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A Meta-Analysis of Survey-Based Research in MIS Field from 1992-2006

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Abstract

Survey research is among the most common methodologies employed in MIS research. However there is an increasing concern over the rigor of research method in MIS field. Based on a review and comparative analysis of the literature this paper provides a critical analysis of trends in the conduct of survey research in the MIS field. Some 651 survey-based studies reported in three leading MIS journals between 1992 and 2006 are reviewed. The finding indicate that there has been an over-reliance on the conduct of cross-sectional studies whereas more emphasis on the use of longitudinal studies would have been appropriate. In terms of unit of analysis, most of the articles reviewed had focused on the individual leading to some concern about potential mismatch between respondents and the unit of analysis.

Keywords

Methodology, survey research, MIS journals, meta-analysis

INTRODUCTION

Disciplines such as computer science, management science, and organisation science have contributed to the successful emergence of Management Information Systems (MIS) as a new field of scholarly study (Culnun & Swanson, 1986). Similar to any other field of study, the progression of MIS field depends very much on the techniques for collecting, analysing, and interpreting data (A. Pinsonneault & K. Kraemer, 1993). Among variety of methods to conduct a research, survey research is believed to be well understood and applied in MIS field (Palvia, Ilinitich, Mao, Salam, & Soliman, 2003). Among previous efforts at clarifying the orientation of MIS research, the studies (see Table 1) conducted by Culnun & Swanson (1986); Alavi and Carlson (1992); Pinsonneault and Kraemer (1993); and Palvia et al (2003) are worthy of note. The main motivation for conducting the present study is in order to assess the quality of existing research methodologies and to compare the findings to those of previous studies, while in the process identifying those areas that need more attention. This study differs from similar previous studies in three respects:

- *Concentration*: Despite the fact that the survey methodology is extensively and predominantly used in the MIS field, recent studies (for example: Palvia et al., 2003) have not focused specifically on this research method, but rather have tried to investigate it in the context of a broad range of research methodologies.
- *Time span*: As shown in Table 1, the time span for similar studies has ranged from four years for the Palvia study (2003), to nine years for that conducted by Grover et al. (1993), to ten years for that of Pinsonneault and Kraemer (1993). Alavi and Carlson's study (1992) is unusual in that it covered a period of as long as twenty years. The current study covers all survey-based articles published in three leading MIS journals; Information and Management (I&M), Management Information Systems Quarterly (MISQ), and Journal of Management Information Systems (JMIS) between 1992 and 2006. It aims to supplement earlier studies and contribute to a better understanding of trends in survey research in MIS.
- *Comprehensiveness*: Along with such attributes as comprehensiveness, sampling procedure and data collection method used by Pinsonneault and Kraemer (1993), this paper provides additional attributes including those of *authorship* and *place of origin* (Claver, Gonzalez, & Llopis, 2000) and the *status* of researchers, for example academic or practitioner (Hamilton & Ives, 1982). Furthermore, for the purpose of comparability this study employs analytical procedures consistent with those used by Pinsonneault and Kraemer (1993).

SURVEY RESEARCH

There are many data collection and measurement processes that are called surveys. However, strictly speaking a survey is a process that is aimed to produce statistics by asking a sample of people about some aspects of the study population (Floyd & Fowler, 2002). Surveys can be characterized by two elements (Lewis-Beck, 2004; Marsh, 1982) the form of data and the method of analysis.

Form of Data: Surveys attempt to construct a structured data set i.e. a variable-by-case grid in which rows represent *cases* which are the unit of analysis such as individual, organisation etc., and columns represent variables.

Methods of Analysis: The second characteristic of survey research is the way in which data are analyzed. On the one hand, surveys can be used for describing the characteristics of data and on the other hand they are used to identify causes (Lewis-Beck, 2004). Surveys are used because they offer so many advantages. These advantages include: flexibility, versatility, specialization, and efficiency (Alreck & Settle, 1995). Despite such positive features, survey research has its limitations. Kraemer and Dutton (1991) reviewed three of the charges commonly leveled against survey research:

1. It is unable to yield cumulative knowledge
2. It is atheoretical
3. It is ill-suited to address the subtleties of information technology in complex settings.

Methodological attributes

There are three key elements in the conduct of survey: research design, sampling procedure, and data collection (Dillman, 1978; A. Pinsonneault & K. Kraemer, 1993). Not quite a fourth element, but also important is certain demographic information. For the purpose of critical assessment of articles on the use of the survey method in MIS, and a better understanding of the quality of the methodology in the articles examined, certain criteria have been employed for the evaluation of each of the sections identified in the conduct of surveys.

Research Design

Purpose of Survey: Surveys are conducted for different purposes. (Lewis-Beck, 2004) suggests two main purposes: exploration and explanation. In fact, the terms *description* and *exploration* can be used interchangeably in this respect. However, it is worth noting that if the long term goal of research is to generate ideas and to undertake research in a field that is relatively unknown, the research is often called *exploratory* (Hedrick, Bickman, & Rog, 1993). An exploratory study, hence assesses the following types of questions: purely descriptive questions such as 'what is' or 'what was' questions; normative questions which attempt to compare the characteristics of an entity to a standard; and correlative questions which ask whether certain variables are related and to what degree certain variables co-vary either positively or negatively (Hedrick et al., 1993). Explanatory study, on the other hand, builds on exploratory research and attempts to clarify the reasons why something occurs. So while exploratory studies focus on 'what' questions, explanatory studies seek to ask 'why' questions (Neuman, 2003).

Survey Type: There are various types of strategies which are used in conducting a survey including cross-sectional, secondary data and longitudinal strategies. In cross-sectional study, data are collected for a set of cases on a set of variables at a single time. While the ability to determine relationships between variables is among the most important advantages, the greatest drawback of the cross-sectional approach is in not allowing confident causal conclusions to be drawn (Shadish, Cook, & Campbell, 2002). As the incidence of secondary data strategy was very low (less than 10 articles or 0.01 %) they were excluded from further analysis. In the longitudinal study strategic data are collected for more than one time period. The main purpose is to describe patterns or to establish the direction and magnitude of causal relationships between variables (Lewis-Beck, 2004).

Table 1. Major Recent Studies of the Quality of MIS Methodologies

Author	Time period	Main research aims	Number of Journal covered	Number of Articles covered	Important findings
Palvia et al. (2003)	1993-1997	Ranking thirteen different methodologies	7	843	1. A list of ranked methodologies. 2. Specific patterns in given journals and subjects areas.
Pinsonneault and Kraemer (1993)	1980-1990	Examining the quality of survey methodologies in MIS	16*	141	Misapplication of survey methodologies in MIS research due to 5 drawbacks.
Grover et al. (1993)	1980-1989	Investigation of the volume, trends and quality of MIS research	8 journals and one conference	227	1. MIS needs more methodological rigor. 2. Some indication of the maturing of MIS field.
Culnun & Swanson (1986)	1980-1984	Study of maturation of the MIS field	6 journals and one conference	271	MIS is still less established than its foundation disciplines e.g. management science, computer science)
Alavi and Carlson (1992)	1968-1988	Development of MIS as a field of research	8	908	Popular research topics: 1. IS management 2. Information system types and characteristics and 3. development and operation of systems

Unit of analysis: A unit of analysis is the subject of study about which a researcher may generalize (Neuman, 2003). For most studies, the unit of analysis can be either the individual, department, organisation, or project, in other words 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 (A. Pinsonneault & K. Kraemer, 1993).

Sampling Procedure: Sampling procedure involves the selection of appropriate populations and appropriate probability sampling and appropriate respondents. Ideally, details about whether the survey uses probability or non- probability sampling should be included in any description of the research (Grover et al., 1993).

Data Collection: Method Although the majority of surveys use a single data collection method, this approach can lead to the problem of non-response bias. Hence in order to reduce the possibility of non-response bias, a combination of methods can be employed (Floyd & Fowler, 2002). The choice of data collection method is a complex issue which involves many aspects of the survey research process. This can obviously affect the quality and the cost of the data collected. The use of mail, the telephone and interviews all feature as methods for collecting data in survey research. As the Internet has grown in importance as a communication channel, so too has the incidence of use of the Internet as a medium for conducting survey research.

Response Rate (or responses as a percentage of the size of the contacted samples) is a universal measure of the effectiveness of a data collection method (Yu & Cooper, 1983). Accordingly, survey researchers routinely work to maximize response rates, often mindful as they do, of the possible need for a trade-off between response rates and research budgets.

STUDY DESIGN

Three journals, *Information and Management*, *Management Information Systems Quarterly*, and *Journal of Management Information Systems* were selected as the basis for the study. Prominent among the reasons for choosing these journals, in addition to their high standing in MIS circles, was that they had featured in previous studies of research methods in MIS (Palvia et al., 2003; A. Pinsonneault & K. L. Kraemer, 1993). Access to the full text version of relevant articles was obtained via the ABI/INFORM database. All articles in these journals were read, while survey-based articles were subject to further investigation. A standard coding format was developed for methodological attributes. In addition to these methodological attributes, the demographic data included such items as journal name, year of publication and place of study. The system of data coding employed was similar to that employed by Pinsonneault and Kraemer (1993). Using article abstracts or a simple search procedure, we sought to locate survey-based studies. Benbasat's (1984) definition was used to define the boundary of survey research.

* Eight journals possessed equal or less than 1 % of total articles examined

1. Data collected using structured interviews and/or mail or telephone questionnaires;
2. Respondents contacted in their office homes or through the mail; and
3. No experimental manipulation of the independent variables.

Based on Benbasat’s guidelines, papers employing unstructured and semi-structured interviews were excluded from the study. However, as use of email and web-based questionnaires are now common forms of data collection, these types of surveys were added in our study. Of 1784 articles reviewed, 651 articles were considered as survey-based research according to our criteria. Then, using keywords, a search was conducted within individual articles in an attempt to identify relevant information relating to individual attributes. If the direct search for given keywords failed, the entire article was read thoroughly in order to find the necessary information. As each article was reviewed, it was classified as follows:

1. Demographic data
2. Research Design, covering such issues as survey type, unit of analysis, mix of analysis and purpose of survey,
3. Sampling method, including sample size and sampling procedure
4. Data collection (method, response rate, pilot survey)

Total coding activity took approximately 325 hours (an average of almost 30 minutes per article).

FINDINGS

This section reports the findings of our research, both in respect of general trends and with regard to specific considerations of research design. As it is shown in the Total row in Table 2, of all 1784 articles reviewed, a total of 651 were survey-based (See Appendix A for details). Table 2 also summarizes the characteristics of journals selected. Our analysis reveals that the journal *Information and Management* contained the most survey-based articles (55.8% of survey-based articles) followed by *JMIS* with 23.2% of the survey-based articles.

Table 2. Survey Articles by Journal

	# of articles	# of survey	Percentage
Information and Management	858	363	55.8%
Journal of MIS(JMIS)	554	151	23.2%
MIS Quarterly	372	137	21%
Total	1784	651	

Figure 1 presents the trend in the publication of survey-based papers in MIS in comparison to total MIS publications over the 15 year period 1992-2006. As is depicted in Figure 1, whereas a significant part of all MIS research was survey-based during the same period (36.5%), the incidence of survey-based research increased dramatically after 1998. In total the use of survey research has increased from an identified fifty surveys in 1992 to seventy two surveys in 2006, an increase of 44 percent. However this shows a dramatic reduction in growth rates compared with the 900 per cent reported by Pinsonneault and Kraemer (1993) and the 775 per cent mentioned by Grover et al. (1993).

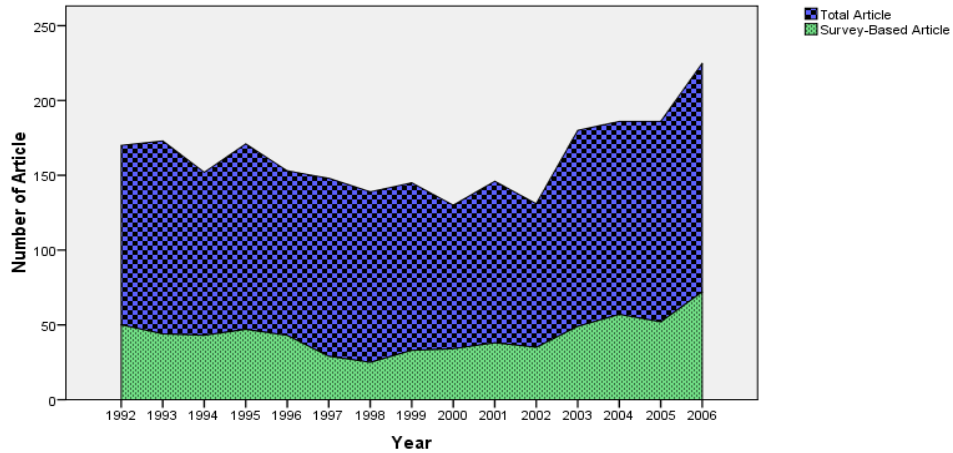


Figure 1: Proportion of MIS survey research

Research Design

Purpose of Study: The majority of MIS research conducted during the period 1992-2006 (56.2%) was exploratory in nature. It is of high importance that prior to 1998 most of survey-based research was exploratory (see Figure 2). Given that exploratory research attempts to describe the status of a phenomenon, a high proportion of exploratory researchers in MIS prior to 1998 have focused on asking *what* type questions and seeking to discover what phenomena were occurring in the MIS field. This can be taken as evidence not only that MIS is a suitable context for the conduct of explanatory studies, but also for the emergence and establishment of MIS as a serious field of study and research (Kraemer & Dutton, 1991). However after 1998 most efforts focused on answering why these phenomena were happening (explanatory).

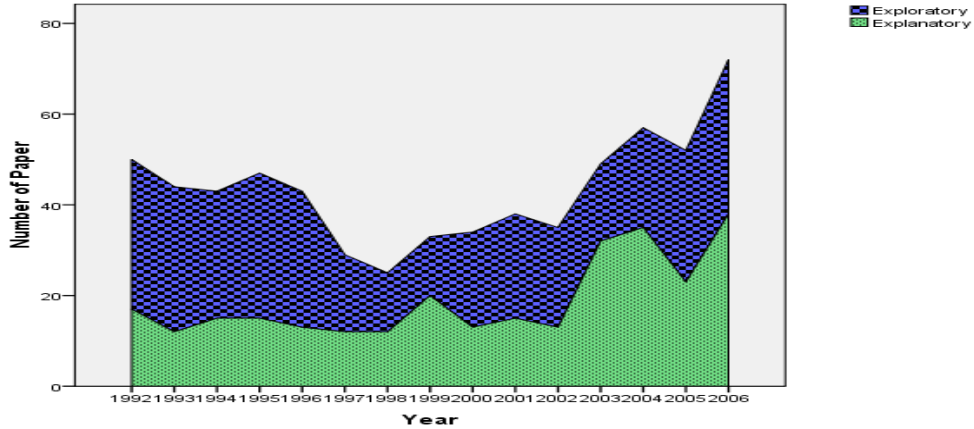


Figure 2: Survey Purpose by Year

These findings indicate the maturation of the MIS field and converge with findings by Pinsonneault and Kraemer (1993).

Survey Type: In terms of the time dimension to data collection, 42 studies (6.5%) were found to have used a longitudinal approach in collecting data. As with the work conducted by Pinsonneault and Kraemer (1993), our findings reveal that a significant portion of surveys employed a cross-sectional approach in their research. This relatively low level of representation on the part of longitudinal studies could be put down on the one hand, to a number of potential difficulties in the conduct of longitudinal studies, such as the increased cost of data collection, missing data etc (Lewis-Beck, 2004), and on the other hand, to the simplicity of cross-sectional data collection, reflected in the fact that almost 87% of the articles located employed this approach.

Unit of analysis: Table 3 summarizes the analysis with regard to units of analysis and different research purposes. The right column and the last row in Table 3 show the total number of articles with regard to the unit

of analysis and purpose of survey respectively. The individual (56%) has been the dominant unit of analysis in both exploratory and explanatory research, followed by the organisation (28.8%). However *organisation* and *project* have featured in about equal proportion by purpose. Compared to Pinsonneault and Kraemer's work (1993), our data analysis indicates that the *individual* is still the main unit of analysis in the MIS field.

Mix of Analysis: There is no doubt that the use of multiple methods of analysis can improve knowledge of the phenomenon studied. Fifty five (10%) and seventy two (12%) of the survey-based articles, also employed the case study and experiment methods (see the Total column and the Total row in Table 4). Within the experimental category, a clear majority of survey-based articles (78%) also had occasion to use the field study method. This breakdown in numbers is perhaps explained by the fact that use of the experiment and case study methods requires researchers to have direct control of variables, hence the small number of surveys which have supplemented their methodology by use of case studies and experiments.

Table 3. Unit of Analysis in Articles studied

Unit of Analysis	Purpose of Survey		Total (Unit of Analysis)
	Exploratory	Explanatory	
Individual	204	137	341
Department	3	5	8
Organisation	90	87	177
Project	30	27	57
Application	1	2	3
Other	11	7	18
Total (Purpose of Survey)	342	272	614

Research Hypotheses: Working on the application of the survey research methodology between 1980 and 1989, Pinsonneault and Kraemer (1993) found that more than half of the articles identified did not provide research hypotheses. In our database, three hundred and seventy three surveys (57.3 percent) used hypotheses. This is a matter of considerable importance in that hypotheses can help determine the design of the research, and because it is unlikely that research will lead to reliable findings in the absence of research hypotheses (A. Pinsonneault & K. L. Kraemer, 1993).

Table 4. Mix of Analysis by Research Purpose

		Purpose of Survey		Total
		Exploratory	Explanatory	
Mix of Analysis	Case study	39	16	55(10%)
	Field study	230	210	440(78%)
	Experiment	24	48	72(12%)
Total		293	274	567

Pilot Study: The pre-testing instrument helps provide more reliable and useful research items (Straub, 1989). In comparison with Pinsonneault and Kraemer's study and Grover et al's study(1993) in which 67 and 73 percent of studies respectively did not pretest the research instrument, our findings show this proportion has decreased to a level of 45 percent. Put differently, this means that fifty five percent (358 studies) employed a pre-tested research instrument. One reason for not pre-testing instrument might be due in part to the fact that researchers employed pre-tested instruments from previous research.

Table 5. Response Rate by Collection Method and Respondents

Collection Method	Overall Response Rate	Response rate by Respondent	
Mail	41.28%	IS Professional	37.87%
		Top Management	30.41%
		End User	49.00%
		Middle Manager	27.24%
		Student	66.22%
		Non-managerial staff	49.73%
Interview	61.29%	IS Professional	92.00%
		Top Management	86.00%
		End User	n/a
		Middle Manager	50.10%
		Student	n/a
		Non-managerial staff	54.15%
Mail AND Interview	52.53 %	IS Professional	39.58%
		Top Management	73.95%
		End User	50.40%
		Middle Manager	47.42%
		Student	76.63%
		Non-managerial staff	51.67%
Email/Web-Based Survey	43.07%	IS Professional	44.00%
		Top Management	9.00%
		End User	35.73%
		Middle Manager	42.99%
		Student	51.57%
		Non-managerial staff	50.02%
Mail AND Web-based Survey	31.29%	IS Professional	19.00%
		Top Management	14.00%
		End User	44.08%
		Middle Manager	32.50%
		Student	n/a
		Non-managerial staff	15.76%

Response Rate (RR): Response rates are mostly affected by the method of contact, so we employed a strategy which involved use of personal/telephone interviews, mail questionnaires, and web-based/email surveys in different combinations. A heavy reliance on the mail survey is found (62.8%), undoubtedly because of its relatively low cost (Fox, Robinson, & Boardley, 1998). However, the response rates for mail surveys (41.28) are lower than those (61.3%) obtained from interview surveys or from a combination of data collection methods. Table 5 presents the response rates obtained by the use of different collection methods. Schuldt and Totten (1994) studied the comparative response rates associated with electronic surveys vs. paper surveys, and found higher response rates for the paper survey (75% vs. 67%). As shown in table 5, our database revealed that the response rate for email/web-based questionnaires has been a bit higher than that for mail surveys (43.07% vs. 41.28%). Those studies that employed the *interview* method obtained the highest response rates (61.29%), followed by those that used the *mail and interview* method of data collection (52.35%). The minimum response rate (31.29%) accrued to studies with *mail* and *Web-based* methods. In terms of type of respondent, the highest level of response rates was exhibited by respondents who were IS professionals (92%). By contrast, the lowest response rates (9%) were for *Top Management*. This might be due to the fact that top managers are particularly difficult respondents from whom to gain data via a mail survey (Baruch, 1999). However, it is worth noting that the first choice of respondent for the researchers was *middle* managers, with 139 articles (25.8%), followed by *non-managerial* staff (20.4%). The lowest level of respondents was end user with 47 articles.

Probability Sampling: 35.8 percent of articles analyzed in this research project used probability sampling techniques to select potential respondents, while 44.8 percent employed non-probability methods. The remainder of the articles (19 %) did not mention their sampling method. These findings can be compared to the 28.7 and 14.5 percent of articles that used probability sampling reported by Pinsonneault and Kraemer (1993) and Grover (1993) respectively. It seems reasonable to suggest that the proportion of 35.8 percent identified in our research, indicates an incremental trend toward the application of probability sampling in the MIS field.

Country of Origin and authorship: The vast majority of survey research in MIS has been conducted by researchers based in the United States of America. Figure 3 presents the percentage of survey research by country. Those countries with less than one percent were consolidated into category of 'Others' with a value of 8 percent. The researcher population was comprised of academics (96.5%) and non-academics (0.6%). Joint authorship involving academic and non-academics occurred in just 2.5 percent of all articles. Also 107 articles (19.2 %) were the work of a single author, whereas 449 articles (80.8%) had more than one author.

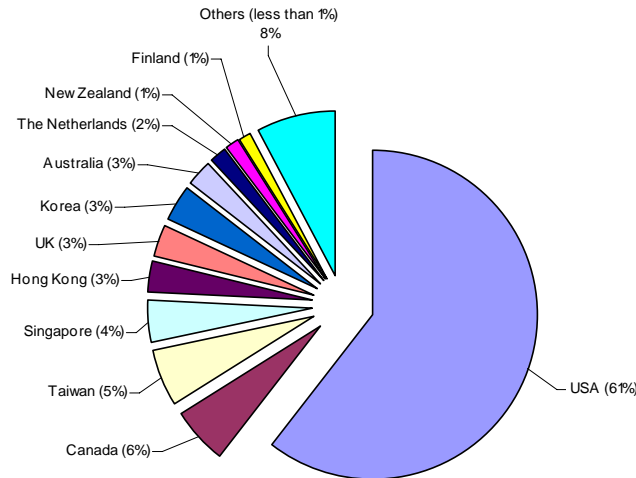


Figure 3: The Percentage of Survey Research by Country

SUMMARY AND DISCUSSION

By analyzing the content and structure of survey-based articles published in three leading journals during 1992-2006, we have provided an assessment of the overall methodological status of the MIS field during that time. This analysis of methodological attributes indicates that a considerable proportion of MIS research has been conducted using the survey method. However in terms of research purpose, there has been an imbalance between the use of exploratory and explanatory surveys. Most survey-based research in MIS is exploratory in nature. Consequently, it is to be expected that in the immediate future, the trend will be much more towards the development of models and the explanation of relationships, that is towards explanatory studies. Based on analysis of the articles contained in our database, mail surveys appear to be the least effective in terms of generating a response from survey populations. Due to the perceived low efficiency of mail surveys, researchers have tended to employ other methods especially use of the telephone. However, all aspects of research design should be considered in making a decision about contact methods (Yu & Cooper, 1983).

Our research reveals that most survey-based research in MIS has focused on the individual as the unit of analysis. However, the perceived absence of connection between the unit of analysis and the respondent can threaten the reliability of any subsequent research. The highest response rates reported in survey-based research emerged where the interview method was employed and where the majority of respondents were middle managers. With regard to sampling methods and probability sampling in particular, researchers tended to employ non-probability sampling methods. Ideally in survey research, researchers are expected to employ a probability sampling method (Grover et al., 1993). However, one of the weaknesses of survey methodologies is in the use of unsystematic sampling methods. Although the use of systematic sampling methods has been increasing in recent years, a considerable portion of papers identified in our database (63.8%) either employed unsystematic methods or did not report their sampling procedure. However, conducting a probability sampling procedure is not an easy task, not least because there is no way to ensure that potential respondents will participate (Grover et al., 1993). Furthermore, as expected, a major part the research conducted in the MIS field employed a single-method approach in collecting data, despite the fact that such an approach is likely to adversely affect the reliability of any data collected. In our study, only 172 studies (27.3%) were found to have employed a multiple data collection method approach.

Finally in our study, we attempted to focus on two overall categories of sampling procedures namely, systematic and non-systematic procedures. However further research is needed to more comprehensively investigate different types of both of these procedures including random, stratified, snowball, quota or cluster sampling procedures. Research themes in survey-based MIS research are another area need to be considered. In another words, among the different potential areas of interest in MIS, which areas have been most subject to the conduct of survey research. Another important issue which was not covered in this article is whether survey-based articles need to conduct a non-response bias analysis, the argument being that such an analysis could help to identify any differences between respondents and non-respondents.

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APPENDIX

Appendix A: Summary of Survey-based Studies in Three MIS Journals

Year	Information and Management		MIS Quarterly		Journal of MIS(JMIS)		Total	
	# of articles	# of survey	# of articles	# of survey	# of articles	# of survey	# of articles	# of survey
1992	59	24	31	13	30	13	120	50
1993	59	22	31	10	39	12	129	44
1994	50	20	23	12	36	11	109	43
1995	64	28	24	14	36	5	124	47
1996	47	22	22	8	41	13	110	43
1997	61	13	20	3	38	13	119	29
1998	57	6	21	9	36	10	114	25
1999	49	15	27	8	36	10	112	33
2000	33	17	25	7	38	10	96	34
2001	49	27	17	7	42	4	108	38
2002	46	19	18	5	32	11	96	35
2003	75	35	23	8	33	6	131	49
2004	72	41	25	6	32	10	129	57
2005	62	31	30	11	42	10	134	52
2006	75	43	35	16	43	13	153	72
	858	363	372	137	554	151	1784	651

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