to report a complete lack of dissatisfaction (or perceived need), so that a minimum score of 15 is postulated. The highest possible difference score on the seven-point scale is six, so that a need-score of 90 (15 questions x 6) is possible. But a 90-score is only theoretical because, to score 90, a respondent would have to circle minimum on the "is now" scale and maximum on the "should be" scale for all 15 questions. To assess the results of the study, the researcher postulates the following scale for the magnitude of the perceived need-scores:

Score	Interpretation
15	minimum perceived needs
30	low perceived needs
45	medium perceived needs
60	high perceived needs

According to this scale, an expressed median need-score of 29.7 does not indicate that managers can be expected to give information systems development much priority.

5.4 PERCEIVED EFFECTS OF MIS DEVELOPMENT

The second hypothesis predicted managers' perceptions of MIS development:

H2: Middle managers feel that MIS development will reduce the need satisfactions obtained in their management positions.

This hypothesis was divided into testable sub-hypotheses which measure satisfactions on five dimensions: 1. security (H2-A), 2. social (H2-B), 3. esteem (H2-C), 4. automony (H2-D), and 5. self-actualization (H2-E). These dimensions are drawn from L.W. Porter's adaptation of Maslow's need hierarchy and the fifteen statements of Section B come directly from Porter's questionnaire. In Section B the two questions which follow each statement ask, "How much is there now" and, "How much would there be under MIS?" The statistical model is the same as in Section A and the same Wilcoxon technique is used to determine if respondents scored significant differences between "is now" and "under MIS".

Examination of Table 5.2 shows that the z statistic indicates significant differences on the two scales. Because respondents could indicate either increased or decreased expected satisfaction under MIS, a two-tailed test is appropriate and, at the 5% level of significance, a z value no greater than 1.96 would be necessary to indicate no expected effect.

The median of 7.0, first quartile of 1.0, and third quartile of 15.4 indicate the expectation of increases under MIS in the satisfactions obtained by the managers.

Significantly, many managers recorded zero difference scores between "is now" and "under MIS" (129 managers scored zero for all 15 questions). This means that many managers either thought MIS would have no effect on their satisfactions, felt capable of handling any needed adjustments, or did not know what the effects would be and responded with zero difference scores. Certainly there is no support for the predicted expectation of reductions in the levels of satisfactions obtained from the respondents' jobs.

These results seem to establish the fact that middle managers in the organization do not fear that MIS will reduce the level of satisfactions experienced in their management positions. The "massive resistance" (described by some writers) due to fear of MIS does not seem to be characteristic of this managerial population. This indication of a positive (or at least neutral) attitude towards MIS development should be considered as an encouraging factor by those interested in improving the organization's information system.

TABLE 5.2

Results of Wilcoxon Matched-Pairs Signed-Ranks Tests on Difference Scores for Section B of Questionnaire

Variable No.	Reference	N	Z
1	Q. 6	718	10.0
2	Q.13	1575	31.8
3	Q.15	1082	10.9
4	H2-A	1633	29.1
5	Q.10	1214	19.7
6	Q.14	617	6.8
7	H2-B	1298	18.3
8	Q. 1	1096	19.5
9	Q. 4	936	18.1
10	Q. 8	665	13.6
11	H2-C	1371	22.5
12	Q. 2	952	17.2
13	Q. 5	1093	9.9
14	Q.11	1160	18.3
15	Q.12	1096	19.5
16	H2-D	1576	21.0
17	Q. 3	1135	21.6
18	Q. 7	1093	12.8
19	Q. 9	1078	15.9
20	H2-E	1498	20.9
21	H2	1862	26.3

Number of Observations = 1991

Median = 7.0; 1st quartile = 1.0; 3rd quartile = 15.4;

Semi-interquartile range = 7.2

5.5 DIFFERENCES IN SCORES AMONG VARIOUS CLASSIFICATIONS OF THE RESPONDENTS

The third hypothesis predicted that managers' attitude scores would vary as a function of their experience and familiarity with MIS concepts:

> H3: Middle managers who have familiarity or successful experience with MIS will have more favorable perceptions regarding the need for and the effects of MIS than middle managers who have little or no familiarity or experience.

This hypothesis was divided into nine testable sub-hypotheses which relate to situs and experience dimensions of the respondents: 1. job function, 2. service in present position, 3. service in present organization, 4. service in total, 5. computer/systems experience, 6. information systems change experience, 7. participation in information systems development, 8. exposure MIS development, and 9. recent management training.

Respondents were classified into groups according to the above dimensions by reference to their answers to the questions in Section C of the questionnaire. A tabulation of the various groups is presented in Table 5.3. The functional and service groupings are straight-forward and were objectively determined. The last five groupings were made by reference to answers to Section C questions and (hopefully consistent) use of the researcher's judgement. The fifth classification was made by reference to the respondent's reported EDP, computer, and systems analysis experience. The sixth category attempts to classify the respondents' perception of the environment of change recently experienced in their information system. The seventh classifies respondents on the basis of both their participation in actual information systems development and their expressed philosophy as to what user/specialist participation mix is best. Thus, those who indicate that computer/systems specialists should do all or most of the planning, designing and implementation of MIS would be assigned to low index, and so on. The eighth category assigns an index to the respondents' expressed exposure to MIS development. The final category assigns an index to the managers according to reported recent management training. A respondent who was a recent MBA graduate, for example, would be given "a great deal", or index 3.

TABLE 5.3

Tabulation of Respondents According to Experience/Familiarity Dimensions

1) By job function:	Group	Count
Engineering	0	74
Production	1	267
Sales, Advertising, Marketing	2	97
Finance, Accounting	3	156
Personnel, training	4	121
Purchasing	5	41
Research & Development	6	223
Systems, EDP, Computer Operations	7	118
General Administration	8	656
Other:	9	110
Other: planning, policy	9 (1)	40
Other: security, maintenance	9 (2)	15
Other: medical	9 (3)	19
Other: quality & materials control	9 (5)	11
Other: technical officer, appeals, investigations	9 (6,7,8)	43
		1991
2) By service, present position:		
Short (under 3 yrs.)	1	846
Medium (3 to 10 yrs.)	2	945
Long (over 10 yrs.)	3	200
		1991
3) By service; present organization:		
Short (under 3 yrs.)	1	250
Medium (3 to 10 yrs.)	2	719
Long (over 10 yrs.)	3	1022
		1991
4) By service in total:		
Short (under 3 yrs.)	1	30
Medium (3 to 10 yrs.)	2	365
Long (over 10 yrs.)	3	1596
		1991

TABLE 5.3 (cont'd)

	Group	Count
5) By computer/systems experience		
Little or none	1	1320
Some	2	447
Considerable	3	224
		1991
6) By information system change:		
Little or none	1	1089
Some	2	696
Considerable	3	206
		1991
7) By participation index:		
Low	1	415
Medium	2	1095
High	3	481
		1991
8) By MIS development index:		
Low	1	1636
Medium	2	320
High	3	35
		1991
9) By recent management training:		
Little or none	0	1275
Some	1	563
Considerable	2	141
A great deal	3	12
		1991

With this broad survey, it is possible to also look for differences between the individual organizations, between organizations of various types and sizes, and between managers in different regions of Canada. No predictions were made about the directions of organizational and regional differences; analysis was simply made to see if there were significant differences along five dimensions:

10) the various organizations participating in the study
11) province of the respondents
12) size of the respondent's organization
13) type of organization in which the respondent works
14) management level of respondents.

In addition, an internal classification was made for some participating organizations. This dimension is reported in the individual organization reports. Table 5.4 presents a tabulation of the organizational/provincial dimensions. Note that individual organizations are identified by number only, according to the research plan. Also, the last group contains three organizations where the number of responses was low and no internal breakdowns were required.

The objective of statistical analysis is to determine whether or not the independent (experience) variables are determinants of the attitude scores obtained. The test is to determine whether the inevitable differences between the groups is due to real population differences or due to chance. The statistical model is one of K independent samples, where K is the number of groups in the experience dimension tested. The Kruskal-Wallis one-way analysis of variance was chosen as the most appropriate non-parametric technique to accomplish the test objectives. It should be noted that the Kruskal-Wallis test is a one-way analysis technique and future work may be undertaken to look at the higher-order interactions between the various experience dimensions.

Results of application of the Kruskal-Wallis test on the nine categories are presented in Table 5.5. Figures for both the perceived needs and perceived effects are presented. In the Kruskal-Wallis results, the H statistic is distributed as chi square with degrees of freedom equal to K-1, provided there are more than five cases in

TABLE 5.4

Tabulation of Respondents According to Organizational and Provincial Dimensions

	Group	Count
10) By various organizations:		
Canadian Institute of Management	1	640
Organization 25	2	165
" 26	3	58
" 27	4	75
" 28	5	15
" 30-38	6	133
" 39-42	7	162
" 43-67	8	327
" 68-73	9	88
" 74-76	10	33
" 77-83	11	119
" 84-89	12	18
" 90-94	13	65
" 95	14	28
" 24, 29, 96, 99	15	65
		1991
11) By province:		
Newfoundland	1	8
Nova Scotia	2	61
P.E.I.	3	5
New Brunswick	4	22
Quebec	5	156
Ontario	6	1445
Manitoba	7	101
Saskatchewan	8	28
Alberta	9	63
British Columbia	10	102
		1991
12) By organization size:		
Small (under 200 employees)	1	158
Medium (200-2000)	2	234
Large (over 2000)	3	1599
		1991

TABLE 5.4 (cont'd)

	Group	Count
13) By organization type:		
Retailing	1	24
Other distribution	2	31
Manufacturing	3	448
Federal Government	4	1133
Provincial Government	5	13
Municipal Government	6	7
Education	7	12
Other	8	23
Public Utility Service	9	177
Research	10	67
Transportation	11	9
Communications	12	42
Finance, banking, etc.	13	5
		1991
14) By management level:		
Top executive	1	69
Middle management	2	1857
Lower management	3	43
Others	4	22
		1991

TABLE 5.5

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks

By:		Needs			Effects		
		H	d.f.	p	H	d.f.	p
1)	Job function	32.29	14	<.01*	34.07	14	<.01*
2)	Service, present position	1.34	2	>.50	6.62	2	<.05*
3)	Service, present organization	8.93	2	<.02*	6.60	2	<.05*
4)	Service in total	1.11	2	>.50	6.10	2	<.05*
5)	Computer/Systems experience	3.72	2	>.10	.45	2	>.80
6)	Information systems change index	39.00	2	<.001*	269.94	2	<.001*
7)	Participation Index	2.02	2	>.30	4.12	2	>.10
8)	MIS development index	13.67	2	<.01*	34.23	2	<.001*
9)	Recent Management training	16.62	3	<.001*	68.54	3	<.001*
10)	Various organizations	35.46	14	<.01*	25.59	14	<.05*
11)	Province	25.91	9	<.01*	24.94	9	<.01*
12)	Organizational size	3.33	2	>.10	1.58	2	>.30
13)	Organization type	24.45	12	<.02*	15.13	12	>.10
14)	Management level	.80	3	>.80	10.01	3	<.02*

*Indicates significant differences between groups.

each of the K samples. Reference to a table of the critical values of chi square will give the probability of the groups being equal, given a value as large as the calculated H statistic. If this probability is larger than the chosen level of significance, five percent, then the conclusion is that there is no difference in the scores of the various groups of middle managers.

Examination of Table 5.5 shows that there are significant differences in either or both perceived needs and perceived effects in all dimensions except:

- computer/systems experience of respondents
- participation index of respondents
- size of organizations in which respondents work

and no further analysis will be made of these three classifications.

For the dimensions where respondents in the various groups had significantly different results, the median need-scores and effects-scores were computed, along with the inter-quartile ranges. These figures are shown in Table 5.6 and reference will be made to them in an attempt to interpret the results. Note that the analysis of variance was calculated on the total scores for perceived needs and perceived effects. It was not deemed necessary to calculate for each sub-hypothesis (or for each question) because of the general consistency among answers (shown in Tables 5.1 and 5.2) in each of the two attitude dimensions. Also, correlations between need-scores and attitude scores were computed. In general, correlations were high, indicating that a high score for perceived need, was accompanied with a high positive score for perceived effects, and vice versa. Low correlations seemed to occur only when the number of respondents in a group was small.

By Job Function:

When respondents are classified along the job functional dimension, significant differences in the medians of both perceived needs for I.S. development and perceived effects of MIS development are observed. Examination of Table 5.6 by job function reveals both some interesting and puzzling points. The researcher cannot explain why security and maintenance managers have the highest medians in both the

TABLE 5.6

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By job function									
Engineering	74	27.2	17.2	34.3	8.5	4.7	-.6	13.0	6.8
Production	267	30.9	20.4	40.5	10.1	6.9	.4	16.1	7.9
Sales, advertising, marketing	97	30.7	20.3	42.7	11.2	8.6	2.4	16.7	7.2
Finance, accounting	156	27.3	18.3	35.8	8.8	6.9	1.3	14.5	6.6
Personnel, training	121	32.1	23.0	44.2	10.6	4.6	.3	12.2	5.9
Purchasing	41	31.1	23.2	41.7	9.2	9.0	2.0	19.7	8.9
Research & development	223	29.8	19.9	43.3	11.7	8.4	1.6	17.6	8.0
Systems, EDP, computer perations	118	30.0	23.6	39.0	7.7	7.7	1.8	18.0	8.1
General administration	656	28.7	19.9	39.2	9.7	6.7	1.0	14.1	6.5
Other	110	33.2	23.0	42.0	9.5	10.3	2.3	17.1	7.4
Other: planning, policy	40	26.0	16.0	37.5	10.7	7.5	3.8	11.5	3.8
Other: security and maintenance	15	45.0	26.7	50.2	11.7	16.0	7.0	32.2	12.6
Other: medical	19	29.0	22.7	38.0	7.7	4.0	-5.0	13.0	9.4
Other: Quality & Materials Control	11	33.0	21.0	40.0	9.5	11.2	6.0	23.0	8.5
Other: technical officer etc.	43	32.2	22.0	39.2	8.6	5.0	-1.0	16.0	8.5
	1991								
By service, present position									
Short (under 3 yrs.)	846	29.9	20.1	39.9	9.9	6.8	1.0	15.0	7.0
Medium (3 to 10 yrs.)	945	29.3	20.2	39.6	9.7	6.7	.7	15.3	7.3
Long (over 10 yrs.)	200	30.5	22.2	41.3	9.5	8.8	2.2	18.5	8.1
	1991								

needs and effects scores. The result may be due simply to the small sample (15) of this particular functional manager. A similar statement can be made about the relatively low scores of the medically-related managers.

Given that the median need-score when all respondents are grouped together is 29.7, it can be seen that some major functional groups have significantly lower medians:

- Planning, policy	26.0
- Engineering	27.2
- Finance, accounting	27.3
- General Administration	28.7

while other major functional groups have higher medians:

- Technical officers	33.2
- Quality and materials control	33.0
- Personnel, training	32.1
- Purchasing	31.1
- Production	30.9
- Sales, advertising, marketing	30.7

Perhaps this result is due to the fact that the former groups are reasonably satisfied with existing, financially based information systems, while the latter groups see greater needs for broader, non-financial information systems development.

Given a median of 7.0 for all respondents' perceived effects-scores, some groups have relatively low medians:

- Personnel, training	4.6
- Engineering	4.7
- Technical officer	5.0

while others have relatively high medians:

- Quality and materials control	11.2
- Purchasing	9.0
- Sales, advertising, marketing	8.6
- Research & development	8.4

The high medians of the latter groups indicate that these types of managers expect MIS development to bring them significantly higher satisfactions than they obtain with their existing information systems.

There are two noteworthy inconsistencies in the above medians by job function; technical officers and personnel or training people see relatively high needs for I.S. development, but see relatively low positive effects due to MIS development. This could mean either that they perceive MIS will have little impact on them in their jobs or that they do not perceive MIS development as fulfilling their information needs.

By Service:

When the respondents are sorted into groups according to their service in their present position, the differences in need-scores are not statistically significant (at the .05 level). The differences in the perceived effects-scores are significant and examination of Table 5.6 shows that the median score is higher for long-service employees than for short or medium service employees. This result runs counter to the notion that well established incumbents fear new developments (like MIS) will have negative effects on them.

When respondents are sorted into three groups according to service in their present organization, both needs and effects-scores are significantly different among the groups. As predicted by the researcher, scores are higher for newer employees and the scores drop as service time increases. Is this diminishing need-score because longer service employees understand well their organization's I.S. and can obtain needed information, or because they are commited to operating with current, limited information systems? Do the diminishing positive effects-scores result because longer service managers see MIS development as irrelevant or because they see MIS as a threat to their entrenched positions in the organization? Whatever, the reasons, confirmation of the intuitively appealing notion about longer service managers is worthy of note.

When respondents are grouped by total service in government or industry differences in need-scores are not significant, but differences in effects-scores are. As expected, managers who are newer in the work force score higher on expected effects than older managers. This test was not too effective because the sort produced only 30 "short total service" managers, due to the selection of "middle managers" for study.

TABLE 5.6 (Cont'd)

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By service, present organization									
Short (under 3 yrs.)	250	32.4	22.7	44.1	10.6	7.8	2.2	19.1	8.4
Medium (3 to 10 yrs.)	719	29.4	20.3	39.4	9.5	7.2	.9	15.3	7.2
Long (over 10 yrs.)	1022	29.2	19.8	39.6	9.9	6.7	.7	14.9	7.1
	1991								
By service in total									
Short (under 3 yrs.)	30	35.5	24.0	45.0	10.5	12.5	4.0	25.7	10.9
Medium (3 to 10 yrs.)	365	29.6	21.5	39.4	8.9	8.2	1.9	15.8	7.0
Long (over 10 yrs.)	1596	29.6	20.1	39.9	9.9	6.7	.8	15.2	7.2
	1991								
Information systems change index									
Low	1089	27.6	18.6	38.3	9.9	3.9	-.4	10.7	5.6
Medium	696	31.1	22.5	40.8	9.1	9.9	4.0	17.1	6.5
High	206	32.5	24.7	43.0	9.1	18.1	10.1	27.2	8.3
	1991								
MIS development index									
Low	1636	30.2	20.9	40.5	9.8	7.8	1.5	16.3	7.4
Medium	320	27.8	18.7	36.8	9.1	4.2	-.4	10.1	5.6
High	35	23.7	14.7	30.3	7.8	4.2	.4	18.0	8.8
	1991								

By Information Systems Change:

Criteria for classification in the I.S. change index were both the amount of change and the type of change experience. A low index indicates little change or negative experiences, that is, experiences with I.S. changes which performed badly. Similarly, a high index indicates significant, successful I.S. change experience. Examination of Table 5.6 shows the direct relationship between positive change experience on the median scores for both perceived needs and expected effects. It is clear that good experiences increase the managers' awareness of the need for better information and very positively influence their concepts of the impacts of MIS development.

These results show that organizations with out-dated I.S. should undertake improvements as soon as possible. Rewards for development will include more positive attitudes on the part of their middle managers, the real users of the systems. At the same time, the results contain a warning; any changes should be well planned and executed, because abortive attempts will have definite negative impacts on user-managers. Reference to some of the respondents' quotations presented in the previous chapter will reinforce this statement.

By MIS Development Index:

First, it should be noted that only 35 out of the 1991 respondents were judged to have a high MIS development index. This is consistent with the background assumption (Chapter 3) which states that MIS is not yet implemented to any significant degree in Canadian organizations. Many respondents reported MIS experience as the automation of some isolated clerical routine and this concept of MIS (where apparent) was discounted in the assignment of the MIS index to the respondent. Examination of the medians (Table 5.6) indicates that MIS development experience operates as a negative influence on managers' attitudes. Does this mean that, when middle managers gain work experience with MIS, their perception of needs for better information drop? Does it also mean that experience shows them that MIS will reduce the satisfactions which they obtain from their management positions?

TABLE 5.6 (Cont'd)

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By recent management training									
Little or none	1275	28.8	19.5	38.7	9.6	5.7	.3	13.1	6.4
Some	563	30.5	21.6	41.7	10.0	9.6	2.2	17.9	7.8
Considerable	141	32.0	24.7	42.2	8.8	11.7	3.9	22.9	9.5
A great deal	12	39.0	26.5	45.5	9.5	20.5	13.5	31.5	9.0
	1991								
By various organizations									
CIM	640	30.1	20.6	40.7	10.1	7.9	1.6	16.9	7.6
Organization 25	165	30.7	18.7	39.9	10.6	6.1	.2	14.0	6.9
" 26	58	25.5	18.7	44.0	12.7	6.2	1.3	15.5	7.0
" 27	75	32.0	20.9	43.2	11.2	7.2	1.7	17.2	17.7
" 28	15	28.0	19.0	38.0	9.5	4.2	1.0	8.0	3.5
" 30-38	133	29.6	19.3	40.0	10.3	7.2	1.1	15.1	7.0
" 39-42	162	28.7	22.7	38.2	7.8	8.2	.2	17.0	8.4
" 43-67	327	26.3	18.5	35.7	8.6	4.7	.3	13.4	6.6
" 68-73	88	30.7	23.3	39.8	8.3	6.3	1.2	12.3	5.5
" 74-76	33	31.0	17.7	46.0	14.1	12.0	4.0	21.0	8.5
" 77-83	119	32.0	24.0	42.2	9.1	9.7	1.2	15.2	7.0
" 84-89	18	26.5	14.0	37.0	11.5	7.5	-3.0	9.2	6.1
" 90-94	65	34.4	22.2	46.0	11.9	10.3	3.6	22.2	9.3
" 95	28	36.5	27.5	43.5	8.0	4.2	-4.5	23.5	14.0
" 24, 29, 96, 99	65	30.7	18.4	38.4	10.0	5.6	1.6	10.4	4.4
	1991								

The researcher's guess is that the apparent negative results are due to the many unfortunate experiences with "so-called" MIS; a hardware-oriented, "paper-producing" procedure imposed upon them by EDP specialists. Reference to comments of respondents which are quoted in Chapter 4 supports this view. What is not proven is whether experience with a well conceived, relevant and successfully functioning MIS would have a positive influence on user-managers' attitudes.

By Training Index:

The tabulation of respondents by recent management training (Table 5.3) shows that, according to the criteria adopted, 1275 of the 1991 respondents were designated as having "little or none". Because the classification was by "management" training, technical courses were given little weight, although computer and MIS courses tended to increase a respondent's index. To be classified as "a great deal", the respondent would have to report recent training which might approximate an MBA program and, accordingly, only 12 respondents were assigned an index of 3.

The impact of management training on respondents is quite clear and direct. From a level well below the total medians (29.7 and 7.0) the medians for each factor increase steadily as the level of recent training increases. Apparantly, management training has a definite effect in expanding both perceived I.S. needs and perceived positive effects from MIS. Organizations contemplating MIS development should consider management (not technical) training programs for their middle managers.

By Organizations:

Median needs-scores and effects-scores are both significantly different when respondents are grouped into their separate organizations. Respondents from the CIM survey are classified as one organization for this analysis (see Chapter 6 for the CIM results by branch) and Table 5.6 shows that CIM scores approximate the total-study medians of 29.7 and 7.0. Three organizations' medians are relatively high for both need-scores and effects-scores:

	Needs	Effects
Organization 90-94	34.4	10.3
Organization 77-83	32.0	9.7
Organization 74-76	31.0	12.0

and three organization's medians are relatively low:

	Needs	Effects
Organization 26	25.5	6.2
Organization 43-67	26.3	4.7
Organization 28	28.0	4.2

Two organizations exhibit significant inconsistencies between the two attitude factors; organization 95 has the high median need-score (36.5) and the low median effects-score (4.2), while conversely, organization 39-42 is low on the median needs-score (28.7) but high on the median effects-score (8.2). Reference to the individual organization reports (Chapter 6) helps explain these results.

It appears that the organizational environment has a significant impact on middle managers' attitudes towards MIS. All eight organizations referred to above appear to have a relatively high degree of MIS development and the effects on attitudes seem to be either positive or negative. These results support the chapter 4 contention that MIS development should be well-planned and executed. Successful development fosters positive attitudes but, on the other hand, unsuccessful development fosters negative attitudes. This is perhaps a fairly obvious comment to make, but the empirical verification from this study serves as good reinforcement to the statement.

Organization 95 is an example of the results of unfortunate MIS experience. Although perceived information needs are still high, the expected effects of MIS are much less positive than in other organizations. Perhaps organization 39-42 is the counter-example, where needs have been generally well-satisfied and the expected positive effects of MIS are relatively high.

TABLE 5.6 (Cont'd)

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By province									
Newfoundland	8	18.5	14.5	27.5	6.5	2.5	.2	12.5	6.2
Nova Scotia	61	29.0	23.3	35.7	6.2	6.3	1.7	13.2	5.7
P.E.I.	5	20.0	13.0	27.0	7.0	-3.0	-12.0	1.0	6.5
New Brunswick	22	32.2	29.7	41.7	6.0	6.0	1.2	12.2	5.5
Quebec	156	33.2	22.9	43.5	10.3	11.2	3.5	20.3	8.4
Ontario	1445	30.0	20.5	40.2	9.8	7.0	1.0	15.5	7.2
Manitoba	101	27.4	21.0	39.4	9.2	6.2	.1	11.7	5.8
Saskatchewan	28	26.5	20.5	33.0	6.2	5.5	1.0	18.5	8.7
Alberta	63	28.2	18.7	37.0	9.1	6.4	2.0	13.0	5.5
British Columbia	102	25.2	18.3	32.0	6.8	4.5	-.3	12.2	6.3
	1991								
By organization type									
Retailing	24	23.5	16.5	30.5	7.0	5.2	.5	17.5	8.5
Other distribution	31	31.2	22.2	51.0	14.4	9.0	2.0	17.3	7.7
Manufacturing	448	30.7	21.1	40.8	9.8	8.1	1.4	16.3	7.4
Federal Government	1133	29.2	20.4	38.9	9.3	6.7	.9	15.0	7.0
Provincial Government	13	37.0	21.0	41.0	10.0	6.0	1.7	12.0	5.1
Municipal Government	7	18.0	14.0	53.0	19.5	6.0	3.0	15.0	6.0
Education	12	44.5	30.5	49.5	9.5	11.5	5.0	23.5	9.2
Other	23	27.0	17.0	40.0	11.5	6.0	-2.7	9.3	6.0
Public utilities	177	31.0	18.7	40.0	10.6	6.0	.2	14.6	7.2
Research	67	26.7	18.3	43.0	12.3	7.1	2.5	16.6	7.2
Transportation	9	27.2	23.0	33.0	5.0	13.0	6.0	26.7	10.3
Communications	42	35.0	27.0	43.2	8.1	6.2	.7	25.0	12.2
Finance, banking	5	25.0	18.0	42.0	12.0	10.0	9.0	13.0	2.0
	1991								

By Province:

Reference to the median scores by province of the respondent (Table 5.6) is interesting. Quebec has the high score for both perceived needs and perceived positive effects. Ontario is right on the total-study medians of 29.7 and 7.0, as might be expected due to the fact that approximately three quarters of respondents come from Ontario. Prince Edward Island is low for both factors, but this may not be significant because of the small representation from that province (5 respondents). New Brunswick is the one province where the two median scores are quite inconsistent; high for perceived needs (median = 32.2) and low for perceived effects (median = 6.0). The one generalization which can be made is that some geographically isolated provinces (Newfoundland, Saskatchewan, British Columbia) exhibit relatively low scores on both factors. This would support the contention that knowledge of and experience with the newer systems concepts are positive attitude determinants.

By Organization Type:

Respondents' organizations were classified into 13 separate categories and the number of respondents in each type varied widely. The heavy representation of federal government managers has already been mentioned. As can be seen from Table 5.5, there is no significant difference in perceived effects-scores when respondents are classified by organization type, but there are significant differences in perceived needs-scores.

The relatively high need-scores for managers in education and in provincial governments is interesting, but possiblely not meaningful due to the small sample sizes (12 and 13 respondents respectively). The same comment applies to the low needs-score of municipal government managers (7 respondents). It is difficult to make any generalizations about organization-types, except to say that perceived needs seem to vary amongst different types of organizations.

By Management Level:

This study is a survey of middle managers (as defined in Chapter 3) who are users of the information system. Inevitably, some replies were received from persons who did not fit the definition for middle managers and it had to be decided whether or not to include these responses. The decision was to include the few "non-middle managers", give them a separate coding, and then see if their scores were significantly

TABLE 5.6 (Cont'd)

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By management level									
Top executive	69	28.0	19.2	41.7	11.2	4.4	.8	7.0	3.1
Middle management	1857	29.7	20.5	39.8	9.6	7.1	1.0	15.4	7.2
Lower management	43	30.4	21.0	40.7	9.9	11.7	1.0	20.0	9.5
Others	22	24.5	12.0	30.7	13.9	9.0	2.0	19.2	8.6
	1991								

different from the middle managers. Table 5.5 indicates that median effects-scores do exhibit significant differences.

Note that top managers score relatively low on both factors. It is possible that top managers' expressed lower needs for information development are due to the fact that many of their decisions are unique and intuitive, so that a better formal I.S. is not perceived as being a strong need. The low perceived effects-score could be due to the fact that top managers do not expect impacts from MIS development. This expectation is consistent with current experience and predictions. On the other hand, the generally less positive scores by top management could be interpreted as support for some of the criticisms voiced about top management by respondent middle managers (see Chapter 4).

The Non-significant Dimensions:

Before closing the discussion of experience/familiarity dimensions, brief consideration should be given to dimensions where statistical analysis did not reveal significant differences between groups. The size of the respondent's organization does not appear to be a determinant of attitude scores, contrary to the researcher's prediction. This may be because the new technology and concepts are now available and feasible for small as well as large organizations.

Computer and systems experience was predicted to be a positive influence on attitudes and yet the results show no significant difference in scores when respondents are classified on this dimension. These results run counter to the notion of computer and systems managers who are intent upon computerizing everything in sight because of their "tunnel vision" and their "empire-building" aspirations. Perhaps "managers are managers", independent of their computer/systems experience, and their perceptions of I.S. needs and MIS impacts are conditioned by other factors.

Demands for more intensive user participation in MIS development are clearly evident in respondents' comments (Chapter 4), although the statistical testing indicates that the participation index does not appear to be a significant attitude determinant. The tabulation by the participation index (Table 5.3) shows that almost 80% of the respondents felt that the user-specialist balance in systems development should be 50-50 (1095 respondents), or even higher for the users (481 respondents). These figures support the Chapter 3 recommendation for a more intensive and effective participation in MIS development by the user managers.

The survey results presented in this chapter are subject to interpretations which may differ from those presented. The researcher's interpretations are, however, conditioned heavily by comments from and contacts with managers who participated in the study. Readers from participating organizations will want to compare these total study results with the results of their own organization, which are presented in the next chapter.

CHAPTER SIX

REPORTS ON INDIVIDUAL ORGANIZATIONS

6.1 INTRODUCTION

This chapter contains the reports on the Canadian Institute of Management and the sixteen other organizations who participated in the study. The sixteen organizational reports are largely repetitive and it is evident that most readers will refer only to the reports of organizations in which they have an interest. All reports are included as a chapter for completeness and availability of the data to other researchers.

The chapter is less readable than it could be, because organizations are identified only by number. Multiple numbers are used where necessary for coding internal divisions of some organizations.

In many instances, general comments are made about information systems development in particular organizations. The comments are made on the basis of the researcher's impressions from limited contacts with the organizations and from comments by respondents from the organizations. Readers from each organization can best judge whether the general comments actually reflect the state of their MIS development and correcting or substantiating comments are invited.

The individual reports refer back to the total-study results. The assumptions, rationale, and methodology which have been articulated in the total-study are not repeated in this chapter. For these reasons, the individual reports may not be clear without reference to at least parts of the total-study.

6.2 REPORT ON THE CANADIAN INSTITUTE OF MANAGEMENT

The Organization:

The Canadian Institute of Management (formally the Canadian Industrial Management Association) is active across Canada, with 23 branches from Halifax to Vancouver and the National Council office in Toronto. Due to the growing number of "non-industrial" managers seeking enrolment for training and other CIM activities, the Institute has opened its doors to managers in other major spheres, such as finance, government, and education. Although industrial manager enrolment is still the CIM's backbone, the heterogeneous nature of the membership can be inferred from the tabulation of respondents shown in Table 6.2.1. In the tabulation by CIM branch, some branches were combined (roughly geographically) because of the small number of responses.

The Results:

The 640 CIM members who responded to the survey indicate a definite perceived need for information systems development in their organizations. The median need-score for the CIM group of 30.2 is very close to the median score for the total study of 29.7.

The CIM median score for the perceived effects of MIS development is somewhat more positive than the total study score; 7.9 compared to 7.0. This more positive view of the impacts of MIS should not be considered too significant, because some individual organizations (see the reports which follow) have much higher median effects-scores (as high as 12.0).

Analysis by various aspects of the respondents' experience and familiarity with MIS was made in 13 different dimensions and the results are shown in Table 6.2.2. Differences in attitude scores are not statistically significant when respondents are grouped according to seven dimensions:

- service, present position
- service in total
- computer/systems experience
- participation index
- CIM branches
- type of organization
- size of respondent's organization

TABLE 6.2.1

Tabulation of Respondents by Experience/Familiarity Dimensions

	Group	Count
1) By job functions:		
Engineering	0	40
Production	1	199
Sales, advertising, marketing	2	73
Finance, accounting	3	40
Personnel, training	4	30
Purchasing	5	35
Research & development	6	43
Systems, EDP, computer operations	7	28
General administration	8	95
Other:	9	43
Other: security & maintenance	9(2)	6
Other: quality & materials control	9(3)	8
		640
2) By service: present position:		
Short (under 3 yrs)	1	223
Medium (3 to 10 yrs)	2	366
Long (over 10 yrs)	3	51
		640
3) By service: present organization:		
Short	1	84
Medium	2	298
Long	3	258
		640
4) By service: total:		
Short	1	18
Medium	2	177
Long	3	445
		640
5) By computer/systems experience:		
Little or none	1	429
Some	2	150
Considerable	3	61
		640

TABLE 6.2.1 (Cont'd)

Tabulation of Respondents by Experience/Familiarity Dimensions

	Group	Count
6) By positive systems change:		
Little or none	1	341
Some	2	217
Considerable	3	82
		640
7) By participation:		
Low	1	146
Medium	2	330
High	3	164
		640
8) By MIS development:		
Low	1	460
Medium	2	153
High	3	27
		640
9) By recent management training:		
Little or none	0	226
Some	1	275
Considerable	2	131
A great deal	3	8
		640
10) By CIM branches:		
Halifax-Dartmouth; Cape Breton	8,3	24
Montreal; Eastern Townships	12,4	63
Ville Marie	21	21
Ottawa Valley	14	44
Quinte	15	34
Toronto	19	159
Hamilton	9	49
Niagara & District	13	24

TABLE 6.2.1 (Cont'd)

Tabulation of Respondents by Experience/Familiarity Dimensions

	Group	Count
10) By CIM branches: (cont'd)		
Brant-Norfolk	1	16
Grand Valley	6	59
London	11	42
Sarnia & District	16	14
Lake Simcoe & Thunder Bay	10,18	19
Winnipeg & Edmonton	22,5	51
Vancouver	20	21
		640
11) By management level:		
Top executive	1	46
Middle management	2	536
Lower management	3	42
Other	4	16
		640
12) By organization type:		
Retailing	1	24
Other distribution	2	31
Manufacturing	3	445
Federal Government	4	38
Provincial Government	5	12
Municipal Government	6	7
Educational	7	12
Public utility service	9	12
Research	10	8
Transportation	11	9
Communications	12	14
Finance	13	5
Other	8	23
		640
13) By organization size:		
Small (under 200 employees)	1	157
Medium (200-2000)	2	231
Large (over 2000)	3	252
		640

TABLE 6.2.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job Function	19.84	11	<.05*	18.98	11	>.05
2) Service, present position	1.12	2	>.50	2.51	2	>.20
3) Service, present organization	7.52	2	<.05*	6.10	2	<.05*
4) Service in total	1.58	2	>.30	3.42	2	>.10
5) Computer/systems experience	2.29	2	>.30	3.02	2	>.20
6) Information systems change index	.71	2	.70	66.22	2	<.001*
7) Participation index	.62	2	>.70	.24	2	>.80
8) MIS development index	27.97	2	<.001*	27.23	2	<.001*
9) Recent management training	1.99	3	>.50	24.71	3	<.001*
10) CIM branches	12.50	14	>.50	13.41	14	>.30
11) Management level	.46	3	>.90	7.88	3	<.05*
12) Type of organization	18.14	12	>.10	13.24	12	>.30
13) Organization size	4.84	2	>.05	.19	2	>.90

*Indicates significant differences

For example, when respondents are classified into managers with short, medium or long service in their present position, the scores do not vary significantly between the three groups. On the other hand, analysis of six dimensions reveals definite differences in need-scores, effects-scores, or both. Medians and semi-interquartile ranges for these six dimensions are shown in Table 6.2.3 and discussion of these possible determinants of MIS attitudes follows.

By Job Function:

As indicated in the total study analysis (Chapter 5) the researcher is unable to explain the extremely high scores for security/maintenance managers, except to point out that there are only 6 CIM respondents in that category. Engineering, accounting, personnel, and systems/EDP managers are well below the CIM median need-score, while purchasing, production, and other managers are above. This result might occur because the former groups are reasonably well serviced by existing information systems, while the latter groups are not.

Although the median effects-scores may seem to vary upon first inspection, the differences are not significant at the .05 level. In other words, the probability is greater than 5% that the median effects-scores vary among the functional groups simply by chance.

By Service in Present Organization:

Both needs-score and effects-score medians vary significantly when respondents are classified by their length of service in their present organization. Newer service managers exhibit both a higher perception of needs for I.S. development and a higher positive view of the impacts of MIS on their job satisfactions. This result was as predicted by the researcher, because it seems reasonable that longer service incumbents would see less need for and expect less benefits from MIS development.

TABLE 6.2.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By job function:									
Engineering	40	23.0	15.5	33.5	9.0	5.5	-.2	14.5	7.3
Production	199	32.2	21.6	41.3	9.9	8.9	1.4	18.6	8.6
Sales, marketing, advertising	73	29.7	19.7	41.0	10.6	6.4	1.9	13.3	5.7
Finance, accounting	40	26.5	18.2	32.8	7.3	5.0	-.5	11.5	6.0
Personnel, training	30	27.0	19.0	47.0	14.0	3.5	-.2	13.0	6.6
Purchasing	35	31.3	26.7	43.7	8.5	7.2	1.0	20.0	9.5
Research & development	43	30.2	20.9	38.3	8.7	8.3	2.0	15.0	6.5
Systems, EDP, computer operations	28	27.5	22.5	35.5	6.5	8.8	1.5	16.5	7.5
General administration	95	28.9	19.0	40.0	10.5	7.1	2.4	16.0	6.8
Other:	43	35.0	24.0	42.7	9.4	10.6	4.2	17.3	6.5
Other: security & maintenance	6	45.5	39.0	50.2	5.6	32.0	8.0	38.0	15.0
Other: quality & materials control	8	30.5	21.5	39.5	9.0	13.5	6.5	23.5	8.5
	640								
By service: present organization:									
Short (under 3 yrs)	84	35.0	24.1	45.5	10.7	11.3	3.5	21.2	8.8
Medium (3 to 10 yrs)	298	29.6	19.9	39.4	9.8	8.4	1.5	15.8	7.1
Long (over 10 yrs)	258	30.0	20.6	40.7	10.0	6.8	1.5	16.1	7.3
	640								
By information systems change:									
Little or none	341	30.3	19.4	40.7	10.6	4.8	-.4	11.9	6.2
Some	217	30.3	21.2	41.4	10.1	10.7	4.1	18.3	7.1
Considerable	82	29.7	23.0	40.0	8.5	16.0	7.0	25.0	9.0
	640								

By Information Systems Change:

A "considerable" rating on this dimension required that the respondent have both significant and positive change experience and, by these criteria, less than 13% of the CIM respondents were assigned a high rating, Almost 73% of the respondents were given a low rating, indicating either negative (or bad) experiences or a static I.S. environment. These percentages are particularly significant when the results in Table 6.2.3 are examined. Although perceived change does not seem to affect perceived needs, the impact of positive experience on the expected effects of MIS development is clear and direct. Good experiences seem to breed positive attitudes and this conclusion is supported in the total-study results.

By MIS Development Index:

The CIM results on this dimension are consistent with the total-study results. Experience with MIS development seems to foster less positive attitude scores, contrary to the study prediction. The suggested reason for these results is that "MIS experience" reported by the respondents is either automation of clerical routines or an attempt at MIS development which proved to be unsuccessful. It is critical that MIS development should be well-planned and well-executed, because negative experiences result in a definite negative shift in user-manager attitudes.

By Recent Management Training:

In assigning an index for respondents' management training, it was decided to assign recent graduates of the CIM education program a high index. Less-recent graduates and current students were scaled down on consistent basis. Table 6.2.3 shows the direct and significant impact of management training on perceived effects of MIS development. As management training increases, so does the expected positive effects of MIS.

TABLE 6.2.3 (Cont'd)

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By MIS development index:									
Low	460	32.4	21.6	42.4	10.4	9.7	3.1	18.5	7.7
Medium	153	27.1	19.1	35.7	8.3	5.4	-.6	11.3	5.9
High	27	22.7	14.0	29.2	7.6	3.0	.1	11.0	5.4
	640								
By recent management training:									
Little or none	226	29.9	19.7	40.3	10.3	6.0	.1	13.0	6.5
Some	275	29.4	20.1	41.1	10.7	7.9	1.6	16.3	7.4
Considerable	131	31.4	23.2	41.0	8.9	11.1	3.6	22.9	9.7
A great deal	8	32.5	15.5	42.5	13.5	20.5	13.0	26.5	6.7
	640								
By management level:									
Top executive	46	29.5	21.0	42.2	10.6	4.9	.7	11.2	5.2
Middle management	536	30.1	20.5	40.5	10.0	8.1	1.7	16.5	7.4
Lower management	42	30.5	21.0	40.7	9.9	12.0	1.7	20.0	9.1
Other:	16	33.5	14.5	40.5	13.0	11.5	2.5	19.5	8.5
Total CIM	640	30.2	20.6	40.7	10.1	7.9	1.6	16.8	7.6
Total Study	1991	29.7	20.3	39.9	9.8	7.0	1.0	15.4	7.2

By Management Level:

This research was designed as a study of middle managers, however, responses were obtained from a number of CIM members who did not meet the study definition of "middle manager" (see Chapter 3). These responses were identified by code and included in the study in order to see if their scores deviated from the middle managers' scores. As can be seen from Table 6.2.3, needs-scores by management level do not vary significantly, but effects-scores do. The lower expected effects by top managers and higher expected effects by low level management are consistent with the total-study results and with most predictions about MIS's impacts.

Conclusions:

The above results show that the CIM group exhibits less than the total-study variation in attitude scores when respondents are grouped along certain MIS experience/familiarity dimensions (i.e., job function, length of service, I.S. change experience, management training, the type of respondent's organization). This result might lead one to speculate on the homogenizing influence of associations, especially those (such as the CIM) which offer education programs. It should be noted that no significant differences between branches resulted when the respondents were grouped by CIM branch. However, the lack of response, or extremely low response rate from some CIM branches means that the results by branch probably should be disregarded.

In fact, it is not possible to make generalizations about the CIM membership as a whole, due to the low response rate (approximately 12%). The 640 responses from CIM members forms a significant and useful part of the total study (see Chapter 2), but the discussion above with respect to CIM results should properly be construed as relevant to CIM members who responded, not necessarily the membership as a whole.

6.3 REPORT ON ORGANIZATION 24

The Organization and the Response:

Organization 24 is a major federal government department, operating out of Ottawa headquarters and in various parts of Canada. Participation in the study was limited to directors, chiefs, and senior advisors who operate out of Ottawa headquarters, so this point should be kept in mind when interpreting results.

A total of 20 questionnaires were distributed to managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Eleven usable completed questionnaires were received, resulting in a response rate of 55%. Table 6.3.1 is a tabulation of the respondents, grouped in the nine experience dimensions into which they were classified.

The Results for Organization 24:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 37.0, much higher than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 4.0 (below the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This relatively low score could be explained by the fact that the respondents are drawn from high-level, headquarters positions, where MIS development would not be perceived as having a significant impact.

TABLE 6.3.1

Tabulation of Respondents by Experience/Familiarity Dimensions

	Group	Count
1) By service, present position		
Short (less than 3 yrs)	1	7
Medium (3 to 10 yrs)	2	3
Long (over 10 yrs)	3	1
		11
2) By service, present organization		
Short	1	6
Medium	2	1
Long	3	4
		11
3) Service, total		
Short	1	1
Medium	2	0
Long	3	10
		11
4) By computer/systems experience		
Little or none	1	7
Some	2	3
Considerable	3	1
		11
5) By information systems change		
Little or none	1	6
Some	2	4
Considerable	3	1
		11
6) By participation index		
Low	1	2
Medium	2	4
High	3	5
		11

TABLE 6.3.1 (Cont'd)

Tabulation of Respondents by Experience/Familiarity Dimensions

	Group	Count
7) By MIS development index		
Low	1	10
Medium	2	1
High	3	0
		11
8) By recent management training		
Little or none	0	9
Some	1	2
Considerable	2	0
A great deal	3	0
		11
9) By management level		
Top	1	5
Middle	2	6
Lower	3	0
		11

Differences in Scores According to Experience Dimensions:

Analysis was to be made of the attitude scores of the organization's middle managers, classified into groups according to nine different MIS experience/familiarity dimensions. However, due to the small number of respondents from organization 24, analysis was feasible only on the four dimension shown in Table 6.3.2. Note that consolidation of some groups was necessary in order to obtain the minimum count of five for a group. The length of service and management level classifications did not result in significant differences between groupings. The amount of successful information systems change experience has a definite positive effect on the respondents' perception of the effects of MIS development (see Table 6.3.3) and this is consistent with the total-study results.

The results are interesting when respondents are grouped by participation index. First, none of the organization's respondents were assigned a lov index and this indicates that all managers who answered advocate a manager - specialist balance of 50-50, or even higher for the user-manager. The significant difference in scores of "medium" over "high" participators is difficult to explain. Note that, in the total-study, participation index did not appear to be a significant determinant of attitude scores.

A Concluding Note:

Conclusions above are drawn from the 11 usable responses to the questionnaire, but it should be pointed out that answers from the 9 managers who did not respond might be significantly different. Of course, it is clear that this limited sample cannot be expected to be representitive of the organization's middle managers as a whole.

The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development

TABLE 6.3.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Service, present organization	.03	1	>.80	-.00	1	>.99
2) Information systems change index	2.70	1	>.10	4.82	1	<.05*
3) Participation index	7.50	1	<.01*	4.43	1	<.05*
4) Management level	1.20	1	>.2	1.64	1	.20

*Significant difference between groups

TABLE 6.3.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By information system change									
Little or none	6	18.5	17.0	37.0	10.0	1.5	.75	4.0	1.62
Some	5	47.0	46.0	51.0	2.5	11.0	10.0	19.0	4.5
Considerable	0								
	11								
By participation index									
Low	0								
Medium	6	47.5	46.0	56.0	5.0	10.5	6.0	19.0	6.5
High	5	18.0	17.0	20.0	1.5	2.0	1.0	3.0	1.0
	11								
Total Organization	11	37.0	18.0	51.0	16.5	4.0	1.25	11.0	4.9

might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing this organization's scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.4 REPORT ON ORGANIZATION 25

The Organization and the Response:

Organization 25 is a large non-government utility employing approximately 40,000 people. Only middle managers in the Ottawa headquarters region were surveyed so the results should not be over-generalized for the organization as a whole. The Ottawa region itself is a large organization, employing approximately 3,000 people. It was reported to the researcher that no extensive, formal MIS development has been proposed or designed for the organization and this is confirmed in the perception of the respondents (see Table 6.4.1). Some relatively informal attempts have recently been made to develop a retrieval system for information on employee activities, suitable for reporting in media such as the organization's newsletter.

A total of 375 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by two senior officials, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. One hundred and sixty-five usable completed questionnaires were received, resulting in a response rate of 44%. Three questionnaires received were incomplete or otherwise unusable. Table 6.4.1 is a tabulation of the respondents, grouped into the nine experience dimensions along which they were analysed.

The Results for Organization 25:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 30.7, very close to the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

TABLE 6.4.1

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
1) By Job Function		
Engineering	0	28
Production	1	17
Marketing, Advertising	2	18
Finance, Accounting	3	10
Personnel, Training	4	20
Purchasing	5	0
Research & Development	6	8
Systems, EDP, Computer Work	7	16
General Administration	8	29
Other	9	13
Planning, Forecasting	11	6
		165
2) By Service, Present Position		
Short (less than 3 yrs.	1	101
Medium (3 to 10 yrs.)	2	54
Long (over 10 yrs.)	3	10
		165
3) By Service, Present Organization		
Short (less than 3 yrs.)	1	23
Medium (3 to 10 yrs)	2	35
Long (over 10 yrs.)	3	107
		165
4) By Service in Total		
Short (less than 3 yrs.)	1	0
Medium (3 to 10 yrs.)	2	32
Long (over 10 yrs.)	3	133
		165

TABLE 6.4.1 (Cont'd)

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
5) By Computer/System Experience		
Little or none	1	104
Some	2	35
Considerable	3	26
		165
6) By Information System Change		
Little or none	1	99
Some	2	47
Considerable	3	19
		165
7) By Participation Index		
Low	1	52
Medium	2	56
High	3	57
		165
8) By MIS Development Index		
Low	1	128
Medium	2	32
High	3	5
		165
9) By Recent Management Training		
Little or none	0	142
Some	1	23
Considerable	2	0
A great deal	3	0
		165

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 6.1 (close to the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. Significantly, many managers recorded zero difference scores between "is now" and "under MIS" (approximately 10% of the respondents scored zero for all 15 questions). This result is similar to that of the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to nine different MIS experience/familiarity dimensions. Table 6.4.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the effects-scores are present only when the organization's respondents are classified in four dimensions:

1) Job function
2) Length of service in the organization
3) Information systems change index
4) Participation in I.S. development index

For the needs-scores, differences are significant only when respondents are grouped by the information systems change index.

Marketing, sales and advertising respondents showed a relatively high positive effects-score (median = 15.0, see Table 6.4.3). Personnel, training respondents scored very low (perhaps one-half scored negative) perceptions of the effects of MIS (median = .5). Recalling that the organization's median was 6.1, these alternate high and low expectations on the part of marketing and personnel are interesting.

Managers who have short service in the organization showed the expectation of little or negative effects from the development of MIS while longer-service managers showed positive effects. This result runs counter to the researcher's prediction and to the notion of old-time employees who resist systems change.

A similar counter-intuitive result is found when respondents are grouped by their participation (or expressed desire to participate) in information systems development. The low participators score high (median = 11.0, see Table 6.4.3) on

TABLE 6.4.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	11.14	9	>.20	21.98	9	.01*
2) Service, present position	.08	2	>.70	1.19	2	>.20
3) Service, present organization	.48	2	>.70	8.48	2	<.02*
4) Service, in total	1.83	1	>.10	.83	1	>.30
5) Computer/systems experience	4.63	2	.10	4.60	2	.10
6) Information systems change index	8.96	2	<.02*	20.74	2	<.001*
7) Participation index	2.05	2	>.30	9.68	2	<.01*
8) MIS development index	1.16	2	>.50	.77	2	>.50
9) Training index	.10	1	>.70	.14	1	>.70

*Significant differences between groups

TABLE 6.4.3

Medians, Quartiles and Semi-Inter-Quartile Ranges On

Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q	3rd Q	Range	Medians	1st Q	3rd Q	Range
1) By: Job Functions									
Engineering	28	29.0	15.5	37.2	10.8	4.5	-.5	7.5	4.0
Production	17	32.2	19.9	39.0	10.0	4.2	-.3	16.0	8.2
Marketing, Advertising	18	36.5	27.0	51.7	12.4	15.0	8.2	27.0	9.4
Finance, Accounting	10	32.5	27.2	40.0	6.4	6.5	0.0	10.0	5.0
Personnel, Training	20	24.5	18.0	34.5	8.2	.5	-2.0	5.5	3.7
Research & Development	8	30.5	18.5	39.5	10.5	6.5	4.5	13.5	4.5
Systems, EDP, Computer Work	16	28.5	10.5	37.0	13.2	6.5	.5	13.5	6.5
General Administration	29	27.0	13.0	40.0	13.5	8.0	.2	13.2	6.5
Other	13	38.0	27.0	43.0	8.0	7.7	4.0	14.7	5.4
Planning, Forecasting	6	22.5	17.0	35.0	9.0	6.5	5.7	13.0	3.6
	165								
2) By: Service in the Organization									
Short (less than 3 yrs.)	23	28.0	10.0	39.2	14.6	.7	-10.0	6.3	8.2
Medium (3 to 10 yrs.)	35	30.2	18.0	41.2	11.6	7.7	1.0	16.0	7.5
Long (over 10 yrs.)	107	31.0	19.0	39.7	10.4	6.6	.4	14.9	7.2
	165								
Total Organization	165	30.7	18.7	39.9	10.6	6.1	.2	14.0	6.9

TABLE 6.4.3 (Cont'd)

Medians, Quartiles and Semi-Inter-Quartile Ranges On

Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q	3rd Q	IQ Range	Medians	1st Q	3rd Q	IQ Range
6) By IS Change Index									
Little change	99	27.4	18.3	38.0	9.8	3.#	.7	9.9	5.3
Some	47	31.7	16.7	40.0	11.6	8.7	3.7	15.7	6.0
Significant	19	40.7	32.0	51.0	9.5	15.0	6.0	28.0	11.0
	165								
7) By Participation Index									
Little participation	52	32.5	26.2	39.0	6.4	11.0	5.5	16.5	5.5
Some	56	28.5	18.5	40.0	10.7	4.7	.7	8.5	3.9
Significant	57	26.9	16.7	40.7	12.0	4.2	.3	14.0	7.2
	165								
By Total Organization	165	30.7	18.7	39.9	10.6	6.1	.2	14.0	6.9

expected positive effects from MIS development, while the high participators score low (median = 4.2). Perhaps some managers believe that the systems experts can perform wonders for them while others (who have participated in some systems development) realize that progress is generally slow and painful.

As predicted, attitudes regarding the effects of MIS become more positive as the degree of recent successful information systems change increases. This is consistent with the perceived needs-scores and with the total-study results, where positive change seems to lead to more positive MIS attitudes.

A Concluding Note:

Conclusions above are drawn from the 165 usable responses to the questionnaire, but it should be pointed out that answers from the 210 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing this organization's scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.5 REPORT ON ORGANIZATION 26

The Organization and the Response:

Organization 26 is a large, non-government research operation located near Ottawa. The primary function is systems and product research for production and public utilities organizations. Organization 26 has undertaken significant development in MIS for its own operation. The payroll, personnel sub-system has been in operation for approximately one year and a financial information sub-system is almost ready for implementation. Broad plans for MIS have been formulated and detailed development is proceeding in accordance with the over-all plan.

A total of 280 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Fifty-eight usable completed questionnaires were received, resulting in a response rate of 21%. Table 6.5.1 is a tabulation of the respondents, grouped in the 10 experience dimensions along which they were analysed. The low response rate can be partially explained by the fact that many potential respondents were mainly research-oriented and did not find the "general management" questionnaire relevant to them.

The Results for Organization 26:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 25.5, somewhat lower to the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development. The relatively low median score for I.S. development can probably be explained by the specialized information needs of research managers and by the fact that the organization has already undertaken significant work on their information system.

TABLE 6.5.1

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
1) By job function		
Research, development	6	33
System, EDP, computers	7	5
General administration	8	8
Other	9	12
		58
2) By service, present position		
Short (less than 3 years)	1	35
Medium (3 to 10 years)	2	23
Long (over 10 years)	3	0
		58
3) By service, present organization		
Short (less than 3 years)	1	11
Medium (3 to 10 years)	2	36
Long (over 10 years)	3	11
		58
4) By service in total		
Short (less than 3 years)	1	0
Medium (3 to 10 years)	2	19
Long (over 10 years)	3	39
		58
5) By computer/systems experience		
Little or none	1	23
Some	2	17
Considerable	3	18
		58
6) By information systems change		
Little or none	1	31
Some	2	27
Considerable	3	0
		58

TABLE 6.5.1 (Cont'd)

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
7) By participation index		
Low	1	10
Medium	2	39
High	3	9
		58
8) By MIS development index		
Low	1	49
Medium	2	9
High	3	0
		58
9) By recent management training		
Little or none	0	42
Some	1	16
Considerable	2	0
A great deal	3	0
		58
10) By province		
P.Q.	5	5
Ontario	6	53
		58

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 6.2 (close to the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This result is similar to that of the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers. There is less consistency in this organization's respondents' answers on the expected effects than in the total-study results. Although organization 26's aggregated results show expected positive effects, answers to 3 of the 15 questions indicate that (at the .05 level) respondents expect no real impacts from MIS development.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to 10 different MIS experience/familiarity dimensions. Table 6.5.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the needs-scores result only when respondents are classified by job function and in effects-scores only when classified by information systems change index.

Table 6.5.3 indicates that systems, EDP, computer, and other managers perceive a higher degree of need for I.S. development than do research and general administrative managers in the organization. This result may not be very significant, due to the small number of respondents in the former categories.

Inspite of the MIS development work referred to above, answers to Section C of the questionnaire indicated that the information systems change index for respondents was low-to-moderate. Never-the-less, the positive and direct impact of successful change (noted in the total-study report) is evident from Table 6.5.3, especially in the perceived effects of MIS.

TABLE 6.5.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	8.90	3	<.05*	1.62	3	>.50
2) Service, present position	.75	1	>.30	0	1	>.99
3) Service, present organization	1.49	2	>.30	2.43	2	>.20
4) Service in total	.12	1	>.70	.47	1	>.30
5) Computer/systems experience	.17	2	>.50	5.53	2	>.05
6) Information systems change index	.09	1	>.70	6.91	1	<.01*
7) Participation index	.78	2	>.50	2.99	2	>.05
8) MIS development index	.01	1	>.90	.58	1	>.30
9) Recent management training	.15	1	.70	1.34	1	>.20
10) Province	3.05	1	>.05	.03	1	>.80

*Significant differences between groups.

TABLE 6.5.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
1) By job function									
Research, development	33	24.2	18.0	32.2	7.1	5.4	1.2	16.0	7.4
Systems, EDP, computer work	5	42.0	17.0	50.0	16.5	10.0	4.2	21.0	8.4
General administration	8	19.5	15.5	24.5	4.5	6.5	.5	7.5	3.5
Other	12	35.0	29.5	52.0	11.2	3.5	-.5	9.5	5.0
	58								
6) By information system change									
Little or none	31	25.0	17.0	48.0	15.5	4.0	.0	9.0	4.5
Some	27	29.0	18.7	43.0	12.1	10.2	5.0	20.0	7.5
Considerable	0								
	58								
Total Organization	58	25.5	18.7	44.0	12.7	6.2	1.3	15.2	7.0

A Concluding Note:

Conclusions above are drawn from the 58 usable responses to the questionnaire, but it should be pointed out that answers from the 222 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing this organization's scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.6 REPORT ON ORGANIZATION 27

The Organization and the Response:

Organization 27 is a major federal government department, operating primarily out of Ottawa. The organization is operating an "MIS", which is primarily a computerized reporting system producing periodic reports on the status of the projects along which virtually all the organization's activities are structured. Computers are used extensively in this department in connection with their main functional activities.

A total of 150 questionnaires were distributed to a sample of the large middle management group via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by the senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Seventy-five usable completed questionnaires were received, resulting in a response rate of 50%. Table 6.6.1 is a tabulation of the respondents, grouped in the nine experience dimensions along which they were analysed.

The Results for Organization 27:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 32.0, above the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

TABLE 6.6.1

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Production	1	6
Research, development	6	29
Systems, EDP, computer work	7	21
General administration	8	11
Other	9	8
		75
2) By service, present position:		
Short (under 3 yrs.)	1	29
Medium (3 to 10 yrs.)	2	39
Long (over 10 yrs.)	3	7
		75
3) By service, present organization:		
Short (under 3 yrs.)	1	12
Medium (3 to 10 yrs.)	2	39
Long (over 10 yrs.)	3	24
		75
4) By service in total:		
Short (under 3 yrs.)	1	0
Medium (3 to 10 yrs.)	2	20
Long (over 10 yrs.)	3	55
		75
5) By computer/systems experience:		
Little or none	1	25
Some	2	19
Considerable	3	31
		75
6) By information systems change:		
Little or none	1	41
Some	2	24
Considerable	3	10
		75

TABLE 6.6.1 (Cont'd)

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
7) By participation index:		
Low	1	10
Medium	2	36
High	3	29
		75
8) By MIS development index:		
Low	1	45
Medium	2	30
High	3	0
		75
9) By recent management training:		
Little or none	0	57
Some	1	18
Considerable	2	0
A great deal	3	0
		75

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 7.2 (close to the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfaction obtained by the managers. Significantly, many managers recorded zero difference scores between "is now" and "under MIS" (approximately 15% of the respondents scored zero for all 15 questions). This result is similar to that of the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to nine different MIS experience/familiarity dimensions. Table 6.6.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the effects-scores are present only when the organization's respondents are classified in two dimensions; information systems change index and recent management training. Table 6.6.3 presents medians and ranges along these two dimensions. As predicted, attitudes towards MIS become more positive as the degree of recent successful information systems change increases and as the amount of recent managerial training increases. This is consistent with the total study results.

A Concluding Note:

Conclusions above are drawn from the 75 usable responses to the questionnaire, but it should be pointed out that answers from the 75 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

TABLE 6.6.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
By:	H	d.f.	p	H	d.f.	p
1) Job function	5.84	4	>.20	1.16	4	>.80
2) Service, present position	.06	2	>.95	.10	2	.95
3) Service, present organization	.09	2	>.95	1.34	2	>.50
4) Service in total	.15	1	.70	1.97	1	>.10
5) Computer/systems experience	1.25	2	>.50	.09	2	>.95
6) Information systems change index	7.75	2	<.05*	10.04	2	<.01*
7) Participation Index	1.52	2	>.30	3.47	2	>.10
8) MIS development index	.67	1	>.70	.01	1	>.99
9) Recent management training	1.86	1	>.10	12.38	1	<.001*

*Significant differences between groups

TABLE 6.6.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By information systems change									
1. Little or none	41	25.0	17.7	38.3	10.3	4.1	1.0	10.3	4.7
2. Some	24	33.5	22.5	44.5	11.0	8.5	3.0	17.0	7.0
3. Considerable	10	38.5	33.0	49.0	8.0	16.5	13.0	39.0	13.0
	75								
By recent management training									
0. Little or none	57	29.7	21.0	39.2	9.1	4.7	.7	12.0	5.7
1. Some	18	38.5	21.0	49.0	14.0	18.5	9.7	39.0	14.7
2. Considerable	0								
3. A great deal	0								
	75								
For Total Organization	75	32.0	20.9	43.2	11.1	7.2	1.7	17.2	7.7

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing the scores to those of other organizations and to the total-study results and relationships. The researche wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensati to the organization and to the responding managers.

6.7 REPORT ON ORGANIZATION 28

The Organization and the Response:

Organization 28 is a major federal government department, operating primarily out of Ottawa. Questionnaires were sent to managers in the Services and Investigation and Research branches, as well as the two main functional branches of the department. It was intended to classify results according to the above four areas, but the response was not large enough to make inter-branch analysis possible.

A total of 44 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Fifteen usable completed questionnaires were received, resulting in a response rate of 34%. Table 6.7.1 is a tabulation of the respondents, grouped in the nine experience dimensions along which they were analysed.

The Results for Organization 28:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 28.0, well below the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation on systems development.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of some effects. The median score of 4.2, however, is the lowest positive score obtained in any of the organizations studied. Most of the respondents reported little expected effect from MIS development and many reported no expected effect (negative expected effects were reported in some answers to 5 questions).

TABLE 6.7.1

Tabulation of Respondents by Experience/familiarity Dimensions

	Group	Count
1) By job function:		
Personnel, training	4	1
Research, development	6	2
General administration	8	12
		15
2) By present position:		
Short (less than 3 yrs)	1	3
Medium (3 to 10 yrs)	2	11
Long (over 10 yrs)	3	1
		15
3) By present organization:		
Short	1	2
Medium	2	7
Long	3	6
		15
4) By total service:		
Short	1	1
Medium	2	1
Long	3	13
		15
5) By computer/systems experience:		
Little or none	1	11
Some	2	2
Considerable	3	2
		15
6) By information systems change:		
Little or none	1	8
Some	2	6
Considerable	3	1
		15

TABLE 6.7.1 (Cont'd)

Tabulation of Respondents by Experience/Familiarity Dimensions

	Group	Count
7) By participation index:		
Low	1	0
Medium	2	6
High	3	9
		15
8) By MIS development:		
Low	1	10
Medium	2	5
High	3	0
		15
9) By recent management training:		
Little or none	0	11
Some	1	3
Considerable	2	1
A great deal	3	
		15

Differences in Scores According to Experience Dimensions:

Analysis of the attitude scores of the organization's middle managers, classified into groups according to MIS experience/familiarity dimensions, was possible on only four dimensions, due to the small sample. These analyses are presented in Table 6.7.2 and it should be pointed out that respondents had to be reclassified from three into two groups (the statistical test requires at least five in a group). Table 6.7.2 indicates only one situation where differences between groups are significant; the needs-scores according to MIS development index. This dimension is further analysed in Table 6.7.3 and, as with the total-study and the CIM results, the direction of effects-scores is more negative as MIS experience increases.

A Concluding Note:

Conclusions above are drawn from the 15 usable responses to the questionnaire, but it should be pointed out that answers from the 29 managers who did not respond might be significantly different. Also, the relatively low attitude scores from the respondents from this organization may be due to the limited sample and not representative of organization's total middle management population.

The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers' the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

TABLE 6.7.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Service, present organization	.12	1	>.70	.14	1	>.70
2) Information systems change index	.12	1	>.70	.05	1	>.80
3) Participation index	3.12	1	>.05	.79	1	>.30
4) MIS development index	.06	1	>.80	7.02	1	<.01*

*Significant differences between groups

TABLE 6.7.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
MIS development index									
Low	10	24.5	19.0	46.0	13.5	7.0	4.0	11.0	3.5
Medium	5	29.0	22.0	36.0	7.0	.7	.2	1.2	.5
High									
Total Organization	15	28.0	19.0	38.0	9.5	4.25	1.0	8.0	3.5

6.8 REPORT ON ORGANIZATION 29

The Organization and the Response:

Organization 29 is a major federal government department which agreed to a relatively limited participation in the study. A total of 25 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Fourteen usable completed questionnaires were received, resulting in a response rate of 56%. Table 6.8.1 is a tabulation of the respondents, grouped into the four experience dimensions which were feasible for analysis of the respondents.

The Results for Organization 29:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the response from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 29.5, very close to the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of some effects. The median score of 4.5 (lower than the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This relatively low score on expected effects of MIS may not be significant, due to the small number of responses from organization 29 middle managers.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to four different MIS experience/familiarity dimensions. Table 6.8.2 indicates a greater degree of homogeneity in scores across these dimensions

TABLE 6.8.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
General administration	8	5
Others	9	9
		14
2) By present organization:		
Short (under 3 yrs.)	1	8
Medium (3 to 10 yrs.)	2	6
Long (over 10 yrs.)	3	0
		14
3) By computer/systems experience:		
Little or none	1	7
Some	2	5
Considerable	3	2
		14
4) By positive change index:		
Little or none	1	9
Some	2	4
Considerable	3	1
		14

TABLE 6.8.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	.11	1	>.70	1.97	1	>.10
2) Service, present organization	1.84	1	>.10	1.68	1	>.10
3) Computer/systems experience	.10	1	>.70	1.64	1	.20
4) Information systems change index	.22	1	>.50	1.29	1	>.20

than exists in the total-study analysis. Significant differences in either the needs-scores or effects-scores are not present, contrary to the total-study results, where all of these dimensions (except the third) revealed significant differences in scores. Again, these results may not be representitive of the middle manager population of organization 29.

A Concluding Note:

The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.9 REPORT ON ORGANIZATION 30-38

The Organization and the Response:

Organization 30-38 is a major federal government department, operating out of Ottawa Headquarters, and in all provinces of Canada. It is the researcher's impression that the concept of MIS has not been publicized or implemented to any significance in this department and this impression seems to be supported in the responses of participating managers (see Table 6.9.1). Questionnaires were sent to virtually all members of the organization who were classified at middle management levels. Accordingly, it is possible to analyse respondents by branches or divisions within the department. (This inter-organization breakdown explains the multiple number for the department).

A total of 542 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. One hundred and thirty-three usable completed questionnaires were received, resulting in a response rate of 24%. Table 6.9.1 is a tabulation of the respondents, grouped in the eleven experience dimensions along which they were analysed.

The Results for Organization 30-38:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 29.6, very close to the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 7.2 (close to the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This result is similar to that of the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

TABLE 6.9.1

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Production	1	5
Personnel, training	4	18
Research & development	6	28
Systems, EDP, computer work	7	6
General administration	8	61
Other	9	15
		133
2) By service, present position:		
Short (less than 3 yrs.)	1	44
Medium (3 to 10 yrs.)	2	68
Long (over 10 yrs.)	3	21
		133
3) By service, present organization:		
Short (less than 3 yrs.)	1	13
Medium (3 to 10 yrs.)	2	31
Long (over 10 yrs.)	3	89
		133
4) By service in total:		
Short (less than 3 yrs.)	1	0
Medium (3 to 10 yrs.)	2	23
Long (over 10 yrs.)	3	110
		133
5) By computer/systems experience:		
Little or none	1	96
Some	2	27
Considerable	3	10
		133
6) By information change index:		
Little or none	1	69
Some	2	51
Considerable	3	13
		133

TABLE 6.9.1 (Cont'd)

Tabulation of Respondents According to Experience/Familiarity Dimensions

	Group	Count
7) By participation index:		
Low	1	23
Medium	2	85
High	3	25
		133
8) By MIS development index:		
Low	1	117
Medium	2	16
High	3	0
		133
9) By recent management training:		
Little or none	0	110
Some	1	23
Considerable	2	0
A great deal	3	0
		133
10) By internal organizations:		
Finance, administration	31	6
Research	32	35
Internal organization #6	33	7
Internal organization #8	35	9
Production, Marketing	36	49
Personnel	37	17
Economics	38	10
		133
11) By province:		
Not designated	0	8
New Brunswick	4	7
Quebec	5	6
Ontario	6	87
Manitoba	7	11
Saskatchewan	8	8
Alberta	9	6
		133

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to eleven different MIS experience/familiarity dimensions. Table 6.9.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the needs-scores are present only when the organization's respondents are classified by job function and by internal organizations. Significant differences in effects-scores are present only when respondents are classified by information systems change index and by recent management training.

Table 6.9.3 indicates that production managers perceive a relatively low need for I.S. development (median = 19.0), while personnel, training managers see a relatively high need (median = 33.5). Perceptions of the expected effects of MIS seem to follow the needs-scores, although differences between functional groups are not significant (at the .05 level) for effects-scores.

As predicted, attitudes regarding the effects of MIS become more positive as the degree of recent successful information systems change increases. This is consistent with the perceived needs-scores and with the total-study results, where positive change seems to lead to more positive MIS attitudes. Similarly, the direct, positive influence of recent management training on the expected effects of MIS is evident in this organization's results.

Analysis of needs-scores by internal organizations shows significant differences in the expected effects of I.S. development. Note that internal organization names have been disguised where necessary (by use of coding supplied by the organization) to retain the promised confidentiality of results. Internal organization #6 is low (median = 13.3) and personnel, training is high (median = 39.0) on perceived needs for I.S. development, when compared to the total organization needs-score (median = 29.6). Members of organization 30-38 can probably supply reasons for internal differences in attitude scores.

TABLE 6.9.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	12.89	5	<.05*	2.28	5	>.80
2) Service, present position	2.75	2	>.20	2.74	2	>.20
3) Service, present organization	.95	2	>.50	3.99	2	>.10
4) Service in total	.52	1	>.30	1.49	1	>.10
5) Computer/systems experience	2.50	2	>.20	3.84	2	>.10
6) Information systems change index	1.34	2	>.50	43.78	2	<.001*
7) Participation index	2.88	2	>.20	5.47	2	>.05
8) MIS development index	.71	1	>.30	.92	1	>.30
9) Recent management training	3.07	1	>.05	12.46	1	<.001*
10) Internal organization	13.61	6	<.05*	8.27	6	>.20
11) Province	2.20	6	.90	8.32	6	>.20

*Significant differences between groups

TABLE 6.9.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By job function									
Production	5	19.0	11.0	26.0	7.5	.2	-.2	8.0	4.1
Personnel, training	18	33.5	30.3	48.7	9.2	8.5	3.0	15.2	6.1
Research & development	28	28.5	12.5	39.5	13.5	6.5	.5	15.5	7.5
Systems, EDP, computer work	6	24.5	22.0	30.0	4.0	4.5	3.7	23.0	9.6
General administration	61	28.7	20.2	39.0	9.4	6.8	.7	12.7	6.0
Other	15	28.0	21.7	41.0	9.7	9.0	-1.0	26.0	13.5
	133								
By information systems change									
Little or none	69	29.2	15.3	39.2	12.0	2.7	-3.0	7.6	5.3
Some	51	29.6	23.0	40.0	8.5	11.2	5.3	19.0	6.8
Considerable	13	34.0	25.0	45.0	10.0	27.0	23.0	30.7	3.9
	133								
By recent management training									
Little or none	110	28.8	18.0	39.0	10.5	6.2	.6	13.3	6.4
Some	23	33.7	26.0	47.0	10.5	17.0	8.7	31.0	11.1
	133								

TABLE 6.9.3 (Cont'd)

Median, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By internal organizations									
Finance, administration	6	22.5	21.7	61.0	19.6	13.5	-9.0	23.0	16.0
Research	35	29.7	13.3	39.0	12.8	7.0	.7	19.0	9.1
Internal organization #6	7	13.3	12.7	41.0	14.2	4.0	-4.0	6.0	5.0
Internal organization #8	9	25.7	16.0	28.0	6.0	-.7	-7.0	9.0	8.0
Production, marketing	49	29.2	22.7	39.0	8.1	7.6	2.2	18.0	7.9
Personnel, training	17	39.0	31.7	48.0	8.2	10.0	5.0	14.7	4.9
Economics	10	25.5	22.0	30.0	4.0	4.5	1.0	11.0	5.0
	133								
For total organization	133	29.6	19.3	40.0	10.3	7.2	1.1	15.1	7.0

A Concluding Note:

Conclusions above are drawn from the 133 usable responses to the questionnaire, but it should be pointed out that answers from the 409 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.10 REPORT ON ORGANIZATION 39-42

The Organization and the Responses:

Organization 39-42 is a major federal government department, operating out of Ottawa Headquarters and in the various provinces of Canada. Questionnaires were distributed to all managers in the organization who conformed to the study definition of "middle manager". Accordingly it was possible to make an internal analysis by managers in four separate programs, defined by the organization:

Program	1 - Group	39
"	2 - "	40
"	3 - "	41
"	4 - "	42

A total of 350 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. One hundred and sixty-two usable completed questionnaires were received, resulting in a response rate of 46%. Table 6.10.1 is a tabulation of the respondents, grouped in the eleven experience dimensions along which they were analysed.

The Results for Organization 39-42:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 28.7, lower than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 8.2 (higher than the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers.

TABLE 6.10.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Production	1	9
Finance, accounting	3	10
Personnel, training	4	8
General administration	8	89
Other	9,5,6,9(4)	22
Other: security maintenance	9(2)	6
Other: medical	9(3)	18
		162
2) By service, present position:		
Short (1 - 3 yrs)	1	30
Medium (3 - 10 yrs)	2	83
Long (over 10 yrs)	3	49
		162
3) By service, present organization:		
Short	1	10
Medium	2	39
Long	3	113
		162
4) By service in total:		
Short	1	3
Medium	2	17
Long	3	142
		162
5) By computer/systems experience:		
Little or none	1	138
Some	2	24
Considerable	3	0
		162
6) By information change index:		
Little or none	1	98
Some	2	51
Considerable	3	13
		162

TABLE 6.10.1 (Cont'd)

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
7) By participation index:		
Low (system staff)	1	38
Medium (50/50)	2	80
High (user)	3	44
		162
8) By MIS development index:		
Low	1	136
Medium	2	26
High	3	0
		162
9) By recent management training:		
Little or none	0	104
Some	1	57
Considerable	2	1
A great deal	3	0
		162
10) By internal code:		
Program 1	39	119
Program 2	40	20
Program 3	41	13
Program 4	42	10
		162
11) By province:		
Nova Scotia	2	10
Quebec	5	40
Ontario	6	57
Manitoba	7	13
Alberta	9	14
British Columbia	10	21
Others:	8,3	7
		162

Reasons for the relatively low perceived needs for I.S. development and the relatively high positive perceived effects of MIS development are probably best supplyed by those in organization 39-42. An optomistic interpretation would be that managers' I.S. needs are being reasonably well satisfied and that existing good systems have fostered positive attitudes about the impact of more development.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to eleven different MIS experience/familiarity dimensions. Table 6.10.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the need-scores are present only when the organization's respondents are classified by the participation index, and in effects-scores only when respondents are classified by the I.S. change index.

Table 6.10.3 shows that attitudes regarding the effects of MIS become more positive as the degree of recent successful information systems change increases. This is consistent with the total-study results, where positive change seems to lead to more positive MIS attitudes. Results of the perceived needs-scores by participation index are not so clear-cut. The score is significantly higher (median = 31.5) for respondents who have a "medium" index (i.e., those who advocate a 50-50 mix of users and systems specialists in MIS development).

A Concluding Note:

Conclusions above are drawn from the 162 usable responses to the questionnaire, but it should be pointed out that answers from the 188 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

TABLE 6.10.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	4.81	6	>.50	9.84	6	>.10
2) Service, present position	.86	2	>.50	1.72	2	>.30
3) Service, present organization	2.89	2	>.20	1.58	2	>.30
4) Service in total	.04	1	>.80	.46	1	.50
5) Computer/systems experience	.42	1	>.50	.66	1	>.30
6) Information systems change index	2.29	2	>.30	11.88	2	<.01*
7) Participation index	9.10	2	<.02*	2.55	2	>.20
8) MIS development index	.03	1	>.80	1.04	1	>.30
9) Recent management training	.72	1	>.30	.64	1	>.30
10) Internal programs	4.97	3	>.10	.52	3	>.90
11) Province	9.14	6	>.10	4.13	6	>.50

*Significant differences between groups

TABLE 6.10.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By positive information change									
Little or none	98	27.3	20.3	39.0	9.3	6.0	-3.2	14.7	9.0
Some	51	31.1	25.1	38.0	6.4	10.0	4.7	19.0	7.1
Considerable	13	28.2	21.0	37.0	8.0	15.0	11.0	23.0	6.0
	162								
By participation index									
Low	38	25.5	17.7	31.3	6.8	6.5	-7.7	14.3	11.0
Medium	80	31.5	24.5	42.5	9.0	9.5	.2	19.5	9.6
High	44	29.0	22.0	37.5	7.7	8.5	2.5	13.5	5.5
	162								

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.11 REPORT ON ORGANIZATION 43-67

The Organization and the Response:

Organization 43-67 is a major federal government department, operating from Ottawa Headquarters and from major urban centers throughout Canada. The organization is a heavy user of computers and automation in the execution of its major functional activities. In addition, an "MIS" system is being installed. The current system is primarily a time/production reporting system by activity and has had some impacts on the organization's middle managers.

Questionnaires for this study were distributed to middle management levels of the organization across Canada. At the same time, another unrelated survey with respect to human behavior in organizations was distributed to a random sample of all employees in 10 of the organization's offices. Because of the differences in scope and selection of respondents, it is expected that few managers were selected in both studies.

A total of 566 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Three hundred and twenty-seven usable completed questionnaires were received, resulting in a response rate of 58%. Table 6.11.1 is a tabulation of the respondents, grouped in the ten experience dimensions along which they were anlysed. Note that some offices were grouped together (roughly geographically), due to the low number of responses from those offices.

The Results for Organization 43-67:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 26.3, below the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

TABLE 6.11.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Production	1	25
Finance, accounting	3	49
Personnel, training	4	11
Research & development	6	16
Systems, EDP, computers	7	14
General administration	8	158
Other:	9,2	10
Other: planning, policy	9(1)	5
Other: technical officer	9(6)	5
Other: appeals	9(7)	16
Other: Special investment	9(8)	18
		327
2) By service, present position:		
Short (under 3 yrs.)	1	180
Medium (3 to 10 yrs.)	2	113
Long (over 11 yrs.)	3	34
		327
3) By service, present organization:		
Short	1	17
Medium	2	58
Long	3	252
		327
4) By total service:		
Short	1	0
Medium	2	26
Long	3	301
		327
5) By computer/systems experience:		
Little or none	1	235
Some	2	64
Considerable	3	28
		327

TABLE 6.11.1 (Cont'd)

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
6) By positive information change:		
Little or none	1	182
Some	2	121
Considerable	3	24
		327
7) By participation index:		
Low	1	60
Medium	2	208
High	3	59
		327
8) By MIS development index:		
Low	1	308
Medium	2	19
High	3	0
		327
9) By recent management training:		
Little or none	0	262
Some	1	65
Considerable	2	0
A great deal	3	0
		327
10) By office code #1:		
Newfoundland, P.E.I.	43,44	9
Sydney, Halifax	45,46	7
St. John	47	9
Toronto	57	23
Head office	58	88
Ottawa	59	12
Winnipeg	60	17
Regina	61	7
Saskatoon	62	8
Calgary	63	21
Edmonton	64	12
Penticton	65	5

TABLE 6.11.1 (Cont'd)

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
10) By office code #1: (cont'd)		
Vancouver	66	16
Victoria	67	8
Kingston, Belleville	48,49	9
Hamilton	50	18
Kitchener	51	10
St. Catherines	52	9
London	53	17
Windsor	54	6
Sudbury	55	8
Thunder Bay	56	8
		327

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of some effects. The median score of 4.7 (well below the total-study median of 7.0) indicates some expectation of increases under MIS in the satisfactions obtained by the managers. Significantly, many managers recorded zero difference scores between "is now" and under MIS" (approximately 10% of the respondents scored zero for all 15 questions).

The low attitude scores (relative to the total-study scores) for organization 43-67 are particularly significant when it is considered that this organization has undertaken relatively extensive MIS development. Possibly, organization 43-67 should give particular attention to the need for user-participation in systems development. A number of the comments quoted in Chapter 4 came from respondents in this organization. Examination of Table 6.11.1 indicates that almost 90% of respondents specify that user-specialist participation should be 50-50 (or greater for the user).

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to ten different MIS experience/familiarity dimensions. Table 6.11.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the effects-scores are present only when the organization's respondents are classified in three dimensions:

1) Information systems change index
2) MIS development index
3) Recent management training

For the needs-scores, differences are significant only when respondents are grouped by the information systems change index.

Table 6.11.3 indicates that attitudes regarding the effects of MIS become more positive as the degree of recent successful information systems change increases. This is consistent with the perceived needs-scores and with the total-study results, where positive change seems to lead to more positive MIS attitudes.

TABLE 6.11.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	12.70	10	>.20	17.37	10	>.05
2) Service, present position	1.17	2	>.50	3.25	2	>.10
3) Service, present organization	.06	2	>.95	.50	2	>.70
4) Service in total	.03	1	>.80	.00	1	>.90
5) Computer/systems experience	.93	2	>.50	2.43	2	>.20
6) Information systems change index	12.83	2	<.01*	63.73	2	<.001*
7) Participation index	.97	2	>.50	.38	2	>.80
8) MIS development index	.32	1	>.50	7.55	1	<.01*
9) Recent management training	1.72	1	>.10	4.81	1	<.05*
10) Internal organization #1	15.27	13	>.20	12.23	13	>.50
Internal organization #2	4.88	7	>.50	8.00	7	>.30

*Significant differences between groups

TABLE 6.11.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By positive systems change index									
Little or none	182	24.1	15.0	33.0	9.0	2.1	-.8	8.0	4.4
Some	121	30.0	19.7	38.0	9.1	7.1	3.1	14.3	5.6
Considerable	24	25.5	23.8	34.5	5.3	20.5	16.5	22.2	2.9
	327								
By MIS development									
Low	308	26.3	18.8	35.7	8.5	5.1	.3	13.9	6.8
Medium	19	26.0	13.7	35.0	10.6	2.0	-2.0	4.4	3.2
High	0								
	327								
By management training									
Little or none	262	25.8	17.6	34.6	8.5	4.3	.3	11.1	5.4
Some	65	28.7	19.2	37.2	9.0	10.0	.3	19.7	9.7
Considerable	0								
A great deal	0								
	327								
Total Organization	327	26.3	18.5	35.7	8.6	4.7	.3	13.4	6.6

As with the total-study results, the direct and positive effects of recent management training is evident in organization 43-67. It is worthy of note that, according to the study criteria (see Chapter 5), little management training is evident in this organization.

The results when respondents are grouped by the MIS development index are interesting in two respects. First, almost 95% of the respondents are rated "low" on this dimension of MIS familiarity, inspite of the relatively extensive development in this organization. This supports the contention above that more extensive user-participation is desirable. Second, the expected results of MIS decrease as familiarity increases. This somewhat conflicting result may be due to the fact that current MIS development has been imposed upon user-managers and is not perceived as being for their benefit or to their advantage.

A Concluding Note:

Conclusions above are drawn from the 327 usable responses to the questionnaire, but it should be pointed out that answers from the 239 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the overall study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.12 REPORT ON ORGANIZATION 68-73

The Organization and the Response:

Organization 68-73 is a major federal government department, operating from Ottawa Headquarters and from various regional offices. Information systems development is proceeding in accounting, manpower, data communications, and some operational areas. Planning is being done for extensive information retrieval and up-dating systems. Questionnaires were distributed to managers in headquarters and in the three main operational administrations and analysis was made by an internal classification:

Group	Administration
68	Department HQ
69	Administration C, HQ
70	Administration B, HQ
71	Administration B, Regions
72	Administration A, Regions
73	Administration A, HQ

A total of 150 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Eighty-eight usable completed questionnaires were received, resulting in a response rate of 59%. Table 6.12.1 is a tabulation of the respondents, grouped in the ten experience dimensions along which they were analysed.

The Results for Organization 68-73:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 30.7, very close to the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

TABLE 6.12.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Finance, accounting	3	14
Personnel, training	4	11
Research & development	6	13
General administration	8	36
Others	9,7,0,1	14
		88
2) By service, present position:		
Short (under 3 yrs.)	1	40
Medium (3 to 10 yrs.)	2	40
Long (over 10 yrs.)	3	8
		88
3) By service, present organization:		
Short	1	12
Medium	2	36
Long	3	40
		88
4) By computer/systems experience:		
Little or none	1	58
Some	2	20
Considerable	3	10
		88
5) By positive information systems change:		
Little or none	1	46
Some	2	35
Considerable	3	7
		88
6) By participation index:		
Low	1	9
Medium	2	57
High	3	22
		88

TABLE 6.12.1 (Cont'd)

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
7) By MIS development index:		
Low	1	83
Medium	2	5
High	3	0
		88
8) By recent management training:		
Little or none	0	68
Some	1	20
Considerable	2	0
A great deal	3	0
		88
9) By internal organizations:		
Department HQ	68	9
Administration C, HQ	69	11
Administration B, HQ	70	21
Administration B, Regions	71	28
Administration A, Regions	72	11
Administration A, HQ	73	8
		88
10) By province:		
Nova Soctia, New Brunswick	2,4	7
Quebec	5	7
Ontario	6	58
Manitoba, Alberta	7,9	8
British Columbia	10	8
		88

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 6.3 (close to the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. Significantly, many managers recorded zero difference scores between "is now" and "under MIS" (approximately 10% of the respondents scored zero for all 15 questions). This result is similar to that of the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to ten different MIS experience/familiarity dimensions. Table 6.12.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the effects-scores are present only when the organization's respondents are classifed in three dimensions:

1) Job function
2) Information systems change index
3) Internal organizations

For the needs-scores, differences are significant only when respondents are grouped by the information systems change index and by recent management training.

Examination of Table 6.12.3 shows that Research and Development managers scored low on perceived needs for I.S. development (median = 26.0), while Personnel, Training managers scored high (median = 38.0). These differences in the needs-scores among the various functional groups might best be interpreted by members of organization 68-73.

The positive and direct effect on MIS attitudes of favorable information systems change experience and of recent managerial training is consistent with the results of other organizations and the total-study results. The positive effects of managerial training are particularly worthy of note, because (according to the study criteria) the level of recent management training appears low in organization 68-73.

TABLE 6.12.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Efeects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	9.97	4	<.05*	1.70	4	>.70
2) Service, present position	1.01	2	>.50	.05	2	>.95
3) Service, present organization	.68	2	>.70	4.81	2	>.05
4) Computer/systems experience	.49	2	>.70	.88	2	>.50
5) Information systems change index	12.48	2	<.01*	28.81	2	<.001*
6) Participation index	.06	2	>.95	2.87	2	>.20
7) MIS development index	.64	1	>.30	.48	1	>.30
8) Recent management training	2.20	1	>.10	4.70	1	<.05*
9) Internal organization	14.64	5	<.02*	3.31	5	>.30
10) Province	6.90	4	>.10	6.22	4	>.10

*Significant differences between groups

TABLE 6.12.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By job function									
Finance, accounting	14	28.5	23.2	38.0	7.4	10.0	2.0	15.2	6.2
Personnel, training	11	38.0	28.0	48.0	10.0	3.2	.0	13.0	6.5
Research & development	13	26.0	18.0	32.0	7.0	8.7	1.0	10.7	4.9
General administration	36	27.5	22.5	37.5	7.5	5.8	.5	12.5	6.0
Others	14	33.0	31.7	41.7	5.0	8.5	3.2	11.0	3.9
	88								
By positive information systems change									
Little or none	46	27.8	22.7	32.1	4.7	2.1	-.4	7.0	3.7
Some	35	32.2	23.0	42.0	9.5	10.1	5.7	14.7	4.5
Considerable	7	42.2	38.0	48.0	5.0	22.0	13.0	33.0	10.0
	88								
By recent management training									
Little or none	68	29.0	22.7	38.5	7.9	5.5	.5	11.2	5.3
Some	20	32.5	28.0	40.5	6.2	9.5	4.5	21.5	8.5
Considerable	0								
A great deal	0								
	88								
By internal organizations									
Department HQ	9	28.0	26.0	39.0	6.5	3.0	-2.0	13.0	7.5
Administration C, HQ	11	25.7	13.0	32.0	9.5	6.0	.2	10.7	5.2
Administration B, HQ	21	32.0	23.0	41.7	9.4	6.0	1.7	10.3	4.3
Administration B, Regions	28	33.5	27.5	43.0	7.7	8.5	4.0	13.5	4.7
Administration A, Regions	11	23.0	17.0	28.2	5.6	6.0	.2	13.0	6.4
Administration A, HQ	8	29.5	12.5	35.5	11.5	5.5	.0	15.5	7.7
	88								
Total Organization	88	30.7	23.3	39.8	8.3	6.3	1.2	12.3	5.5

The significant differences between internal organizations is interesting. Needs-scores range from a low in Administration A, Regions (median = 23.0) to a high in Administration B, Regions (median = 33.5). Again, interpretation of these internal organization differences must be left to organization 68-73 personnel.

A Concluding Note:

Conclusions above are drawn from the 88 usable responses to the questionnaire, but it should be pointed out that answers from the 62 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the overall study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.13 REPORT ON ORGANIZATION 74-76

The Organization and the Response:

Organization 74-76 is a major federal government department, operating primarily in Ottawa. This organization has information systems projects underway, with objectives such as integration of systems, manual-to-computer conversion of financial data, manpower inventory, etc. It would appear that organization 74-76 is at an early stage in MIS implementation at this time.

Questionnaires were sent to ADM's, branch directors and selected division chiefs. A total of 100 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Thirty-three usable completed questionnaires were received, resulting in a response rate of 33%. Table 6.13.1 is a tabulation of the respondents, grouped into the nine experience dimensions along which they were analysed. Note that the ninth dimension (internal organizations) was condensed into two separate programs plus a miscellaneous category, due to the low response in some categories.

The Results for Organization 74-76:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 31.0, higher than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is still interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

TABLE 6.13.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Research & development	6	5
General administration	8	14
Other	9,3,4	14
		33
2) By service, present position:		
Short (under 3 yrs)	1	23
Medium (3 to 10 yrs)	2	9
Long (over 10 yrs)	3	1
		33
3) By service, present organization:		
Short	1	11
Medium	2	22
Long	3	0
		33
4) By total service:		
Short	1	0
Medium	2	12
Long	3	21
		33
5) By computer/systems experience:		
Little or none	1	19
Some	2	14
Considerable	3	0
		33
6) By information systems change:		
Little or none	1	17
Some	2	13
Considerable	3	3
		33
7) By participation index:		
Low	1	7
Medium	2	17
High	3	9
		33

TABLE 6.13.1 (Cont'd)

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
8) By recent management training:		
Little or none	0	26
Some	1	7
Considerable	2	0
A great deal	3	0
		33
9) By internal organizations:		
Program B	74	11
Program C	75	15
Other	76	7
		33

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 12.0 was the highest obtained in the study for the expectation of increases under MIS in the satisfactions obtained by the managers. This result is much more positive than the total-study results on effects-scores (median = 7.2), and indicates no general fear of MIS on the part of the responding middle managers.

Responses from this organization on the two attitude dimensions were significantly more positive than responses from other organizations. If these responses are representative of general MIS attitudes in organization 74-76, further study would be valuable, to see what this organization is doing better than other organizations.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to nine different MIS experience/familiarity dimensions. Table 6.13.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. In fact, significant differences between groups are found only in the effects-scores when respondents are classified by information change index. Table 6.13.3 shows the clear and direct impact of positive change on respondents' perception of the effects of MIS. Note that, due to the low response, the "some" and "considerable" indices had to be combined for analysis.

A Concluding Note:

Conclusions above are drawn from the 33 usable responses to the questionnaire, but it should be pointed out that answers from the 67 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

TABLE 6.13.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	5.82	2	>.05	.74	2	>.30
2) Service, present position	.14	1	>.70	.68	1	>.30
3) Service, present organization	.04	1	>.80	.08	1	>.70
4) Service in total	.43	1	>.50	1.26	1	>.20
5) Computer/systems experience	.97	1	>.20	.30	1	>.50
6) Information systems change index	1.50	1	>.20	4.23	1	<.05*
7) Participation index	.76	2	>.50	.07	2	>.95
8) Recent management training	.66	1	>.30	.08	1	>.70
9) Internal organizations	3.44	2	>.10	3.23	2	>.10

*Significant differences between groups

TABLE 6.13.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By information system change									
Little or none	17	29.0	13.7	39.7	13.0	5.0	.0	14.0	7.0
Some	13	34.5	23.5	47.5	12.0	15.5	9.5	22.5	6.5
Considerable	3								
	33								
Total Organization	33	31.0	17.7	46.0	14.1	12.0	4.0	21.0	8.5

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.14 REPORT ON ORGANIZATION 77-83

The Organization and the Response:

Organization 77-83 is a major federal government department, operating out of Ottawa headquarters and in all regions of Canada. Extensive work has been done on the department's information system and it is apparent that organization 77-83 is at a much more advanced stage in sophisticated information systems development than are most federal government departments.

Questionnaires were distributed to managers in the field by a project group reviewing information systems in the department and returned directly to the researcher in the envelope supplied. Also, questionnaires were distributed to middle managers at headquarters. Because questionnaires for other organizations were disseminated entirely through organizational mailing systems, this different distribution system could be a confounding factor when making inter-organization comparisons.

A total of 150 questionnaires were distributed and 119 usable completed questionnaires were received, resulting in a high response rate of 79%. Table 6.14.1 is a tabulation of the respondents, grouped into 12 dimensions along which they were analysed. As the multiple number for this organization indicates, respondents were grouped into seven internal divisions. Also, SX - 2's were isolated from the middle management group to form a management level dimension.

The Results for Organization 77-83:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 32.0, higher than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is still interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

TABLE 6.14.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) Job function:		
Research & development	6	16
Systems, EDP, computers	7	7
General administration	8	76
Other	9	15
Other: planning, etc.	9(1)	5
		119
2) By service, present position:		
Short (under 3 yrs)	1	52
Medium (3 to 10 yrs)	2	63
Long (over 10 yrs)	3	4
		119
3) By service, present organization:		
Short	1	13
Medium	2	69
Long	3	37
		119
4) By service in total:		
Short	1	0
Medium	2	16
Long	3	103
		119
5) By computer/systems experience:		
Little or none	1	79
Some	2	29
Considerable	3	11
		119
6) By information systems change index:		
Little or none	1	57
Some	2	44
Considerable	3	18
		119

TABLE 6.14.1 (Cont'd)

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
7) By participation index:		
Low	1	27
Medium	2	79
High	3	13
		119
8) By MIS development index:		
Low	1	109
Medium	2	10
High	3	0
		119
9) By recent management training:		
Little or none	0	89
Some	1	30
Considerable	2	0
A great deal	3	0
		119
10) By internal organizations:		
HQ regional officers	77	44
Area managers, District administration	78	23
HQ - Program #1	79	7
HQ - Program #2	80	9
HQ - Program #3	81	12
HQ - Operations	82	7
HQ - Administration	83	17
		119
11) By management level:		
Top management	1	11
Middle managers	2	108
		119
12) By province:		
Nova Scotia	2	13
Quebec	5	14
Ontario	6	65
Manitoba, Saskatchewan	7,8	11
British Columbia	10	16
		119

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 9.7 (higher than the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This result is more positive than the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to twelve different MIS experience/familiarity dimensions. Table 6.14.2 indicates a somewhat greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in the needs-scores are found when respondents are classified by:

1) MIS development index
2) Recent management training
3) Management level

and differences in the effects-scores are found when respondents are classified by:

1) Service in present position
2) MIS development index
3) Recent management training
4) Province of the respondent

The above dimensions are further analysed in Table 6.14.3 and the non-significant dimensions are not considered any further.

Respondents who are new in their positions have more positive expectations about MIS's effects than those who have been longer on the job. This result is consistent with the notion that newer people in particular positions are optimistic about the effects of MIS on them in their jobs, while longer service incumbents naturally prefer the status quo.

TABLE 6.14.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	4.52	4	>.30	8.51	4	>.05
2) Service, present position	.00	1	>.90	9.08	1	<.01*
3) Service, present organization	.72	2	>.50	5.71	2	>.05
4) Service in total	2.01	1	>.10	.26	1	>.50
5) Computer/systems experience	3.88	2	>.10	2.39	2	>.30
6) Information systems change index	.83	2	>.50	4.16	2	>.10
7) Participation index	.22	2	>.80	1.66	2	>.30
8) MIS development index	7.15	1	<.01*	9.73	1	<.01*
9) Recent management training	4.28	1	<.05*	7.21	1	<.01*
10) Internal organizations	6.92	6	>.30	2.76	6	>.80
11) Management level	6.70	1	<.01*	4.40	1	<.05*
12) Province	7.92	4	>.05	9.89	4	<.02*

*Significant differences between groups

TABLE 6.14.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By service, present position:									
Short (under 3 yrs)	52	31.5	24.2	43.0	9.4	11.5	5.5	17.5	6.0
Medium (3 to 10 yrs)	67	33.0	23.2	41.7	9.2	5.7	-.4	13.1	6.7
Long (over 10 yrs)	0								
	119								
By MIS development index:									
Low	109	33.3	25.3	43.2	9.0	10.3	2.1	15.8	6.8
Medium	10	22.5	14.0	30.0	8.0	.0	-10.0	1.2	5.6
High	0								
	119								
By recent management training:									
Little or none	89	30.4	23.3	39.2	8.0	6.7	.4	13.6	6.6
Some	30	38.5	29.0	44.7	7.9	12.5	8.7	17.3	4.3
Considerable	0								
A great deal	0								
	119								
By management level:									
Top executive	11	24.0	15.7	29.0	6.6	1.7	-3.7	7.0	5.4
Middle	108	33.5	24.8	43.0	9.1	10.2	1.7	15.5	6.9
Lower management	0								
Junior, staff	0								
	119								

TABLE 6.14.3 (Cont'd)

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By province:									
Nova Scotia	13	33.0	29.2	36.0	3.4	2.2	.7	14.0	6.6
Quebec	14	39.5	37.0	50.0	6.5	13.5	10.0	18.0	4.0
Ontario	65	30.2	23.9	43.2	9.7	10.0	1.9	15.6	6.9
Manitoba & Saskatchewan	11	32.0	24.0	40.0	8.0	9.7	1.0	13.0	6.0
British Columbia	16	20.5	17.5	39.5	11.0	4.5	-7.5	10.5	9.0
	119								
By Total Organization	119	32.0	24.0	42.2	9.1	9.7	1.2	15.2	7.0

The results according to the MIS development index are worthy of serious consideration. Those with more exposure to MIS in the organization perceive lower needs for I.S. development and also are more negative about MIS's effects. One-half of those with a moderate degree of familiarity with MIS expect reductions in the satisfactions which they obtain from their management positions. These results suggest that any MIS-type development to which the organization's respondents have been exposed has had real or perceived negative impacts on them. Perhaps investigation of the impacts of I.S. development on managers should be undertaken.

The significant positive effects of recent management training on both perceived needs for and perceived effects of MIS development are clear from Table 6.14.3. This kind of result was obtained in the total-study and should be considered as an obvious route for organizations to positively influence attitudes of user-managers towards MIS.

The lower needs-scores and effect -scores for top managers (relative to middle managers) is consistent with the total-study results and is probably due to differences in the information needs of top managers. As in the total-study, attitude scores seem to vary significantly in different regions of Canada. In organization 77-83, perceived effects of MIS development range from a low of 2.2 (Nova Scotia) to a high of 13.5 (Quebec). Because Quebec is the high score, these differences cannot be simply explained by headquarters-versus-field argument.

A Concluding Note:

Conclusions above are drawn from the 119 usable responses to the questionnaire and, because of the high response rate, might be reasonably interpreted as representative of organization 77-83 managers in the levels surveyed. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the overall study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

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6.15 REPORT ON ORGANIZATION 84-89

The Organization and the Response:

Organization 84-89 is a major federal government department, operating out of Ottawa headquarters. A total of 75 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Eighteen usable completed questionnaires were received, resulting in a response rate of 24%. Table 6.15.1 is a tabulation of the respondents, grouped into the six experience dimensions along which they could be analysed. Only three internal organizations could be formed, because of the low number of responses (six groups were planned).

The Results for Organization 84-89:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 26.5, lower than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 7.5 (close to the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This result is similar to that of the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

TABLE 6.15.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
General administration	8	9
Other	9	9
		18
2) By service, present position:		
Short (under 3 yrs)	1	12
Medium (3 to 10 yrs)	2	6
Long (over 10 yrs)	3	0
		18
3) By service, present organization:		
Short	1	2
Medium	2	3
Long	3	13
		18
4) By computer/systems experience:		
Little or none	1	13
Some	2	3
Considerable	3	2
		18
5) By information systems change:		
Little or none	1	13
Some	2	5
Considerable	3	0
		18
6) By internal organizations:		
Senior line, staff managers, line directors	84,85,86	5
Staff directors	87	8
Line & staff section hands	88,89	5
		18

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to six different MIS experience/familiarity dimensions. Table 6.15.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. The only dimension which produced statistically significant differences was for the needs-scores when respondents were grouped according to exposure to successful information systems changes. As with the total-study and with many other organizations' results, positive change experience seems to foster positive MIS attitudes.

A Concluding Note:

Care should be taken in drawing inferences for such a small sample of organization 84-89's managers. Conclusions above are drawn from the 18 usable responses to the questionnaire, but it should be pointed out that answers from the 57 managers who did not respond might be significantly different.

The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the over-all study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

TABLE 6.15.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	.38	1	>.50	.24	1	>.50
2) Service, present position	1.06	1	>.30	.02	1	>.80
3) Service, present organization	.55	1	>.30	1.08	1	>.20
4) Computer/systems experience	.06	1	>.80	-.00	1	>.99
5) Information systems change index	4.30	1	<.05*	1.65	1	>.10
6) Internal organization	.49	2	>.30	.25	2	>.50

*Significant differences between groups

TABLE 6.15.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By information systems change:									
Little or none	13	21.2	13.0	33.0	10.0	3.0	-3.0	8.2	5.6
Some	5	33.0	30.0	50.0	10.0	9.0	8.0	22.0	7.0
Considerable	0								
	18								
Total Organization	18	26.5	14.0	37.0	11.5	7.5	-3.0	9.2	6.1

6.16 REPORT ON ORGANIZATION 90-94

The Organization and the Response:

Organization 90-94 is a major federal government department, operating from Ottawa headquarters and across Canada. Manpower statistics and personnel information systems are being installed and extensive data storage/retrieval systems are in the planning stages. There is some indication of plans for centralization and redesign of operating information systems.

A total of 260 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Sixty-five usable completed questionnaires were received, resulting in a response rate of 25%. Table 6.16.1 is a tabulation of the respondents, grouped into the nine experience dimensions along which they were analysed.

The Results for Organization 90-94:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 34.4, much higher than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is still interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 10.3 (the total-study median is 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This result is more positive than the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

TABLE 6.16.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Finance, accounting	3	5
Research & development	6	10
Systems, computer, EDP	7	10
General administration	8	31
Other	9	9
		65
2) By service, present position:		
Short (under 3 yrs)	1	34
Medium (3 to 10 yrs)	2	25
Long (over 10 yrs)	3	6
		65
3) By service, present organization:		
Short	1	19
Medium	2	25
Long	3	21
		65
4) By total service:		
Short	1	0
Medium	2	16
Long	3	49
		65
5) By computer/systems experience:		
Little or none	1	36
Some	2	17
Considerable	3	12
		65

TABLE 6.16.1 (Cont'd)

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
6) By information systems change:		
Little or none	1	36
Some	2	22
Considerable	3	7
		65
7) By participation index:		
Low	1	13
Medium	2	37
High	3	15
		65
8) By recent management training:		
Little or none	0	48
Some	1	14
Considerable	2	2
A great deal	3	1
		65
9) By internal organizations:		
Branch A	90	7
Branch B	91	25
Branch C	92	6
Branch D	93	10
Branch E	94	17
		65

When both perceived needs for and perceived effects of MIS development are considered, organization 90-94 exhibits the highest attitude score of any organization studied. Further study would be worthwhile to see if the responding managers are really representative of the organization's managers and, if so, what organization 90-94 is "doing right" that could be emulated by other organizations.

Differences in Scores According to Experience Dimensions:

Analysis was made of the attitude scores of the organization's middle managers, classified into groups according to nine different MIS experience/familiarity dimensions. Table 6.16.2 indicates a greater degree of homogeneity in scores across these dimensions than exists in the total-study analysis. Significant differences in both the needs-scores and effects-scores are present only when the organization's respondents are classified in two dimensions, computer/systems experience, and information systems change index. When grouped by service in organization 90-94, respondents' effects-scores vary significantly.

Table 6.16.3 presents the somewhat mixed result with respect to organization service. Highest positive expected effects of MIS are held by short-service managers (median = 16.0), lowest held by medium-service managers (median = 4.7), and long-service managers' scores are in the middle (median = 11.2). The reader is invited to speculate on the causes of these scores by the service classification.

The significant differences in needs-scores and effects-scores when respondents are grouped by computer/systems experience is interesting. Analysis by this dimension did not produce significant differences for any other organization or for the total-study. The generally more favorable attitudes of managers was predicted in the study hypotheses, because it seemed reasonable that managers with more familiarity with computers and systems concepts would have more favorable attitudes towards MIS. However, organization 90-94 is the only one where significant differences in scores are recorded by respondents.

TABLE 6.16.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	6.93	4	>.10	6.90	4	>.10
2) Service, present position	.98	2	>.50	3.92	2	>.10
3) Service, present organization	4.61	2	>.05	6.72	2	<.05*
4) Service in total	3.23	1	>.05	.62	1	>.80
5) Computer/systems experience	8.85	2	<.02*	7.37	2	<.05*
6) Information systems change index	13.21	2	<.01*	15.20	2	<.001*
7) Participation index	5.47	2	>.05	3.63	2	>.10
8) Recent management training	3.03	1	>.05	.90	1	>.90
9) Internal organizations	4.03	4	>.30	5.51	4	>.20

*Significant differences between groups

TABLE 6.16.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By service, present organization:									
Short (under 3 yrs)	19	38.0	29.0	47.0	9.0	16.0	8.0	27.7	9.9
Medium (3 to 10 yrs)	25	28.0	21.7	39.0	8.6	4.7	.7	13.7	6.5
Long (over 10 yrs)	21	37.0	23.0	47.2	12.1	11.2	3.0	32.7	14.9
	65								
By computer/systems/EDP experience:									
Little or none	36	25.5	19.5	40.5	10.5	10.0	3.5	20.5	8.5
Some	17	36.0	29.0	47.0	9.0	8.7	2.0	16.0	7.0
Considerable	12	43.5	34.5	49.5	7.5	27.5	8.5	40.5	16.0
	65								
By information systems change:									
Little or none	36	29.5	19.5	37.5	9.0	7.0	1.5	13.5	6.0
Some	22	38.5	28.0	47.3	9.7	14.5	7.0	27.0	10.0
Considerable	7	45.0	42.0	59.2	8.6	37.0	28.0	42.0	7.0
	65								
Total Organization	65	34.4	22.2	46.0	11.9	10.3	3.6	22.2	9.3

As predicted, attitudes regarding the needs for and the effects of MIS become more positive as the degree of recent successful information systems change increases. This is consistent with many other organizations and with the total-study results, where positive change seems to lead to more positive MIS attitudes.

A Concluding Note:

Conclusions above are drawn from the 65 usable responses to the questionnaire, but it should be pointed out that answers from the 195 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the overall study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

6.17 REPORT ON ORGANIZATION 95

The Organization and the Response:

Organization 95 is a large crown corporation, operating from Ottawa headquarters and across Canada. This organization is particularly interesting because, a few years ago, it underwent an unfortunate attempt at a total MIS, an attempt which did not work well and caused considerable disillusionment throughout the organization. At this time, MIS is being approached on a step-by-step basis by systematic analysis of old systems and the introduction of new ones.

A total of 75 questionnaires were distributed to middle managers via the organization's mailing system. Each questionnaire was accompanied by a memorandum, signed by a senior official, which requested the managers' cooperation in completing the questionnaire and returning it directly to the researcher in the envelope supplied. Twenty-eight usable completed questionnaires were received, resulting in a response rate of 37%. Table 6.17.1 is a tabulation of the respondents, grouped into the eight experience dimensions along which they were analysed.

The Results for Organization 95:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 36.5, considerably higher than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is still interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development. However, the median needs-score of 36.5 is easily the highest recorded for any of the organizations surveyed in this study.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of some effects. The median effects-score of 4.2 is the lowest recorded for any participating organization. The first quartile of -4.5 indicates that many respondents expect negative effects from MIS development. On the other hand, the third quartile is 23.5, indicating that a similar number of respondents expect very positive results. This variablity in respondents'

TABLE 6.17.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Finance, accounting	3	7
General administration	8	7
Other	9	14
		28
2) By service, present position:		
Short (under 3 yrs)	1	3
Medium (3 to 10 yrs)	2	23
Long (over 10 yrs)	3	2
		28
3) By service, present organization:		
Short	1	0
Medium	2	5
Long	3	23
		28
4) By computer/systems experience:		
Little or none	1	13
Some	2	10
Considerable	3	5
		28
5) By information systems change index:		
Little or none	1	13
Some	2	14
Considerable	3	1
		28
6) By participation index:		
Low	1	5
Medium	2	15
High	3	8
		28
7) By MIS development index:		
Low	1	21
Medium	2	7
High	3	0
		28
8) By recent management training:		
Little or none	0	21
Some	1	6
Considerable	2	0
A great deal	3	1
		28

expectations is evident from the semi-interquartile range of 14.0, approximately double the total study figure.

Presumably, those who expect negative effects are respondents who are influenced by the earlier, abortive MIS attempt and those who expect positive effects have been influenced by the newer better implementation procedures. It was hoped that analysis along the experience/familiarity dimensions would provide some answers, but examination of Table 6.17.2 is not very helpful. Analysis does not reveal significance in effects-scores when respondents are grouped by any of the eight study dimensions.

For the needs-scores, significant differences among groups were found only when respondents were classified by recent management training. Table 6.17.3 shows the positive impact on perceived needs of management training, a result which was oblained in the total-study and in several other organization's analyses.

A Concluding Note:

Conclusions above are drawn from the 28 usable responses to the questionnaire, but it should be pointed out that answers from the 47 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the overall study results. Conclusions have been made by comparing this organization's scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

TABLE 6.17.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	4.23	2	>.10	5.11	2	>.05
2) Service, present position	.00	1	>.90	.02	1	>.80
3) Service, present organization	.01	1	>.90	.03	1	>.80
4) Computer/systems experience	.85	2	>.50	.06	2	>.95
5) Information systems change index	2.99	1	>.05	2.60	1	>.10
6) Participation index	1.58	2	>.30	.05	2	>.95
7) MIS development index	2.06	1	>.10	2.98	1	>.05
8) Recent management training	4.63	1	<.05*	.91	1	>.30

*Significant differences between groups

TABLE 6.17.3

Medians, Quartiles and Semi-Interquartile Ranges on Perceived Needs and Perceived Effects

	N	Needs				Effects			
		Medians	1st Q.	3rd Q.	Range	Medians	1st Q.	3rd Q.	Range
By recent management training:									
Little or none	21	34.7	26.0	39.2	6.6	4.0	-4.7	15.0	9.9
Some	7	43.2	36.2	52.0	7.9	19.0	.0	30.0	15.0
Considerable	0								
A great deal	0								
	28								
Total Organization	28	36.5	27.5	43.5	8.0	4.2	-4.5	23.5	14.0

6.18 REPORT ON ORGANIZATION 96

The Organization and the Response:

Organization 96 is a major federal government department which gave permission for the researcher to distribute questionnaires by mail to director-general and director levels. A total of 56 questionnaires were distributed, accompanied by a letter signed by the researcher, which requested the managers' cooperation in completing the questionnaire and returning it directly in the envelope supplied. Seventeen usable completed questionnaires were received, resulting in a response rate of 33%. Table 6.18.1 is a tabulation of the respondents, grouped into the five experience dimensions along which they could be analysed.

The Results for Organization 96:

Application of the Wilcoxon Matched-Pairs, Signed-Ranks test on the responses from this organization gives a clear indication that responding managers do perceive needs for information systems development. The median needs-score is 32.3, higher than the total-study median of 29.7. As is indicated in the total-study analysis (Chapter 5) a needs-score of this magnitude is still interpreted as meaning that middle managers do not feel strongly enough about information needs to prompt their active and aggressive participation in systems development.

The Wilcoxon tests on respondents' answers to questions regarding the expected effects of MIS development indicate a perception of definite effects. The median score of 5.2 (lower than the total-study median of 7.0) indicates the expectation of increases under MIS in the satisfactions obtained by the managers. This result is similar to that of the total-study results on effects-scores and indicates no general fear of MIS on the part of the responding middle managers.

Table 6.18.2 presents results of analysis when the respondents are classified along five different experience dimensions. In no instances, were the differences between groups significant (at the .05 level). The lack of significant differences may be simply due to the small sample obtained from organization 96.

TABLE 6.18.1

Tabulation of Respondents by MIS Experience/Familiarity Dimensions

	Group	Count
1) By job function:		
Research & development	6	5
General administration	8	7
Other	9	5
		17
2) By service, present position:		
Short (under 3 yrs)	1	10
Medium (3 to 10 yrs)	2	4
Long (over 10 yrs)	3	3
		17
3) By service, present organization:		
Short	1	7
Medium	2	4
Long	3	6
		17
4) By computer/systems experience:		
Little or none	1	10
Some	2	5
Considerable	3	2
		17
5) By information systems change:		
Little or none	1	10
Some	2	6
Considerable	3	1
		17

TABLE 6.18.2

Results of Kruskal-Wallis One-Way Analysis of Variance by Ranks on Perceived Needs and Perceived Effects

	Needs			Effects		
	H	d.f.	p	H	d.f.	p
By: 1) Job function	2.01	2	>.30	1.99	2	>.30
2) Service, present position	1.50	1	>.20	2.30	1	>.10
3) Service, present organization	.35	1	>.50	2.15	1	>.10
4) Computer/systems experience	.70	1	>.30	.19	1	>.50
5) Information systems change index	.12	1	>.70	.69	1	>.30

A Concluding Note:

Conclusions above are drawn from the 17 usable responses to the questionnaire, but it should be pointed out that answers from the 39 managers who did not respond might be significantly different. The rationale behind the study is that MIS development will not be successful if undertaken in the face of negative attitudes on the part of key middle managers - the prime users of the system. As stated in Chapter 3, top management might impose MIS on an essentially negative group of middle managers and successful initial development might lead to a positive shift in the managers' attitudes. The primary role of the organization's environment (over managers' personal background variables) is developed in the total-study report (Chapter 5). Even so, such a coersive strategy is "doing it the hard way" and it is more rational to foster positive attitudes before attempting MIS development.

The results from this organization are more useful when compared to the overall study results. Conclusions have been made by comparing these scores to those of other organizations and to the total-study results and relationships. The researcher wishes to gratefully acknowledge the cooperation of the organization in this study and hopes that this report, along with the total-study report, will provide some compensation to the organization and to the responding managers.

APPENDIX A

THE QUESTIONNAIRES

A.1 The CIM Questionnaire

A.2 The Questionnaire for other Organizations

A.1 THE CIM QUESTIONNAIRE

The same questionnaire was used for both the CIM and other organizations participating in this study, with the exception that some questions in Section C (experience/familiarity dimensions) were tailored to meet the specific requirements of the CIM survey. The complete questionnaire and the covering letters (both English and French) are presented on the following pages.

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OF MANAGEMENT
national council

please address reply to:

May 4, 1972

Dear Member:

One of the goals of our Institute is to engage in Management Research Projects. This questionnaire is in line with that concept and very pertinent to all of us in the Management field.

Professor Art Guthrie, a faculty member at Carleton, is conducting this survey under a grant from the Social Environment Planning Unit of the Department of Communications, Ottawa. Professor Guthrie has a financial and data processing background in industry and has only recently moved into the academic world of teaching and research. His principal current research interest is in the users' side of Management Information Systems (MIS) and in the impacts of computer technology and information systems concepts on today's managerial environment. The new technology is beginning to effect changes in the ways managers report information and in the ways managers receive reports or information. Indications are that the rate of these changes will accelerate as the new technology becomes pervasive in Canadian organizations.

Professor Guthrie has already completed a pilot study, using a sample of Western Canadian managers, and now seeks data from a cross-Canada survey of managers. Your Institute feels that this study is in keeping with the aims and purposes of the CIM and is of particular relevance to the theme of this year's convention, "Managing in the Changing Environment". In addition, Professor Guthrie will undertake to provide a summary of the results of the survey for publication in the Institute magazine; probably in the November-December 1972 issue.

As President I would urge you to spend some time and effort on this Questionnaire, and return it in the envelope provided as quickly as possible.

Thank you for helping Professor Guthrie, the Institute, and eventually yourself.

Yours sincerely

J. A. Viau, CIM
President

CANADIAN INSTITUTE
OF MANAGEMENT
national council

please address reply to:

Cher membre,

Un des buts de notre Institut consiste à nous engager dans les projets de recherche en gestion. Ce questionnaire est concu dans cet esprit et il nous sera très utile dans le domaine de la gestion.

Le professeur Art Guthrie, membre de la Faculté à Carleton, dirige actuellement cette étude avec l'aide d'une bourse accordée par la section de Planification de l'environnement social du Département de Communications, Ottawa. Monsieur Guthrie, qui a reçu une formation en finance et en traitement des informations dans l'industrie, n'est entré dans le monde de l'enseignement et de recherche que récemment. Actuellement, son principal interêt de recherche se porte sur les usagers des systèmes d'information des administrateurs et sur les répercussions des ordinateurs et des systèmes d'information sur le domaine de l'administration d'aujourd'hui. Cette nouvelle méthode commence à produire des changements dans la façon dont les administrateurs fournissent des renseignements et dans la façon dont ils reçoivent les rapports ou des renseignements. Tout indique que la vitesse de ces changements s'accelerera à mesure que cette nouvelle méthode se répandra dans les entreprises canadiennes.

Monsieur Guthrie a déjà complété une étude pilote en se servant d'un echantillanage d'interviews des administrateurs de l'ouest du Canada et il cherche actuellement des données à partir d'une étude menée parmi des administrateurs canadiens d'un océan à l'autre. Votre association est d'avis que cette étude est en accord parfait avec les buts et les objectifs poursuivis par CIM et très à propos avec le thème du congres de cette année: "L'administrateur canadien dans le monde en évolution". De plus, Monsieur Guthrie fournira un compte-rendu des résultats de l'étude qui sera publiée dans la revue de l'Institut, ceci probablement dans la publication de nov-dec 1972.

A titre de Président, j'aimerais que vous fassiez diligence en repondant à ce questionnaire aussitôt que possible et en nous le retournant dans l'enveloppe ci-jointe.

Merci de votre collaboration avec Monsieur Guthrie, avec l'Institut, et éventuellement avec vous-même.

Veuillez agréer, Monsieur, l'assurance de ma considération distinguée.

J. A. Viau, CIM, Président.

QUESTIONNAIRE

by Professor Art Guthrie, Carleton University

I teach in the School of Commerce at Carleton and also have a research interest in changes to the managerial environment brought about by expanding computer technology and sophisticated information systems concepts. I am conducting a study on behalf of the Social Environment Planning Unit, Department of Communications and would appreciate receiving your answers to the questions which follow. I am interested in your answers, whether or not you have been affected by computers and the new information concepts.

The purpose of this questionnaire is to gather some data on your feelings regarding information systems as related to your management position. You will be asked for information as follows:

Section A: Your feelings regarding the need for information systems improvement

Section B: Your feelings on the effects of the development of a total Management Information System

Section C: Some data on your experience and your present position.

Do not look for any particular order to the questions. The order of the questions has been deliberately scrambled in accordance with proper research technique.

Your first reactions are best for this type of study, so please work through the questions fairly rapidly. You should be able to complete the entire form in thirty minutes. Please be sure to answer all questions.

Replies to this questionnaire will be analysed in "size and type" classifications that will not identify individual respondents or organizations. You can be assured that anonymity and confidentiality will be preserved in the presentation of the results.

SECTION A: INFORMATION SYSTEMS

Information systems usually include more kinds of data than are obtained from the accounting system. Sales analyses, budget-versus-actual cost reports, production schedules, inventory control data, etc., etc. may form part of your information system.

In this section, there are a number of statements that relate to your information system. Each statement is followed by two questions:

(a) How much is there now? (Minimum) 1 2 3 4 5 6 7 (Maximum)
(b) How much should there be? 1 2 3 4 5 6 7

You are asked to rate each of the questions, (a) and (b), on the seven-point scale by circling the appropriate number. Low numbers represent low or minimum amounts and high numbers represent high or maximum amounts. If you think there is "very little" or "none" of the characteristic represented by the statement you would circle numeral 1 on the scale for question (a). If you think there is "just a little", you would circle numeral 2, and so on. If you think there is a "great deal but not a maximum amount", you would circle numeral 6. In the same manner, you should circle the number on the scale for question (b) that best represents how much you think there should be.

Naturally, you should circle only one number for each seven-point scale. Also, please do not omit any scales.

1. Information to help me do the planning and budgeting necessary in my management position:

   (a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
   (b) How much should there be? 1 2 3 4 5 6 7

2. The time I have available to work on improvements to my information system:

   (a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
   (b) How much should there be? 1 2 3 4 5 6 7

3. Information available from other areas that helps me to manage my area or department:

   (a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
   (b) How much should there be? 1 2 3 4 5 6 7

4. Information reported by my area or department that is useful to other areas:

   (a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
   (b) How much should there be? 1 2 3 4 5 6 7

5. The time my staff has available to work on improvements to my information system:

   (a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
   (b) How much should there be? 1 2 3 4 5 6 7

6. Information to keep me up-to-date on activities and performances related to my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

7. Information that is required to guide and control activities related to my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

8. Improvements made by me or my staff to the information system:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

9. Information available throughout the organization so that each manager is aware of what the others are doing:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

10. Information systems that minimize the work of gathering and reporting information throughout the total organization:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

11. Recognition by my superiors of information systems improvement work done by me or my staff:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

12. Information that helps me to adequately report to my superiors:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

13. Information that enables me to make the day-to-day decisions that are necessary in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

14. Rewards given by my superiors for information systems improvement work done by me or my staff:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

15. Information to guide top management in the planning and operation of the whole organization:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

SECTION B: MANAGEMENT INFORMATION SYSTEMS

You may have some knowledge of or experience in MIS but, whatever the degree of your familiarity, I would like to get your opinion on the effects of MIS on your management position. An explanation or definition of MIS follows:

> Under the MIS concept, quantitative data is captured (usually in machine-readable form) as transactions occur, or whenever else the data is available, and then stored in integrated or centralized files. A "richer" data base can be set up that contains external as well as internal information, future-oriented as well as historical information, etc. The information is available to managers or departments on schedule or on demand. Many routine decisions can be made automatically within the system and exception or management reports can be generated automatically. An integrated or total-system point-of-view is taken, rather than a segmented or departmental orientation.

You are asked to circle the appropriate number on the same type of seven-point scale as was used in Section A, but you are asked to rate different questions:

(a) How much of the characteristic is there now?
(b) How much of the characteristic do you think there would be if MIS were implemented (or expanded) in your organization?

Again, please circle only one number for each rating scale and do not omit any scales.

1. The feeling of self-esteem a person gets from being in my management position:

(a)	How much is there now?	(Min.)	1 2 3 4 5 6 7	(Max.)
(b)	How much would there be under MIS?		1 2 3 4 5 6 7	

2. The authority connected with my management position:

(a)	How much is there now?	(Min.)	1 2 3 4 5 6 7	(Max.)
(b)	How much would there be under MIS?		1 2 3 4 5 6 7	

3. The opportunity for personal growth and development in my management position:

(a)	How much is there now?	(Min.)	1 2 3 4 5 6 7	(Max.)
(b)	How much would there be under MIS?		1 2 3 4 5 6 7	

4. The prestige of my management position inside the organization (that is, the regard received from others in the organization):

(a)	How much is there now?	(Min.)	1 2 3 4 5 6 7	(Max.)
(b)	How much would there be under MIS?		1 2 3 4 5 6 7	

5. The opportunity for independent thought and action in my management position:

(a)	How much is there now?	(Min.)	1 2 3 4 5 6 7	(Max.)
(b)	How much would there be under MIS?		1 2 3 4 5 6 7	

6. The feeling of security in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

7. The feeling of self-fulfillment a person gets from being in my management position (that is, the feeling of being able to use one's own unique capabilities, realizing one's potentialities):

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

8. The prestige of my management position outside the organization (that is, the regard received from others, not in the organization):

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

9. The feeling of worthwhile accomplishment in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

10. The opportunity in my management position, to give help to other people in my organization:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

11. The opportunity in my management position, for participating in the determination of methods and procedures:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

12. The opportunity, in my management position, for participation in the setting of goals:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

13. The feeling of being informed in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

14. The opportunity to develop close associations and friendships in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

15. The feeling of pressure in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

SECTION C: BACKGROUND INFORMATION

To assist in statistical analysis of the replies, a number of factors regarding your background are needed. Therefore, please answer the following questions to the best of your ability.

1. Type of organization (check one)

_____ Retailing
_____ Other distribution
_____ Manufacturing
_____ Federal Government
_____ Provincial Government
_____ Municipal Government
_____ Educational
_____ Other (specify) _____

Size of organization (that is, the total organization, not your division)

(a) Approximate number of employees (management and non-management) _____

(b) Approximate annual sales, budget or appropriation, whichever is the suitable measure _____

2. How would you classify your level in the organization (check one)
_____ Top management (chief executive of organization or decentralized division)
_____ Middle management-line or functional
_____ Middle management-staff specialist
_____ Other (specify) _____

3. How would you categorize your main function in the organization?
_____ Production
_____ Sales, marketing, advertising
_____ Finance, accounting
_____ Personnel, training
_____ Purchasing
_____ Research and development
_____ Systems, EDP, computer operations
_____ General administration
_____ Other (specify) _____

4. How long have you been working in business, government or education?
In your present position? _____yrs.
In your present organization? _____yrs.
In total? _____yrs.

5. Please state any experience you have had in computers, EOP, or systems work (include the lengths of time). _____

_____

_____

_____

6. If your organization uses computers (either in-house or service bureau), please indicate which of the following areas are computerized by checking the appropriate spaces.

_____ Accounts receivable	_____ Sales analysis
_____ Payroll	_____ Labor costing
_____ Purchasing	_____ Accounts payable
_____ Inventory control	_____ Job and/or product costing
_____ Production scheduling	_____ Production control
_____ Financial statements	_____ Departmental statements
_____ Fixed asset accounting	_____ Budgeting
_____ Process control	_____ Market forecasting

_____ Other (specify) _____

_____

_____

7. How would you characterize you and your staff's involvement in computer activities? (check one)

_____ Operation or control of computer activities
_____ Provide input and utilize output
_____ User-department (that is, use computer output and/or reports)
_____ Provide input only
_____ Not involved
_____ Other (specify) _____

8. Indicate any recent changes in your information system (that is, changes in the way you report information or in the way you receive reports or information). Space has been provided below for three (3) separate changes, but if this is insufficient, please add any others to the back of these pages.

(1) Type of change; brief description _____

_____

_____

(a) How far along is the change (that is, planning, installing, completed, etc.)? _____

(b) To what degree do you consider the change successful or unsuccessful?

_____

(c) Did you participate in the planning, design, or installation of the new system and, if so, to what extent? _____

_____

(d) What has been the effect of the change on you (that is, no effect, advantageous, disadvantageous, etc.)? _____

(e) Was (or is) this change a part of a total system or MIS development, or is it an isolated change? _____

_____

(2) Type of change; brief description _____

_____

_____

(a) How far along is the change (that is, planning, installing, completed, etc.)? _____

(b) To what degree do you consider the change successful or unsuccessful?

_____

(c) Did you participate in the planning, design, or installation of the new system and, if so, to what extent? _____

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(3) Type of change; brief description _____

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(a) How far along is the change (that is, planning, installing, completed, etc.)? _____

(b) To what degree do you consider the change successful or unsuccessful?

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(d) What effect has the change had on you (that is, advantageous, no effect, disadvantageous, etc.)? _____

(e) Was (or is) this change a part of a total system or MIS development, or is it an isolated change? _____

_____

9. To what extent do you expect information systems changes in the future?

_____

_____

_____

_____

10. Do you feel that the systems staff (or outside consultants) should plan, design, and supply new information systems; or that the user-department managers and their staffs should actively participate in the planning, design, and installation (that is, what sort of balance is best)? _____

_____

_____

_____

11. Please list any recent education or training courses in which you have been (or are) involved (include sponsor, subject, course length). _____

_____

_____

_____

THANKS VERY MUCH FOR YOUR COOPERATION!

MAKE ANY COMMENTS YOU WANT TO BELOW.

A.2 THE QUESTIONNAIRE FOR OTHER ORGANIZATIONS

The questionnaire presented on the following pages is identical to the one used in the CIM survey, except that less questions are asked in Section C, because organization size and type could be predetermined by the researcher. As was stated in the reports for each organization, a covering memorandum, signed by a responsible organizational official, accompanied the questionnaires (as well as a stamped return envelope, addressed to the researcher at Carleton University). Copies of the covering memorandums are on file, and are not presented here.

QUESTIONNAIRE

by Professor Art Guthrie, Carleton University

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Naturally, you should circle only one number for each seven-point scale. Also, please do not omit any scales.

1. Information to help me do the planning and budgeting necessary in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

2. The time I have available to work on improvements to my information system:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

3. Information available from other areas that helps me to manage my area or department:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
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4. Information reported by my area or department that is useful to other areas:

(a) How much is there now? (Min.) I 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

5. The time my staff has available to work on improvements to my information system:

(a) How much is there now? (Min.) I 2 3 4 5 6 7 (Max.)
(b) How much should there be? 1 2 3 4 5 6 7

6. Information to keep me up-to-date on activities and performances related to my management position:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

7. Information that is required to guide and control activities related to my management position:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

8. Improvements made by me or my staff to the information system:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

9. Information available throughout the organization so that each manager is aware of what the others are doing:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

10. Information systems that minimize the work of gathering and reporting information throughout the total organization:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

11. Recognition by my superiors of information systems improvement work done by me or my staff:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

12. Information that helps me to adequately report to my superiors:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

13. Information that enables me to make the day-to-day decisions that are necessary in my management position:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

14. Rewards given by my superiors for information systems improvement work done by me or my staff:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

15. Information to guide top management in the planning and operation of the whole organization:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much should there be?		1	2	3	4	5	6	7

SECTION B: MANAGEMENT INFORMATION SYSTEMS

You may have some knowledge of or experience in MIS but, whatever the degree of your familiarity, I would like to get your opinion on the effects of MIS on your management position. An explanation or definition of MIS follows:

> Under the MIS concept, quantitative data is captured (usually in machine-readable form) as transactions occur, or whenever else the data is available, and then stored in integrated or centralized files. A "richer" data base can be set up that contains external as well as internal information, future-oriented as well as historical information, etc. The information is available to managers or departments on schedule or on demand. Many routine decisions can be made automatically within the system and exception or management reports can be generated automatically. An integrated or total-system point-of-view is taken, rather than a segmented or departmental orientation.

You are asked to circle the appropriate number on the same type of seven-point scale as was used in Section A, but you are asked to rate different questions:

(a) How much of the characteristic is there now?
(b) How much of the characteristic do you think there would be if MIS were implemented (or expanded) in your organization?

Again, please circle only one number for each rating scale and do not omit any scales.

1. The feeling of self-esteem a person gets from being in my management position:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much would there be under MIS?		1	2	3	4	5	6	7

2. The authority connected with my management position:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much would there be under MIS?		1	2	3	4	5	6	7

3. The opportunity for personal growth and development in my management position:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much would there be under MIS?		1	2	3	4	5	6	7

4. The prestige of my management position inside the organization (that is, the regard received from others in the organization):

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much would there be under MIS?		1	2	3	4	5	6	7

5. The opportunity for independent thought and action in my management position:

(a)	How much is there now?	(Min.)	1	2	3	4	5	6	7 (Max.)
(b)	How much would there be under MIS?		I	2	3	4	5	6	7

6. The feeling of security in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

7. The feeling of self-fulfillment a person gets from being in my management position (that is, the feeling of being able to use one's own unique capabilities, realizing one's potentialities):

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

8. The prestige of my management position outside the organization (that is, the regard received from others, not in the organization):

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

9. The feeling of worthwhile accomplishment in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

10. The opportunity in my management position, to give help to other people in my organization:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

11. The opportunity in my management position, for participating in the determination of methods and procedures:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

12. The opportunity, in my management position, for participation in the setting of goals:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

13. The feeling of being informed in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

14. The opportunity to develop close associations and friendships in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

15. The feeling of pressure in my management position:

(a) How much is there now? (Min.) 1 2 3 4 5 6 7 (Max.)
(b) How much would there be under MIS? 1 2 3 4 5 6 7

SECTION C: BACKGROUND INFORMATION

To assist in statistical analysis of the replies, a number of factors regarding your background are needed. Therefore, please answer the following questions to the best of your ability.

1. How would you categorize your main function in the organization?
   _____ Production
   _____ Sales, marketing, advertising
   _____ Finance, accounting
   _____ Personnel, training
   _____ Purchasing
   _____ Research and development
   _____ Systems, EOP, computer operations
   _____ General administration
   _____ Other (specify) _____

2. Please give your job classification or job title _____

   _____

3. How long have you been working in business, government or education?
   In your present position? _____yrs.
   In your present organization? _____yrs.
   In total? _____yrs.

4. Please state any experience you have had in computers, EOP, or systems work (Include the lengths of time). _____

   _____

   _____

5. How would you characterize you and your staff's involvement in computer activities? (check one)
   _____ Operation or control of computer activities
   _____ Provide input and utilize output
   _____ User-department (that is, use computer output and/or reports)
   _____ Provide input only
   _____ Not involved
   _____ Other (specify) _____

   _____

6. Indicate any recent changes in your information system (that is, changes in the way you report information or in the way you receive reports or information). Space has been provided below for three (3) separate changes, but if this is insufficient, please add any others to the back of these pages.

(1) Type of change; brief description _____

_____

_____

(a) How far along is the change (that is, planning, installing, completed, etc.)? _____

(b) To what degree do you consider the change successful or unsuccessful?

_____

(c) Did you participate in the planning, design, or installation of the new system and, if so, to what extent? _____

(d) What has been the effect of the change on you (that is, no effect, advantageous, disadvantageous, etc.)? _____

(e) Was (or is) this change a part of a total system or MIS development, or is it an isolated change? _____

_____

(2) Type of change; brief description _____

_____

_____

(a) How far along is the change (that is, planning, installing, completed, etc.)? _____

(b) To what degree do you consider the change successful or unsuccessful?

_____

(c) Did you participate in the planning, design, or installation of the new system and, if so, to what extent? _____

_____

(d) What effect has the change had on you (that is, advantageous, no effect, disadvantageous, etc.)? _____

(e) Was (or is) this change a part of a total system or MIS development or is it an isolated change? _____

_____

(3) Type of change; brief description _____

_____

_____

(a) How far along is the change (that is, planning, installing, completed, etc.)? _____

(b) To what degree do you consider the change successful or unsuccessful?

_____

(c) Did you participate in the planning, design, or installation of the new system and, if so, to what extent? _____

_____

(d) What effect has the change had on you (that is, advantageous, no effect, disadvantageous, etc.)? _____

(e) Was (or is) this change a part of a total system or MIS development, or is it an isolated change? _____

_____

7. To what extent do you expect information systems changes in the future?

_____

_____

_____

_____

8. Do you feel that the systems staff (or outside consultants) should plan, design, and supply new information systems; or that the user-department managers and their staffs should actively participate in the planning, design, and installation (that is, what sort of balance is best)? _____

_____

_____

_____

9. Please list any recent education or training courses in which you have been (or are) involved (include sponsor, subject, course length). _____

_____

_____

_____

THANKS VERY MUCH FOR YOUR COOPERATION!

MAKE ANY COMMENTS YOU WANT ON BACK OF THIS PAGE.

APPENDIX B

METHODOLOGICAL CONSIDERATIONS

B.1 THE SURVEY TECHNIQUE

Reference to published work indicates that most research into the impact of MIS on managers has taken the form of field or case studies of single organizations or of a limited number of organizations.[1] Some of the longitudinal case studies enabled the researchers to assess the "before and after" effects of an MIS installation. These case studies are useful in identifying ex-post the conditions under which MIS installations may be relatively more or less successful. However, the approach does not get to the basic underlying problem that is proposed in this study -- negative attitudes towards MIS by the key middle managers.

Little research has been conducted on management's reactions to the installation and operation of MIS. What work that has been done has tended to be case studies or surveys of technical MIS personnel, not user-middle managers. Due to the lack of empirical data in this area, the study was essentially exploratory in nature. To test the hypotheses, data was gathered from a broad, cross-sectional sample of a segment of the middle-manager population. To gain such data, a survey approach was used and a questionnaire instrument developed.

As Porter and Lawler point out, the type of questions to be asked in a research project dictate the research design and methodology.[2] The fact that this study focuses on questions concerned with attitudes limits the data-gathering process to the use of either interviews or questionnaires. Interviewing allows the researcher to use some flexibility in his questioning and to get some degree of involvement by the respondents.

The use of questionnaires allows the economical questioning of a larger, heterogeneous sample, so that a cross-section of the middle management population can be studied. The larger sample decreases the probability that the results obtained are a function of unique conditions existing in the environment of the respondents sampled. In other words, questionnaire results are usually more appropriate for generalization than interview results, assuming, of course, that the sample has been randomly selected.

When questionnaires are used, it is known that each respondent has answered exactly the same questions. As Haire, Ghiselli and Porter put it, "depth" is sacrificed for "exactitude".[3] The claim to exactitude must be qualified by some of the obvious limitations of questionnaires. All respondents may not interpret the questions in the way intended by the researcher. However, a degree of exactitude is obtainable that at least enables the comparison of results from group to group within the sample.

B.2 THE QUESTIONNAIRE

The questionnaire developed for this study is an adaptation of the research tool developed by L.W. Porter. Porter's scale is an instrument which has been extensively field-tested and which produces a measure of dissatisfaction as well as a measure of satisfaction.[4] Porter's questionnaire is designed to measure job satisfaction by obtaining responses in dimensions of an amended model of Maslow's need hierarchy.[5] The overall structure of the study questionnaire is shown in Table B.1.

In Section A of the questionnaire, statements are made which relate to the respondent's perception of his need for information systems development (the felt need). The level of dissatisfaction is measured by use of the subtractive approach developed by Porter, rather than by making a direct attempt to gauge dissatisfaction. For example, question 1 of Section A reads:

1. Information to help me do the planning and budgeting necessary in my management position:

   a) How much is there now? (Min.) 1 2 3 4 5 6 7 (max.)
   b) How much should there be? 1 2 3 4 5 6 7

The respondent's answer to question (a) is subtracted from his answer to (b) to obtain the "perceived need-fulfillment deficiency", or felt need.[6] The acceptance of this difference score as a measure of felt need can be termed an <u>a priori</u> assumption that is made by the many users of this subtractive approach.[7] The resulting scores are subject to certain measurement limitations which are discussed below.

TABLE B.1

Structure of the Questionnaire Developed to Measure
Middle Manager's Attitudes towards MIS

SECTION A: data for H1, the felt need.

15 statements which are related to the respondent's felt need for information systems development. Each statement is followed by 2 questions to be answered on a 7-point scale:

a) How much is there now?
b) How much should there be?

SECTION B: data for H2, effects on need satisfactions.

15 statements which are related to the respondent's perception of the effects of MIS on his need satisfactions. Each statement is followed by 2 questions to be answered on a 7-point scale:

a) How much is there now?
b) How much would there be under MIS?

SECTION C: data for H3, the range of attitudes.

Background information in eight dimensions is obtained from answers to 10 questions.

In Section B of the questionnaire, need satisfaction measures are obtained by the same subtractive technique. The 15 statements are drawn directly from Porter's questionnaire, but question (b) is amended so that the respondent's answers yield data needed for this study. Instead of being asked "How much should there be?" (as in Section A), the respondent is asked "How much would there be under MIS?"

Section C of the questionnaire is designed to produce a profile of the respondent's experience and familiarity with MIS along eight separate dimensions that can be tested under the third hypothesis. The 10 questions in Section C were designed to reveal maximum information with minimum effort on the part of the respondent.

Use of the Porter-style questionnaire technique has several advantages for this study. First, the technique is compatible with the conceptual framework that was developed for hypotheses one and two. Statements in Section A of the questionnaire were developed by the researcher to test the first hypothesis regarding the lack of felt need. Statements in Section B test the second hypothesis on perceived need satisfaction reduction and were taken intact from Porter's questionnaire because Porter also used the Maslow need satisfaction model.

In addition to these theory-fitting advantages, the technique of making a statement, then asking for a reply to two "how much" questions has some technical advantages. It helps keep the statements and questions short and simple, while at the same time allowing coverage of the whole range of the attitude. These characteristics are necessary in the construction of a successful scale.[8]

The technique of breaking the attitude down into various dimensions or factors means that specific rather than global questions can be asked. Instead of global questions like "What need satisfactions are obtained in your job?", the respondents are asked to reply to questions that are related to their specific needs.[9] By subtracting the (b) answers from the (a) answers, difference scores (that is, measures of dissatisfaction) are obtained. These difference scores are the felt needs or perceived

effects that the study was set up to measure, so that the questionnaire facilitates production of the specific data required. If a respondent is satisfied with the existing systems, he would mark the same answer to both the (a) and (b) questions and a zero difference score would result. If he is dissatisfied, a positive difference score will be produced by the subtractive technique.

A final advantage of the technique relates particularly to the need satisfaction dimension. Section B gives relatively more emphasis to intrinsic need satisfaction factors than do other techniques (which tend to give most weight to extrinsic factors). As is predicted by Maslow's theory and as has been shown empirically by researchers like Herzberg, the intrinsic factors are more important to managers.[10] This is because the lower order needs (that relate to extrinsic factors) have been largely satisfied for managers and therefore higher order needs (that relate to intrinsic factors) become relatively more important.

The shortcomings of this questionnaire instrument are essentially the shortcomings inherent in any questionnaire. The fact that questions are asked about information systems and MIS tends in itself to introduce a positive bias or response set. Division of the various dimensions of the attitude into factors which are measured by questions implies that each factor has equal weight or impact upon the attitude (unless a weighting scheme is used). However, there is no data to verify the relative weight of factors or to prove that all relevant factors are covered by the questionnaire. Statements and the related questions are subject to the individual interpretation of respondents and may not be answered in the context intended by the researcher.

These shortcomings cannot be completely avoided; the researcher can only design the questionnaire to minimize the effects of the above problems. He can do this by reference to the cited questionnaire construction criteria, by utilizing scales (if available) that have been field-tested and validated, and by carefully pre-testing his instrument. Then he will get the best measurement that is possible considering the present state-of-the-art.

The pre-testing of the questionnaire used in this study consisted of a 1971 survey of a cross-section of middle managers in B.C. The 119 useable responses received from this survey indicated that the questionnaire did in fact produce useful data for analysis purposes. With minor wording changes in one or two questions and with an appropriate heading sheet, the 1971 instrument was used for this study.[11]

B.3 MEASUREMENT CONSIDERATIONS AND ANALYSIS METHODS

After deciding on a survey methodology and developing a questionnaire instrument, it is necessary to designate the appropriate analysis methods to be used. In order to decide on the statistical tests, both the level of measurement attained and the assumptions that can be made about the population must be specified. Then it can be ascertained if classical, parametric statistical tests can be applied to the data.

For the analyses in this study, it was decided to use non-parametric tests if they were available. Non-parametric techniques do not require assumptions of normality or homoscedasticity in the population of middle managers. Any such assumptions would be dangerous because virtually nothing is known about the population's characteristics. Also, the use of the Porter scaling technique means that the variables to be tested are measured in either ordinal or nominal scale. The combination of an unknown population and a low level of measurement means that non-parametric tests should be used if at all possible.

The three hypotheses stated at the beginning of this section were divided into sub-hypotheses which are testable. To designate appropriate tests, the research variables were identified and the sub-hypotheses stated in the statistical null and alternate form. The variables for the first hypothesis are actually difference scores from two related samples (How much should there be? minus How much is there now?), where each subject is used as his own control. Similarly, variables for the second hypothesis are difference scores. These difference scores (or (b) - (a) on the questionnaire) are a measures of dissatisfaction, or felt need for information systems improvement. The weakness of this data is that it is only ordinal scale measurement and there is no knowledge as to its underlying distribution or variance characteristics. But, the use of difference scores rather than absolute levels on the seven-point scale has the advantage that dissatisfaction can be measured while making no assumptions about a "correct" or average level of satisfaction. Specified in this way, the measures can be quite error-free. They are based only on the assumption that respondents can accurately assess the difference between what "is" and what "should be".

A zero difference score under hypothesis one would indicate support for the null hypothesis that middle managers do not perceive a felt need for information systems development. The predicted probability of exact zero scores is low and it will be necessary to decide if observed non-zero scores are significant; that is, whether or not positive difference scores mean support of the alternate hypothesis that the managers do perceive a felt need. A theoretical model which predicts the magnitudes of the difference scores has not been developed. Nor is empirical data from other studies available to help assess the significance of difference score values. The research hypothesis states that "middle managers do not perceive information systems development as an important need..." and an operational definition of "important need" (based on the values of the difference scores) is proposed in the analysis of the results.

The second hypothesis predicts that the difference scores will be negative, but the research variables could actually be either positive or negative. In other words, managers might anticipate increases or decreases in their need satisfactions when comparing their existing situation to that expected under MIS.

The statistical model for the first two hypotheses is a matched two-sample case and the usual parametric technique would be to apply the t test to the difference scores. However, as pointed out at the beginning of this section, a non-parametric test should be used if one is available. Several non-parametric tests are available for the related two sample case, and the Wilcoxon Matched-Pairs Signed-Ranks test was chosen as the best alternative for this study.[12]

Performance of the Wilcoxon test on the data with respect to research hypotheses one and two will enable statements to be made about managers' perceptions of the need for and effects of MIS development. However, it is hypothesized that managers' perceptions will vary, largely as a function of their experience relevant to MIS and information systems in general. The third research hypothesis states that middle managers who have familiarity or successful experience with MIS will have more favorable perceptions regarding MIS than middle managers who have little or no familiarity or experience.

Although graphical analysis of the third hypothesis is possible, it was decided that statistical testing would present a clearer picture and allow for fuller interpretation of the results. The objective of statistical testing is to determine whether the independent (experience) variables are determinants of attitude scores obtained. For testing purposes, respondents can be classified into separate samples, according to the experience classifications. Then the attitude scores for each sample can be tested. The test will be to determine whether the inevitable differences between the samples is due to real population differences or to chance. The statistical model is one of k independent samples, where k is the number of groups or samples in the experience dimension tested.

Because normality and homoscedasticity in the population cannot be assumed and because measurement is only in ordinal or nominal scales, a non-parametric statistical test should be applied if one is available. The Kruskal-Wallis one-way analysis of variance by ranks was chosen as the most appropriate non-parametric technique to accomplish the objectives of testing the third hypothesis of this study.[13] It should be noted that Kruskal-Wallis test is a one-way analysis technique. The decision not to consider interactions between the independent variables is based only partly on the computational problems involved in multi-way analyses.[14] More important, is the concern that the eight experience and familiarity factors hypothesized as influences on managerial attitudes towards MIS may not be the relevant or the only determining factors. Future research might be undertaken to look at the higher order interactions between factors which may be relevant (either individually or jointly) to attitude formation.

FOOTNOTES

1 Guthrie, (1971).

2 Porter and Lawler, (1968), Ch. 6.

3 Haire, Ghiselli and Porter, (1966), p. 2.

4 The test-retest reliability of Porter's questionnaire instrument is reported as about .75 to .80 in D.B. Simpson, Leadership Behavior, Need Satisfactions, and Role Perceptions of Labor Leaders: A Behavioral Analysis, (Unpublished doctoral dissertation, University of Washington, 1971), p.7.

5 Maslow, (1954), see Ch. 5 for discussion of Maslow's original model. Porter made two major alterations:

1) Questions were not asked about the most prepotent category of needs (physiological needs) since this category would be so adequately satisfied in managers that the questions would be irrelevant.

2) An "autonomy" category was added, made up of questions that otherwise would have been included in the esteem category. This was done because the autonomy questions were logically distinct items, at least with respect to management subjects.

6 Users of this subtractive approach usually cite the original article which discussed the questionnaire instrument and the methodology:

L.W. Porter, "A Study of Perceived Need Satisfaction in Bottom and Middle Management Jobs", Journal of Applied Psychology, (February 1961), p. 1. In this article, Porter says, "Whenever Part (b) was checked higher than Part (a), this was termed a 'deficiency' in need fulfillment" (p. 4), but discusses the matter no further. This rationale is amplified in Porter and Lawler's more recent work by the statement, "The difference in answers between the second (the perceived equitable amount) and the first (reality) of these questions was taken as the operational measure of need satisfaction. That is, the greater the amount by which 'should be' exceeded 'is now' in our findings, the greater the dissatisfaction" (Porter & Lawler, op. cit., p. 131).

7 See, for example:

1) E.L. Miller, "Job Satisfaction of National Union Officials", Personnel Psychology, (Autumn 1966), p. 261.

2) Haire, Ghiselli, and Porter, op. cit., p. 87.

8 Edwards, (1957), Ch. 1.

9 A clear justification of the requirement to relate questions to the respondent's own experience and needs is found in Selltiz, Jahoda, Deutsch, (1959), p. 546.

10 Herzberg, (1966).

11 A detailed write-up of the 1971 study can be found in Guthrie, (1971).

12 Other alternatives include the McNemar, Sign, Walsh, and Randomization tests that are described in Siegel, (1956), pp. 76, 101, 156, and 170.

13 Seven non-parametric tests for the case of k independent samples are discussed in Siegel, (1956), Ch. 8, p. 174.

14 One of the disadvantages of non-parametric tests, according to Siegel (p. 33), is that there are no well established methods for testing interactions in the analysis of variance model. Bradley, (1963), p. 138 outlines extensions to two non-parametric methods which will test main effects and interactions in multi-way analyses. However, the column-and-block technique used for testing the interactions would be cumbersome for eight interacting variables, particularly (as in this study) when the number of observations under each combination of levels of the different variables is not constant.

APPENDIX C

CODING AND COMPUTING

C.1 Coding

C.2 Computing

C.1 CODING

As completed questionnaires were received, they were checked for apparent validity and completeness. Usable questionnaires were assigned the envelope number (4-digit) and an identification number for the respondent (3-digit). (The return envelopes contained a code to identify the organization and any required internal organization breakdowns.)

Raw scores are required as input to the program used for running the Wilcoxon Matched-Pairs, Signed-Ranks test, so actual numbers circled by respondents were recorded on 80-column data-coding sheets. At this recording stage, replies were coded into separate variable groupings, not in the (random) sequence of questions on the questionnaire. Separate coding sheets were used for Section's A and B of the questionnaire.

Difference score values are required for the program used to compute the Kruskal-Wallis One-Way Analysis of Variance by Ranks tests, so need-scores and effects-scores were summed manually for each respondent (from Sections A and B). These difference scores were recorded on a third data-coding sheet, along with the experience familiarity codings obtained from respondents' answers to Section C questions.

The coding of the almost 2,000 responses was a sizeable job and required perhaps 3 months work on the part of a research assistant.

Three 80-column cards for each respondent were punched up from the coding sheets, one for Section A (card-code 1), one for Section B (card-code 2), and one for Section C plus the manually calculated difference scores (card-code 3). Key-punching was done by Carleton University staff as a normal research-support procedure. Punched cards were listed on the university computer by use of the available PCL routine, then listings were sample-checked back to the coding sheets and at the same time, the coder's manual additions were sample-checked by the researcher.

C.2 COMPUTING

For the statistical testing, Simon Fraser University's Non-Parametric Package program UAE-NONP05 was utilized and, for the medians, Quartiles and Semi-Interquartile Ranges, Simon Fraser's program UAE-NONP04. Program and test decks were obtained from Simon Fraser University for these two packages and control cards were

punched for running on the Carleton University XDS computer. The programs were tested by running the test decks and also the data cards from the 1971 pilot study, before any data for this study was submitted for computation.

All computer computations for this study were run in card batch mode, submitted to the Carleton University Computer Center either by the research assistant or the researcher. Separate computations were made for each organization and for the total-study results. This procedure required that approximately 200 separate jobs be submitted to the computer center (including testing and aborted runs). The listings to check key-punching and coding required approximately 35 separate job submissions. Records were not kept of run-times, but "charge units" were recorded and the total charge units amounted to approximately $1100.00. At the time these computations were made, the charge units were for memorandum purposes only and were not actually charged to the researcher or the department.

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