Survey Research Methodology in Management Information Systems: An Assessment

ALAIN PINSONNEAULT AND KENNETH L. KRAEMER

ALAIN PINSONNEAULT is an Associate Professor at École des Hautes Études Commerciales de Montréal. He holds a Ph.D. in administration from the University of California at Irvine (1990) and an M.Sc. in management information systems from École des Hautes Études Commerciales de Montréal (1986). His current research interests include the organizational implications of computing, especially with regard to the centralization/decentralization of decision-making authority and middle managers work force; the strategic and political uses of computing, the use of information technology to support group decision-making process; and the benefits of computing. He has published articles in *Decision Support Systems*, *European Journal of Operational Research*, and in *MIS Quarterly*, and one book chapter. He is an associate editor of the journal, *Informatization and the Public Sector*. His doctoral dissertation won the 1990 International Center for Information Technology Doctoral Award.

KENNETH L. KRAEMER is the Director of the Center for Research on Information Technology and Organizations (CRITO) and Professor of Management and Information and Computer Science. He holds a Ph.D. from University of Southern California. Professor Kraemer has conducted research into the management of computing in organizations for more than twenty years. He is currently studying the diffusion of computing in Asia-Pacific countries, the dynamics of computing development in organizations, the impacts of computing on productivity in the work environment, and policies for successful implementation of computer-based information systems. In addition, Professor Kraemer is coeditor of a series of books entitled *Computing, Organization, Policy, and Society (CORPS)* published by Columbia University Press. He has published numerous books on computing, the most recent of which is *Managing Information Systems*. He has served as a consultant to the Department of Housing and Urban Development, the Office of Technology Assessment, and the United Nations, and as a national expert to the Organization for Economic Cooperation and Development. He was recently Shaw Professor in Information Systems and Computer Sciences at the National University of Singapore.

ABSTRACT: Survey research is believed to be well understood and applied by management information systems (MIS) scholars. It has been applied for several years and

Acknowledgments: The authors would like to thank the participants of the 1991 Queen's-HEC workshop and two anonymous reviewers and the Editor-in-chief of the *Journal of Management Information Systems* for their helpful comments on an earlier version of this paper. This study was supported financially by École des Hautes Études Commerciales de Montréal and the University of California at Irvine.

Journal of Management Information Systems / Fall 1993, Vol. 10, No. 2, pp. 75–105

it has precise procedures which, when followed closely, yield valid and easily interpretable data. Our assessment of the use of survey research in the MIS field between 1980 and 1990 indicates that this perception is at odds with reality. Our analysis indicates that survey methodology is often misapplied and is plagued by five important weaknesses: (1) single-method designs where multiple methods are needed, (2) unsystematic and often inadequate sampling procedures, (3) low response rates, (4) weak linkages between units of analysis and respondents, and (5) overreliance on cross-sectional surveys where longitudinal surveys are really needed. Our assessment also shows that the quality of survey research varies considerably among studies of different purposes: explanatory studies are of good quality overall, exploratory and descriptive studies are of moderate to poor quality. This article presents a general framework for classifying and examining survey research and uses this framework to analyze the usage of survey research conducted in the past decade in the MIS field. In an effort to improve the quality of survey research, this article makes specific recommendations that directly address the major problems highlighted in the review.

KEY WORDS AND PHRASES: research of management information systems, research methodology, survey research.

SCIENCE MAY BE SAID TO PROGRESS ON ITS METHODS. The production of knowledge depends very much on the techniques for collecting, analyzing, and interpreting data and on the way they are applied [64]. The same may be said of management information systems (MIS). The academic study of MIS relies very much on the methods used to answer research questions and test research hypotheses, and on the careful application of these methods. Moreover, since most of the methods are borrowed from established disciplines, the issue of appropriate and skillful application becomes key. And this is especially the case in survey research where the basic methods have been known since the 1950s, but where the application in many fields continues to fall short of the theoretical ideal.

Assessment of survey research methodology might be done from any of three different perspectives:

1. Developing insights into appropriate research methodologies: establish appropriate usage of different methodologies [3, 20, 36, 37, 46, 50, 52, 55, 70, 72].
2. Examining the quality of existing research methodologies: assess the strengths and weaknesses of different methodologies as they apply in the MIS field [8, 9, 57, 65, 73].
3. Identifying where research is needed: determine areas where the application of specific methodologies would be most insightful [11, 12, 22, 38, 40, 48, 50].

This paper examines the quality of survey research methodology in MIS, and differs from three major recent assessments in its comprehensiveness. For example, Newsted, Munro, and Huff [57] inventory and assess data collection instruments. Zmud and Boynton [73] assess survey instruments and survey measures, whereas Straub [65] describes the evolution of data analysis methods in MIS. This article focuses on the broader elements of survey research in that it analyzes research design, sampling procedures, and data collection. Our review of 122 survey-based studies in MIS indicates that survey research in MIS suffers from the same problems that plague survey research generally: (1) single-method designs where multiple methods were needed, (2) unsystematic and often inadequate sampling procedures, (3) low response rates, (4) weak linkages between units of analysis and respondents, and (5) overreliance on cross-sectional surveys where longitudinal surveys were really needed. On the one hand, this is disappointing, especially when one considers the extent to which survey research is used,[1] and the proportion of survey-based studies in MIS that fail to measure up. The key problem revealed by this article is weaknesses in application of survey methodology, not inappropriate technical knowledge concerning the methodology. On the other hand, the assessment is reassuring because those problems are not more acute or pronounced in MIS than they are in other more mature fields where survey research has been applied for a much longer period. One would expect a new field, such as MIS, to have difficulties at first in adopting and applying methods developed in other fields for its own problems.

The first section defines survey research and discusses its appropriate application. The second section describes the database and method used to examine survey research in MIS, and the third section presents the findings of our assessment. The fourth section discusses the findings and the last section summarizes the results and recommendations that were made throughout this article.

Definition of Survey Research

THERE IS AN IMPORTANT DISTINCTION BETWEEN SURVEYS AND SURVEY RESEARCH. A survey is a means of "gathering information about the characteristics, actions, or opinions of a large group of people, referred to as a population" [66]. As such, there are many data collection and measurement processes that are called surveys—marketing surveys, opinion surveys, and political polls to name some of the most common. This paper is not about such surveys. Rather, it focuses on surveys that are conducted to advance scientific knowledge, which we refer to as survey research.

Characteristics of Survey Research

Surveys conducted for research purposes have three distinct characteristics. First, the purpose of the survey is to produce quantitative descriptions of some aspects of the studied population. Survey analysis may be primarily concerned either with relationships between variables, or with projecting findings descriptively to a predefined population [32]. Survey research is a quantitative method, requiring standardized information from and/or about the subjects being studied. The subjects studied might be individuals, groups, organizations, or communities; they also might be projects, applications, or systems.

Second, the main way of collecting information is by asking people structured and

predefined questions. Their answers, which might refer to themselves or to some other unit of analysis, constitute the data to be analyzed.

Third, information is generally collected about a fraction of the study population—a sample—but it is collected in such a way as to be able to generalize the findings to the population—such as service or manufacturing organizations, line or staff work groups, MIS departments, or various users of information systems such as managers, professional workers, and clerical workers. Usually, the sample is large enough to allow extensive statistical analyses.

Appropriate Application of Survey Research in MIS

The nature of survey research can be best understood by comparing it with two other dominant methods in MIS: case studies and laboratory experiments.

Case studies involve examination of a phenomenon in its natural setting. The researcher has no control over the phenomenon, but can control the scope and time of the examination. The researcher may or may not have clearly defined independent and dependent variables. Case studies are most appropriate when the researcher is interested in the relation between context and the phenomenon of interest.[2]

Laboratory experiments involve examination of a phenomenon in a controlled setting. The researcher manipulates the independent variables and observes their effects on the dependent variables. The researcher has direct control over the laboratory conditions and manipulation of the independent variables, but the researcher can only study phenomena in the present. Laboratory experiments are especially well suited to research projects involving relatively limited and well-defined concepts and research questions and problems that involve individuals or small groups.

In contrast to these two methods, survey research involves examination of a phenomenon in a wide variety of natural settings. The researcher has very clearly defined independent and dependent variables and a specific model of the expected relationships which are tested against observations of the phenomenon. Survey research is most appropriate when:

a. The central questions of interest about the phenomena are "what is happening?" and "how and why is it happening?" Survey research is especially well suited for answering questions about what, how much, and how many, and to a greater extent than is commonly understood, questions about how and why.
b. Control of the independent and dependent variables is not possible or not desirable.
c. The phenomena of interest must be studied in their natural setting.
d. The phenomena of interest occur in current time or the recent past.

On the other hand, surveys are less appropriate than other methods such as case studies and naturalistic observation when detailed understanding of context and history of given computing phenomena is desired.

Data and Method

THE DATABASE FOR THIS ARTICLE CONSISTS of 141 published articles using survey research culled from major MIS journals between 1980 and 1990. Table 1 distributes the 141 articles by journal.[3]

The list of MIS journals was taken from those commonly included in studies of research and publications in the field [17, 18, 72].[4] When specific individuals recurred in the database, a computer search on the individuals was done in an attempt to find the full body of publications connected with a particular survey effort. This sometimes introduced additional journals into the search (*Data Management, Health, Marketing, and Consumer Behavior, Information Age, Information Processing Management, Microprocessing and Microprogramming, Product Inventory Management*), but only for those individuals and studies.

Each journal was reviewed by the authors, starting with the table of contents, but extending to the abstracts and to the articles themselves. These reviews produced 133 articles. Eight other articles were obtained through computer searches on individuals. After examination, these 141 articles were grouped into 122 studies because some articles are based on the same survey project and research method. In order to obtain the most accurate assessment of the surveys from which several articles were published, all related materials were used to describe and analyze the particular research effort. The method used to assess survey research involves three discrete steps: (1) classification of the studies by purpose, (2) development of a framework for assessment, and (3) actual assessment of the studies.

Classification of Studies by Purpose

Survey research can be used for exploration, description, or explanation purposes. The use of survey research for these purposes is different, however, from the use of case studies or experiments for such purposes.

The purpose of survey research in *exploration* is to become more familiar with a topic and to try out preliminary concepts about it. A survey in this context is used to discover the range of responses likely to occur in some population of interest (end users, IS managers, Fortune 500 companies, etc.) and to refine the measurement of concepts. The exploratory survey focuses on determining what concepts to measure and how to measure them best. The exploratory survey also is used to discover and raise new possibilities and dimensions of the population of interest. For example, Rockart and Flannery [62] did a survey to help define the various types of end-user computing that were developing in organizations.

Usage of survey research for exploration as an end in itself is almost never warranted. Exploratory surveys should be used as the basis for developing concepts and methods for more detailed, systematic descriptive or explanatory surveys [4, 24, 27]. In short, the purpose of an exploratory survey is to elicit a wide variety of responses from individuals with varying viewpoints in a loosely structured manner as the basis for design of a more careful survey.[5]

Table 1 Survey Articles by Journal

Journals	Number of survey articles
Academy of Management Journal	1 (1%)
Communications of the ACM	18 (13%)
Data Base	15 (11%)
Datamation	2 (1%)
Data Management	1 (1%)
Decision Sciences	2 (1%)
Health, Marketing, and Consumer Behavior	1 (1%)
Information Age	1 (1%)
Information and Management	34 (24%)
Information Processing Management	1 (1%)
Journal of Management Information Systems	12 (9%)
MIS Quarterly	44 (31%)
Management Science	6 (4%)
Microprocessing and Microprogramming	1 (1%)
Product Inventory Management	1 (1%)
Public Adminstration Review	1 (1%)
Total	141 (100%)

The purpose of survey research in *description* is to find out what situations, events, attitudes, or opinions are occurring in a population. Survey research aimed at description asks simply about the distribution of some phenomena in a population or among subgroups of a population. The researcher's concern is simply to describe a distribution or to make comparisons between distributions. Analysis stimulated by descriptive questions is meant to ascertain facts, not to test theory. The hypothesis is not causal, but simply that common perceptions of the facts are or are not at odds with reality. For example, it might examine what kind of people use computers in an organization [19], or what kind of people work at home [69], or what kind of applications people use at work [46].

The purpose of survey research in *explanation* is to test theory and causal relations. Survey research aimed at explanation asks about the relationships between variables. It does so from theoretically grounded expectations about how and why the variables ought to be related. The theory includes an element of cause and effect in that it not only assumes that relations exist between the variables, but assumes directionality (e.g., that the relationship is positive or negative, or that variable *A* influences variable *B*). Explanatory questions may extend not only to establishing the existence of a causal relationship but also to asking why the relationship exists. The central research question in explanatory survey research is: "Does the hypothesized causal relationship exist, and does it exist for the reasons posited?" An example of explanatory survey research is the Baroudi, Olson, and Ives [7] study of whether or not user participation in systems development projects affects usage and satisfaction, and why.

Development of Framework for Assessment

Dillman [24] and Fowler [27] indicate that there are three key elements in the conduct of surveys, and that these can be used to assess the quality of survey research. These elements include: (a) research design, (b) sampling procedures, and (c) data collection methods. These elements, and their related dimensions, constitute the framework used to assess survey research methodology in MIS. Table 2 presents the minimum dimensions that a study must meet for each element. Each of the elements and selected dimensions is described next.

Research Design

A research design is the strategy for answering the questions or testing the hypotheses that stimulated the research in the first place. Survey designs may be distinguished as cross-sectional or longitudinal, depending upon whether they exclude or include explicit attention to the time dimension. Appropriate research design thus depends on the problem or question the researcher addresses. When the researcher's aim is to describe a population or document and test differences in subset of the population at one point in time, the cross-sectional design is probably the most appropriate. The classic cross-sectional design collects data at one point in time from a sample selected to represent the population of interest at that time. One can generalize safely the findings from the sample to the population at the point in time the survey was conducted. Cross-sectional designs limit causal inferences because the study is conducted at one point in time and temporal priority is difficult to establish.

On the other hand, when the question or problem of interest is the examination of a dynamic process that involves change over time and understanding of the sources and consequences of a phenomenon, the longitudinal design is the most appropriate. The classic longitudinal design collects data for at least two points in time.[6] The underlying principle of longitudinal designs, like that of the "one-group pretest–postest design" described by Campbell and Stanley [13], is to measure some dimensions of interest of a given entity before and after an intervening phenomenon to determine whether or not the phenomenon has some effects.[7] In MIS, the intervening variable is usually the implementation and usage of computing. The dimensions studied range from social interaction, to organizational structure, to communication, to decision making, and to work effects, among others. Longitudinal designs provide greater confidence for causal inferences than cross-sectional designs because they establish temporal priority more easily.

Another critical issue in research design is determining the unit(s) of analysis—or the unit about which statements are being made. It may be an individual, group, department, or organization. Alternatively, it may be an application, system, or application portfolio; or it may be a development project, or any of the phases of a development project. The point is that the unit of analysis can be anything the researcher decides as long as the unit chosen relates to the questions and hypotheses in the research. There also may be more than one unit of analysis in a survey, such as the individual, work group, and organization.

Table 2 Minimum Dimensions of Survey Studies by Purpose

Element/Dimension	Exploration	Description	Explanation
Research design			
Survey type	Cross-sectional	Cross-sectional	Cross-sectional and longitudinal
Mix of research methods	Multiple methods	Not necessary	Multiple methods
Unit(s) of analysis	Clearly defined	Clearly defined & appropriate for the questions/hypotheses	Clearly defined & appropriate for the research hypotheses
Respondents	Representative of the unit of analysis	Representative of the unit of analysis	Representative of the unit of analysis
Research hypotheses	Not necessary	Questions or hypotheses clearly stated	Hypotheses clearly stated
Design for data analysis	Not necessary	Inclusion of antecedent variables and time order of data	Inclusion of antecedent variables and time order of data
Sampling procedures			
Representativeness of sample frame	Approximation	Explicit, logical argument; reasonable choice among alternatives	Explicit, logical argument; reasonable choice among alternatives
Representativeness of the sample	Not a criterion	Systematic, purposive, random selection	Systematic, purposive, random selection
Sample size	Sufficient to include the range of the phenomena of interest	Sufficient to represent the population of interest & perform statistical tests	Sufficient to test categories in theoretical framework with statistical power
Data collection			
Pretest of questionnaires	With subsample of sample	With subsample of sample	With subsample of sample
Response rate	No minimum	60–70% of targeted population*	60–70% of targeted population*
Mix of data collection methods	Multiple methods	Not necessary	Multiple methods

* Babbie [4], Dillman [24].

A final issue is data analysis. When exploration or description is the aim of survey research, analysis frequently involves no more than developing the marginal and cross-tabulations for the variables and using simple descriptive statistics such as means and medians. Thus, there are no design issues. When explanation is the aim, analysis must employ the full *logic of survey analysis* [63]. That logic is illustrated by testing hypotheses with cross-sectional data. The data produced by a survey comprise the answers to questions which respondents of the survey have been asked, or which have been collected through secondary sources, or both. These questions may all refer to one point in time, but more typically they refer to several different points in time (present, immediate past, distant past, future). The logic of survey analysis is based on the assumption that the time order of data can be established, or reasonably inferred.

The use of cross-sectional survey data to test causal hypotheses requires that the investigator design the survey to include data on the independent and dependent variables and on such antecedent variables as theory would suggest might explain the expected original relation. Analysis, then, involves introducing these antecedent variables into the two-variable (or more) relation to test the null hypothesis. Testing causal relationships with cross-sectional designs in this manner is only possible when very specific factual data that can be correctly remembered by informants are used.

Sampling Procedures

Sampling is concerned with drawing individuals or entities from a population in such a way as to permit generalization about the phenomena of interest from the sample to the population. The most critical element of the sampling procedure is the choice of the sample frame that constitutes a representative subset of the population from which the sample is drawn. The sample frame must adequately represent the unit of analysis. For example, in the Vitalari and Venkatesh [69] study of computing in the home, the household is the unit of analysis and the sample frame is the list of people who had bought computers on credit. The logic was that households that bought computers for home use (versus office use) would likely buy them on personal credit because the average cost was around $4,000.00. While that might not be an adequate sampling frame for home computer users today, it was appropriate for 1983 when computers were first being adopted for home use.

Sampling is also concerned with representativeness in selection of individual respondents from the sample frame. One aspect of representativeness in the home computing study concerns giving each potential respondent an equal chance of being included in the sample. This requires random selection of households from the sample frame. Another aspect of representativeness concerns selecting a specific respondent from each household. In the household study, this requires purposive choice of the adult who uses the home computer the most. As can be seen by this discussion, these sampling issues involve judgment rather than simple application of technique.