

The Case Research Strategy in Studies of Information Systems

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Abstract

This article defines and discusses one of these qualitative methods—the case research strategy. Suggestions are provided for researchers who wish to undertake research employing this approach. Criteria for the evaluation of case research are established and several characteristics useful for categorizing the studies are identified. A sample of papers drawn from information systems journals is reviewed. The paper concludes with examples of research areas that are particularly well-suited to investigation using the case research approach.

ACM categories: H.O., J.O.

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Introduction

There has been a growing interest in the use of qualitative techniques in the administrative sciences. For example, a full issue of *Administrative Science Quarterly* (Volume 24, 1979) has been devoted to qualitative methods. This interest has been sparked by a general dissatisfaction with the type of research information provided by quantitative techniques [51]. The dissatisfaction stems from several sources: the complexity of multivariate research methods, the distribution restrictions inherent in the use of these methods (e.g., multivariate normality), the large sample sizes these methods dictate, and the difficulty of understanding and interpreting the results of studies in which complex quantitative methods are used.

Similarly, in the information systems (IS) field, Franz and Robey [14] have suggested the use of idiographic rather than nomothetic research strategies. Idiographic research attempts to understand a phenomenon in its context. In such research, the investigator intensely examines a single entity or a particular event. Nomothetic methods, on the other hand, seek general laws and draw solely on procedures used in the exact sciences [54].

This article discusses the use of one qualitative technique, the case research strategy, in studies of information systems. It provides some suggestions about how to conduct and evaluate case study research. A sample of case-based research from selected IS journals is categorized according to a set of characteristics developed in this paper. The articles in the sample are then evaluated.

We are not advocating an exclusive use of the case strategy. Many authors have commented that each research strategy has advantages and disadvantages; no strategy is more appropriate than all others for all research purposes. Benbasat [3] showed that the goals of the researcher and the nature of the research topic influence the selection of a strategy. Case research is particularly appropriate for certain types of problems: those in which research and theory are at their early, formative stages [44], and "sticky, practice-based problems where the experiences of the actors are important and the context of action is critical" [4].

The information systems area is characterized by constant technological change and innovation. IS researchers, therefore, often find themselves trailing behind practitioners in proposing changes or in evaluating methods for developing new systems. Researchers usually learn by studying the innovations put in place by practitioners, rather than by providing the initial wisdom for these novel ideas. For example, when companies experienced a growth in end-user computing in the late 1970s and early 1980s, academics were not able to offer a set of guidelines describing how an organization could effectively manage the introduction of end-user computing technology. Researchers first descriptively studied how organizations were managing end-user computing. These studies then formed the basis for the development of prescriptive management guidelines (for example, Rockart and Flannery [43]).

We believe that the case research strategy is well-suited to capturing the knowledge of practitioners and developing theories from it. Christenson [9] points out that the trial-and-error process in which practitioners are engaged is necessary for knowledge to accumulate. It is incumbent upon the scientists to formalize this knowledge and proceed to a testing stage. Before this formalization takes place, case studies could be employed to document the experiences of practice.

The IS field has also seen a shift from technological to managerial and organizational questions, and consequently more interest in how context and innovations interact. For example, airline reservation systems were very innovative technical achievements in the early 1960s. However, they became a key competitive factor in the changing airline industry within the last few years. In order to understand this phenomenon, one must examine the structure of the industry, the role of deregulation, and the federal laws governing the industry.

To summarize, there are three reasons why case study research is a viable information systems research strategy. First, the researcher can study information systems in a natural setting, learn about the state of the art, and generate theories from practice. Second, the case method allows the researcher to answer "how" and "why" questions, that is, to understand the nature and complexity of

the processes taking place. Questions such as, "How does a manager effectively introduce new information technologies?" are critical ones for researchers to pursue. Third, a case approach is an appropriate way to research an area in which few previous studies have been carried out. With the rapid pace of change in the information systems field, many new topics emerge each year for which valuable insights can be gained through the use of case research.

Case Research: Definition

There is no standard definition of a case study. For our purposes, we will draw our definition from those presented by Benbasat [3], Bonoma [5], Kaplan [23], Stone [46], and Yin [56]. A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations). The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used. Table 1 contains a list of eleven characteristics of case studies summarized from the papers mentioned above.

To place case studies in perspective, it is useful to contrast this approach with other methods commonly used by IS researchers. In laboratory experiments the researcher measures dependent variables while manipulating independent variables in a controlled environment. Similarly, field experiments involve the manipulation and measurement of clearly defined variables, but in a natural setting. Finally, in field studies researchers measure independent and dependent variables in their natural context; however, no control or manipulation is involved. A fundamental difference between case studies and these alternative methods is that the case study researcher may have less *a priori* knowledge of what the variables of interest will be and how they will be measured.¹

¹ We must emphasize, however, that this is a matter of degree. There are instances of case studies where the investigators had a prior notion of certain critical variables, such as the type of industries and the type of firms they wanted to examine. For example, Lawrence and Lorsch [29] chose industries that

Table 1. Key Characteristics of Case Studies

1. Phenomenon is examined in a natural setting.
2. Data are collected by multiple means.
3. One or few entities (person, group, or organization) are examined.
4. The complexity of the unit is studied intensively.
5. Case studies are more suitable for the exploration, classification and hypothesis development stages of the knowledge building process; the investigator should have a receptive attitude towards exploration.
6. No experimental controls or manipulation are involved.
7. The investigator may not specify the set of independent and dependent variables in advance.
8. The results derived depend heavily on the integrative powers of the investigator.
9. Changes in site selection and data collection methods could take place as the investigator develops new hypotheses.
10. Case research is useful in the study of "why" and "how" questions because these deal with operational links to be traced over time rather than with frequency or incidence.
11. The focus is on contemporary events.

In our survey of the literature, we identified three categories of qualitative research that appear to be considered as case studies. Our focus in this article, however, includes only one of these. For clarification we will define the two excluded categories—application descriptions and action research. Then we will describe key aspects of the execution of case research.

Application descriptions—Written by practitioners, application descriptions detail the author's experiences implementing a particular application, such as a database management system. The outcomes of these published projects are almost always successful and the author concludes by providing a list of "dos" and "don'ts" for the implementation of similar systems. The author does not conduct a research study; instead, the objective is to successfully implement a specific system for a given assignment. Application descriptions are not included in our definition of case research.

Action research—We have also excluded action research. These are studies in which the author, usually a researcher, is a participant in the implementation of a system, but simultaneously wants to evaluate a certain intervention technique. An example might be the use of the sociotechnical approach for

differed in their rates of technological change. They also studied effective and ineffective organizations within the same industry as well as comparing effective organizations in different industries.

system development. The articles in both this and the application descriptions categories are written by individuals who have an insider's view of the system in question. However, action research articles are authored by those whose *original intent* is to conduct research while effecting change [47]. The action researcher is not an independent observer, but becomes a participant, and the process of change becomes the subject of research. Thus, the researcher has two objectives: to take action to solve a problem and to contribute to a set of system development concepts [8].

The strength of these studies is the indepth and first hand understanding the researcher obtains. Conversely, a weakness is the potential lack of objectivity stemming from the researcher's stake in effecting a successful outcome for the client organization. Further, generalizations to other situations where the intervention technique is applied by people less knowledgeable than the researcher may be difficult. Examples of action research in IS are found in Gibson [16], Ginzberg [17], Mumford [35] and Morton [34].

Case study research—In case studies the clear objective is the conduct of research. These are efforts where research questions are specified prior to the study by researchers who are observers/investigators rather than participants. We will discuss considerations that are important in selecting the case research approach and we will detail the mechanics of executing case research.

Conducting Case Research

Research themes and objectives— Deciding on case research

Given a specific research question, one must ask whether the case method is a useful approach. To judge the appropriateness of the case strategy, we can ask the following questions (drawn from Table 1):

1. Can the phenomenon of interest be studied outside its natural setting?
2. Must the study focus on contemporary events?
3. Is control or manipulation of subjects or events necessary?
4. Does the phenomenon of interest enjoy an established theoretical base?

Case methodology is clearly useful when a natural setting or a focus on contemporary events is needed. Similarly, research phenomena not supported by a strong theoretical base may be fruitfully pursued through case research. A rich natural setting can be fertile ground for generating theories. Conversely, when subjects or events must be controlled or manipulated in the course of a research project, the case approach is not suitable.

Quite often, however, the decision to use a case approach is not clear-cut. Both Yin [56] and Bonoma [5] discuss the usefulness of the case approach in various phases of research. Table 2 gives their terminology for the traditional exploration, hypothesis generation, and testing phases of knowledge accrual. Research that is not strictly exploratory or descriptive may be enhanced by using quali-

tative methods. For example, Yin [56] states that case studies could be used to explain phenomena. He considers Allison's [1] study of the Cuban missile crisis an example of such studies. Allison proposed different theories to account for the same course of events, identified the one that provided the best explanation, and suggested how this theory could be useful to understand other situations. Bonoma suggests that the case strategy could play a role in both hypothesis generation and hypothesis testing. Bauer (as reported in Towl [50]) refers to the use of the critical case (crucial experiment) to test a well-founded theory.

When the case approach is deemed appropriate, researchers may be uncertain about how to proceed. The remainder of this section offers practical aid to researchers for understanding and implementing case research.

Unit of Analysis

Prior to searching for sites, the researcher should determine the unit of analysis most appropriate for the project. Will the study focus on individuals, groups (e.g., a task force, profit center, IS group) or an entire organization? Alternatively, the unit of analysis may be a specific project or decision. In making this determination, the researcher should closely examine the research questions to be pursued. These often indicate an appropriate unit of analysis. Finally, the researcher should consider what generalizations are hoped for at the project's completion. Does the researcher hope to generalize to other organizations, individuals, or decisions, for instance?

Table 2. Terminologies for Stages of Case Research Programs

Traditional Phases of Knowledge Accrual	Yin's [56] Framework	Bonoma's [5] Framework	Number of Cases
Exploration	Description	Drift	Single or multiple case(s)
Hypothesis generation	Exploration	Design	Multiple cases
Hypothesis testing			
• Confirmation	Explanation	Prediction	Multiple cases
• Disconfirmation	Explanation	Disconfirmation	Single critical case

When the research is highly exploratory, a single case may be useful as a pilot study. The goal will be to determine the appropriate unit and familiarize the researcher with the phenomenon in its context.

Single-Case vs. Multiple-Case Designs

Central to case research design is the decision to include one or several cases in the project. Most research efforts require multiple cases, but single cases are useful in specific instances. Yin suggests single-case studies are appropriate if:

- 1) It is a *revelatory* case, i.e., it is a situation previously inaccessible to scientific investigation.
- 2) It represents a *critical* case for testing a well-formulated theory.²
- 3) It is an *extreme* or *unique* case.

As Table 2 shows, single-case study projects are most useful at the outset of theory generation and late in theory testing. A single case used for exploration may be followed by a multiple-case study. This corresponds to Bonoma's drift stage in which researchers learn first hand the relevant jargon and context in which the phenomenon will be studied. A single case may also be used to test the boundaries of well-formed theory.

Multiple-case designs are desirable when the intent of the research is description, theory building, or theory testing. These three correspond to Bonoma's design, prediction, and disconfirmation stages, respectively. Multiple-case designs allow for cross-case analysis and the extension of theory. Of course, multiple cases yield more general research results.

Site Selection

The factors that dictate a single-case design also determine site selection. When multiple cases are to be included in a study, however, choices must be made. It is quite useful to consider a multiple-case project as analogous to the replication that is possible with multiple traditional experiments [19]. Adopting this point of view, Yin proposes two criteria for selecting potential sites. First, sites where

similar results are predicted may be used as "literal" replications. Second, sites may be chosen for "theoretical" replication. That is, chosen such that contradictory results are predicted. With careful site selection, the researcher can extend and revise the initial propositions of the study.

Site selection should be carefully thought out rather than opportunistic. Researchers may begin site selection by considering the nature of their topic. Research on organization-level phenomena would require site selection based on the characteristics of firms. These may include the industry, company size, organizational structure, profit/not-for-profit status, public or private ownership, geographic coverage, degree of vertical or horizontal integration, and so on. Researchers interested in specific technologies, IS methodologies or organizational structures should consider these characteristics when selecting sites.

Once the limiting factors are determined, specific sites may be identified and approached. Regular scans of business newspapers and periodicals often turn up potential sites. Library research using indexes of industries, business literature, and marketing or financial research data may be helpful. Finally, talking with friends, colleagues, or acquaintances is a good way to identify potential research locations.

Approaching the potential site is a crucial point in orchestrating a case research project. Here again, the topic of study is key to determining whom to contact. The researcher must eventually contact the individual with enough authority to approve the project. Colleagues may be able to help with introductions. If not, prepare carefully before placing a cold call or writing to the organization. The researcher should clearly describe the project and who will be involved—researchers, assistants, or company employees. The contact should be told the amount of time, effort and expense required of the organization.

Two key points to be addressed in order to gain cooperation are confidentiality and benefits to the organization. The researcher must provide assurance that the organization will not be harmed by its participation. The organization and its employees must know that the researcher will not betray their con-

² According to Yin [56, p. 42] "To confirm, challenge or extend a theory, there may exist a single case, meeting all the conditions for testing the theory."

fidence. On the other hand, the researcher should seek assurance that reasonable candor will be provided and that essential data will be made available.

The benefits to an organization participating in a research project are varied. They may include learning more about the organization, getting feedback and new insights from the researcher, and developing a relationship with the researcher. In addition, there is the opportunity to contribute to knowledge and business research. The organization may or may not wish to be identified when the research is published. If it does, there is the additional benefit of recognition and publicity.

Data Collection Methods

Multiple data collection methods are typically employed in case research studies. Ideally, evidence from two or more sources will converge to support the research findings. Yin identifies several sources of evidence that work well in case research [56, p. 78].

1. Documentation—Written material ranging from memoranda to newspaper clippings to formal reports.
2. Archival records—Organization charts; service, personnel or financial records.
3. Interviews—These may be open-ended or focused (See Bouchard [6]; Cook and Campbell [10]).
4. Direct observation—Absorbing and noting details, actions, or subtleties of the field environment (see Webb, *et al.*, [53] on unobtrusive measures).
5. Physical artifacts—Devices, outputs, tools.

The goal is to obtain a rich set of data surrounding the specific research issue, as well as capturing the contextual complexity.

Specific data to be collected will depend on the research questions and the unit of analysis. Prior to site visits, the researcher should outline, in detail, the data to be gathered. This may include a list of materials to be collected (documentation, archival records and physical artifacts) as well as questions for interviews and plans for direct observation. This formalization helps coordination when multiple investigators work together. It also provides some separation of data collection from data analysis. The goals of this planning should be to ensure good coverage of the re-

search questions and excellent use of time spent on-site.

This planning stage helps to structure projects that are inherently flexible. It gives the researcher a guide from which to work. As the project unfolds, the plan will be revised according to the researcher's judgement, unexpected observations, or limitations and opportunities.

Finally, the researcher should be meticulous in record-keeping. Precious data may be lost when entrusted to memory or not organized as soon after collection as possible. This is particularly important in multiple case designs where, as time passes, the details of various sites tend to run together. The researcher's goal should be to collect data in such a way that another researcher could pick it up and immediately understand it and work with it.

Data analysis and exposition

The analysis of case data depends heavily on the integrative powers of the researcher. Using multiple methods of data collection, however, offers the opportunity for triangulation and lends greater support to the researcher's conclusions. Working with a research partner may also provide invaluable assistance. Two researchers can capture greater richness of data and rely more confidently on the accuracy of the data.

The key elements of data analysis are also critical to the written results of case research. As much as possible, the contextual and data richness of the study should be presented, and a clear chain of evidence should be established. The researcher's reasoning in establishing cause and effect or drawing out hypotheses should be clearly stated and defended. The research should move from objectives and questions, to assumptions and design choices, to specific data uncovered, and finally, to results and conclusions. Readers should be able to follow this path readily.

A Critique of Case-Based Research

To gain an understanding of the nature and quality of case research on IS, we surveyed

the following journals and conference proceedings³ for the period January 1981 to December 1985: *Communications for the ACM*, *The Proceedings of the International Conference on Information Systems*, *Information and Management*, *Quarterly*, and *Systems, Objectives, Solutions*.

After excluding the two categories of application descriptions and action research articles, we identified only five case papers in the *Communications of the ACM*, an average of one per year. There were few case papers in *Information and Management*; even if we include the action research and application description articles in this journal, case research makes up only 10% of all articles. *The Proceedings of the International Conference on Information Systems* included seven case papers, again about one per year. Finally, about 10% of the articles in the *MIS Quarterly* were case studies.

Compared to these journals, *Systems, Objectives, Solutions* had a substantial proportion of case research articles (about 25% of the articles published). This journal published case research articles in each issue and encouraged researchers to submit case studies. After four years as an independent publication, the journal merged with *Information and Management* in 1985.⁴

We approached the critique of the articles in our sample in two parts. First, we looked at four case studies in detail and evaluated their strengths and weaknesses. Then, we rated the whole sample of case studies based on our guidelines for conducting case studies.

Four case research studies

We chose the following four case studies because each took a different approach to investigation and they illustrate both the strengths and weaknesses in case study research.

³ In our estimation, these were the IS journals most likely to publish case-type articles. Our intention was to provide examples of case studies, not to do an exhaustive search.

⁴ Hamilton and Ives [18], based on a sample of IS articles from 15 journals published between 1970–79, observed that 14% of these were case studies. Based on a similar sample between 1977–83, Vogel and Wetherbe [52] report that about 17% of the published IS articles were case studies.

Markus: IS Implementation—Markus [32] examined the use of a “production planning and profit analysis system” in two manufacturing plants within the same division of a company. The system was readily accepted in one plant, but was at first strongly rejected in the other (eventually it was put into use). Her case study attempted to find the reasons for the contradictory outcomes of implementation. Markus stated that an explanation based on user participation could only partially account for these findings. She observed that the plant that accepted the system exhibited a higher degree of user participation than the one that rejected the system initially. But how does one account for the later reversal?

Markus proposed a “distribution of power” model to explain the different reactions to the system. That is, the lack of consonance between the distribution of power implied by the system and the distribution of power within the organization caused the failure of one plant to adopt the system. Based on this same model, Markus also explained why one system was rejected at first, but was eventually accepted when the organizational conditions that led to the initial rejection were changed.

Markus’ research had to be carried out in a natural setting since it traced the evolution of the system’s implementation from rejection to acceptance and the reasons for the switch. Markus was interested in answering a “why” question: Why was the system used in one plant and not in another? The fact that both units were within a single company increased the internal validity of the case study. A large number of possible causes for the acceptance in one plant and not in the other could be eliminated since the sites shared the same organizational setting and company history. Thus, Markus took advantage of a unique opportunity to study an implementation issue. Since the opportunity was unique, Markus added to our knowledge about the implementation of systems, even though some previous research on the same topic existed.

The history of the implementation process, which spanned a period of six years, was described in detail. One flaw in the study though, was the total lack of detail about the data collection methodology. The reader could only infer that interviews took place, since direct quotations from the people in-

volved were used to support the author's arguments. Aside from this, it is not clear what, if any, additional data sources were used for triangulation and validation. This is of particular concern because the history of the project covered six years and the memories of the participants may have been inconsistent.

Dutton: Adoption of a Fiscal Impact Model—Dutton's [12] study of the City of Tulsa's adoption of a fiscal impact model and its eventual rejection was outstanding among case studies we looked at for the rich level of detail it provided about the implementation process. According to Dutton, the sequence of events was reconstructed based on newspaper accounts, government reports, documents, memos, over 20 lengthy unstructured interviews with participants having different perspectives on implementation, and telephone calls that preceded and followed site visits. As a final check for accuracy, a draft of the paper was sent to several respondents and important participants who had not previously been interviewed.

The purpose of the study was to examine the limitations of both the technical and organizational perspectives of the implementation process. Dutton stated that his study contributed to our understanding of the process of innovation rejection, a topic we know little about. Following a 16-page description of the events, the organizational and political environment, and the actors associated with the implementation process, Dutton explained how technical, organizational, and interpersonal factors influenced the implementation process. However, he concluded that the greatest determinant was the political environment; he described in detail how the organizational and technical factors were contingent on the political ones.

Dutton described events in such detail that readers could make their own, different interpretations if they wished. It is an exploratory paper that reveals an important factor in the implementation process.

One criticism of the study is that Dutton did not clearly define his original research objectives. Further, we do not know why he chose this particular site. Did he know about the outcome (failure of system) before he analyzed retrospectively the events that took place? If this is the case, then his original objective

might have been to explore why a failure had occurred. Alternatively, was his intention to study the implementation of computer-based systems in city governments and describe the factors influencing the outcomes? In the latter case, the investigator was in the discovery stage; in the former case he was attempting to find the factors that caused a particular outcome. Since these concerns might affect the way the researcher approached data collection and thought about the issues in the case, we believe that a clear statement of the initial objectives of the researcher should have been provided in the study description.

Pyburn: Strategic IS Planning—Pyburn [39] investigated IS strategic planning processes that were underway in several companies, examined the business and technical context in which these plans were developed, and generated preliminary conclusions about the success or failure of the planning activity. He wanted to understand why a particular methodology worked well in some settings but not in others. The impetus for the study was the growing importance of such plans in the success of the overall IS effort, coupled with the lack of effectiveness of existing IS planning methodologies.

The method used was a comparative case study which, as described by Pyburn, "relies on the fact that outcomes in the different sites were the results of identified differences in those factors measured for its conclusions" [39, pp. 4–5]. Therefore, he chose eight sites that were as similar as possible based on a number of characteristics, i.e., a literal replication. Some of these characteristics, such as "the company had formal business planning for five years" and "top managers were willing to commit time to assist the research," made obvious sense. However, the reasons for other characteristics of the site selection, such as "the companies were dominated by a founding family" and "had corporate headquarters in relatively small cities," were not immediately evident. It appeared that Pyburn was more concerned with choosing highly similar sites, rather than choosing a model group that was representative of companies involved in strategic IS planning.

In each site, Pyburn conducted indepth interviews with the senior IS executive and the top management team (four to six individuals). He used a series of questions to gather data

concerning the nature of the business, the factors critical to its success, the company's IS planning practices, and the extent to which IS was addressing the critical needs of the firm. In order to increase the reliability of the data collection process and to reduce interviewee bias, prior to the first interview, he administered a questionnaire that contained items similar to the questions subsequently posed in the interviews. The questionnaire data were analyzed using nonparametric statistical methods. For the interview data, a case description was written for each organization. For a given topic, a side-by-side presentation of all comments made by each interviewee for each topic was provided. (However, the case descriptions and comments were not included in the published paper and are presumably part of Pyburn's doctoral thesis on which the article was based.)

Based on the interview data and partially supported by questionnaire results, Pyburn identified three IS planning styles: personal-informal, personal-formal, and written-formal. He then determined the degree of success of IS strategic planning in each company. Since none of these planning approaches appeared to be uniformly successful in all the companies in which they were implemented, Pyburn pursued a contingency analysis. A number of factors, such as the perceived status of the IS manager and the complexity of the IS environment, were identified as important influences on the success or failure of the planning process. Finally, all of this information was tied together and the critical factors in the success of a particular planning style were identified. For example, a personal-informal style depended on both an informal general management style and high IS manager status.

Pyburn set forth clear research objectives prior to data collection. This led to a focused approach to the interviews and site selection, and the use of triangulation in data collection. He carefully explained each step of a logical process that eventually culminated in a preliminary typology of strategic MIS planning. The use of multiple sites allowed him to attempt a contingency analysis. This is a good example of an exploratory case study that proposed a classification scheme for MIS planning that could be further refined and tested in other studies.

A drawback of this work was that the type of detailed descriptions found in the Dutton and the Markus papers were not provided in this paper. Of course, the journal may have imposed length limitations that made it impossible to present the data collected from each of the eight sites. Books or monographs might be better vehicles to publish case study research. Nevertheless, the reader has to rely on the author's interpretation and cannot interpret the data independently.

Olson: Centralization of the System Development Function—Olson [37] examined the issue of whether the systems development function should be centralized or located in the user organization. Based on an analysis of the literature, Olson contended that there is no best way to organize the system development function; the decision depends on factors outside the IS function. She therefore conducted an in-depth study of two organizations in order to identify the factors that influence the organization of the system development function and the quality of the development process. She conducted extensive interviews with IS managers and key participants in the system design process, and administered questionnaires to users as well as those who were part of the design effort. Two computer-based systems (one an accounts receivable system, the other a benefits system) were selected from two large multidivisional companies. In one case, the systems development function was centralized; in the other it was decentralized to business divisions.

Olson's results showed that in the decentralized development group users had a higher level of information satisfaction, users participated less in the design of the system, and analysts were less satisfied with their jobs than in the centralized group. These results were based upon very small samples of users and analysts in each organization, a fact acknowledged by Olson. She suggested several conclusions about the effectiveness of user participation in the development process.

Olson chose her sample to bring out the differences associated with alternative organizations of the system development function. The views of the various participants in the development process were sought and data were collected by multiple means. Furthermore, recently completed systems were

chosen to minimize the problems associated with retrospective data collection. A strength of the paper was the author's attempt to provide explanations for the outcomes based on what was observed from the cases. The IS departments of the two companies and their activities were described in reasonable detail, but little was offered to the reader about the companies themselves. Finally, since the outcomes were based only on a sample of two companies, this study could be considered only a basic exploratory case study.

The characteristics of the four case studies discussed above, as well as a sample of others identified in our survey, are outlined in Table 3. It is clear that the case studies have both similarities and differences. For example, the Pyburn and Dutton studies were both exploratory in nature, but differed in terms of sample selection and data gathering methods. One common feature of all four studies, which is not evident in the larger sample outlined in Table 3, was the detailed explanations that accompanied the findings. An investigator conducting a field study or experiment mainly relies on theory or *a priori* reasoning to deductively arrive at the outcomes. In these four studies, the investigators collected data, distilled the evidence, and inductively developed causal links to explain particular outcomes. While on the positive side the explanations were grounded in observed facts, our concern is that these facts were filtered through the subjective lenses of the investigators.

An overall evaluation of case studies

In this section, we will describe the nature and general quality of case research in IS. We'll evaluate the case studies in our survey based on our guidelines for conducting case research.

Research Themes

The predominant theme in the case studies was implementation, that is, the possible causes of the success or failure of an information or decision support system (e.g., [11]). Since the process of implementation takes place over time, is a complex process involving multiple actors, and is influenced by events that happen unexpectedly, a case

study methodology is well-suited to identifying key events and actors and to linking them in a causal chain. Examples of case study topics are: the impact of organizational strategy on the IS organization's structure [45], the impact of IS on organizational change [41, 42], the impact of technology on personnel [28], the influence of technology on organizational communications [15], the factors affecting the success of end-user developed applications [40], and the role of users in DSS development [31].

Research Objectives

In the published case research we surveyed, the objective of the study was seldom clearly specified. Among the exceptions were Pyburn [39] and Hirschheim [20], who stated that their objectives were to describe and explore a phenomenon that was not well-understood.

We would characterize most of the case studies as exploratory in nature. They described the context in which an intervention occurred and the intervention itself. For example, Kraemer [27] and Dutton [12] described the implementation of model-based systems in the public sector. Almost all of these exploratory studies concluded with a list of suggestions to improve the success of future implementation efforts. It was difficult to determine if the researchers were at the same time attempting to generate hypotheses. An exception is the study by Ives and Olson [21] which basically described the nature of an IS manager's job.

Some case studies pursued an explanatory strategy by first describing the events that took place and then presenting multiple competing theories to explain the course of events (e.g., Franz and Robey [14], Kling and Iacono [26], Markus [33]). Each of these studies used a sample of one case. For example, Markus [33] evaluated three theories of resistance: people-determined, system-determined, and interaction-determined, and concluded that the interaction theory did a better job of explaining the causes of resistance to a system.

Some other studies also followed an explanatory strategy by testing hypotheses derived from a single theory (or *a priori* reasoning). White [55] examined the influence of the cognitive style composition of a project team on

Table 3. An Illustrative Categorization of a Sample of Case Studies

	Theme	Research Thrust	Sample Selection	Units of Analysis	Data Collection Method	Level of Description About Units
Olson [37]	Centralization/ decentralization of system development	Exploration	2 IS groups, differing on the degree of centralization of system development	Group	Interview and questionnaire	High
Markus [32]	Implementation	Explanation	2 plants within same company differing on implementation success	Organizational subunit	Unspecified, inferred to be interviewed	High
Pyburn [39]	IS strategic planning	Exploration	8 companies chosen based on similar characteristics	Organizations	Interview and questionnaire	Low
Dutton [12]	Implementation of models in the public sector	Exploration and explanation	1 U.S. city	Organization	Multiple sources, high degree of triangulation	Very High
Hirschheim [20]	Participative systems design	Exploration	20 individuals from 8 organizations with experience in participative design	Individuals and organizations	Interviews	Low
White [55]	Cognitive styles of MIS project teams	Explanation	2 MIS project teams in the same company differing in the cognitive style composition of their members	Groups	Interviews	Low
Ives and Olson [21]	Nature of IS manager's job	Exploration	6 IS managers chosen based on several common criteria	Individuals	Observations of each manager for 3-4 days	High, but at aggregate level
Keen, Bronsema, and Zuboff [24]	Implementation of common systems in an international banking setting	Exploration and explanation	Banks in 9 countries (part of an international bank) selected on a number of criteria	Organizational subunits	Interviews	High
Fulk and Dutton [15]	Effect of videoconferencing on organizational communication	Exploration	2 organizations, new user, one localized experienced user	Organization	Interview	High
Franz and Robey [14]	User-led system design	Exploration and explanation	1 IS development team	Group	Longitudinal and multiple sources	High

its performance, and Schonberger [45] tested the hypothesis that organization strategies will influence the structure of the IS organization. Although Schonberger clearly stated that he first observed two organizations with different IS department structures and then got interested in testing the influence of strategy on structure based on Chandler's [7] theory, White appeared to be more ambiguous. It is not clear if she first observed two project teams with different cognitive styles and decided to test a hypothesis, or if she intended to test a hypothesis and then searched for an ideal sample of project teams with different compositions. However, we do not wish to single out her work for criticism since this was typical of the case studies in our sample.

In only one instance (Keen, *et al.*, [24]) were the authors' stated objectives both the exploration and testing of the explanatory power of theories. Two organizational change paradigms (the Lewin-Schein and Kolb-Frohman models) were used for theory testing. These provided *a priori* explanations of major factors that influence the success or failure of implementation efforts. Theory testing was done both by goodness of fit and by counterexamples, *i.e.*, by the prediction and disconfirmation strategies suggested by Bonoma [5].

In summary, we found that the IS case researchers we surveyed did not provide clear descriptions of where their topics fit in the knowledge building process. They thus did not justify their research purpose (drift, description, exploration and explanation) and did not allow readers to judge their work on a more informed basis.

Unit of Analysis and Site Selection

The unit of analysis for a case study, and consequently for the selection of a particular site to study, was not provided in many of the published works. This is a problem consistent with the lack of clear research objectives discussed above, and probably an outcome of it. Several of the cases examined a single company or a subunit. Since these typically did not represent critical, unique or revelatory cases, they were presumably chosen based on availability and evidently the researchers' goals were to conduct exploratory case studies.

Markus' [32] study previously described was a single-case sample containing two embedded units of analysis (two plants within the same division). It was rare because of the unique outcomes of the implementation process (one plant had a success, the other a failure with the same computerized system) and the unusual insights it offered.

Based on a large number of criteria, Keen, *et al.* [24] selected nine sites (countries) affiliated with an international bank. The criteria included IS development strategy, pace, focus, perceived ease of implementation, geographical dispersion, the size of the country, and the complexity of the operation. Two of the sites, which differed the most in terms of criteria, were selected for indepth analysis. Even though this study appeared to be a single-case, embedded unit analysis, it could be considered a multiple-case design, due to the decentralized nature of the sites.

A study by Ein-Dor and Segev [13] measured the relationship between the success of an IS and the perceived importance and investment in that system. They examined 10 sub-systems supported by a logistics IS in a large organization in Israel. This was an embedded case study design in which the researchers conducted quantitative analysis of a large number of subunits. However, a problem of embedded designs that Yin [56] mentioned and this study appeared to have, is that it makes the subunits the sole focus of the study and ignores the context—the characteristics of the organization as a whole. There was less focus on the context and more focus on a few aspects of the subunits. Thus, this study seemed to fall somewhere between a case and a field study, but had the strengths of neither.

The sites for some of the multiple-case research studies were chosen based on the study's research theme and objective. For example, to measure the effects of centralization, Olson [37] chose two sites—one in which the system development function was centralized and one in which it was decentralized. To examine the influence of strategy on structure, Schonberger [45] observed two organizations that had different IS department structures. The sites were chosen partly because they differed in terms of the outcome variable of interest, and partly on an opportunistic basis. Similarly, in their paper on factors affect-

ing user involvement in DSS development, Mann and Watson [31] presented three cases that demonstrated substantially different degrees of user involvement. However, the reader is not told whether the three cases were chosen from a larger sample because of their unique characteristics.

In other instances, the researcher sought a homogeneous sample with as many similar characteristics as possible [39]. However, as we mentioned in our discussion of Pyburn's study [39], it was not obvious why these particular characteristics were chosen. In any case, the investigator did not know in advance what independent variables would prove to be important. The idea was to minimize the extraneous variables so that if significant factors were indeed found, there would be a high degree of confidence that only those factors caused the observed differences. In contrast to Pyburn's approach, Fulk and Dutton [15], in their study of the impact of videoconferencing on organizational communications, chose two companies with different characteristics. One was a large aerospace company with offices on the east and west coasts that had recently started using videoconferencing. The second was a large western public utility with several years of routine utilization.

None of the multiple-case studies clearly stated the site selection objectives, i.e., whether the investigator pursued a literal or a theoretical replication. Nevertheless, in most instances, the rationale for choosing a particular site combination was stated.

Sometimes the reasons for site selection were not easy to infer. For example, Robey (1983) studied eight companies located in different countries. Even though the samples appeared to be from differing organizations, the researcher did not explicitly state whether a literal or theoretical replication was the goal. In one study [28] the three cases were chosen for a variety of disparate reasons. One company was chosen because one of the authors was involved in the implementation of a system there. In the second company, 2 out of 17 branches were selected because the implementation of a system went smoothly in one and was "less successful" in the other. The third company was included in the sample because it had a recent, major shift from a manual system to a computerized system and it

was self-contained. It thus appeared that the first case was chosen opportunistically, the second due to the observed outcomes, and the third based on a possible causal factor. In this particular study, it was difficult to infer whether the authors' goal was a literal or theoretical replication, or whether the cases were chosen for exploratory or illustrative reasons.

Authors in our sample did not indicate if their case studies were part of systematic/programmatic research plans. Most seemed to be stand-alone, one-shot studies. Only one case study was a triangulation in that it was a follow-up to a survey [15]. Another case study was part of a large-scale effort to study various aspects of IS and their organizational impact, but the linkage to the larger study was not described in the paper [41].

Data Collection

In about half of the case studies, the data were collected by multiple means; the other half relied solely on interviews. In two case studies, though, the data collection method was not specified at all. We believe that a clear description of data sources and the way they contribute to the findings of the research is an important aspect of the reliability and validity of the findings. Yin's [56] suggestions about describing the case study protocol and having a case study database can serve as important guidelines.

Almost all of the studies used interviews for data collection. The interview questions were rarely specified and, when they were, it was in a very general form. Hirschheim [20], a notable exception, included the questions used in his semistructured interview in an appendix. In some studies, researchers interviewed individuals who had different perspectives on a given process, e.g., managers, users, and designers. Sometimes the researchers mentioned that they used documents and observations, but they did not provide any more detail about them.

A few studies of implementation in the public sector collected data from a large number of sources [25, 27]. These studies were similar to the Dutton [12] study in the richness of their descriptions and data sources. The only study that used a longitudinal methodology is also an exemplary effort of data collection [14]. To study user involvement in IS design,

the investigators collected data over a two-year period. In order to achieve triangulation, data were gathered through questionnaires, critical incident files, unstructured interviews, documents and memoranda, observations at meetings and tape recordings. In this way, they attempted to get both an objective view of events and the subjective interpretations of participants.

Keen, *et al.* [24] used an outside expert with no knowledge of the system being implemented to interview participants with whom the research team (authors) had already talked and who were in conflict. This was done to reduce any bias arising from the expectations of the researchers. If other studies used such techniques to increase the objectivity of data collection, no mention was made of them.

Case data in the research surveyed was mostly qualitative. A few studies included quantitative observations, mostly in the form of questionnaire data [12, 22, 37]. In general, however, the degree of detail about data collection methods was not very revealing, a substantial problem with most of the case studies observed.

Concluding Comments

Our intent in this article was to clarify the nature of the case research method, explain why it might be utilized in IS studies, survey its uses in IS research within the last five years, and offer some suggestions for improvement.

The case research strategy has mostly been used for exploration and hypothesis generation. This is a legitimate way of adding to the body of knowledge in the IS field. Exploration is, however, not the only reason for applying the case method. As discussed earlier, various authors have suggested the use of cases for providing explanation and for testing hypotheses.

No research strategy is better than all others. Unlike some of the contributors to Mumford, *et al.* [36], we do not advocate exclusive reliance on case/action research methods. The selection of a research strategy depends on the current knowledge of a topic and the nature of the topic, among other factors. The case strategy is particularly well-suited to IS research because the technology is relatively

new and interest has shifted to organizational rather than technical issues. For example, case studies have been helpful in identifying the causal chain that led to the success or failure of an information system by revealing in chronological fashion the various actors and events that influenced the final outcome.

Several current topics within IS research are amenable to the case study approach. The use of an expert system for management support is one such area. Since expert systems are just beginning to be introduced into organizations, a case study of companies that are rather far along in the use of such a system would provide valuable insights. Sviokla [48] has examined how an expert system that assists financial planners affects their jobs and the quality of the plans they produce. This revelatory use of the case method can provide hypotheses about the impact of expert systems technology on organizations. These hypotheses can then be tested using another research method, like a field experiment.

The relationship between information technology and corporate strategy is another area that could be explored further using a structured program of multiple case studies. From the case studies conducted to date, there is evidence that some companies use information technology more effectively as a strategic weapon than others [38]. A systematic study of several companies within one industry could provide important insights into why some companies use information technology more successfully than others.

One of the more difficult decisions that researchers must make is to determine when further case studies are needed in an emerging research area. For example, in the study of information technology and corporate strategy, Bakos and Treacy [2, p. 107] believe that:

As this area of research matures, there is an increasing need to move beyond frameworks and toward explanatory models of the underlying phenomena. This type of research will allow us to build a cumulative tradition and to make normative statements to guide managerial actions.

In the IS area, there is some merit to both the view that more case research is needed and

the view that quantitative techniques should be employed. Case studies can provide the organizational context for the study of the relationship between strategy and information technology. This is important even in this stage of the research. A formal model can provide significant insights into the more quantitative aspects of the issue, such as the economic impact of investing in information technology.

Recently there have been calls for a more detailed understanding of phenomena in the IS area. There is an interesting parallel between our call for higher quality case research and the argument presented by Todd and Benbasat [49] for increased use of protocol analysis in the study of decision support systems. The use of protocol analysis in IS studies has increased within the last few years because many researchers believe that they have to open the "black box." They want to examine processes in order to better understand the effects of information technology on the people who work with it, and their influence on the technology. The intent is to carry out a detailed, indepth examination of a small number of individuals. In a similar way, case research obtains detailed data about one or a few units.

The key difference between the case research method and protocol analysis is that, while both methods require little *a priori* specification of dependent variables and their measurement allow the investigator to use a high degree of discretion in structuring and interpreting the data, the case method also offers little control over the antecedent condition, e.g., independent variables.

In this article we identified a number of problems that were common to most of the case research studies in the sample. Some of these might be alleviated by asking the authors to provide more information about their research objectives and research plans. However, it appears to us that, in many instances, the investigators had not considered some of the methodological issues. In general, the objectives of the researchers were not clearly specified. The reasons for selecting single-case versus multiple-case designs were not explained and the choice of particular sites was not tied to the design approach. In many cases the data collection method was ambiguous and details were not provided.

The use of triangulation to increase reliability was rare.

Yin states that the reader of the case study should be able to follow the derivation of any evidence from initial research questions to the conclusions of the study. This chain of evidence will improve the reliability of the data. The point is that a case study should be more than an exercise in storytelling or an opinion piece; it should adhere to certain rules of procedure, as described in Yin [56] and discussed here. Although these procedures are not as detailed as one would find in a field study, survey or experiment, they are critical to allowing readers to assess the reliability and validity of the study's findings. In this way, IS researchers can better contribute to the knowledge building process and IS case research will come into its own.

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