Case Studies and Organizational Innovation: Strengthening the Connection

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September 1983

COSMOS
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Preface

This study has had an extended history, reflecting the tenacity of the research process even in times of conflicting external crosswinds. The original, preliminary proposal for this project was submitted to the National Science Foundation in February 1979, with the formal proposal submitted in May. Comments by external reviewers and NSF staff led to several revisions of the proposal, and an award was ultimately made in March 1980, when two of the authors (Yin and Bateman) were at M.I.T.

The grant award period was from July 1980 to June 1982, and work began during the late summer of 1980. In December 1980, the project held an advisory meeting, at M.I.T., with five experts in social science methodology:

Thomas Cook, Northwestern University (psychology)
David Leege, University of Notre Dame (political science)
Richard Light, Harvard University (statistics)
Karl Weick, Cornell University (psychology)
Carol Weiss, Harvard University (sociology)

This group, along with NSF staff (Louis Tornatzky and J.D. Eveland), reviewed the plans for the project, including the types of case studies to be examined, the methodological criteria to be used, and the number and types of raters to be called upon. All agreed that the project would be difficult, but all were encouraging.

By April 1981, the next step in the project--the rating of the case studies by panels of experts--was completed. This step involved two panels: 1) a large panel of experts (listed in Appendix A), who were asked to rate the case studies according to their prior knowledge of the studies; and 2) a small panel of three raters, who were asked to rate the case studies both before and after examining them.

However, calendar year 1981 (recall that there was a Presidential election in the fall of 1980, accompanied by dramatically different R&D policies in certain fields), brought changes in the plans of the principal investigators. Although the ratings had been completed, other priorities prevailed, and the project entered a period of relative inactivity. During this period, The Case Study Institute, Inc. (located in Washington, D.C.) became operational and required a major commitment in time and energy. The NSF staff expressed occasional annoyance during this period; however, they remained patient, reflected in part by the eventual granting, in March 1982, of a six-month, no-cost extension.

As a result, the next major step in the project--the counterpart coding of the methodological characteristics of the case studies--was only completed by the spring of 1982 (of course, the coders were still blind to the results of the panel ratings). This task was assisted by Susan Granai, who was completing her dissertation in sociology for Syra-

cuse University at that time. The study team also began a series of open-ended interviews with research investigators in the field of innovation during this period, with the large proportion of these interviews conducted by the third author, Moore, who had joined the project in July 1982.

The data analysis process continued through the fall of 1982, using computational resources at George Washington University. Surprise at both the richness and complexity of the data prompted an extension of the study beyond its December 1982 deadline. The formal M.I.T. project ended (with a slight budget surplus), but because the investigators were all members of The Case Study Institute, Inc., a decision was made to commit corporate resources to the completion of the project. In February 1983, The Case Study Institute became known as COSMOS Corporation, and thus this final report appears under the COSMOS auspice.

The draft report was reviewed by the original advisory group in the spring of 1983, and their comments have, wherever possible, been incorporated into this final report. Their memory of the project may have diminished considerably during the interim period, but their collective wisdom is of such lasting nature that this minor perturbation is not of consequence.

The reader should also be aware that some of the materials in this report have already found their way into published form, although these earlier publications reflect the design issues rather than the results presented in this report. Two pertinent articles, for further reference, are:

> Robert K. Yin, "The Case Study Crisis: Some Answers," Administrative Science Quarterly, March 1981, 26:58-65; and
>
> Robert K. Yin, "Studying Phenomenon and Context Across Sites," American Behavioral Scientist, Sept./Oct. 1982, 26:84-100.

These articles acknowledge support by the NSF grant award, ISI-79-20580, and should therefore be considered part of the entire set of publications emanating from the award.

This winding history has left the authors in debt to many individuals, whom we would like to acknowledge. First is our deep gratitude to the three raters on the small panel, for their yeoman work: Irwin Feller (Pennsylvania State University), David Roessner (Georgia Institute of Technology), and Everett Rogers (Stanford University). Those who responded as part of the large panel, as well as to our open-ended interviews (about 40 such individuals are listed in Appendix A), also deserve our thanks for their prompt and cogent assistance. In addition, we are greatly appreciative of the patience and understanding of J.D. Eveland and Louis Tornatzky at NSF for enduring through the entire

process with us. The chairperson of our department at M.I.T. (Urban Studies and Planning) at that time, Larry Susskind, and its administrative officer, Rolf Engler, also deserve our thanks: first, for providing support at M.I.T. during the first year of the project (as does Paul Smoke, a graduate student who helped during the initial stages of the project) and second, for maintaining a smooth flow of paperwork during this later period, when we were actually considered an off-campus project (the senior author still holds an appointment as Visiting Associate Professor of Urban Studies). And finally, we would like to acknowledge our special debt to our advisory group--Thomas Cook, David Leege, Richard Light, Karl Weick, and Carol Weiss--for their guidance and insights.

All this history suggests that social science--and improvements in the case study method--will continue, even if in unpredictable ways and with unexpected delays. Of course, only the reader can judge the value of this particular effort. The assistance of all of the aforementioned persons notwithstanding, we alone are responsible for this final product and the two published articles.

CASE STUDIES AND ORGANIZATIONAL INNOVATIONS: STRENGTHENING THE CONNECTION (Executive Summary)

Robert K. Yin
Peter G. Bateman
Gwendolyn B. Moore
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Objectives

Case studies remain one of the most common ways of studying organizational innovation. In particular, case studies are likely to be the strategy chosen when the following conditions prevail:

- "Explanatory" rather than "predictive" questions dominate the study's objectives;
- The investigator has little or no opportunity to manipulate any of the behaviors of interest;
- The study focuses on contemporary events within their real-life setting; and, as a result,
- The number of variables of interest far exceeds, by an order of magnitude, the number of data points.

Under such conditions, other research strategies--e.g., experiments, surveys, economic models, and histories--are not likely to be as appropriate as the case study.

Because of the persistence of case studies as a methodology, the present study was designed to determine how this methodology might be improved in the future. This objective was pursued by analyzing methodological characteristics in conjunction with external ratings of a set of case studies. The findings are presumed to be useful both to research investigators who do case studies, as well as to research-funding agencies that support the conduct of case studies.

Analytic Framework and Procedure

Based on a review of previous studies of research methodologies, a six-fold analytic framework was developed. In this framework, individual case studies were examined in the following manner. First, a set of global ratings for each case study was made by a set of experts. These ratings covered the degrees to which the case study appeared to contribute to knowledge about PRACTICE and to knowledge about THEORY, in addition to the overall QUALITY of the case. The ratings represented the dependent variables for all subsequent analysis.

Second, each case study was coded for five other sets of characteristics, covering: 1) its problem definition, 2) its design, 3) the nature of the evidence used, 4) its analysis and interpretation, and 5) its manner of presentation. The coding of these characteristics, done by analysts ignorant of the results of the global ratings, represented the independent variables for all subsequent analysis. Because the methodological characteristics of each study clearly pre-existed the global ratings, the framework was considered a causal and not merely an associative framework.

This procedure was applied to 53 studies identified through an exhaustive search process, in which studies of organizational innovation in seven services (limited to public organizations) were examined: police, fire services, sanitation, public works, transportation, education, and planning. Of these 53 studies, 41 percent (n=22) contained only one case, while 59 percent (n=31) had multiple cases. All of the studies were either final reports or manuscripts published after 1969, with interim reports, working papers, conference papers, dissertations and theses, and any publications prior to 1969 all being omitted from consideration (these and other explicitly stated criteria were used to select the 53 studies from an initial candidate list of 171 studies). Thus, the final collection of case studies was intended to reflect the most recent and best state-of-the-art in case studies of organizational innovation.

The case studies were coded for numerous characteristics reflecting the five sets of independent variables. Many of these characteristics

were found throughout the vast majority of the case studies, and therefore did not vary with the global ratings. Other characteristics were absent throughout the vast majority, and again did not vary. The full report describes these characteristics as being either prevalent or rare characteristics of most case studies.

Findings

Of greater interest were those characteristics that varied with the global ratings. Such characteristics were considered within the control of an investigator and therefore represented ways in which case studies could be improved in the future. These characteristics were examined for their relationship to the global ratings, with the following results.

First, the characteristics related to higher ratings of contribution to PRACTICE were as follows:

- The study was an explanatory study ($p<.05$);
- The study used a multiple-case design ($p<.05$);
- The study used multiple evidentiary sources ($p<.05$); and
- The study defined operational measures of the outcomes of the innovation ($p<.05$).

Second, the characteristics related to higher ratings of contribution to THEORY were as follows:

- The study contained a discussion of previous theory ($p<.01$);
- The study did not use quantitative tabulations; ($p<.05$);
- The study defined a universe of cases to be studied ($p<.05$);
- The study related previous theories to the issues to be studied ($p<.05$);

- The study had an operational procedure for selecting the cases or respondents to be studied ($p<.05$); and
- The study used a multiple-case design ($p<.05$).

Finally, the characteristics related to higher ratings of the overall QUALITY of a study were as follows:

- The study related previous theories to the issues to be studied ($p<.05$);
- The study defined the possible cases to be studied ($p<.01$);
- The study had an operational procedure for selecting the cases or respondents to be studied ($p<.05$); and
- The study used a formal data collection procedure ($p<.01$).

Although these characteristics overlapped to some extent, no single characteristic was related to higher scores on all three global ratings. To this extent, investigators (and their sponsoring agencies) need to identify more clearly the purpose of future case studies. In particular, case studies that rate highly on contribution to PRACTICE do not share characteristics similar to those that rate highly on contribution to THEORY, and different research designs and data collection procedures may need to be considered.

These single characteristics also were examined for interaction effects, to determine whether colinearities would alter the list of relevant characteristics. This analysis did not substantially change the interpretation of the findings, except that the last three characteristics of high ratings on contribution to THEORY did appear to be redundant with the first three characteristics, and therefore less important. This interactive analysis did, however, reveal another interesting finding in that a new, single characteristic--the use of operational definitions for the outcomes of the innovation process (as

opposed to the outcomes of the innovation itself)--was significantly related to one or more of the above characteristics of all three global ratings. In this sense, this single characteristic may be an antecedent condition to high ratings of all three types, following a two-stage sequence.

Policy Recommendations

These findings can provide policy guidelines for future investigators or their sponsoring agencies in the following manner. If pursued, the outcome could be improved case studies of organizational innovation.

First, an investigator or funding agency should establish clearly whether the purpose of a case study is to contribute to knowledge about practice or about theory (or both). Depending upon such a choice, the preferred project characteristics and review criteria ought to be different, reflecting the different correlates among our findings, as listed above.

Second, project characteristics, possibly as reflected in proposal formats, should be organized according to at least five sections--problem definition, research design, nature of the evidence, analysis and interpretation, and manner of presentation. For each section, different methodological characteristics--again as reflected by the above list--may be relevant, and might be suggested by the funding agency as items to be considered by the investigator.

Finally, the funding agencies should alert investigators to the sequential and possibly staged process whereby a study's methodology can unfold. Attention needs to be given throughout the conduct of a study, and not merely at its outset.

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I. The Role and Problems of Case Studies for Studying Organizational Innovation

Case studies continue to be a common way of studying organizational innovation (e.g., Yin et al., 1977). Although many of the better-known cases have been published in popular form--e.g., Tracy Kidder's Soul of a New Machine (1981)--case studies also have persisted as a method of serious investigation (Yin, 1981a). In general, the case study approach is relevant whenever innovation is being studied in an organizational setting--whether the focus of study is the innovation itself, the organizational changes, the innovating individuals, or all three.

The Role of Case Studies as a Research Strategy

This observation concerning the role of case studies should not, however, be taken to imply any preference for case studies in comparison to other research strategies. Such "strategies" are broader than any particular method of data collection (e.g., the interview method), and cover the full set of research activities--from design to data collection to analysis. In addition to case studies, alternative strategies include experiments, surveys, economic models, and histories (see Table 1). What seems to be emerging is a realization that each strategy has its own niche in producing new empirical knowledge, offering unique advantages and disadvantages.

A basic textbook for the social sciences, co-authored by five statisticians at a major university, openly acknowledges this pluralistic view (Hoaglin, Light, McPeek, Mosteller, and Stoto, 1982). The book enumerates nine ways of collecting, analyzing, and reporting data: 1) experiments, 2) comparative observational studies, 3) sample surveys, 4) longitudinal and panel studies, 5) case studies, 6) simulations, 7) forecasting, 8) mathematical modeling, and 9) introspection and advice.[1] The textbook describes the strengths and weaknesses of each approach in separate chapters, suggesting decisionmakers might place more or less reliance on each approach, depending upon the situation. However, the textbook notes that no single approach is considered to be best under

Table 1

TYPICAL RESEARCH STRATEGIES
IN SOCIAL SCIENCE

	ILLUSTRATIVE CHARACTERISTICS				
Strategy	Within-Project Designs	Source of Date Collection	Type of Analysis	Type of Report	Cross-Project Designs
Experiment	Experimental designs Quasi-experimental designs	Laboratory	Analysis of variance Nonparametric statistics Non-statistical techniques	Articles	Replication Critical experiments
Survey	Survey designs Sampling strategies	Interviews Questionnaires	Multi-statistical techniques Content analysis	Books Reports Articles	?
Economic Model	?	Archival records	Regression and other techniques	Books Reports Articles	?
History	?	Documents Physical artifacts	?	Books Articles	?
Case Study	?	Interviews Observations Documents Physical artifacts	?	Books Reports Articles	Replication Critical case

all conditions.

Nor should the continued use of case studies in research efforts be confused with their role as teaching devices in law, business, public administration, public policy, and all types of social science courses (Llewellyn, 1948; Stein, 1952; and Towl, 1969). For teaching purposes, a case study need not reflect a complete or accurate rendition of actual events; rather, the purpose of the teaching case is to establish a framework for discussion and debate among students. This role of case studies is entirely different from that in research, where case studies should be conducted with the utmost concern for the basic rules of scientific investigation and the establishment of actual events and their causes.

Experts' Perceptions of Case Studies. To gain more insight into the role of case studies as a strategy for studying organizational innovation in particular, 22 research investigators were asked, in an open-ended manner,[2] why they thought case studies continued to be done, even though there appeared to be numerous methodological problems with the approach. These 22 research investigators were not necessarily case study enthusiasts. They were chosen because they: a) had been conducting innovation research, b) covered a variety of academic disciplines, c) were at least passingly familiar with the types of case studies in innovation research, and d) were not participating in other phases of the present study. (Appendix A lists all those interviewed as well as 24 persons participating in other phases of the study; together, the groups--including another 31 persons who declined to participate--were intended to cover the major investigators in organizational innovation research in this country.)

From the responses emerged five dominant themes, as indicated in Table 2. The most frequent theme was that case studies allowed an investigator to examine certain types of issues, especially those which other strategies of inquiry could not examine. However, the precise types were not clearly articulated, with the responses including such phrases as:

Table 2

THEMES EXTRACTED ABOUT
THE ROLE OF CASE STUDIES

Q. Why do you think case studies have continued to be done?

Theme	Responses
- To examine certain types of issues better (compared to other methods.	8
- To cover wholistic, complex units of study.	4
- To investigate topics easily and cheaply.	3
- To generate preliminary insights or hypotheses.	3
- To communicate research ideas in an understandable way (especially to novices).	2
- No codable response.	2
Total	22

> "...gathering up experience systematically;"
>
> "...good for studying a process...it is difficult to understand the innovation process through a survey;"
>
> "the important questions...the truth about things;" and
>
> "They provide a nonsubstitutable, qualitative aspect of understanding..."

The second most frequent theme was that case studies allowed an investigator to cover a wholistic, complex unit--e.g.:

> "...relating complex events in some meaningful way;"
>
> "...understanding a large social unit...,"
>
> "...so much information about one site;" and
>
> "...learning about questions, issues, and problems that are not readily structured--broad rather than narrow topics."

Three lesser themes were that case studies were easy or cheap to do, that case studies allowed one to generate preliminary insights or hypotheses about a phenomenon, and that case studies were peculiarly effective for communicating research ideas in an understandable way.

Two comments may be made about these responses. First, although there has been a traditional bias against case studies, in part due to their incorrect confusion with a flawed type of experimental design (Campbell and Stanley, 1966),[3] not a single person hinted that case studies had been an inappropriate form of inquiry, or that they ought to be discouraged in the future. Second, only three espoused the antithetical, hierarchical view of research strategies. (According to this hierarchy, each strategy should be used at a different stage of a coherent, investigatory sequence, with case studies only being appropriate for the problem definition or exploratory stage, surveys for the descriptive stage, and field experiments for the causal stage--see

Gordon et al., 1974; and Rogers and Agarwala-Rogers, 1976.) Overall, the responses of these research investigators therefore reinforced the notion that case studies have a distinctive, independent role, and that the array of strategies can be viewed from a pluralistic rather than hierarchical perspective. Nevertheless, an operational definition of this role is still needed.

Toward a Definition of the Role of Case Studies. The most frequently encountered definitions of case studies merely repeat the types of topics to which case studies may be applied. For example, in the words of one observer (Schramm, 1971):

> ...the essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result.

This definition thus cites the topic of "decisions" as the major focus of case studies. Similarly, other topics have been listed. The textbook by the five statisticians, as another example, defines a case study as "...an analytic description of an event, a process, an institution, or a program" (Hoaglin et al., 1982, pp. 126-127).

These types of definitional approaches, however, fail to uncover the technically critical features of the case study strategy--especially those that might distinguish case studies from other research strategies. In contrast, a clearer technical statement has been developed in several earlier publications by one of the present authors (Yin, 1981a and 1981b; and 1982). Specifically, case studies may be considered a research strategy in which a contemporary phenomenon is to be examined within its real-life context, especially where the boundary between phenomenon and context is difficult to define. This function creates the following technical feature:

- In case studies, the number of variables of interest will outstrip, by an order of magnitude, the number of data points (because the context involves so many variables).

In addition, case studies focus on explanatory, but not predictive or frequency questions--i.e., "how" and "why" questions, rather than "what," "when," "where," or "how many" questions. Finally, the focus can be made on explanatory questions without the need to intervene or to manipulate events.

As an example of how these characteristics may be compared with those of other strategies, histories share most of these characteristics, but do not focus on contemporary events; surveys and experiments require more data points than variables (or employ statistical clustering methods to reduce the number of variables); and economic models tend to be aimed at prediction and not necessarily explanation. (Other comparisons may be gleaned from Table 3.)

These distinctive characteristics of case studies happen to apply well to the topic of organizational innovation.[4] In many studies, the investigations are about phenomena with no clear starting or end points (i.e., an ill-defined boundary between phenomenon and context); the investigations are aimed at explanations and not predictions; the events include a multiplicity of outcomes and participants (i.e., a large number of variables of interest); and the investigators do not have the opportunity to intervene or to manipulate events, as required by an experiment.[5] Of course, there are some studies of innovation for which these conditions are not relevant--e.g., studies that deal with "innovation characteristics," in which investigators may be concerned with only the predictive nature of the different characteristics, and not with any explanation of the innovation process (e.g., see Tornatzky and Klein, 1982, for a summary of such studies).[6] In such studies, however, surveys rather than case studies are the predominant research strategy.

Such a formulation of the basic, technical characteristics of the case study strategy leads to other insights. For instance, if the number of variables of interest far exceeds the number of data points, the traditional statistical techniques are irrelevant for analyzing the "case-level" data.[7] Such techniques are based on the reverse situation-i.e., there must be several if not many data points for each variable, so that a mean and a variance can be calculated. In lieu of the

Table 3

RELEVANT SITUATIONS
FOR DIFFERENT RESEARCH STRATEGIES

Strategy	Concerned with Explaining (E) or Predicting (P)?	Requires Ability to Manipulate Behavior?	Focuses on Contemporary Events?	Can Allow Many Variables in Relation to Data Points?
Experiment	*E/P*	*YES*	*YES*	*NO*
Survey	*P/E*	*NO*	*YES*	*NO*
Economic Model	*P/E*	*NO*	*YES/NO*	*NO*
History	*E/P*	*NO*	*NO*	*YES*
Case Study	*E/P*	*NO*	*YES*	*YES*

traditional statistical approaches, case studies require alternative methods of analysis, and these need to be developed in the future. Along such lines, one potentially fruitful approach is Donald Campbell's preliminary notion about "pattern-matching" (1975). Campbell notes that in a single case study an "explanation," and not necessarily single variables or factors are being tested, and this accounts for the frequent outcome where:

> Even in a single qualitative case study the conscientious social scientist often finds no explanation that seems satisfactory. Such an outcome would be impossible if [single factors were being tested]--there would instead be a surfeit of subjectively compelling explanations (Campbell, 1975, p. 182).

However, the operational procedures for carrying out the pattern-matching process have only begun to be articulated.[8]

Another useful insight is that the case study strategy does not imply the exclusive use of quantitative or qualitative data (either may be relevant and used). Furthermore, the strategy is not limited to the use of any particular data collection technique, such as ethnography or even participant-observation. Interviews, analysis of documents, the review of historical artifacts, and even the use of scientific and engineering tests may all be used as part of the case study strategy (Hoaglin et al., 1982, pp. 124-125). In most case studies, in fact, the objective will be to seek converging evidence from as many of these sources as possible, rather than to rely on a single data collection technique.

Summary. In summary, case studies are but one component in the repertoire of empirical research strategies. Case studies are a way of trying to explain innovation phenomena by examining such phenomena in their real-life contexts. To this extent, the case study has a distinctive role that requires attention to the full range of design, collection, and analysis problems.

Problems with Case Studies as a Research Strategy

If the case study strategy is accepted as one way of studying innovation, an ensuing concern has to be over the adequacy and quality of the strategy as it has been practiced. Thus, the full potential of this distinctive research strategy would not be realized unless some minimal, not to speak of exemplary, standards were being met.

Prevailing Problems. Unfortunately, public commentaries about the use of case studies suggest that such standards have not yet been achieved. One highly respected research investigator, for instance, summarized his own frustrations at doing case studies in the following way (Miles, 1979). First, he considered within-case analysis to be "essentially intuitive, primitive, and unmanageable;" moreover, he found cross-case analysis to be "even less well formulated than within-site analysis." His final judgment was that this type of research on organizations could not "be expected to transcend story-telling" (Miles, 1979, pp. 597-600). Although most of the problems identified by this investigator can be rectified (see Yin, 1981b), the stereotype of the case study as a messy enterprise, barely following the most rudimentary of scientific principles, still dominates the social sciences.[9] In fact, most textbooks treat case studies as an informal form of inquiry, and therefore rarely provide guidelines about how to design or to do case studies properly (for an inventory of such textbooks, see Yin, 1983).

This perspective was largely mirrored by answers to another open-ended question that was posed in the interviews with the 22 research investigators, previously described. When asked for their single most serious criticism of case studies, four themes emerged (see Table 4). The most frequent theme was a sense that case studies fail to provide credible results. This was reflected in such comments as:

> "Case studies involve an ideological mystique --you think you know more than you actually do;"
>
> "They lack a methodological framework...to help distinguish the significant from the insignificant;"
>
> "The observer can be overly selective...,"

Table 4

THEMES EXTRACTED ABOUT
THE PROBLEMS WITH CASE STUDIES

Q. What is your single, most serious criticism of case studies?

Theme	Responses
- Fail to provide credible results.	9
- Offer a poor way of generalizing.	6
- Are defined in too many different ways.	3
- Are too cumbersome.	3
- No codable response.	1
Total	22

> "Researchers often bring with them pre-conceived notions about what happened;" and
>
> "The research is done...sloppily, with no plan for collecting or using data."

The second most dominant theme was that case studies are not usually selected in a sufficiently formal manner, and thus offer a poor way of generalizing. This theme was reflected by such comments as:

> "...no criteria for selecting the cases to be studied;"
>
> "If there is only one case, you don't know how representative the results are;"
>
> "Investigators inappropriately use case studies as the basis from which to generalize;"
>
> "You can't always answer 'What is this a case of?'"

The two remaining themes were expressed much less often, and involved the complaint that the case study strategy was so poorly defined that "too many things can be called case studies," or that case studies were too cumbersome--e.g., "good cases are often too long."

Any broad interpretation of these results suggests serious problems with the case study strategy. Translated to more technical terms, the credibility theme may be considered a problem of internal validity; along the same line, the issues of generalizing may be considered a problem of external validity. In essence, what the 22 research investigators were helping to point out was that the case study strategy, as practiced, had some major methodological flaws.

The Task Ahead for Social Science. Any passive acceptance of this prevailing view would represent, in our judgment, an enormous loss to the development of empirical knowledge about organizational innovation. If the case study strategy is uniquely situated to address certain kinds of issues, and if it is one of the ways of explaining important phenomena (and not just predicting or counting them), a major challenge is to improve the strategy, and not to ignore it.

There are, of course, any number of methodological books that provide advice on data collection techniques and the conduct of fieldwork (e.g., Webb et al., 1966; Barnes, 1971; Schatzman and Strauss, 1973; and Murphy, 1980). However, the data collection step is but one facet of a research strategy, and none of the existing texts gets at the other facets of the case study strategy--e.g., design, analysis, and reporting. Thus, none provide investigators with guidance on such frequently encountered case study problems as:

- What should be the definition of the case?
- Should a single- or multiple-case study be done?
- How should the cases be selected, whether part of a single- or multiple-case study?
- What defines the relevant set of evidence to be examined?
- How should within-case evidence be analyzed? and
- How should between-case evidence be analyzed?

Note that these and related questions are similar to those that might be asked about doing experiments (or any of the other previously enumerated research strategies). The parallel issues would be the selection of topics for experimentation, the assignment of "subjects" to various groups, the selection of key variables, and the determination of appropriate analytic techniques. Moreover, all of these issues are still different from the burdensome problem of data collection--e.g., the development of appropriate instrumentation, the establishment of precise and accurate measurement in the laboratory setting, and the potential need to monitor a variety of behavioral responses.

The Purpose of the Present Study

Nevertheless, the identification and promotion of any set of standards for improving the case study strategy is <u>not</u> a realistic goal for any single project. Such standards can only emerge on the basis of systematic discussion and broad consensus among the scholars of a field,

with time available for some trial-and-error testing of various alternatives. (This type of activity would normally be conducted under the auspices of an organization such as the National Academy of Sciences.)

In contrast, the present study is aimed at gathering and analyzing empirical information about existing case study practices. Methodological characteristics will be identified that appear to be related to judgments about the quality of a case study. And, the results may become one source of information in any deliberations about improving the case study strategy. In other words, the empirical evidence can be used to define the boundaries and scope of any subsequent debate.

As a brief preview, the project team identified a collection of published and unpublished case study reports. The characteristics of each report were coded in a rigorous form, and the results of the coding were quantitatively compared to global ratings of each report (see Yin and Heald, 1975; and Yin et al., 1976, for descriptions of this particular methodology). This approach was applied to 53 studies of organizational innovation, covering 31 single-case studies and 22 multiple-case studies. The framework and methods are described in the following section.

NOTES TO SECTION I

[1]The book also gives equal attention to certain common sources of information--e.g., management records, official statistics, and computer-assisted library searches, as if these were parallel approaches. In fact, they represent sources of evidence rather than strategies for doing research, and therefore have not been included in our list of nine strategies in the text.

[2]These interviews were conducted either in person or by telephone. In either case, the 22 investigators were engaged for about 20 to 30 minutes in an open-ended, conversational format, focusing on five questions: what they considered to be their most serious criticism of the case study approach, whether anything could be done to overcome such problems, why they thought case studies continued to be done in the face of these difficulties, how they defined a case study, and what case studies they would recommend as exemplary (and why).

[3]This confusion was corrected by a later textbook (Cook and Campbell, 1979), in which the authors still identified the one-group, post-test-only design as an inadequate experimental design, but noted that it was not to be considered synonymous with the one-shot case study (p. 96). In fact, the same textbook later offers a design that is quite potent and that has a direct counterpart as a case study design (although the authors did not recognize it as such)--the nonequivalent dependent variables design. This latter design comes close to providing an operational definition of the "pattern-matching" technique.

[4]Of course, these conditions also are applicable to a wide variety of other topics, outside of the field of innovation and organizations. Thus, neighborhood change, social issues, key political elections, biographies, and numerous other topics can and have been the subject of case studies. The point of our discussion is to indicate that all of these applications of the case study strategy may still share the same technical characteristics in comparison to the alternative research strategies commonly available to social scientists.

[5]For a further discussion of these points, see Greenberg et al., 1977.

[6]The contrast here is aptly summarized by Larry Mohr's insightful discussion of "process" theory and "variance" theory (1978). In the former, investigators are concerned with explaining the innovation process; in the latter, investigators are concerned with predicting the variations in innovation outcomes.

[7]However, statistical approaches may still be relevant for analyzing the data at a "sub-level" within the case study. For example, a survey or an examination of quantitative, archival records can be embedded within a case study, and such data ("micro-units") might appropriately be analyzed with statistical techniques, even though the case study itself remained impervious to such an approach (see McClintock, Brannon, and Maynard-Moody, 1979; and Yin, forthcoming).

[8]See footnote 3 above. For more recent discussions of pattern-matching as a way of testing explanations in within-case analysis, see Yin (1981a and 1982).

[9]Miles himself, however, has subsequently contributed handsomely to a change in this stereotype (see Miles and Huberman, no date).

II. A Methodological Framework for Characterizing Case Studies

The analysis and synthesis of existing research studies have become a more rigorously defined research activity in recent years (e.g., Glass, McGaw, and Smith, 1981; and Rogers, 1981). Whereas the traditional form of synthesis--the "literature review"--followed no particular methodology, the current state-of-the-art has suggested many ways in which the synthesis itself can be designed as a replicable and systematic task (Yin et al., 1976). This type of research has become known as one form of "meta-research."

In most syntheses, the major purpose is to aggregate evidence about relevant substantive issues. Thus, most typically, the meta-research effort is directed at summarizing what might be known about various behavioral, organizational, or social topics (e.g., see Glass, McGaw, and Smith, 1981, for a listing of reviews in the field of psychology). The cumulative body of evidence is assessed in order to develop subsequent research agendas or to identify potential policy actions.

In addition to syntheses of substantive issues, investigators have also attended to the various methodological characteristics of social science research (e.g., Bernstein and Freeman, 1975; and McTavish et al., 1977). The investigations have begun with hypotheses regarding particular characteristics that are presumed to lead to higher ratings of a study's overall quality. In such inquiries, the methodological characteristic might therefore be considered to be the independent variables, and the resulting ratings would be considered to be the dependent variables. Presumably, if future studies followed the preferred methodological choices, their quality would be more highly rated by external reviewers, and their findings would be more robust and eventually more highly utilized than studies not following these choices. This same basic causal relationship--between methodological characteristics and external ratings--became the underlying rationale for the present investigation.

Characteristics Identified in Previous Studies

Initially, we examined in detail the concepts and instrument items used in a variety of previous syntheses of the methodological characteristics of social science research. Each of these earlier efforts offered critical suggestions for the present investigation, although none of the syntheses focused on case studies as the sole form of inquiry. Seven syntheses were especially useful and are listed in Table 5. (Our examination also included the forms used by agency reviewers to rate proposals and final reports, which reflected a similar framework of relating characteristics to ratings, and one such form is included in the list.)

The table shows that the previous efforts fell within two broad groups: a) the review and assessment of individual research projects, and b) the review of published reports that appeared to be associated with the utilization of the findings. Although the efforts called upon a variety of sources of evidence--e.g., panel ratings of reports, or surveys of principal investigators--each effort used a formal research instrument or questionnaire. We analyzed these instruments for their structure and content, both with regard to the types of methodological characteristics deemed relevant by these studies, and to the types of scales, questions, or items in the instrument.

Among the methodological characteristics identified by these previous efforts, several general themes were found:

1. Problem Definition--e.g., discussions of previous research, the specification of research questions or hypotheses, and the precision of definition of the phenomenon being studied.

2. Research Design/Method--e.g., the logic of the empirical inquiry (such as the use of comparison groups), the methods for selecting the units to be studied, and the procedures employed to minimize threats to validity.

3. Nature of Evidence or Data--e.g., the data collection procedures, the operationalization of measures, and the procedures used to test the reliability or construct validity of measures.

Table 5

PREVIOUS STUDIES OF THE
METHODOLOGICAL CHARACTERISTICS OF
SOCIAL SCIENCE RESEARCH

Reviews of Research Projects

1. Bernstein and Freeman (1975): Review of 236 federally-supported evaluation studies, conducted by sending questionnaires to the principal investigators.

2. White and Krislov (1977): Use of closed-ended instrument, by review committee, to rate reports from 138 projects funded by the National Institute of Law Enforcement and Criminal Justice.

3. McTavish et al. (1977): Assessment, by panel, of 126 federally-funded social science projects, with each project being represented by its proposal, an interim report, and a final report.

4. National Science Foundation Rating Form (1978): Agency instrument, given to reviewers, for assessing final reports from NSF-funded projects.

Studies of Research Utilization

5. DiMaggio, Useem, and Brown (1978): Review of 86 studies of arts audiences, based on survey of principal investigators. Characteristics of studies then examined to determine possible relationships with degree of utilization.

6. Weiss and Bucuvalas (1980): Analysis of final reports from 50 mental health projects. Characteristics of reports then compared to survey of 155 decisionmakers, who were asked to rate each report.

7. Rothman (1980): Survey of officials in 12 social services agencies, to determine perceived characteristics of highly usable research reports.

4. Nature of the Analysis--e.g., the use of descriptive statistics, the specification of variable-relationships, and the use of inferential statistics.

5. Interpretation of Results--e.g., comparisons to previous research, the discussion of alternative interpretations of the findings, and the general link between data and conclusions.

6. Report Presentation--e.g., clarity of writing style and format, completeness of report, adequacy of executive summary, availability of report.

7. Global Rating--e.g., rating of technical merit, rating of contribution to knowledge, to practice or policymaking, or to teaching.

These general themes also appeared relevant, in one form or another, to the methodological issues regarding case studies.[1] Thus, the themes, as well as some of the specific items used to represent each theme, became the foundation for our case study framework.

The Case Study Framework

The framework portrays the methodological activities that occur in the design and conduct of case studies. The framework's causal links between the methodological characteristics and external ratings are similar to the previous efforts. In addition, however, the framework arrays the methodological characteristics according to their control by a principal investigator, in contrast to the degree to which such characteristics might be determined by the progress or outcome of the research itself.

In this sense, an investigator has the maximum control and choice at the outset of a study--e.g., in defining a problem, selecting sampling units, and developing data collection instruments. In contrast, activities toward the end of a project are less controllable. Thus, a particular type of analysis cannot be used if the required data have not been collected successfully. Similarly, various ways of presenting the evidence and the final report are not readily divorceable from the results of a study. In the extreme situation, which occurs frequently in

laboratory experiments, an experiment that does not "work" might not justify the production of any report at all. As a final example, an investigator obviously has no control over any global ratings of the completed research, as such assessments are, by definition, made by external observers.

In summary, the case study framework covered the relevant themes and characteristics identified by previous studies, but also reflected the investigator's control over such characteristics. The complete framework is depicted in Figure 1.

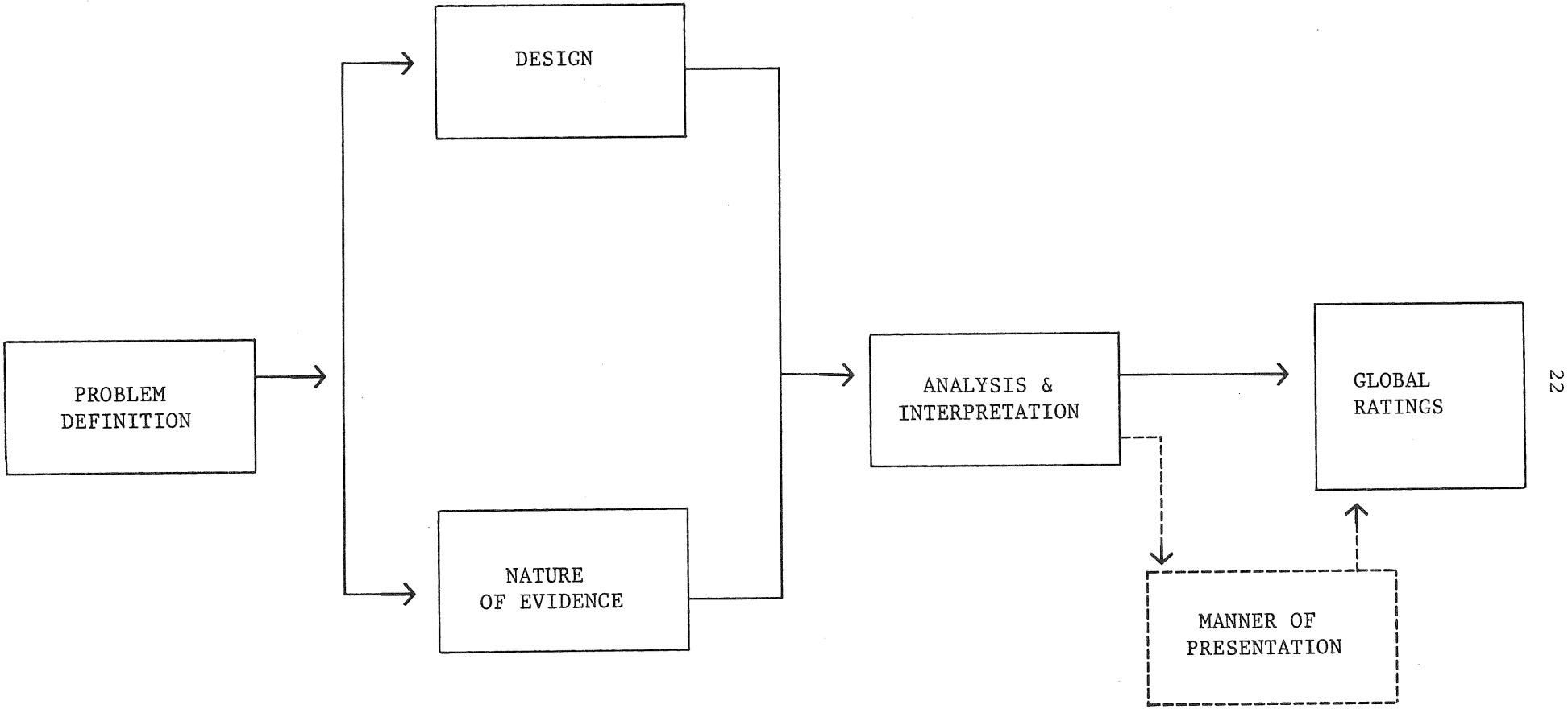
The figure shows the original themes clustered into six groups of variables (the analysis and interpretation themes were combined into a single theme): 1) problem definition, 2) design, 3) nature of evidence, 4) analysis and interpretation, 5) manner of presentation, and 6) global ratings. Each of the first five groups represented sets of variables that were presumed to affect the global ratings of a study. The ratings covered three major types of outcomes--the contribution of a study to knowledge about practice, the contribution to theory, and the general quality of the study (because we were examining the use of case studies as a research strategy, ratings regarding the contribution to teaching were deemed irrelevant).

Each of the first five groups also represented, in declining order, the extent of control by the investigator. Thus, the framework indicates that the first group, involving problem definition, is the set of variables most under such control, whereas the fifth group, the manner of presentation, is least under such control. (Ignored under "presentation" were purely format characteristics--which the investigator can indeed manipulate.) The point here is that the nonformat items--e.g., the presentation of the instruments that might have been used in a study--would not be possible if no instrument had been used in the first place. To this extent, what is presented is more strongly controlled by the conduct of the study rather than by the wishes of the investigator.

Each of the five groups also defined a number of detailed characteristics specifically pertaining to case studies, based on knowledge about existing case studies (see Yin, 1981a and 1981b). Each charac-

Figure 1

CASE STUDY FRAMEWORK



teristic became a variable in our framework, and the full list of variables is contained in Table 6. Except for the overall ratings, which followed previous studies by being cast in the form of five-point Likert scales, each variable called for an analyst to decide whether a particular characteristic was present or absent in the case study being analyzed, following a procedure previously described as part of the "case survey" method (Yin and Heald, 1975; and Yin et al., 1976).

The items were then divided into two closed-ended instruments, which in turn were applied to a sample of case studies (see Section III). The first instrument focused on the five groups of methodological characteristics, and was completed by one group of analysts; the second instrument focused on the global ratings, and was completed by a second group--i.e., experts in the field of organizational innovation.

In this manner, the final conceptual framework allowed us to study the potential causal relationships between the methodological characteristics of case studies and the global ratings of these studies. The two sets of analyses--methodological charateristics and global ratings--were done by two different sets of reviewers (who were not aware of each other's results). To this extent, our case study framework was based on a corroboratory design, in which the findings of independent reviewers were later analyzed for their statistical relationships.

The specific body of case studies to which this framework was applied is described in the next section.

Table 6

LIST OF VARIABLES,
REFLECTING METHODOLOGICAL CHARACTERISTICS
CODED FOR EACH CASE STUDY

Problem Definition

Author cites self in previous publication.
Study discusses previous implementation or innovation theory.
Study relates previous theory to issues, questions, or hypotheses to be investigated.
Citations to previous research are made in introduction.
Citations are made in general literature review.

Study appears to be an exploratory study.
Study appears to be a descriptive study.
Study appears to be an explanatory study.
The making of causal inferences seems relevant to the study.

Design

Scope of inquiry defined by time boundaries.
Scope of inquiry defined by spatial boundaries.
Scope of inquiry focuses on organizational units of analysis.
Study describes potential universe of eligible cases.

Study uses operational procedure for selecting some cases and ignoring others.
Study uses operational procedure for selecting some respondents and ignoring others.

Study consists of single case with no subunits.
Study consists of single case, but with subunits.
Study consists of multiple cases, with no subunits.
Study consists of multiple cases, with subunits.
The total number of cases in the study.

Design compares contrasting cases.
Design compares same case, but contrasting time periods.
Design makes no comparisons, but is based on replication among cases.
Design makes comparisons at subunit level.

Study mentions limitations regarding internal validity.
Study identifies specific threats to validity.
Specific steps are taken to offset threats to validity.

Table 6, page 2

Nature of Evidence

Author participated in events of study.
Author assisted in data collection for study.
Study mentions biases or predispositions held by author.
Steps are taken to reduce the effects of these biases.
Study mentions methodological training to perform the tasks in the study.

Study mentions concern over quality of data sources.
Study discusses possible shortcomings of sources.
Steps taken to overcome possible shortcomings.
Study mentions use of formalized, intermediate records (e.g., field notes, logs, observational tabulations).

Evidence based on elite interviews.
Evidence based on large-scale interviews.
Evidence based on primary documents or records.
Evidence based on secondary documents.
Evidence based on direct observations or participation.

Study identifies names or titles of interviewees.
Study identifies specific files or records searched.
Study lists data tapes or sources.
Study gives circumstances for observational data.

Operational definitions used for nature of the innovation.
Operational definitions used for key aspects of the implementation process.
Operational definitions used for specific outcomes of the implementation process.
Operational definitions used for specific outcomes of the innovation.

Study discusses validity or reliability of data.
Tests made for validity or reliability of data.
Procedure used for developing convergence.
Difficulties noted in dealing with qualitative data.
Reactivity problems mentioned.
Inconsistency of data across cases or subunits noted.
Unavailability of respondents or records noted.

Study mentions modifications made in instruments, during course of work.
Study mentions use of formal respondent questionnaire.
Study mentions use of formal researcher's protocol.
Study mentions use of formal protocol for using documents.
Study indicates that key portions of the text were reviewed by at least one of the informants or interviewees.

Table 6, page 3

Analysis and Interpretation

Study presents quantitative tabulations.
Study presents nonquantitative tabulations.
Study uses chronologies.
Study presents figures or graphs.

Study gives narrative description of the characteristics of the innovation.
Study gives narrative description of the implementation process.
Study gives narrative description of the innovation's outcomes.

(For multiple-case studies only)
Study conducts statistical manipulations between cases.
Study conducts numerical tabulations between cases.
Study juxtaposes different types of information between cases.
Study contains narrative discussion of between-case trends.

Study draws conclusions about the innovation/implementation process.
Study draws conclusions about the innovation's outcomes.
Study draws conclusions about the organization(s), if any.
Study draws conclusions about needed future research.
Study makes recommendations for policy action.

Manner of Presentation

Report uses footnotes.
Report uses tables or other data displays.
Report contains appendices with specific evidence.
Report provides reproductions of relevant documents used as evidence.
Report gives quotations from respondents or documents.
Report contains a bibliography.
Report indicates that sources were searched fairly.

Report provides copy of questionnaires used.
Report provides copy of researcher's protocol used.
Report provides sample of field notes, logs, or other intermediate records kept by the investigators.
Report contains copy of any rating instruments used.

Report contains 0-4 references.
Report contains 4-9 references.
Report contains over 9 references.
Citations are made in findings of report.
Citations are made in considerations of alternative explanations.
Citations are made in conclusions or recommendations.

NOTES TO SECTION II

[1]Such an observation reinforces our earlier point regarding the pluralistic view of alternative research strategies: although case studies are a distinctive form of empirical inquiry, they nevertheless share the same concerns as other forms of social science research.

III. Collecting and Scoring Case Studies

The main purpose of our investigation was to apply this framework to a specific set of case studies, thereby developing an empirical basis for any conclusions about the causal relationships. In other words, our own data collection and analysis consisted of collecting a group of case studies of innovation, and "scoring" these case studies, by obtaining a global rating and also by coding the methodological characteristics.

The operational procedures for conducting this phase of the investigation are described below. Particular care was exercised in identifying the studies to be collected and scored, a step that has often been unarticulated in previous meta-analytic research, even though the consequences of such procedures can clearly affect the outcome of the analysis (e.g., Yin and Heald, 1975; and Yin et al., 1977).

Identification of Eligible Studies

Definition. The following definition of an eligible study was developed, reflecting a pre-designated focus on organizational innovation in public agencies:

a. The innovation[1] had to be a new machine, material, computer system, quantitative analysis, or organizational structure or function.

b. The innovation had to involve some change in the policies or procedures of the organization.

c. The organization had to be a unit of government in the United States, exclusive of the federal government.

d. The study had to cover the organizational events related to the organization's adoption of the innovation, as well as the organizational events following adoption.

For the purpose of increasing the likelihood of covering public, and not private organizations, the eligible studies also were limited to

seven service areas: police, fire services, sanitation, public works, transportation, education, and planning. These services are those that most tend to involve public organizations, whereas other services--e.g., housing, health, mental health, and social services--frequently involve private organizations. (Of course, certain multiple-case studies, included because one of the seven eligible services had been represented, also could have covered one of the latter service areas.)

The basic definition of eligible studies was intended to highlight certain features and to ignore others. The nature of the innovation was purposely cast in broad terms to include hardware as well as managerial innovations--in contrast to previous investigations that have only focused on hardware innovations (e.g., Yin, 1981c). The reason for the broader definition was to assure that our results would pertain to both types of innovations rather than favoring one or the other.

Similarly, the definition did not limit itself to any specific type of public organization other than excluding the federal government. In this way, case studies of municipalities, counties, state governments, school districts, and other special districts were all eligible to be included. Finally, the emphasis on the description of organizational events was critical, due to our basic assertion that a case study is a study of "a phenomenon in its real life context" (Yin, 1981a). In this instance, the phenomenon was the innovation, and the context therefore had to be the organizational events. Excluded by this last definitional criterion were those studies focusing on the technical characteristics of an innovation alone--as might be the case where a report only discussed the mathematical features of a new operations research model.

To understand better the implications of these definitional assumptions (e.g., see Tornatzky et. al., 1982, for a comprehensive review of the entire literature), our definition can be contrasted to that used in two recent studies: 1) an analysis of 75 studies by Tornatzky and Klein (1982); and 2) a review of 181 articles by Schneider et al. (1982).

The first analysis was primarily concerned with innovation <u>characteristics</u>, and the relationship between such characteristics and innova-

tion outcomes; by comparison, our criteria were intended to emphasize the innovation process. Furthermore, Tornatzky and Klein's definitional criteria also permitted the inclusion of: a wide range of innovations (e.g., those in agriculture, family planning, and energy); both public and private sector organizations; situations where no organization was relevant as the adopting or implementing unit; and innovations in countries other than the U.S. Overall, their investigation was implicitly concerned with the identification of universals among innovation characteristics, whereas our investigation was more concerned with the methodological lessons regarding the study of "how (a process question) innovation (a phenomenon) occurs in public organizations (a limited contextual realm)." The two investigations are therefore complementary to each other. Conceptually, the two investigations may be distinguished by what Mohr (1978) has labeled as the "process" (ours) and "variance" (theirs) approaches to the study of innovation.

The second study, by Schneider et al. (1982), was concerned with the characteristics of published articles in various social policy journals. Their analysis compared the methodological and substantive characteristics of the articles with a normative model of empirical inquiry. Although their approach was similar to that used in our investigation, their study restricted its universe to articles from "self-selected" public policy journals, and then randomly selected articles published between 1975 and 1980. As the authors note, the journal selection criterion tended "...to exclude journals focused on a particular technology or policy area, and may have underselected journals with particular disciplinary orientation" (Schneider et al., 1982, p. 105).

Search Process. This basic definition of an eligible study was then applied to a variety of sources, including eight electronic bibliographies, sixteen academic journals (see Appendix B for a description of each), and the card catalogs of two universities (Harvard and MIT). In searching the electronic bibliographies, two items were specified: "case study/case studies" and "innovations." In searching the card catalogs, the following key words were used:

case study(ies)
city government
education
fire
health
housing
innovation(s)
local government
municipal government
organizational change
police
public administration
public management
public policy
public safety
public services
state government
technological change
technology
transportation
urban government

The search was limited to published works dated no earlier than 1960 and unpublished works dated no earlier than 1970, to focus attention on contemporary experiences. Furthermore, preliminary reports, working papers, conference papers, articles in trade journals and magazines, teaching case studies, and unpublished theses and dissertations were all excluded as documents of uncertain research quality.[2]

Studies Identified. The result of this extensive search was the identification of 171 candidate studies. These studies were then inspected to determine whether all the definitional criteria had been met. The sorting process led to a final array of 53 studies, listed in Appendix D along with the global rating instrument that was used. (None of the candidates were judged according to their methodological quality; all of the exclusions were due to the failure to meet one or more of the explicitly stated criteria). The most frequent reasons for excluding a study were that the study:

- was a preliminary (working) report, an unpublished thesis, a dissertation, or a conference paper;

- was on the excluded topic of citizen participation;
- omitted any discussion of the organizational events related to the adoption and implementation of the innovation; or
- covered organizations outside of the U.S.

Characteristics of the Studies Identified. Of the 53 studies finally selected, 41% (22) appeared in the form of technical reports, while another 32% (17) appeared as complete books. The remainder were either single chapters in a longer book (7) or were journal articles (7). The earliest study was published in 1964, and only 6 of the 53 studies were published prior to 1970. Almost two-thirds of the studies were evenly distributed within a seven-year span from 1971 to 1977 (approximately six each year). In 53% (28) of the studies, the publisher was either a commercial press or university press. The next most frequent "publishers" were independent research groups (11) and academic departments (5). Finally, 40% (21) of the studies were authored by a single person, with the balance being authored by more than one person or by an organization.

Because the number of case studies contained in the overall study was not a criterion for selection, 41% (22) of the studies contained only one case, and 59% (31) had multiple cases. The number of cases in a multiple-case study ranged from 2 to 30, with 5 being the mode. The types of innovations covered by the studies included hardware or physical improvements, managerial or decisionmaking innovations, systems analysis, rearrangements in service delivery patterns, as well as other innovations. Specific examples of these innovations are listed in Appendix C.

Scoring of Case Studies

The methodological characteristics of these 53 studies were then scored by two independent groups of raters.

The first group focused only on the global ratings, using three

separate five-point rating scales, to indicate:

- a study's perceived contribution to THEORY;
- its perceived contribution to PRACTICE; and
- its perceived QUALITY.

These three sets of global ratings became the dependent variables for our subsequent analysis (see instructions in Appendix D).

The second group focused on all the remaining methodological characteristics:

- problem definition;
- design;
- nature of evidence;
- analysis and interpretation; and
- manner of presentation.

These characteristics became the independent variables for our subsequent analysis. For these items, the second group was asked to determine whether a particular characteristic was present or absent from a study (see instrument in Appendix E).

The following discussion covers the procedures used and variables selected for further analysis. However, the actual analysis of the variables is not discussed until Section IV.

Dependent Variables. The global ratings were initially tried three different ways, reflecting our desire: a) to include a diverse group of raters, and b) to use the most informed judgments possible.

Because the global ratings were to represent judgments about contribution to knowledge about PRACTICE, contribution to THEORY, and degree of overall QUALITY, the pertinent pool of raters was considered to be senior investigators active in the field of innovation. At the outset, about 40 of these persons--who had not previously participated

in the interview portion of our study (see Section I of this report)--were identified. (The persons are listed in Appendix A, which also lists those who were interviewed, to show the nonoverlap between the two groups.)

All of these 40 persons were contacted by mail, presented with the list of 53 studies, and asked to rate them. Responses were returned by 21 of these persons. The major finding was that, for many of the studies, the respondents had such little familiarity with the study that no rating could be made. For instance, none of the 21 was able to rate fully nine of the studies, and another nine studies drew 20 "no ratings." (The number of studies receiving various proportions of "unable to judge" ratings is shown in Table 7.) This high proportion of "unable to judge" ratings was attributable to at least two factors. First, our 53 studies covered a diverse array of subfields, and experts in one subfield--e.g., educational innovation--were unlikely to be knowledgeable about studies in another subfield--e.g., innovations in police organizations. Second, many of the studies took the form of monographs that had not necessarily received wide dissemination.

This finding thus indicated that raters would have to be provided with an opportunity to become more familiar with the studies. In short, they would have to have access to the studies for their own reading and inspection.

However, the studies could only be made available in this manner to a few such raters, due to logistical problems. Together, the 53 studies occupied a volume of two large carton boxes, and it was judged infeasible either: a) to reproduce and ship numerous sets of these studies to a large number of raters, or b) to have the raters travel to a central point for an intensive period of perhaps a week, to read and inspect the studies. Thus, a decision was made to send the full set of studies to three experts, each of whom was allowed one month in which to review the studies and produce the ratings. These three experts all had some familiarity with the major subfields of innovation, and represented three different disciplinary backgrounds--economics, sociology-communications, and engineering-policy sciences. All were well-read, and all had been

Table 7

NUMBER OF STUDIES RECEIVING
"UNABLE TO JUDGE" RATINGS

Number of Studies	Number of "Unable to Judge" Ratings
1	4
1	12
6	15
5	16
9	17
6	18
7	19
9	20
9	21
Total 53	

involved in innovation research for ten years or longer. This procedure allowed each rater to review the studies individually, and at a leisurely pace in accordance with their own schedules.

Table 8 shows the resulting modal ratings for each of the three dependent variables. These ratings indicate that higher scores were given for contribution to PRACTICE than for contribution to THEORY, and that the ratings for overall QUALITY were the most dispersed. To reduce the number of cells for further analysis, these ratings were recoded into bivariate form, with scores of 1 or 2 considered a "low" rating, and scores of 3, 4, or 5 considered "high." Correlational analyses among the three types of ratings then showed some colinearity among the three dependent variables, with contribution to THEORY being significantly related to contribution to PRACTICE ($X^2 = 5.40$, df = 1, $p < .05$) and to overall QUALITY ($X^2 = 13.77$, df = 1, $p < .001$), but with contribution to PRACTICE not related to overall QUALITY ($X^2 = 0.86$, df = 1, p = n.s.).

These modal ratings by the three experts in the field of innovation were used as the dependent variables throughout the subsequent analysis.

Independent Variables. The independent variables all reflected the observable characteristics of a study, whether involving problem definition, design, nature of evidence, analysis, or manner of presentation. In contrast to the global ratings, these characteristics were coded by raters trained in social science methodology in general, who were not necessarily experts in the field of innovation.

Previous studies have suggested that these kinds of ratings can be conducted in a reliable manner. First, the inter-rater reliability scores are high (e.g., Yin et al., 1976). Second, the items generally involve "...enumeration...or recording of data," and therefore do not call for the compilation of measures of inter-rater reliability (Tornatzky and Klein, 1982). Thus, the ratings of the independent variables in our study were conducted by members of the research team. After initial pre-tests for training purposes, each member scored a portion of the 53 studies; the only stipulation was that the team had no knowledge of the ratings on the dependent variables.

Table 8

DISTRIBUTION OF GLOBAL RATINGS

	Three Global Ratings		
Modal Rating	Contribution to Practice	Contribution to Theory	Contribution to Quality
5 (high)	-	-	7
4	10	5	9
3	19	10	12
2	23	18	23
1 (low)	1	20	2
Total Number of Studies	53	53	53

The initial results of these ratings may be reported in four categories. First, certain variables were consistently found to be present throughout the vast majority of the 53 studies. Thus, at least 44 out of 53 studies, or over 83 percent of the studies, had the characteristics listed in Table 9 (the number in parentheses indicates the number of studies with the characteristic). Because these characteristics were found in the overwhelming proportion of all our studies, they may be considered to be the prevalent characteristics of case studies.

Second, certain independent variables were consistently found to be absent throughout the vast majority of the studies. Thus, 9 or fewer of the 53 studies, or less than 17 percent, had the characteristics listed in Table 10 (again, the number in parentheses indicates the number of studies with the characteristic). Because these characteristics were absent from the overwhelming proportion of all our studies, they may be considered to be the rare characteristics of case studies.

A third group of independent variables was excluded from further investigation either because the required coding did not seem relevant to the 53 studies, or because the variables were considered conceptually redundant with some other variables. These variables are listed in Table 11 and were not the subject of any further analysis.

A fourth and final group of variables remained, which represented neither extreme prevalence or rarity, and which were considered suitable for further analysis. Because this fourth and final group was still a large number of variables, the analytic inquiry in relation to the dependent variables was limited to this fourth group. In addition, certain low-frequency but related variables were analytically aggregated, to highlight seven important methodological themes. These clusters are listed in Table 12.

Thus, the analysis reported in the next section is limited to this fourth pool of variables--the rationale being that such characteristics were likely to be more mutable in the future than either the highly prevalent or highly rare characteristics. In other words, findings regarding this fourth group would focus on case study characteristics that could be influenced in future studies, and if such variables were found

Table 9

PREVALENT CHARACTERISTICS OF CASE STUDIES*

Problem Definition

Citations of previous research are made in introduction. (43)

Design

Scope of inquiry defined by time boundaries. (43)
Scope of inquiry defined by spatial boundaries. (47)

Nature of Evidence

Author assisted in data collection for study. (45)
Operational definitions used for nature of innovation. (47)
Operational definitions used for key aspects of the implementation process. (44)

Analysis and Interpretation

Study gives narrative description of the characteristics of the innovation. (52)
Study gives narrative description of the implementation process. (49)
Study gives narrative description of the innovation's outcomes. (46)
Study draws conclusions about the innovation/implementation process. (50)
Study makes recommendations for policy action. (50)

Manner of Presentation

Report uses footnotes. (48)
Report uses tables or other data displays. (45)

*Numbers in parentheses refer to number of studies having the characteristic (maximum = 53).

Table 10

RARE CHARACTERISTICS OF CASE STUDIES*

Problem Definition

Study appears to be an exploratory study. (5)

Design

Study mentions limitations regarding internal validity. (10)
Study identifies specific threats to validity. (4)
Specific steps are taken to offset threats to validity. (3)

Nature of Evidence

Author participated in events of study. (9)
Study mentions biases or predispositions held by author. (5)
Steps are taken to reduce the effects of these biases. (2)
Study mentions methodological training to perform the tasks in the study. (7)
Study discusses possible shortcomings of sources. (9)
Steps are taken to overcome possible shortcomings. (5)
Study mentions use of formalized, intermediate records (e.g., field notes, logs, observational tabulations). (9)
Reactivity problems mentioned. (2)
Inconsistency of data across cases or subunits noted. (11)
Unavailability of respondents or records noted. (5)
Study mentions modifications made in instruments, during course of work. (3)

Analysis and Interpretation

Study draws conclusions about the organization(s), if any. (7)

Manner of Presentation

Report contains 0-4 references. (5)
Report contains 5-9 references. (6)

*Numbers in parentheses refer to number of studies having the characteristic (maximum = 53).

Table 11

VARIABLES EXCLUDED FROM FURTHER INVESTIGATION
DUE TO IRRELEVANCE OR REDUNDANCY

Problem Definition

The making of causal inferences seems relevant to the study.

Design

Scope of inquiry focuses on organizational units of analysis.
Design compares contrasting cases.
Design compares same case, but contrasting time periods.
Design makes no comparisons, but is based on replication among cases.
Design makes comparisons at subunit level.

Nature of Evidence

Study mentions concern over quality of data sources.

Analysis and Interpretation

None.

Manner of Presentation

None.

Table 12

AGGREGATED VARIABLES

Problem Definition

None.

Design

Variable #1: Study uses operational procedures for case or respondent selection. Includes:

Study uses operational procedure for selecting some cases and ignoring others.
Study uses operational procedure for selecting some respondents and ignoring others

Variable #2: Study consists of multiple-case design. Includes:

Study consists of single case with no subunits.
Study consists of single case, but with subunits.
Study consists of multiple cases, with no subunits.
Study consists of multiple cases, with subunits.
The total number of cases in the study is [ ].

Nature of Evidence

Variable #3: Study uses multiple sources of evidence. Includes:

Evidence based on elite interviews.
Evidence based on large-scale interviews.
Evidence based on primary documents or records.
Evidence based on secondary documents.
Evidence based on direct observations or participation.

Variable #4: Study identifies sources of evidence. Includes:

Study identifies specific files or records searched.
Study lists data tapes or sources.
Study gives circumstances for observational data.

Table 12, page 2

Variable #5: Study indicates concern over quality of data. Includes:

Study discusses validity or reliability of data.
Tests made for validity or reliability of data.
Procedure used for developing convergence.
Difficulties noted in dealing with qualitative data.

Variable #6: Study uses formal data collection techniques. Includes:

Study mentions use of formal respondent questionnaire.
Study mentions use of formal researcher's protocol.
Study mentions use of formal protocol for using documents.

Analysis and Interpretation

None.

Manner of Presentation

Variable #7: Study contains copies of instruments used. Includes:

Report provides copy of questionnaires used.
Report provides copy of researcher's protocol used.
Report provides sample of field notes, logs, or other intermediate records kept by investigators.
Report contains copy of any rating instruments used.

to be related to higher contributions to theory or practice, or to a higher overall rating of quality, methodological improvements in future case studies could result.

NOTES TO SECTION III

[1]With the exception of any form of citizen participation, which was excluded from study.

[2]The emphasis on final publication, rather than on preliminary presentation, was a major reason for excluding many of the case studies analyzed in an earlier study by Yin et al., 1977, which included draft reports disseminated by independent research firms as well as academic departments. This criterion should also be contrasted with that of Tornatzky and Klein (1982), who included unpublished theses and dissertations. This latter study also focused on a much older literature and drew mainly from the bibliographies of four books on innovation published in the early 1970s.

IV. Correlates of Highly-Rated Case Studies

This section identifies the case study characteristics that were significantly correlated with the three global ratings of contributions to PRACTICE, contributions to THEORY, and overall QUALITY. The candidate characteristics, as described in Section III, were those that had been neither highly prevalent nor rare among the cases, but that had varied in their presence or absence among the collection of case studies.

The correlation between these characteristics and the three global ratings, each serving as a separate dependent variable, was examined through the use of contingency tables, although a complementary approach using logit models (e.g., Bishop, Fienberg, and Holland, 1975; and Goodman, 1978) was also attempted. Wherever a statistically significant relationship was found, the characteristic became regarded as a "first-line" correlate of highly-rated studies. Interactive analysis was then conducted to identify some of the colinearities among these "first-line" correlates.

The analysis also included another step that was unanticipated at the outset of the investigation. This step revealed a second set of correlations, in which a second set of independent variables was found to be correlated with the first-line correlates, but not with the global ratings directly. Following further interactive analysis, these "second-line" correlates became the basis for suggesting a possible two-stage, causal process in producing highly-rated case studies.

First-Line Correlates

Direct Effects. Figures 2, 3, and 4 summarize the first-line correlates of each of the three dependent variables (PRACTICE, THEORY, and QUALITY), in which relationships were found to be significant at the $p<.05$ level or higher. (The X^2 values and their tests for significance, for all three sets of correlations, are found in Appendix F.)

Each figure reflects the basic case study framework, which divided the observable characteristics of a study into five categories--problem

Figure 2

CORRELATES OF HIGH RATING FOR PRACTICE

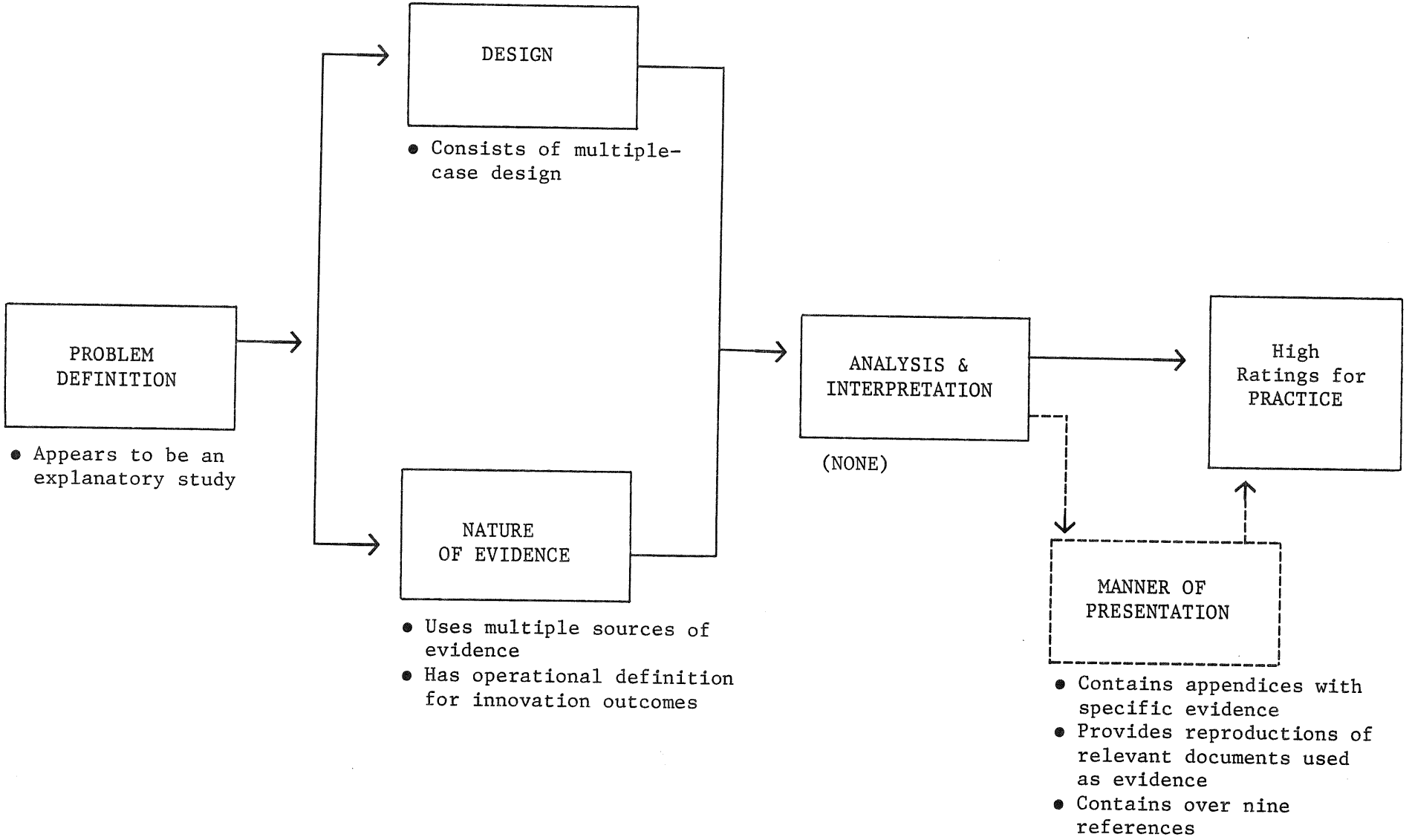


Figure 3

CORRELATES OF HIGH RATING FOR THEORY

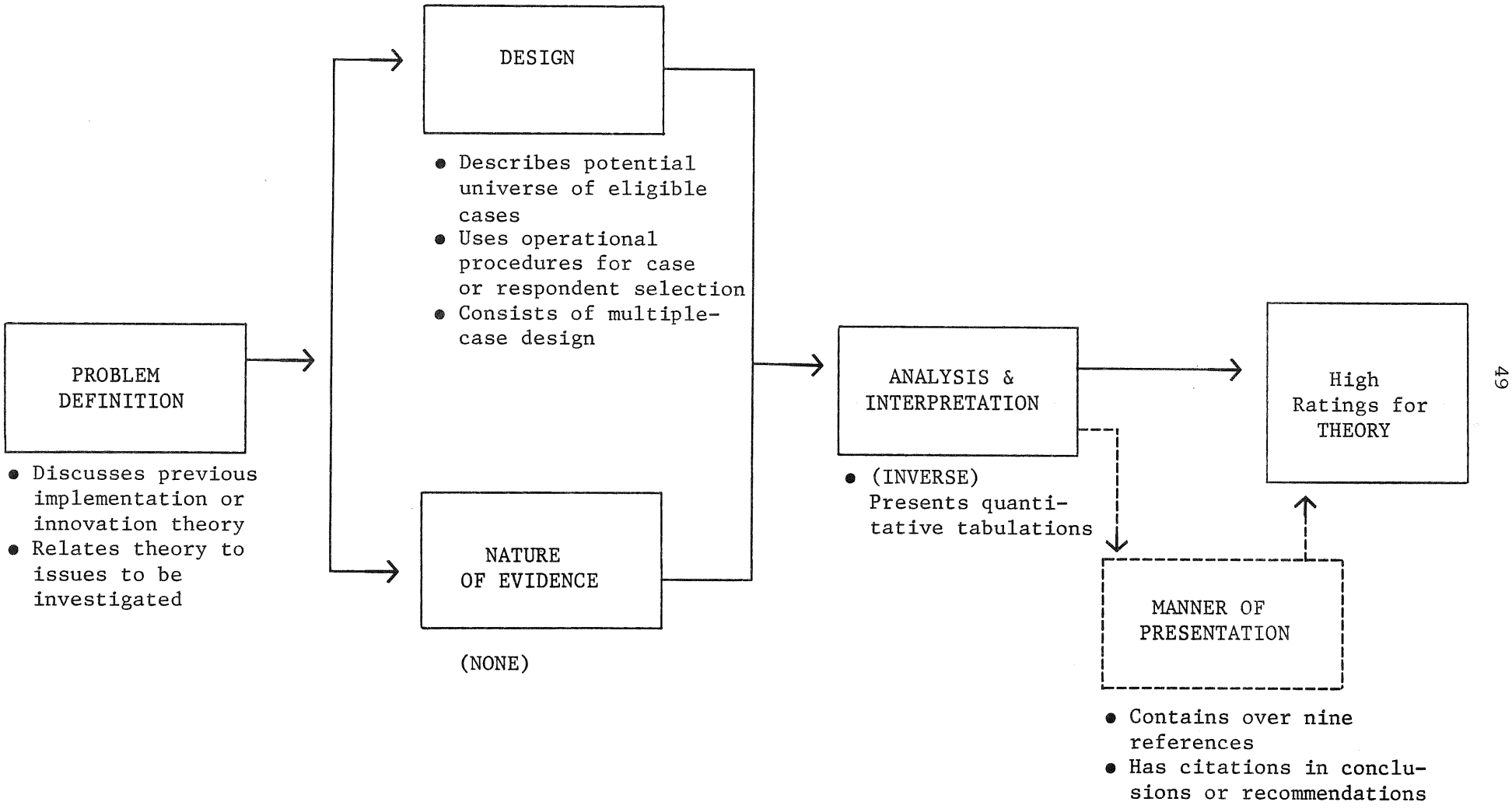
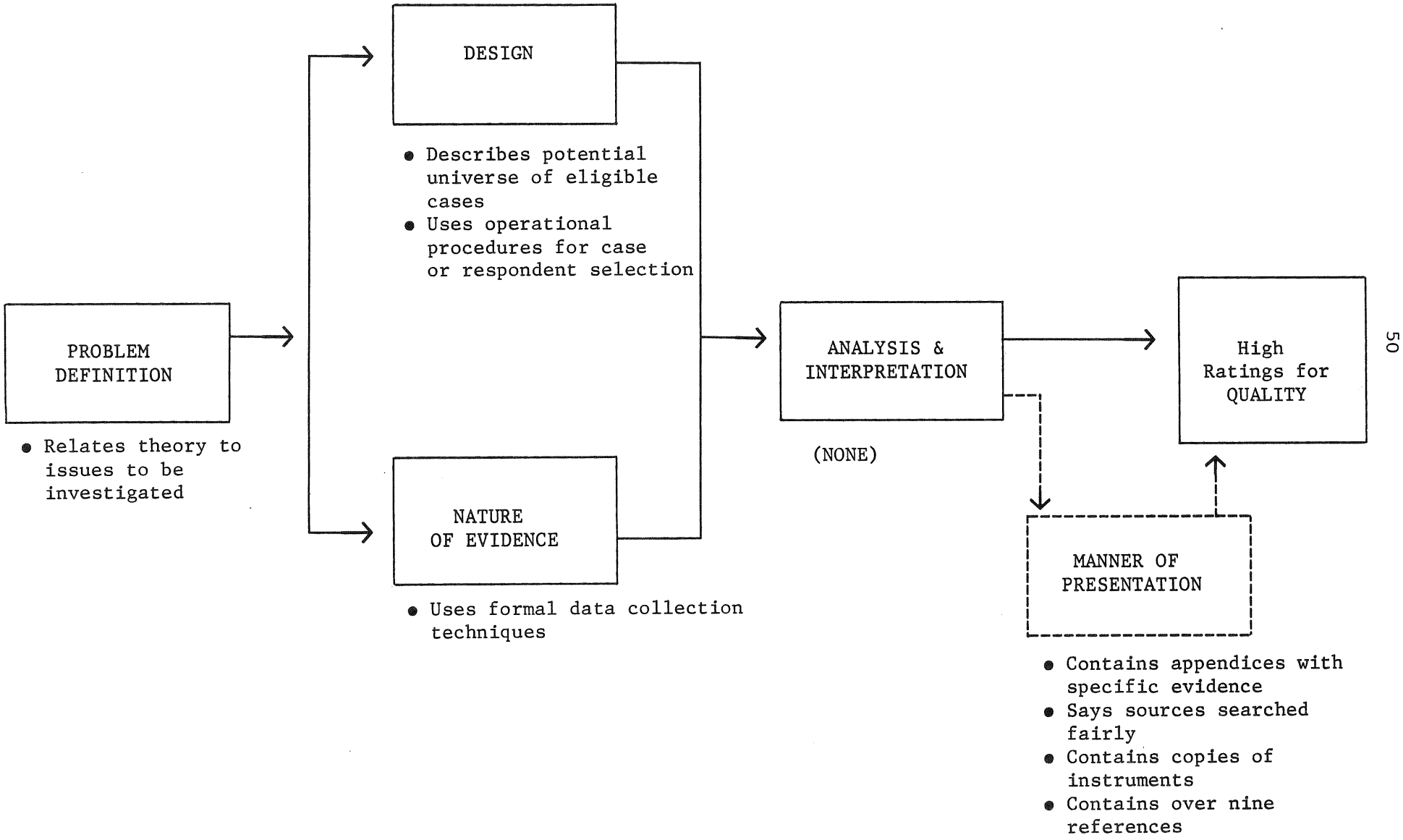


Figure 4

CORRELATES OF HIGH RATING FOR QUALITY



definition, design, nature of evidence, analysis, and manner of presentation. Thus, Figure 2 shows that seven characteristics were significantly related to a high rating on contribution to PRACTICE. Of these seven, three were characteristics previously defined as reflecting the manner of presentation of a study, two were part of the nature of the evidence, one was a design characteristic, one was a problem definition characteristic, and none were analysis characteristics. The other two figures can be interpreted in a similar manner.

Of these five categories, our framework had stipulated that the characteristics reflecting the manner of presentation could not be considered causally related to global ratings, although they could be identified as correlates. This was because of the logical observation that manipulations of presentation styles alone do not change the actual nature of a study (though they can clearly be correlated with the perceived nature of the study, as our results attest). Thus, only a cynical interpretation of this first set of findings would make the causal inference--i.e., that case study reports having: a) over nine references, b) one or more appendices, c) copies of instruments or documentation, d) citations in the concluding or recommending sections, and e) a description that evidentiary sources were searched fairly are likely to lead, in different combinations, to higher ratings on PRACTICE, THEORY, or QUALITY (refer to Figures 2, 3, and 4 for the specific combinations). The more reasonable interpretation would be that these characteristics were merely correlated with the more highly-rated case studies, in a descriptive but not causal sense. Because we favor this latter interpretation, these characteristics received no further analytic attention, and the subsections below deal only with the four other categories of independent variables.

Among the four other categories of problem definition, design, nature of evidence, and analysis, this first set of results showed that no single characteristic of case studies was a first-line correlate of all three global ratings, although several characteristics were related to two of the three ratings. In particular, case studies that: a) related the relevant theory to the issues to be studied (a characteristic of

problem definition), and that b) defined the universe of cases, and c) described some case selection procedure (both characteristics of research design) were all rated higher on QUALITY and THEORY than those case studies without such characteristics. Similarly, case studies that used a multiple-case design (a design characteristic) were rated higher on THEORY and PRACTICE than those case studies without such a characteristic. No characteristics were shared between studies having high ratings on PRACTICE and QUALITY, reinforcing the earlier observation that these two sets of global ratings are not colinear. Overall, there was considerable overlap among the correlates of the three global ratings, although no single characteristic was related to all three.

In addition to observations about overlapping correlates, the findings also had some distinct, individual features. Most prominent of these was the inverse correlation between the presence of quantitative tabulations (defined here to be a characteristic of analysis) and high ratings on THEORY.

A re-examination of the case studies in relation to this characteristic showed that cases that tended to rely on numerical evidence or analysis appeared to be more frequently pursuing policy questions, and not necessarily theoretical ones (e.g., the implementation of a new transit system, the assessment of performance contracting in schools, or the evaluation of career-based education programs). Conversely, case studies that did not have such evidence or analysis may have had to rely more heavily on the development of theoretical insights. Thus, the inverse relationship is not necessarily to be interpreted as suggesting the lowered desirability of quantitative tabulations in the future, but only that the specific purposes of such tabulations may be different from those of theory-building. This equivocal interpretation was reinforced by the observation that the presence of quantitative tabulations was not inversely related, to any degree of significance, with the other correlates of high ratings.

A second prominent feature was the general absence of any correlates (except for the quantitative tabulations) between analysis characteristics and global ratings. This may reflect a genuine gap in the

conduct of case studies, in which the development of any common analytic techniques is still in its infancy. Variations in what is called "analysis" abound, and this could account for the absence of any consistent relationship between such approaches and the global ratings.

In summary, the analysis of direct effects showed that several characteristics of case studies were correlated with high ratings. Given the causal nature of our original framework, the characteristics falling within the four solid boxes in Figures 2, 3, and 4 are those that would improve case studies in the future, with regard to ratings of PRACTICE, THEORY, and QUALITY. Note that all of these characteristics are controllable from either of two vantage points--direct actions taken by a principal investigator (or a research team), or actions taken by a research-funding agency in recommending that investigators in turn take such actions.

Colinearities. These direct effects were then examined for their colinearities, to determine whether the entire pattern of results could be accounted for by a subset (or a few) of the original first-line variables. (As indicated above, the analysis only dealt with the four categories of causally-related characteristics, and not with the fifth category, "Manner of Presentation.")

The analysis was conducted by examining a series of three-way contingency tables, in which each first-line variable was correlated with the appropriate global rating, after one of the other first-line variables was held constant.[1] (The results are enumerated in Appendix G, for which a significant result would occur if the sum of the two chi-squares--all key variables had been converted to bivariate conditions--reached a significant level, given two degrees of freedom.) For contribution to PRACTICE, only minor colinearities were found. Thus, the use of a "multiple-case design" was still significant when one other first-line variable was controlled, and the use of "measures of the innovation's outcomes" was significant when one other first-line variable was controlled. However, we did not interpret this result as suggesting that any of the four correlates of PRACTICE could actually account adequately for the relationships of the other three.

For contribution to THEORY, the pattern of colinearity was different. In this case, three variables--the presence of "discussions of previous theory", the presence of "quantitative tabulations" (negative), and the use of a "definition of the universe of cases to be studied"--all tended to be significantly related to the global rating even after the other first-line variables had been controlled for. These results suggest a degree of colinearity among the original first-line variables, with greater importance given to these three variables than to the other three.

Finally, for QUALITY, there were again no outstanding colinearities, although the use of "formal data collection procedures" was correlated with high ratings even after two of the other first-line variables had been, singly, controlled for.

Overall, except for contributions to THEORY, the pattern of colinearities did not essentially alter the conclusions from the analysis of the direct effects. Basically, the first-line relationships may be summarized in the following manner:

Direct causal factors for high ratings on PRACTICE:

1. The study should aim to be an explanatory study.
2. The study should use a multiple-case design.
3. The study should use multiple evidentiary sources.
4. The study should define operational measures of the outcomes of the innovation.

Direct causal factors for high ratings on THEORY:

1. The study should contain a discussion of previous theory.
2. The study should not use quantitative tabulations.
3. The study should define a universe of cases to be studied.

Possibly less important due to colinearities:

4. The study should relate previous theories to the issues to be studied in the present investigation.
5. The study should have an operational procedure for selecting the cases or respondents to be studied.
6. The study should use a multiple-case design.

Direct causal factors for high ratings on QUALITY:

1. The study should relate previous theories to the issues to be studied in the present investigation.
2. The study should define a universe of cases to be studied.
3. The study should have an operational procedure for selecting the cases or respondents to be studied.
4. The study should use a formal data collection procedure.

Second-Line Correlates

Direct Effects. Casual observation of some of the contingency tables suggested a second set of relationships worthy of further examination. The observation was that, for many of the candidate independent variables, no direct relationship had been found with the global ratings, but a statistically significant relationship was now found with the first-line characteristics. (Appendix H contains the two-way contingency tables showing these relationships.)

Further examination of these relationships revealed a new analytic direction, which had been unanticipated. Essentially, the observation raised the possibility of a two-stage process in producing highly-rated case studies, with the first stage being reflected by the first-line correlates, but with a second and antecedent stage being reflected by these "second-line" correlates. To determine the validity of such an interpretation of the data, several additional procedures were now pursued.

Interactive Effects. First, the lack of any statistically significant relationship between these second-line correlates and the three global ratings was confirmed. (Again, as throughout the analysis, each global rating, along with its correlates, was examined separately; for instance, no attempt was made to look at the second-line correlates of PRACTICE with the first-line correlates of THEORY.) The low levels of significance--all failed to achieve the $p<.05$ level--are reflected in the two-way contingency tables in Appendix I.

Second, a new set of three-way contingency tables was produced. For each global rating, the relationship between the second-line corre-

lates and the global rating was tested once again, controlling for the effects of the relevant first-line correlate. For example, the use of "multiple sources of evidence" had been a first-line correlate of PRACTICE. A second-line correlate, "operational definition for the outcomes of the innovation process," had been found to be significantly related to this particular first-line correlate. The three-way contingency table then examined the relationship between "operational definition for the outcomes of the innovation process" and PRACTICE, holding "multiple sources of evidence" constant. The purpose of this procedure was to determine whether the second-line correlates in fact had any direct relationship with the global ratings, once the first-line effects had been controlled.[2]

These three-way contingency tables showed only one significant relationship. For all other second-line correlates, there was still no relationship with the pertinent global rating. (The results are summarized in Appendix J.)

A Two-Stage Causal Sequence. Our tentative interpretation is that these second-line correlates can therefore be considered the second stage of a two-stage process in producing highly-rated case studies. The subtle distinction between a two-stage sequence (which the results support) and an interactive, one-stage sequence (which the results do not support) is as follows.

With two stages, an investigator must try to incorporate the second-line correlate (e.g., "operational definition for outcomes of the innovation process") into his or her investigation as an antecedent condition. This will increase the likelihood that the first-line correlate (e.g., the use of "multiple sources of evidence") will be present. In turn, the presence of the first-line correlate provides the investigator with further choices that will increase the likelihood of a high global rating (e.g., "Practice"). In short, the investigator must be sequentially concerned with each stage. Such a depiction reinforces the more dynamic notion of the research design process--that the process occurs throughout the conduct of a study, and not merely at its outset.

With a single interactive stage, an investigator would simply be

told to attempt to incorporate both correlates, in combination, into the design of his or her case study. Sequencing would not be of any concern, and the overall interpretation would be one of research design as a static process--i.e., occurring once at the outset of a study and not changing thereafter.

Given this understanding of the two-stage interpretation, the specific second-line correlates and their potential importance can now be discussed. Figures 5, 6, and 7 summarize the results, superimposing the second-line correlates on the original Figures 2, 3, and 4. The major observation is that characteristics of the nature of evidence appear more frequently as second-line correlates and hence may be considered the most important antecedent conditions in producing high ratings. In particular, one characteristic--the use of an operational definition for the outcomes of the innovation process (as opposed to outcomes of the innovation itself)--stands out as an antecedent condition for all three global ratings. Recalling that no single characteristic had been a first-line correlate of all three global ratings, the emergence of this single second-line correlate appears to be quite significant.

This finding coincides with recent attention given to the general problem of defining the process being studied in innovation research. As an example, a recent review of 74 implementation studies showed that a large proportion had failed to explicate the implementation process in operational terms, and any conclusions about implementation outcomes were therefore difficult to interpret (see Scheirer and Rezmovic, 1982). This is both a methodological and conceptual shortcoming, and has analogs in other fields where a social or organizational process is the subject of attention (e.g., Yin, 1979). The precise definition of the process being studied, as well as the outcomes attributable to the process itself, therefore ought to be considered a major way of producing higher quality case studies.

From the viewpoint of other isolated correlates, a second observation may be made of Figures 5, 6, and 7. Two characteristics appear either as first- or second-line correlates in all three figures: 1) discussions that relate innovation or implementation theory to the

Figure 5

FIRST- AND SECOND-LINE CORRELATES FOR PRACTICE

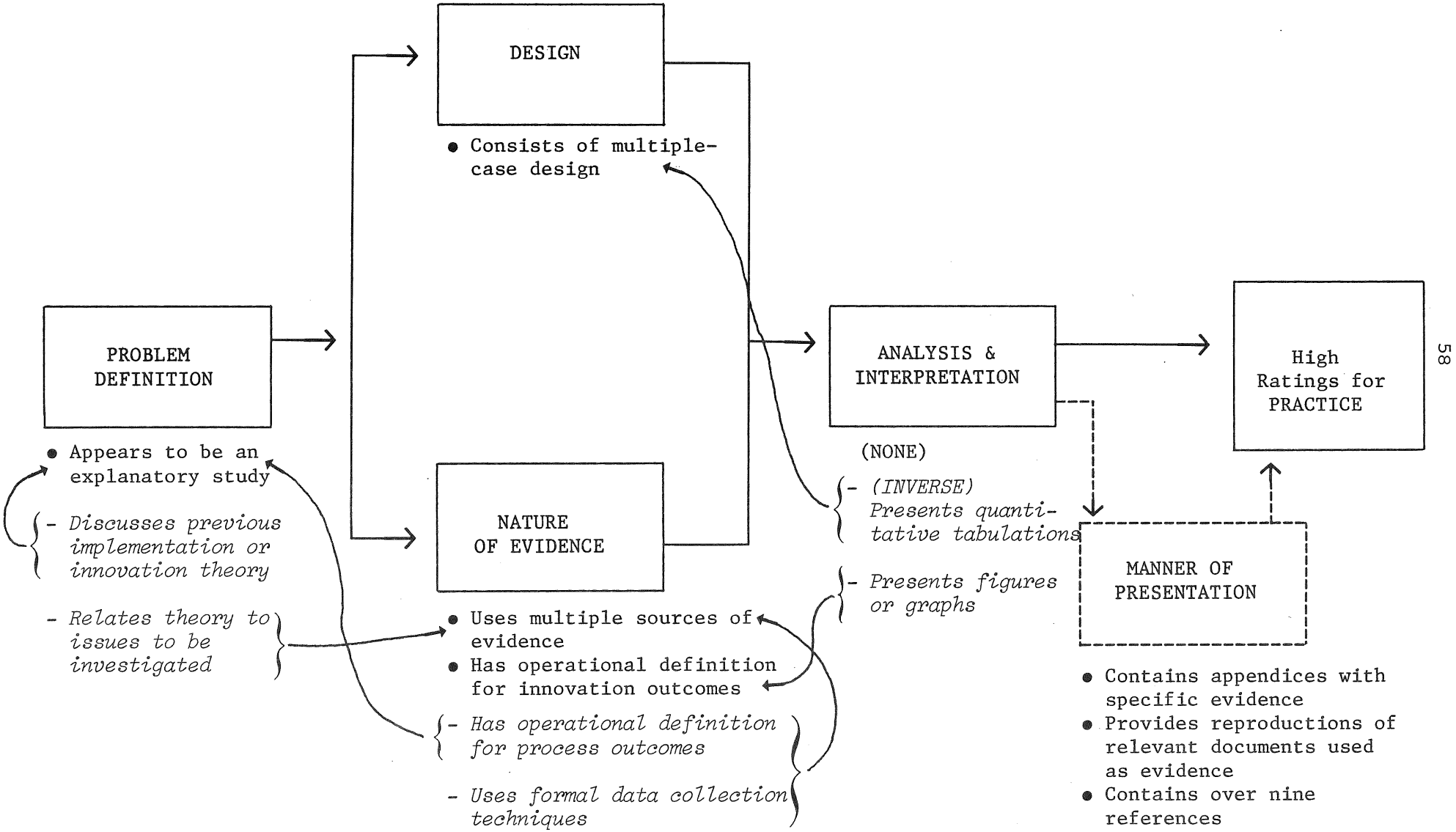


Figure 6

FIRST- AND SECOND-LINE CORRELATES FOR THEORY

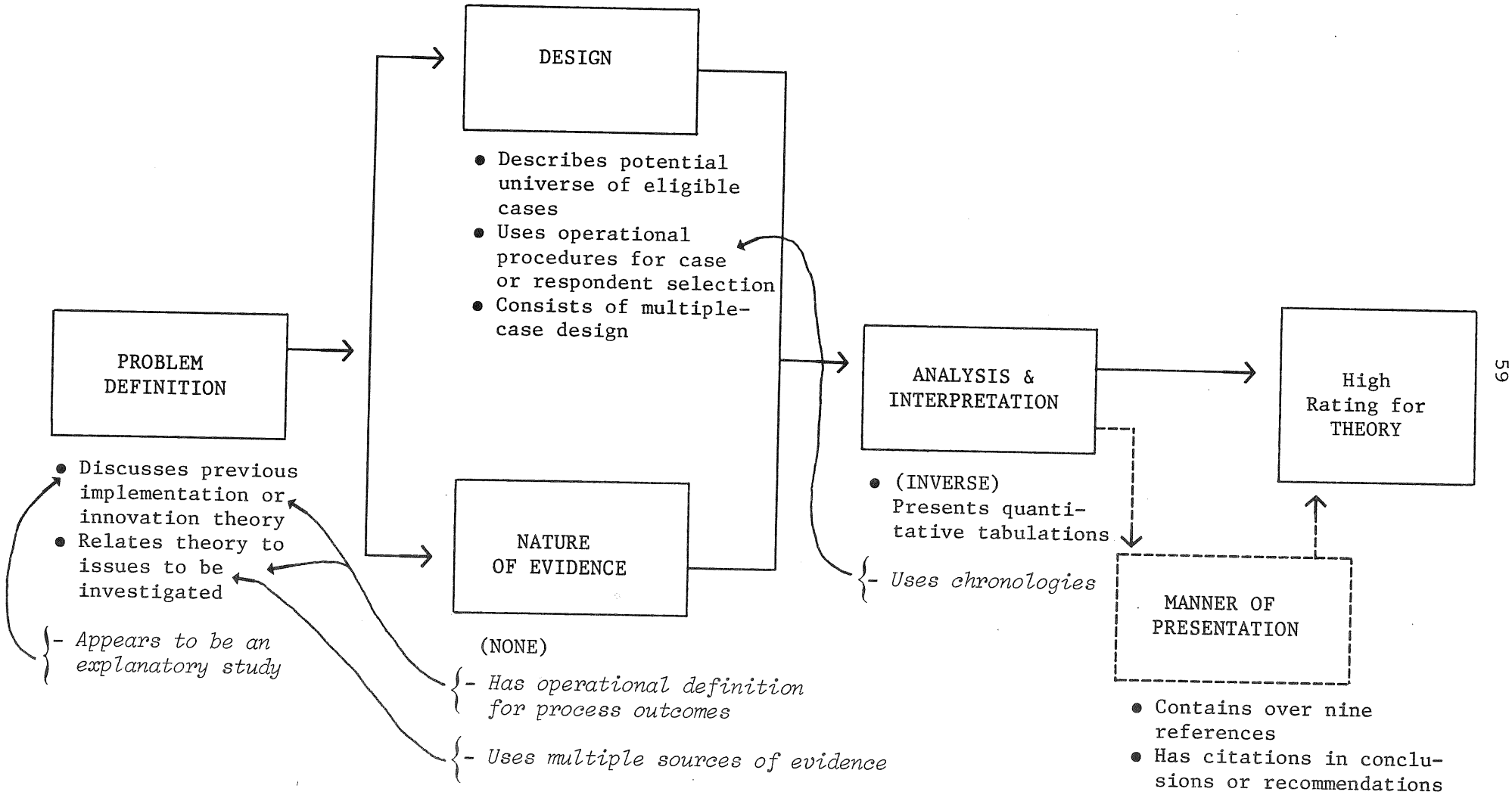
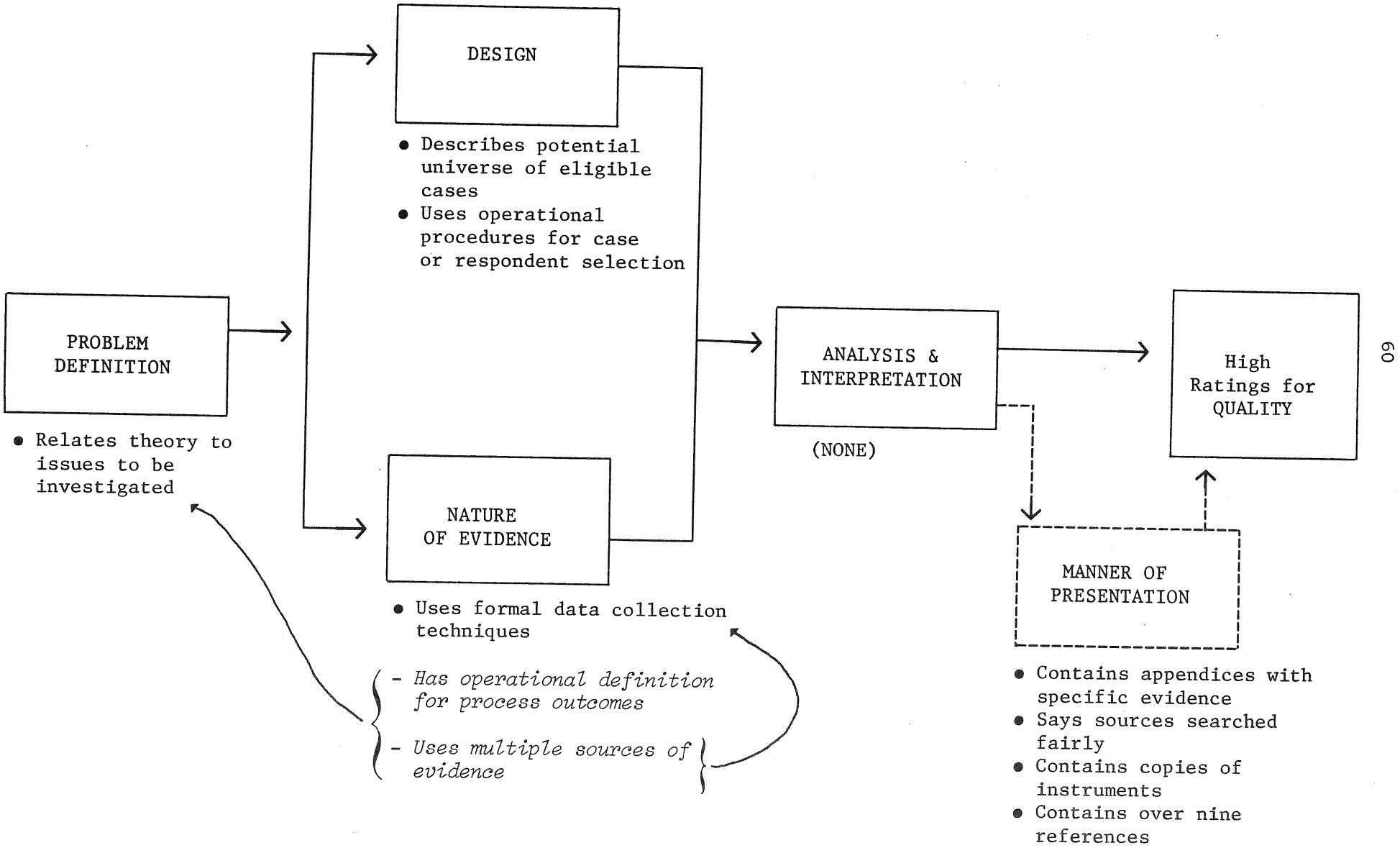


Figure 7

FIRST- AND SECOND-LINE CORRELATES FOR QUALITY



issues to be studied (as part of the problem definition process), and 2) the use of multiple sources of evidence. These characteristics appear to provide one response to a repeated theme in syntheses of innovation research--that too many variables are potentially relevant in studying innovation (for one of the most recent syntheses, see Tornatzky et al., 1982). To the extent that innovation is a complex social process, and to the extent that too many variables may initially be relevant, rigorous problem-definition in relation to theory provides a critical element for conducting a feasible study; and the need for multiple sources of evidence is a natural outgrowth of the diversity of variables that may be relevant, even after some selection and narrowing down has occurred.

In summary, the various characteristics depicted in Figures 5, 6, and 7 may be interpreted as the most likely ways of producing high ratings for PRACTICE, THEORY, and QUALITY, respectively. For each of these global ratings, the combination of characteristics is slightly different. For individual correlates, although a few appear in two of the three figures, only one characteristic--a second-line correlate and hence an antecedent condition--appears in all three. We interpret the entire combination of characteristics, as well as this singular antecedent condition, as a way of strengthening the use of case studies of organizational innovation in the future.

NOTES TO SECTION IV

[1] This approach was complemented by a second one--the construction of a series of log-linear equations, in which the discrete-variable equivalent of step-wise regressions was conducted for each global rating and its first-line correlates--i.e., three such equations were constructed. However, due to the small sample-size, the results from this second approach were only considered worth noting in footnotes.

In this particular case, the results did confirm the results of the three-way contingency tables. For example, for PRACTICE, the overall equation with the four first-line correlates had a value of $X^2 = 12.43$, df = 4, $p<.05$, and the first two significant correlates to fall out of the step-wise procedure were the use of multiple-case designs ($X^2 = 5.17$, df = 1, $p<.05$) and the use of measures for the innovation's outcomes ($X^2 = 11.65$, df = 2, $p<.005$). Neither of the other correlates was significant. For THEORY, the overall equation had a value of $X^2 = 19.70$, df = 6, $p<.005$, and three step-wise correlates were significant: the presence of discussions of previous theory ($X^2 = 8.69$; df = 1, $p<.005$); the use of quantitative tabulations ($X^2 = 13.87$, df = 2, $p<.001$); and the presence of a definition of the universe of cases to be studied ($X^2 = 17.73$, df = 3, $p<.0005$). Similar results were found for QUALITY.

A second logit procedure was also explored: the construction of the same three equations, but with the addition of pairwise interaction terms for each first-line variable. Such additions showed only an increase in the overall X^2 values for each equation (thus being generally consistent with the results from the other approaches), but such results are highly suspect due to the considerable increase in the number of variables in each equation--while still being limited to a sample size of N=53.

[2] Once again, a counterpart logit procedure was available, but could not be used due to the small sample-size. In this procedure, three equations could again have been constructed, with the independent variables consisting of the first-line correlates for a given global rating and the pairwise interactions between the first- and second-line correlates. The comparable prediction would have been that the addition of the pairwise interactions would not reduce the X^2 value significantly, in comparison to the X^2 value for the first-line correlates alone. In a sense, the equations would have been analogous to analysis of variance procedures. However, such equations had far too many variables, given the small sample-size.

V. Conclusions and Recommendations

Our investigation examined the methodological characteristics of 53 case studies in the field of organizational innovation. About two-thirds of these studies were themselves only single case studies, whereas the other one-third consisted of multiple-cases. By design, all of the studies focused on some aspect of innovation in public organizations, excluding the federal government.

The findings indicated that several methodological characteristics could be related to three types of ratings: contribution to knowledge about innovation PRACTICE, contribution to innovation THEORY, and degree of overall QUALITY. Of four categories of characteristics that were initially considered in our theoretical framework, the results showed that three--issues of problem definition, of case study design, and of case study evidence--appeared causally related to high ratings. The fourth category--techniques of analysis and interpretation--was not prominent.

Before drawing specific conclusions and recommendations from these findings, we must ask whether such findings are themselves worthy of generalization and further consideration. Some observers would point to the fact, for instance, that the case studies were not a random or representative sample of all case studies, and that our findings therefore cannot be generalized to a larger population. The response to this observation is that our study was designed from the standpoint of a case study or an experiment (but not a survey)--and that the true test of the study results is not their generalization to a larger population, but whether the results can be replicated by others. Thus, the results stand in a manner analogous to the reporting of results from an experiment: the next step requires similarly designed studies, to replicate or challenge the methodological findings of this initial study.

What the Experts Say: A Revisit

A second test of the results is to compare them to the responses of the 22 research investigators who were interviewed in an open-ended

manner (see Section I for a description of this data collection effort). The investigators were not aware of the results from our study (such results had not been analyzed at the time of the interviews), but all had been asked to respond to the general question of what they would recommend to overcome the problems of doing case studies.

Among the responses, indicated in Table 13, no dominant themes emerged. However, the responses that were made were entirely consistent, if not duplicative, of our findings. The most frequent single theme to emerge was that investigators should use multiple-case designs, reflected by such comments as:

> "There is some virtue in 'piling up' cases; you begin to believe through repetition...;"
>
> "...seven or eight cases that fit the hypothesis would strengthen confidence in it;"
>
> "Do more multiple cases--I like having three;" and
>
> "Do more cases..."

A second theme that was reflected in these responses was that investigators had to place more emphasis on defining the appropriate theoretical and analytic objectives of their inquiry, with such comments as:

> "...need to develop a careful frame of reference for the case...then it is easier to organize the data and 'sift' for meaning;"
>
> "Answer the question: What work are you trying to do? What is the objective of your inquiry? Distinguish between research and teaching cases...;"
>
> "...think through the implications for refining existing theory or developing new theory--this would avoid the tendency to generalize to a population;" and
>
> "...spend time trying to identify underlying variables and theory of what you're studying..."

A third theme was that investigators had to be more careful about how

Table 13

THEMES EXTRACTED ABOUT
WAYS OF IMPROVING CASE STUDIES

Q. What can be done to overcome the problems of doing case studies?

Theme	Responses
- Use multiple-case studies.	5
- Define appropriate theoretical and analytic techniques.	4
- Be more careful about case selection procedures.	4
- Document the methodology and evidence better.	3
- Standardize the method.	3
- Use multiple sources of evidence.	1
- No codable response.	2
Total	22

and why specific cases are selected (although this did not necessarily mean that a sample design had to be used). The comments included the following:

> "...people should be able to argue why or why not a case is representative. Also, they should be able to say when a case is not a case...;"
>
> "...make sure the case or cases are part of some kind of sample...;"
>
> "...increase the credibility of the case by demonstrating that it is unique...then the representativeness is not a question;" and
>
> "...avoid generalizing inappropriately..."

Among the remaining comments, there were a variety of themes, and one had to do with the nature of case study evidence and its presentation. One person, for example, suggested that a characteristic of a good case was that it should be "overdocumented and underconcluded." A more mechanical recommendation along the same lines was that case studies should add a technical or methodological appendix, "...to describe how the case was done, what path the investigator took, etc."

In general, although the experts' responses were not as extensive or detailed as our findings, the responses were consistent with the findings. Of the three most common themes, the two themes regarding the use of multiple-case designs and the care in selecting the specific cases to be studied directly coincided with two of the three design characteristics identified in our findings as first-line correlates (see Figures 2, 3, and 4). In addition, the theme regarding the identification of appropriate theoretical and analytic objectives was similar to another first-line characteristic that had appeared in our findings--the need to relate previous theories to the issues to be investigated. Thus, the most frequent comments were consistent with our findings and provide a basis for believing that they are likely to be replicated in the future.

Improving Case Studies

The findings have the following summary implications for improving case studies. First, different characteristics are likely to lead to different improvements, depending upon whether the goal is to contribute to PRACTICE, to THEORY, or to overall QUALITY. Second, investigators concerned with making such improvements may have to attend to a two-stage sequence of methodological steps. Third, of the four categories of methodological characteristics, one--analysis--is presently less important than the other three--problem definition, design, and nature of evidence.

For improving contributions to PRACTICE, investigators should:

1) pursue explanatory studies, with
2) multiple-case designs,
3) multiple sources of evidence, and
4) operational definitions of innovation outcomes.

For improving contributions to THEORY, investigators should:

1) discuss previous theory, and
2) relate it to the issues to be investigated, using
3) multiple-case designs, defining
4) the potentially relevant cases, and using
5) an operational procedure for selecting the cases or respondents to be studied, but
6) not relying on quantitative tabulations alone for analysis.

Finally, for improving the overall QUALITY of a case study, investigators should:

1) relate previous theories to the issues to be investigated, defining
2) the potentially relevant cases, and using
3) an operational procedure for selecting the cases or respondents to be studied, and using
4) a formal data collection procedure.

The most important antecedent step, reflecting a two-stage sequence

in all three situations, is to establish an operational definition of the outcomes of the innovation process (as opposed the outcomes of the innovation). In addition, other antecedent steps, where not already incorporated as primary tasks, are to relate theory to the issues to be studied and to use multiple sources of evidence.

All of these features, combining the characteristics related to PRACTICE, THEORY, and QUALITY, are schematized in Figure 8. This figure thus summarizes the entire array of concerns in designing future case studies for studying organizational innovation.

These findings offer specific, operational ways that go beyond the general dictum of "doing good science," as it can be seen that several of the recommended ways are unique to the case study strategy (e.g., using multiple sources of evidence), and may also be unique to the topic of organizational innovation. For instance, single case studies may be justifiable if a phenomenon is rare or difficult to study, but this is no longer true of organizational innovations--hence the importance of multiple case studies. Another issue specific to the topic is more subtle and deserves further elaboration: the use of operational definitions for 1) the outcomes of the innovation and for 2) the outcomes of the innovation process. The distinction between these two characteristics is illustrated in Table 14.

The more readily understood are the outcomes of the innovation. These deal with the organizational gains or improvements that were a major purpose of the innovation in the first place, and Table 14 illustrates how such gains might be depicted, in terms of jobs, materials, or available services. The less easily understood are the outcomes of the innovation process. These are more likely to take the form of intermediary steps--e.g. awareness new policies, or communication style. Yet, this latter group illustrates the second-line correlate related to all three high ratings. One guess is that case studies that are able to identify this level of operational detail are also likely to have other informative insights, and thereby contribute to PRACTICE, THEORY, and QUALITY simultaneously (albeit indirectly).

At the same time, none of the findings from the present investiga-

Figure 8

CASE STUDY METHOD

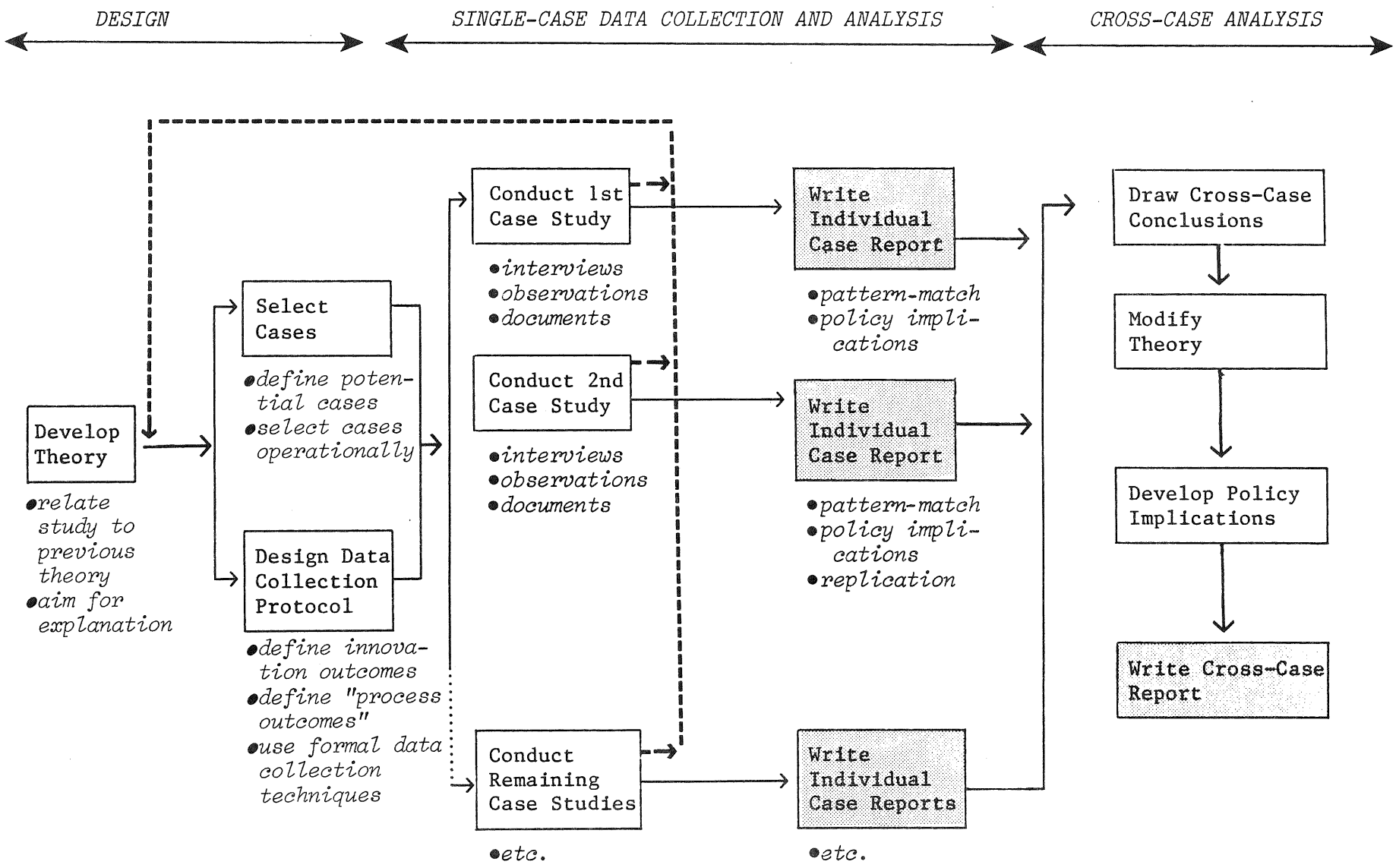


Table 14

TWO TYPES OF OPERATIONAL DEFINITIONS

Specific Outcomes of the Innovation

-"EDA officials estimated that the following number of jobs were created for minorities: 350 at the marine terminal and 150 at the West Oakland Health Center, for a total of 500" (36)*

-"What remains? Not much. Some library books and materials get used sporadically in the elementary school. The collection assembled for the secondary school is almost never touched" (6)

-"Programs of cultural education continued in 1974-75 much as they had begun earlier, with fine arts performances within the district, and some student travel to cultural events outside the district" (21)

Specific Outcomes of the Innovation Process

-The chief effect of these training events was to increase the awareness of a number of personnel of the meaning and precedures of OD" (40)

-"Although a significant number of LEAs were convinced that they should provide employment for participants, sufficient slots were not obtained to place all the participants in schools" (1)

-"The mayor accepted the recommendation and directed that negotiations with the firefighters' union proceed with the objective of eliminating at least one company" (49)

-"Our role as change agent, first as an uninvited consultant, and later as a sustaining source of information and encouragement... eventually led to a more formalized and mature posture of consultation and reinforcement..."

*Numbers in parentheses refer to case study numbers (see Appendix D).

tion should be interpreted as a way of advocating the merits of case studies relative to other research strategies. Our only objective has been to identify the ways of improving the use of case studies, in those situations where such a strategy has already been deemed appropriate. Other strategies, including surveys and experiments, have their own role in the study of innovation, and should be used where appropriate. Whether these other strategies also need to be improved is a matter for others to investigate.

Policy Actions

Research investigators are clearly in a position to cope directly with the above findings. However, research-funding agencies may need to be concerned with actions as well. Such agencies, like the National Science Foundation, the National Institute of Education, or the National Institute of Justice, already make implicit requirements of case study investigators when specifying proposal characteristics or when instructing proposal reviewers. In these circumstances, the findings therefore have the following basic implications.

First, a funding agency should establish clearly whether it aims to support research for purposes of contributing to knowledge about practice or to theory (or to both). Depending upon such a choice, the preferred project characteristics and review criteria ought to be different, reflecting the different correlates among our findings.

Second, the project characteristics, possibly as reflected in proposal formats, should be organized according to at least four sections--problem definition, research design, nature of the evidence, and analysis and interpretation. For each section, depending upon the proposed research objectives, different characteristics should be considered relevant, and these should be suggested by the funding agency as items to be considered by the investigator. The relevant characteristics should reflect the findings just stated, and for each one--e.g., the use of a multiple-case design--the investigators should indicate how the project will be carried out or why the characteristic is to be ignored in a particular instance.

Third, the funding agencies should alert investigators to the sequential if not staged process whereby a study's methodology unfolds. Thus, the funding agency should suggest that attention to the appropriate characteristics must be given throughout the early design and conduct of a study, and not merely at its outset. Of course, if a funding agency also chooses to take a proactive monitoring role throughout the conduct of a study, these later adaptations--again following the findings stated here--can be reviewed as benchmarks of progress.

In summary, our findings suggest at least three types of policy actions that can improve case studies in the future, thereby strengthening their contribution to our knowledge of organizational innovation.

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Appendix A

RESEARCH INVESTIGATORS CONTACTED AS PART OF THE PRESENT STUDY

Appendix A

RESEARCH INVESTIGATORS CONTACTED AS PART OF PRESENT STUDY

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
Alan Altschuler Dept. of Political Science Massachusetts Institute of Technology Cambridge, Mass.			X
Walter Baer Director of Technology Times-Mirror Corporation Times-Mirror Square Los Angeles, Calif.		X	
Roy Bahl Maxwell School of Citizenship and Public Affairs Syracuse University Syracuse, New York		X	
Dr. Paul Berman Berman, Weiler Associates Berkeley, Calif.			X
Richard Bingham Dept. of Political Science University of Wisconsin-Milwaukee Milwaukee, Wisc.			X
Richard Braid Dept. of Urban Planning Rutgers University New Brunswick, N.J.			X
Leonard Buckle Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.			X

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
Marvin Burt The Urban Institute Washington, D.C.			X
Manuel Carballo Kennedy School of Government Harvard University Cambridge, Mass.		X	
Polly Carpenter-Huffman The Rand Corporation Santa Monica, Calif.			X
David Cohen The Huron Institute Cambridge, Mass.			X
Karen Cohen Division for Study and Research in Education Massachusetts Institute of Technology Cambridge, Mass.			X
Stuart Cook Dept. of Psychology University of Colorado Boulder, Colo.	X		
Ronald Corwin Dept. of Sociology Ohio State University Columbus, Ohio	X		
David P. Crandall The NETWORK, Inc. Andover, Mass.	X		
Terrence Deal Graduate School of Education Harvard University Cambridge, Mass.			X
John DeSanctis The Huron Institute Cambridge, Mass.			X

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
Jules Duga Battelle Memorial Institute Columbus Laboratories Columbus, Ohio			X
Eleanor Farrar The Huron Institute Cambridge, Mass.			X
Irwin Feller Pennsylvania State University University Park, Pa.		X**	
Joe Ferreira Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.			X
Ralph Gakenheimer Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.			X
Benjamin Gordon Battelle Memorial Institute Columbus Laboratories Columbus, Ohio			X
Sigurd Grava Graduate School of Architecture and Planning Columbia University New York, New York		X	
Gary Hack Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.		X	

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
John Hansen Center for Policy Alternatives Massachusetts Institute of Technology Cambridge, Mass.	X		
Ronald G. Havelock 1308 4th Street, S.W. Washington, D.C.	X		X
Robert Herriot 85 Jennie Dugan Road Concord, Mass.		X	
Christopher T. Hill Center for Policy Alternatives Massachusetts Institute of Technology Cambridge, Mass.	X		
Ernest House Graduate School of Education Harvard University Cambridge, Mass.			X
Michael Huberman University of Geneva Geneva, Switzerland		X	
Herbert Kaufman The Brookings Institution Washington, D.C.	X		
Fred Knight International City Management Association 1140 Connecticut Ave., N.W. Washington, D.C.		X	
Martin Krieger Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.			X

	Personal Interview	Asked to Rate Case Studies: Responded*	Asked to Rate Case Studies: Did Not Respond
Henry Lambright Syracuse University Research Corporation University Heights Syracuse, New York			X
Richard Larson Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.			X
Karen Seashore Louis Center for Survey Research University of Massachusetts Boston, Mass.	X		
Jerome Lubin School of Architecture and Planning Princeton University Princeton, N.J.		X	
Laurence E. Lynn, Jr. School of Business (visiting) Stanford University Stanford, Calif.	X		
Edwin Mansfield Dept. of Economics University of Pennsylvania Philadelphia, Pa.			X
Gary Marx Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.		X	
Milbrey McLaughlin The Rand Corporation Santa Monica, Calif.		X	
Michael Meyer Dept. of Civil Engineering Massachusetts Institute of Technology Cambridge, Mass.		X	

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
Mark Moore Kennedy School of Government Harvard University Cambridge, Mass.	X		X
Jerome T. Murphy Graduate School of Education Harvard University Cambridge, Mass.	X		X
Sumner Myers Institute for Public Administration Washington, D.C.	X		
Barbara Nelson Division for Study and Research in Education Massachusetts Institute of Technology Cambridge, Mass.			X
Richard Nelson Dept. of Economics Yale University New Haven, Conn.		X	
John Pincus The Rand Corporation Santa Monica, Calif.			X
John Pucher Dept. of Urban Planning Rutgers University New Brunswick, N.J.			X
Henry Raimondo Dept. of Economics Rutgers University New Brunswick, N.J.			X
Martin Rein Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.			X

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
Andrew Reschovsky Dept. of Economics Tufts University Medford, Mass.			X
J. David Roessner Georgia Institute of Technology Atlanta, Ga.		X**	
Everett M. Rogers Institute of Communications Stanford University Stanford, Calif.		X**	
Robert F. Rich School of Urban and Public Affairs Carnegie-Mellon University Pittsburgh, Pa.	X		X
Dennis Rondinelli Maxwell School of Citizenship and Public Affairs Syracuse University Syracuse, New York			X
Daniel Roos Center for Transportation Studies Massachusetts Institute of Technology Cambridge, Mass.		X	
Peter Rossi Social and Demographic Research Institute University of Massachusetts Amherst, Mass.	X		
Lloyd Rowe Indiana University Foundation Bloomington, Ind.		X	
Albert H. Rubenstein Northwestern University Evanston, Ill.	X		

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
Harvey Sapolsky Dept. of Political Science Massachusetts Institute of Technology Cambridge, Mass.			X
Frederick Scherer Swarthmore College Swarthmore, Pa.	X		
Theodore W. Schlie Office of Competitive Assessment Department of Commerce Washington, D.C.	X		
Donald Schon Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.		X	
Samuel Sieber Virgin Islands	X		
Alan Steiss Center for Urban and Regional Studies Virginia Polytechnic Institute Blacksburg, Va.		X	
George Sternlieb Center for Urban Policy Research Rutgers University New Brunswick, N.J.			X
Larry Susskind Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.		X	
Peter Szanton Hamilton, Rabinowitz & Szanton, Inc. Washington, D.C.	X		

	Personal Interview	Asked to Rate Case Studies	
		Responded*	Did Not Respond
Harvey Utech 3900 Watson Place, N.W. Washington, D.C.			X
James M. Utterback Center for Policy Alternatives Massachusetts Institute of Technology Cambridge, Mass.	X		
Eric von Hippel Sloan School of Management Massachusetts Institute of Technology Cambridge, Mass.	X		
Melvin Webber Dept. of City and Regional Planning University of California Berkeley, Calif.			X
William Wheaton Dept. of Urban Studies and Planning Massachusetts Institute of Technology Cambridge, Mass.			X
Douglas Yates Dept. of Political Science Yale University New Haven, Conn.		X	
Gerald Zaltman Graduate School of Business University of Pittsburgh Pittsburgh, Pa.	X		

* Two raters returned their rating sheets anonymously.

** These three individuals were the raters whose scores, upon review of the actual case studies, were used to compile the global ratings. See Section III in the text.

Appendix B

SOURCES SEARCHED FOR POSSIBLE STUDIES

Appendix B

SOURCES SEARCHED FOR POSSIBLE STUDIES

Electronic Bibliographies*

1. National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, Va. Contains 765,000 citations from 1964 to present.

The NTIS database consists of government-supported research, development, and engineering plus analyses prepared by federal agencies, their contractors or grantees. It is the means through which unclassified, publicly available, unlimited distribution reports are made available for sale from such agencies as NASA, DOC, DOE, HEW, HUD, DOT, and some 240 other units. State and local government agencies are now beginning to contribute their reports to the file. The NTIS database includes material from both the hard and soft sciences, including substantial material on technological applications, business procedures, and regulatory matters.

2. Management Contents, Management Contents, Inc., Skokie, Ill. Contains 63,000 citations from September 1974 to the present.

The Management Contents database provides current information on a variety of business and management topics to aid in decisionmaking and forecasting. Articles from approximately 200 U.S. and foreign journals, proceedings, and transactions are fully indexed and abstracted to provide up-to-date information in areas of accounting, decision sciences, finance, industrial relations, managerial economics, marketing, operations research, organization behavior, and public administration.

3. Public Affairs Information Service International (PAIS), PAIS, Inc., New York, New York. Contains 107,000 citations from 1976 to the present.

PAIS contains references to information in all fields of social science including political science, banking, public administration, international relations, economics, law, public policy, social welfare, sociology, education, and social anthropology. The PAIS database contains the records from the printed PAIS Bulletin and the PAIS Foreign Language Index. Over 800 English language journals and 6,000 non-serial publications are indexed each year in the Bulletin. PAIS provides comprehensive coverage on all issues of public policy regarding social, economic, and political problems including information on such areas as accounting; municipal, state, and federal administration; consumer attitudes; multinational corporations; and Congressional hearings. 25,000 citations taken from more than 1,200 journals and upwards of 8,000 books, pamphlets, government

publications, agency reports, and other documents, are added yearly.

4. Scisearch, Institute for Scientific Information (ISI), Philadelphia, Pa. Contains 2.9 million citations from January 1974 to present.

Scisearch is a multidisciplinary index to the literature of science and technology. It contains all the records published in Science Citation Index (SCI) and additional records from the Current Contents of publications that are not included in the printed version of SCI. The ISI staff indexes all significant items (articles, reports of meetings, letters, editorials, correction notices, etc.) from about 2,600 major scientific and technical journals. In addition, the Scisearch file for 1974-75 includes approximately 38,000 items from Current Contents-Clinical Practice. Beginning January 1, 1976, all items from Current Contents-Engineering, Technology, and Applied Science and Current Contents-Agriculture, Biology, and Environmental Sciences that are not presently covered in the printed SCI will be included each month.

5. Social Scisearch (SSCI), Institute for Scientific Information (ISI), Philadelphia, Pa. Contains 765,000 citations from 1972 to present.

SSCI is a multidisciplinary database indexing every significant item from the 1,000 most important social sciences journals throughout the world and social science articles selected from 2,200 additional journals in the natural, physical, and biomedical sciences. The SSCI includes many important monographs as well. The SSCI covers every area of the social and behavioral sciences.

6. Compendex, Engineering Index, Inc., New York, New York. Contains 817,000 citations from January 1970 to present.

The Compendex database is the machine-readable version of the Engineering Index, which provides the engineering and information communities with abstracted information from the world's significant engineering and technological literature. The database provides worldwide coverage of approximately 3,500 journals, publications of engineering societies and organizations, papers from the proceedings of conferences, and selected government reports and books.

7. Transportation Research Information Services (TRIS), U.S. Department of Transportation and the Transportation Research Board, Washington, D.C. Contains 145,000 records from 1968 to present.

TRIS provides transportation research information in air, highway, rail, and maritime transport, mass transit, and other transportation modes. Subjects included are regulations and legislation; energy, environmental,

and safety concerns; materials, design, construction, and maintenance technology; and operations, traffic control, and communications. The database records can be either abstracts of documents and data holdings or resumes of reserach projects. Among the transportation research information services contributing to TRIS are the Highway Research Information Service (HRIS), the Maritime Research Information Service (MRIS), the Railroad Information Service (RRIS), the Air Transportation Research Information Service (ATRIS), and the Urban Mass Transportation Research Information Service (UMTRIS).

8. Education Research Information Center (ERIC), National Institute of Education, Washington, D.C. Contains 360,000 citations from 1966 to present.

ERIC is the complete database on educational materials. It consists of two main files: Research in Education, which is concerned with identifying the most significant and timely education research reports and projects; and Current Index of Journals in Education, an index of more than 700 publications of interest to every segment of the educational profession.

Journals Reviewed

Administrative Science Quarterly
Education and Urban Society
Educational Evaluation and Policy Analysis
Harvard Education Review
Innovation
Journal of Policy Science
Policy Analysis
Policy Sciences
Policy Studies Journal
Public Administration Review
Public Interest
Public Policy
Publius
Urban Affairs Quarterly
Urban Education
Urban Studies

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*The descriptions of each file are taken from the Dialog Database Catalog.

Appendix C

ILLUSTRATIVE LIST OF INNOVATIONS

Appendix C

ILLUSTRATIVE LIST OF INNOVATIONS

Hardware/Physical Improvements

- Remote sensing information system for Michigan highways (41)*
- Installation of a coordinated information network in the New York State Department of Education (22)
- Cable television in Cincinnati (25)
- Installation of a metropolitan, computerized data system in San Diego (52)
- Dial-access instructional television in Evanston High School (12)
- Development of new, planned communities in six cities (11)

Management and Decision-Making

- Educational performance contracting in school districts (10)
- Community involvement in school administration and planning in New Jersey (47)
- Use of monetary incentives and work standards in five cities (16)
- Productivity programs for public services in New York (18)
- Managerial performance appraisal system in New York (2)
- Productivity improvement programs (PIP's) in eight cities (20)
- Creation of district managers for local/district services in New York (5)
- Use of student achievement information in school system management in Atlanta (50)

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* Case number, from Appendix D, is indicated in ( ).

Systems Analysis/Management

- o Community renewal simulation models in San Francisco (39)
- o Fire station location programs in five cities (49)
- o Computer simulation of alarm rates and manpower deployment in New York City Fire Department (15)
- o Application of systems analysis to urban problem solving in three cities (23)
- o Systems analysis, PPBS, and systems management in three jurisdictions (38)
- o Computerized geographic location codes for local data files (GBF/DIME) in seven regions (51)

Service Delivery

- o Neighborhood team policing in New York City (8)
- o Assignment of patrolmen to high-crime shifts in New York City (32)
- o Personal rapid transit system in Morganstown, Pa. (4)
- o Team policing in seven cities (42)
- o Innovative teacher-pupil relationships in public schools (43)
- o Vocational educational development programs (1)

Other Innovations

- o The Oakland Project--a new city-university working relationship (36)
- o State participation in direct, federal grant-in-aid programs in New York (44)
- o Program proposals for classroom experimentation in Milwaukee public schools (19)

- Use of organizational specialists in elementary school districts (40)
- A statewide, School Problem Commission in Illinois (14)
- Catalytic role models for elementary school teachers (17)
- NDEA Title III implementation in California schools (24)
- ESEA Title VI (bilingual education) implementation in six school districts (6)

Appendix D

LIST OF STUDIES REVIEWED,
WITH GLOBAL RATING FORM

RATING INSTRUMENT INSTRUCTIONS

In this set of ratings, we would like you to answer the following four questions based on your existing knowledge, if any, of each study:

1. Have you ever heard of the investigator before?

1	2
yes	no

2. What do you feel is the contribution of the study to innovation or implementation theory?

0	1	2	3	4	5
I know absolutely nothing about study	trivial or inconsequential		minor contribution		a major breakthrough

3. What do you feel is the contribution of the study to practice or policymaking?

0	1	2	3	4	5
I know absolutely nothing about study	research has no connection to practice or policy making		users are likely to have heard of the research for utilization purposes		policy thinking or practice has been changed or influenced

4. What do you feel is the overall quality of the study as a social science endeavor?

0	1	2	3	4	5
I know absolutely nothing about study	poor (unacceptable)	low	barely acceptable	moderate	good

Attached is a list of all 53 studies which has space provided for you to indicate you ratings. Note that on the right hand side of the page are four columns which correspond to the four questions asked. Please answer all four questions for each study by recording your rating in the appropriate column. After you have finished rating all the studies please place your rating sheets and these instructions in the envelope provided. Many thanks for your assistance on this project.

Rater's Name _____

RATING SHEET

Name of Study	Heard of Author?	Contrib. to Theory	Contrib. to Prac.	Overall Quality
1) Abt Associates, Innovation and Change: A Study of Strategies in Selected Projects Supported by the National Center for the Improvement of Educational Systems (Cambridge, MA: Abt Associates, 1972), Vol. I - III.				
2) Allan, Peter, and Rosenberg, Stephen, "Getting a Managerial Performance Appraisal System Under Way: New York City's Experience," Public Administration Review, July/August 1980, pp. 372-379				
3) Atwood, M.S., "Small-scale administrative change: resistance to the introduction of a high school guidance program," in Miles, Matthew B., ed., Innovation in Education (New York: Teachers College, Columbia University, 1964) pp. 49-115				
4) Baer, Walter S., et.al., Analysis of Federally Funded Demonstration Projects (Santa Monica, California: The Rand Corporation, 1976), Vol. I - III.				
5) Barton, Allen H., et.al., Decentralizing City Government (Cambridge, MA: Lexington Books, 1977).				
6) Berman, Paul, and McLaughlin, Milbrey, Federal Programs Supporting Educational Change (Santa Monica, California: The Rand Corporation, 1974-78), Vol. I - IV; this case study project focuses on Volume III: The Process of Change and its appendices containing supporting case studies.				
7) Bingham, Richard D., The Adoption of Innovation by Local Government (Cambridge, MA: Lexington Books, 1976).				
8) Bloch, Peter B., and Specht, David I., Evaluation of Operation Neighborhood (Washington, D.C.: The Urban Institute, 19730.				
9) Brewer, Garry D., Politicians, Bureaucrats, and the Consultant (New York: Basic Books, 1973).				
10) Carpenter, Polly, et.al., Case Studies in Educational Performance Contracting (Santa Monica, California: The Rand Corporation, 1971), Vol. 1 - 6.				

Rater's Name _____

RATING SHEET

Name of Study	Heard of Author?	Contrib. to Theory	Contrib. to Prac.	Overall Quality
11) Derthick, Martha, New Towns In-Town (Washington, D.C.: The Urban Institute, 1972).				
12) Dignam, Monica and Stocking, S. Holly, The ITV Experience at Evanston Township High School (Bloomington, Indiana: Agency for Instructional Television, 1977)				
13) Feller, Irwin, et.al , Diffusion of Innovations in Municipal Governments (University Park, Pennsylvania: Institute for Research on Human Resources, 1976).				
14) Flesche, Donald C., et.al., "The Illinois School Problems Commission: An innovation in decision-making at the state level," in Miles, Matthew B., ed., Innovation in Education (New York: Teachers College, Columbia University, 1964) pp. 183-201.				
15) Greenberger, Martin, et. al., Models in the Policy Process: Public Decision-Making in the Computer Era (New York: Russell Sage Foundation, 1977), "Putting Out Fires in the Fire Department," pp. 249 - 285.				
16) Greiner, J.M., et.al., Monetary Incentives and Work Standards in Five Cities: Impacts and Implications for Management and Labor (Washington, D.C.: The Urban Institute, 1977).				
17) Gross, Neal, et.al, Implementing Organizational Innovations (New York: Basic Books, 1971).				
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20) Hayes, Frederick O'R., Productivity in Local Government (Lexington, MA: Lexington Books, 1977).				

Rater's Name _____

RATING SHEET

Name of Study	Heard of Author?	Contrib. to Theory	Contrib. to Prac.	Overall Quality
21) Herriot, Robert E., and Gross, Neal, The Dynamics of Planned Education Change: Case Studies and Analyses (Berkeley, California: McCutchan Publishing Company, 1979).				
22) Hull, William L., and Benson, Gregory, Jr. Installing a Coordinated Information Network in a State Education Agency (Washington, D.C.: Office of Education, National Center for Educational Research and Development, U.S. Dept. of Health, Education and Welfare, 1972).				
23) International City Management Assocation, Applying Systems Analysis in Urban Government: Three Case Studies (Washington, D.C.,: ICMA, 1972).				
24) Johnson, Donald W., "Title III and the dynamics of educational change in California schools," in Miles, Matthew B., ed., Innovation in Education (New York: Teachers College, Columbia University, 1964) pp. 157-182				
25) Kalba, Kas, City Meets the Cable: A Case Study in Technological Innovations and Community Decision-Making (Cambridge, MA: Program on Information Technologies and Public Policy, Harvard University, 1975).				
26) Kester, Ralph J. and Howard, John, Jr., The Adoption of Systems Innovation in Educational Organizations: A Case Study of Operation Guidance (Columbus, Ohio: The Center for Vocational Education, Ohio State University, 1975).				
27) Laudon, Kenneth C., Computers and Bureaucratic Reform (New York: John Wiley and Sons, 1974).				
28) Lambright, W. Henry, Technology Transfer to Cities: Processes of Choice at the Local Level (Boulder, Colorado: Westview Press, 1979).				
29) Levin, Melvin R. and Abend, Norman A., Bureaucrats in Collision: Case Studies in Area Transportation Planning (Cambridge, MA: The MIT Press, 1971).				
30) Mechling, Jerry E., "A Successful Innovation: Manpower Scheduling," Urban Analysis, Vol. 3, 1974, pp. 259-313.				

Rater's Name _____

RATING SHEET

Name of Study	Heard of Author?	Contrib. to Theory	Contrib. to Prac.	Overall Quality
31) Mogulof, Melvin, Saving the Coast (Lexington, MA: Lexington Books, 1975).				
32) Moore, Mark H., et.al., "The Case of the Fourth Platoon," Urban Analysis, Vol. 3, 1974, ppl 207-258.				
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35) Mushkin, Selma J., "PPB in Cities," Public Administration Review, March/April 1969, pp. 167-178.				
36) Pressman, Jeffrey L. and Wildavsky, Aaron B., Implementation (Berkeley: University of California Press, 1973).				
37) Rittenhouse, Carl H., A Study of Career Education in Six School Districts (Menlo Park, California: Stanford Research Institute, 1971)				
38) Rosenbloom, Richard S., and Russell, John R., eds., New Tools for Urban Management: Studies in Systems and Organizational Analysis (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1971).				
39) San Francisco Department of City Planning, "The San Francisco Community Renewal Simulation Model," in Robinson, Ira M., ed., Decision-Making in Urban Planning (Beverly Hills, California: Sage Publications, 1972) pp. 555-596.				
40)Schmuck, Richard A. and Runkel, Philip J., "Integrating Organizational Specialists into School Districts," in Burke, W. Warren, ed., New Technologies in Organizational Development (LaJolla, California: University Associates, 1975) pp. 168-200.				

Rater's Name _____

RATING SHEET

Name of Study	Heard of Author?	Contrib. to Theory	Contrib. to Prac.	Overall Quality
41) Sellman, A.N. and Warner, K.P., The Prospects for Improving Highway Planning Through Remote Sensing Information Systems: A Case Study for Michigan (Ann Arbor, Michigan: Environmental Research Institite, University of Michigan, 1975).				
42) Sherman, Lawrence W., et.al., Team Policing: Seven Case Studies (Washington, D.C.: The Police Foundation, 1973).				
43) Smith, Louis M. and Keith, Pat M., Anatomy of Educational Innovation: An Organizational Analysis of an Elementary School (New York: John Wiley and Sons, 1971).				
44) Stenberg, Carl W., State Involvement in Federal-Local Grant Programs: A Case Study of the "Buying-in" Approach (Washington, D.C.: Advisory Commission on Intergovernmental Relations, 1970).				
45) Szanton, Peter L., "Urban Public Services: Ten Case Studies," in Nelson, Richard R., and Yates, Douglas, eds., Innovation and Implementation in Public Organizations (Lexington, MA: Lexington Books, 1978) pp. 117-142.				
46) Office of Technology Assessment, United States Congress, An Assessment of Community Planning for Mass Transit (Washington, D.C.: U.S. Government Printing Office, 1976) , Vol. 1 - 10.				
47) Usdan, Michael D., "The New Jersey Administration, United States," in OECD Centre for Educational Research and Innovation, Case Studies of Educational Innovation, Volume 1: At the Central Level (Paris: Organization for Economic Cooperation and Development, 1973) pp. 255-354.				
48) Viteritti, Joseph P., "Implementing Change Through Training: A Case Study," Public Administration Review, September/October 1978, pp. 469-475.				
49) Walker, Warren, E., Changing Fire Company Locations: Five Implementation Case Studies (Washington, D.C.: U.S. Dept. of Housing and Urban Development, 1978).				

Rater's Name _____

RATING SHEET

Name of Study	Heard of Author?	Contrib. to Theory	Contrib. to Prac.	Overall Quality
50) White, Bayla F., et.al., The Atlanta Project: How One Large School System Responded to Performance Information (Washington, D.C.: The Urban Institute, 1974).				
51) Eveland, J. D., et. al., The Innovation Process in Public Organizations: Some Elements of a Preliminary Model (Ann Arbor: Department of Journalism, University of Michigan, 1977).				
52) Haak, Harold H., "The Evolution of a Metropolitan Data System," Urban Affairs Quarterly, Vol. 3, No. 2, December 1967, pp. 3 - 13.				
53) Rogers, Everett M., et. al., The Innovation Process for Dial-A-Ride (Palo Alto, CA: Institute for Communication Research, Stanford University, 1979).				

Appendix E

METHODOLOGY RATING INSTRUMENT

METHODOLOGY RATING INSTRUMENT

Note: When completing these ratings, be sure to check the entire study being reviewed. Relevant information may be found in the front matter, the appendices, and even the cover jacket. All material should be considered.

	keypunch columns
A. General information	
1. Title of the Study _____	Card 1
2. Study Code ____ Rater Code ___ Date _____	1-2/3/4-9
3. Publisher _____	
4. This study is published as a ____ book(1) chapter in a book(2) journal article (3) report(4) other(5) cannot tell(9)[1]	10
5. The year of publication is _____	11-14
6. The publisher is a ____ university press(1) commercial press(2) independent research group(3) academic department(4) professional association(5) government agency(6) other(7) cannot tell(9)	15

The service area(s) discussed in this study include:	yes	no	cannot tell	
7. education	1	2	9	16
8. transportation	1	2	9	17
9. planning	1	2	9	18
10. police/fire/sanitation	1	2	9	19
11. environment	1	2	9	20
12. health	1	2	9	21
13. criminal justice/courts	1	2	9	22
14. other _____	1	2	9	23

1. Throughout this instrument, this response is to be used only when there is insufficient or ambiguous information for making a judgment.

Study Code ___

B. Information About the Author(s)

15. The study is authored by ____.
    a single person(1)
    two people(2)
    three or more people(3)
    an institution, individual authors not listed(4)
    cannot tell(9) [skip to #17]

16. The first (or only) author's academic affiliation is ____
    instructor, lecturer, or assistant professor(1)
    associate professor(2)
    full professor(3)
    professor, but of undetermined rank(4)
    other academic _____(5)
    no academic affiliation(6)
    cannot tell(9)

The first (or only) author:	yes	no	cannot tell	keypunch columns
17. Is cited as author of a previous publication.	1	2	9	26
18. Participated in, and did not merely evaluate or observe, the events in the study.	1	2	9	27
19. Assisted in collecting the data for the study.	1	2	9	28
The study mentions any:				
20. Biases or predispositions, held by the author or the research team, about the subject matter.	1	2	9	29
21. Steps taken to reduce the effects of these biases.	1	2	9	30
22. Specific methodological training to perform the tasks in the study (e.g., a seminar, training procedure, or pilot test for training purposes).	1	2	9	31

C. Manner of Presenting Evidence and Sources[2]

The study presents the following evidence or data:

23. Footnotes, citing sources.	1	2	9	32
24. Tables or other data displays.	1	2	9	33
25. Appendices with specific evidence.	1	2	9	34
26. Reproductions of relevant documents used as evidence.	1	2	9	35
27. Quotations from respondents or documents.	1	2	9	36
28. Other (e.g., vignettes): _____	1	2	9	37

Study Code ___

The study identifies the following specific sources of information:[3]	yes	no	cannot tell	keypunch columns
29. Names or titles of interviewees.	1	2	9	38
30. Description of specific files or records searched.	1	2	9	39
31. List of data tapes or sources.	1	2	9	40
32. Circumstances for observational data.	1	2	9	41
33. Other	1	2	9	42
34. Bibliography	1	2	9	43
35. The study states that at least one of these sources, whether identified or not, were searched "fairly" (e.g., a comprehensive search, a fair sample, or awareness of possible bias in the search process).	1	2	9	44
The study expresses the following concerns over the quality of the sources:				
36. Mentions a general concern:	1	2	9	45
37. Discusses possible shortcomings of the sources (e.g., bias of interviewees, erosion of records, incompleteness of documents):	1	2	9	46
38. Indicates steps taken to overcome possible shortcomings (e.g., double-checking sources, assuring equal access, avoiding conclusions based only on single sources).	1	2	9	47
39. The study mentions the use of formalized, intermediate records kept by the investigators (e.g., field reports, logs, notes, or observational tabulations).	1	2	9	48

2. Cf. questions 76-81 and 94-97. The emphasis here is on whether the evidence was presented or not, regardless of whether it was part of the study.
3. Answer yes only if the source of information is identified in enough detail and specificity to enable another investigator to locate and access the same data source.

Study Code ___

The study presents, in the text or appendices, the following materials:[2]	yes	no	cannot tell	keypunch columns
40. A copy of any questionnaires used.	1	2	9	49
41. A copy of any guidelines used.	1	2	9	50
42. A sample of the field notes, logs, notes, or other intermediate records kept by the investigators.	1	2	9	51
43. A copy of any rating instruments.	1	2	9	52
44. Other related types of materials: _____	1	2	9	53

D. Study Design

The study defines the scope of inquiry by mentioning:				
45. Time boundaries.	1	2	9	54
46. Spatial boundaries.	1	2	9	55
47. Focus on a specific organization or set of organizations (or units).	1	2	9	56
48. A unit of analysis: _____	1	2	9	57
The study describes:				
49. A potential universe of eligible cases or units of analysis.	1	2	9	58
50. An operational sampling procedure for selecting some cases and ignoring others.	1	2	9	59
51. An operational procedure for selecting some respondents & not others.	1	2	9	60
52. One or more of the above procedures, but not in sufficient detail to be understood operationally.	1	2	9	61
53. The study identifies ____ causal relationships to be investigated(1) some topics to be covered(2) an uncertain line of inquiry(3) cannot tell(9)				62
The study covers previous research on the topic by:				
54. Mentioning 0-4 references.	1	2	9	63
55. Mentioning from 5 to 9 references.	1	2	9	64
56. Mentioning more than 9 references.	1	2	9	65
57. Discussing previous implementation or innovation theory.	1	2	9	66
58. Relating previous theory to the issues, questions, or hypotheses to be investigated.	1	2	9	67

[2] See Footnote 2 on the previous page.

Study Code ___

The study consists of:	yes	no	cannot tell	keypunch columns
59. A single "case" (e.g., site, decision, innovation, or organization), with no subunits (e.g., a group of users who can be surveyed, multiple implementation experiences at the same site, etc.).	1	2	9	68
60. A single case, but with subunits.	1	2	9	69
61. More than a single case, with no subunits.	1	2	9	70
62. More than a single case, but with subunits.	1	2	9	71
63. Some other design: _____	1	2	9	72
64. The total number of "cases" in the study is ____				73-74
The research design of the study consists of:				
65. A comparison of contrasting cases (cases chosen to be different in outcome).	1	2	9	75
66. A comparison of contrasting time periods for the same case.	1	2	9	76
67. No comparison, but a "replication" among cases deliberately chosen to have similar outcomes.	1	2	9	77
68. Some other logic at the case level: _____	1	2	9	78
69. A comparison of contrasting results at the subunit level.	1	2	9	79
70. A comparison of contrasting time periods at the subunit level.	1	2	9	4
71. Some other logic at the subunit level:._____	1	2	9	5
The study expresses the following concerns about possible threats to internal validity (i.e., threats to causal inferences):				
72. Limitations of the study in this regard are noted.	1	2	9	6
73. Specific threats are identified: _____	1	2	9	7
74. Specific steps are taken to offset these threats.	1	2	9	8
75. The making of causal inferences seems relevant to this study.	1	2	9	9

NOTE:
80=1
Card 2
1-2=SN
3=RC

Study Code ___

E. Type of Evidence

The study is based on evidence, whether presented or not, from the following kinds of sources:[4]	yes	no	cannot tell	keypunch columns
76. Elite interviews (e.g., a project director).	1	2	9	10
77. Large-scale interviews.	1	2	9	11
78. Primary documents or records.	1	2	9	12
79. Secondary documents.	1	2	9	13
80. Direct observations or participation.	1	2	9	14
81. Other: _____	1	2	9	15
Operational definitions are used for:				
82. The nature of the innovation.	1	2	9	16
83. Key aspects of the implementation process.	1	2	9	17
84. Specific outcomes of the implementation process.	1	2	9	18
85. Specific outcomes of the innovation.	1	2	9	19
The study expresses concern for the adequacy of these definitions by:				
86. Discussing the validity or reliability of the data.	1	2	9	20
87. Testing for the validity or reliability of the data.	1	2	9	21
88. Developing some procedure for convergence or purposeful redundancy.	1	2	9	22
89. Noting the difficulties of dealing with qualitative data.	1	2	9	23
The following data collection problems are mentioned, even if no compensatory steps were taken:				
90. Reactivity problems due to the researcher's role.	1	2	9	24
91. Inconsistency of data across cases or subunits.	1	2	9	25
92. Unavailability of appropriate respondents or records.	1	2	9	26
93. Modification or change in instruments during the study.	1	2	9	27

4. Cf. questions 23-28 and 40-44. The emphasis here is on whether these materials are said to have been used, whether they were presented in the study or not.

Study Code ___

As part of the data collection procedures, the study mentions use of a:	yes	no	cannot tell	keypunch columns
94. Formal respondent questionnaire(s).	1	2	9	28
95. Formal researcher guideline(s).	1	2	9	29
96. Specific protocol (e.g., sampling plan or search procedures) for using records or archives.	1	2	9	30
97. Other: _____	1	2	9	31

F. Type of Analysis[5]

The key, within-case "facts" are represented through:				
98. Quantitative tabulations	1	2	9	32
99. Non-quantitative tabulations.	1	2	9	33
100. Chronologies.	1	2	9	34
101. Figures or graphs.	1	2	9	35
102. A narrative description of the characteristics of the innovation.	1	2	9	36
103. A narrative description of the implementation process.	1	2	9	37
104. A narrative description of the innovation's outcomes.	1	2	9	38
The key, between-case trends or relationships are noted through:				
105. Statistical manipulation.	1	2	9	39
106. Numerical tabulations, but no statistical manipulations.	1	2	9	40
107. Juxtapositioning of different types of information (e.g., sequencing of events, comparisons between two sets of facts).	1	2	9	41
108. Narrative discussion.	1	2	9	42
Citations to previous theories and research are made in the study in the following discussions:				
109. Introduction.	1	2	9	43
110. General literature review.	1	2	9	44
111. Presentation of the findings.	1	2	9	45
112. Considerations of alternative explanations.	1	2	9	46
113. Development of conclusions and recommendations.	1	2	9	47

5. All questions refer to analysis done at the case level and not at any subunit level. For multiple cases, choose an illustrative case randomly to answer Qs. 98-104 and 120-128.

Study Code ___

	yes	no	cannot tell		keypunch columns
114. The study indicates that the individual cases, or other key portions of the text were reviewed by at least one of the study's informants or interviewees.	1	2	9		48
The study ends with the following information:					
115. Conclusions about the innovation/ implementation process.	1	2	9		49
116. Conclusions about the innovation's outcomes.	1	2	9		50
117. Conclusions about the organization(s).	1	2	9		51
118. Conclusions about needed future research.	1	2	9		52
119. Recommendations for policy action (no matter how vaguely stated).	1	2	9		53
Note: Questions 120 through 134 are to be answered if the study has more than one case. If the study has only one case, code 120 - 135 as "0" and skip to question 136.					
The "facts" of the individual case are:					
120. Analyzed <u>within</u> each case.	1	2	9	0	54
121. Analyzed <u>between</u> the cases.	1	2	9	0	55
122. The between-case analysis draws from these within case analyses.	1	2	9	0	56
The within-case assemblies appear as:					
123. Individual cases, in separate chapters, an appendix, or some other form, for <u>all</u> cases.	1	2	9	0	57
124. Short vignettes (more than one per chapter) for <u>all</u> cases.	1	2	9	0	58
125. Mixed treatment of the cases, with only some appearing as case studies or vignettes.	1	2	9	0	59
126. Any of the above, but with the cases cited anonymously.	1	2	9	0	60
127. Unpublished materials not in the present document.	1	2	9	0	61
128. Non-reported or non-presented materials.	1	2	9	0	62

Study Code ___

The between-case analyses or syntheses appear:	yes	no	cannot tell		keypunch columns
129. In tabular form, whether quantitative or non-quantitative.	1	2	9	0	63
130. In narrative form, with specific citations to individual cases (usually the cases are "named" in parentheses).	1	2	9	0	64
131. In some other form, but with the individual cases still being mentioned: _____.	1	2	9	0	65
Whether within or between cases, alternative (competing) explanations or interpretations are:					
132. Mentioned in passing	1	2	9	0	66
133. Discussed in logical arguments, but without any formal reconsideration of the evidence.	1	2	9	0	67
134. Used to reorganize the evidence, and thereby tested.	1	2	9	0	68
135. Relevant to the study.	1	2	9	0	69

G. Analyst's Ratings

Rate the study in relation to each of the following statements. The rating should be based on a three-point scale:

1 = High quality--like that found in articles in a good journal.
2 = Moderate quality--acceptable for the field in general.
3 = Marginal quality--there are some possible gaps or contradictions that even a good dissertation should have covered better.
9 = Cannot tell.

136. The study defines the issues/questions/hypotheses adequately and correctly in relation to the topic of study.	1	2	3	9	70
137. The study distinguishes among three phases of research: having knowledge and beliefs prior to data collection, doing data collection, and holding or modifying knowledge and beliefs after data analysis.	1	2	3	9	71

Study Code ___

Rate the study in relation to each of the following statements. The rating should be based on a three-point scale:

1 = High quality--like that found in articles in a good journal.
2 = Moderate quality--acceptable for the field in general.
3 = Marginal quality--there are some possible gaps or contradictions that even a good dissertation should have covered better.
9 = Cannot tell.

					keypunch columns
138. The study presents enough evidence so that the reader can review it himself (and possibly arrive at different conclusions).	1	2	3	9	72
139. The data collection and analysis procedures are adequately documented, so that the reader knows how the study was done.	1	2	3	9	73
140. The study's design or analysis was done with flexibility and openness to unexpected results.	1	2	3	9	74
141. The study gives confidence that the author(s) were concerned and careful about methodological issues.	1	2	3	9	75
142. The study was easy to read.	1	2	3	9	76

The study appears to be:

	yes	no	cannot tell	
143. An exploratory study.	1	2	9	77
144. A descriptive study.	1	2	9	78
145. An explanatory study.	1	2	9	79

146. The study appears to have been written for ____. 80

teaching(1)
dissemination of model project(2)
research(3)
other: _____(4)
cannot tell(9)

147. Additional comments or concerns (list question #)

_____

_____

_____

Appendix F

PAIRWISE RELATIONSHIPS BETWEEN FIRST-LINE CORRELATES AND GLOBAL RATINGS

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V145

MODEPSTP MODE RATING OF PRACTICE AFTER READING V145 IS AN

PRACTICE Rating	Appears to be an Explanatory Study: Yes (1)	No (2)	TOTAL
0 Low	15	9	24
	0.5	1.6	
	28.30	15.98	45.28
	62.50	37.50	
	37.50	69.23	
1 High	25	4	29
	0.4	1.4	
	47.17	7.55	54.72
	86.21	13.79	
	62.50	30.77	
TOTAL	40	13	53
	75.47	24.53	100.00

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	3.987	DF= 1	PROB=0.0459
PHI	-0.274		
CONTINGENCY COEFFICIENT	0.265		
CRAMER'S V	0.274		
LIKELIHOOD RATIO CHISQUARE	4.028	DF= 1	PROB=0.0448
CONTINUITY ADJ. CHI-SQUARE	2.809	DF= 1	PROB=0.0937
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0467
(2-TAIL)			PROB=0.0596
GAMMA	-0.579	ASE1= 0.227	
KENDALL'S TAU-B	-0.274		
STUART'S TAU-C	-0.235	ASE1= 0.117	
SOMER'S D C R	-0.237	ASE1= 0.118	
SOMER'S D R C	-0.317	ASE1= 0.149	
PRODUCT MOMENT CORRELATION	-0.274		
SPEARMAN CORRELATION	-0.274		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.208		
LAMBDA SYMMETRIC	0.135		
UNCERTAINTY COEFFICIENT C R	0.068		
UNCERTAINTY COEFFICIENT R C	0.055		
UNCERTAINTY COEFFICIENT SYM	0.061		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V203

MODEPSTP MODE RATING OF PRACTICE AFTER READING V203 SINGLE

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Consists of Multiple Case Design

PRACTICE Rating	No 1	Yes 2	TOTAL
0 Low	14	10	24
	1.6	1.2	
	25.42	18.87	45.28
	58.33	41.67	
	63.64	32.26	
1 High	8	21	29
	1.4	1.0	
	15.09	39.62	54.72
	27.59	72.41	
	36.36	67.74	
TOTAL	22	31	53
	41.51	58.49	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	5.113	DF= 1	PROB=0.0237
PHI	0.311		
CONTINGENCY COEFFICIENT	0.297		
CRAMER'S V	0.311		
LIKELIHOOD RATIO CHISQUARE	5.174	DF= 1	PROB=0.0229
CONTINUITY ADJ. CHI-SQUARE	3.925	DF= 1	PROB=0.0476
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0235
(2-TAIL)			PROB=0.0291
GAMMA	0.572	ASE1= 0.197	
KENDALL'S TAU-B	0.311		
STUART'S TAU-C	0.305	ASE1= 0.130	
SOMER'S D C R	0.307	ASE1= 0.130	
SOMER'S D R C	0.314	ASE1= 0.133	
PRODUCT MOMENT CORRELATION	0.311		
SPEARMAN CORRELATION	0.311		
LAMBDA ASYMMETRIC C R	0.182		
LAMBDA ASYMMETRIC R C	0.250		
LAMBDA SYMMETRIC	0.217		
UNCERTAINTY COEFFICIENT C R	0.072		
UNCERTAINTY COEFFICIENT R C	0.071		
UNCERTAINTY COEFFICIENT SYM	0.071		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V204

MODEPSTP MODE RATING OF PRACTICE AFTER READING V204 MULTIP

PRACTICE Rating	Uses Multiple Sources of Evidence: Yes (1)	No (2)	TOTAL
0 Low	16	8	24
	1.2	1.2	
	30.19	15.09	45.28
	66.67	33.33	
	59.26	30.77	
1 High	11	18	29
	1.0	1.0	
	20.75	33.96	54.72
	37.93	62.07	
	40.74	69.23	
TOTAL	27	26	53
	50.94	49.06	100.00

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	4.339	DF= 1	PROB=0.0372
PHI	0.286		
CONTINGENCY COEFFICIENT	0.275		
CRAMER'S V	0.286		
LIKELIHOOD RATIO CHISQUARE	4.406	DF= 1	PROB=0.0358
CONTINUITY ADJ. CHI-SQUARE	3.265	DF= 1	PROB=0.0708
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0349
(2-TAIL)			PROB=0.0542
GAMMA	0.532	ASE1= 0.207	
KENDALL'S TAU-B	0.286		
STUART'S TAU-C	0.285	ASE1= 0.131	
SOMER'S D C|R	0.287	ASE1= 0.132	
SOMER'S D R|C	0.285	ASE1= 0.131	
PRODUCT MOMENT CORRELATION	0.286		
SPEARMAN CORRELATION	0.286		
LAMBDA ASYMMETRIC C|R	0.269		
LAMBDA ASYMMETRIC R|C	0.308		
LAMBDA SYMMETRIC	0.240		
UNCERTAINTY COEFFICIENT C|R	0.060		
UNCERTAINTY COEFFICIENT R|C	0.060		
UNCERTAINTY COEFFICIENT SYM	0.060		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R|C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V85

MODEPSTP MODE RATING OF PRACTICE AFTER READING V85 DEFINE

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Has Operational Definition for Innovation Outcomes

PRACTICE Rating	Yes 1	No 2	TOTAL
0 Low	13	11	24
	0.8	1.9	
	24.53	20.75	45.28
	54.17	45.83	
	35.14	68.75	
1 High	24	5	29
	0.7	1.6	
	45.28	9.43	54.72
	82.76	17.24	
	64.86	31.25	
TOTAL	37	16	53
	69.81	30.19	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	5.094	DF= 1	PROB=0.0240
PHI	-0.310		
CONTINGENCY COEFFICIENT	0.296		
CRAMER'S V	0.310		
LIKELIHOOD RATIO CHISQUARE	5.154	DF= 1	PROB=0.0232
CONTINUITY ADJ. CHI-SQUARE	3.828	DF= 1	PROB=0.0504
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0250
(2-TAIL)			PROB=0.0358
GAMMA	-0.605	ASE1=	0.203
KENDALL'S TAU-B	-0.310		
STUART'S TAU-C	-0.283	ASE1=	0.123
SOMER'S D C|R	-0.286	ASE1=	0.124
SOMER'S D R|C	-0.336	ASE1=	0.140
PRODUCT MOMENT CORRELATION	-0.310		
SPEARMAN CORRELATION	-0.310		
LAMBDA ASYMMETRIC C|R	0.000		
LAMBDA ASYMMETRIC R|C	0.250		
LAMBDA SYMMETRIC	0.150		
UNCERTAINTY COEFFICIENT C|R	0.079		
UNCERTAINTY COEFFICIENT R|C	0.071		
UNCERTAINTY COEFFICIENT SYM	0.075		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R|C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V57

MODEPSTT MODE RATING OF THEORY AFTER READING V57 DISCUSSE

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Discusses Previous Implementation or Innovation Theory: Yes 1	No 2	TOTAL
THEORY Rating: 0 Low	20	18	38
	0.8	1.4	
	37.74	33.96	71.70
	52.63	47.37	
	58.82	94.74	
1 High	14	1	15
	2.0	3.6	
	26.42	1.89	28.30
	93.33	6.67	
	41.18	5.26	
TOTAL	34	19	53
	64.15	35.85	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	7.747	DF= 1	PROB=0.0054
PHI	-0.382		
CONTINGENCY COEFFICIENT	0.357		
CRAMER'S V	0.382		
LIKELIHOOD RATIO CHISQUARE	9.248	DF= 1	PROB=0.0024
CONTINUITY ADJ. CHI-SQUARE	6.078	DF= 1	PROB=0.0137
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0045
(2-TAIL)			PROB=0.0093
GAMMA	-0.853	ASE1=	0.148
KENDALL'S TAU-B	-0.382		
STUART'S TAU-C	-0.330	ASE1=	0.095
SOMER'S D C R	-0.407	ASE1=	0.103
SOMER'S D R C	-0.359	ASE1=	0.099
PRODUCT MOMENT CORRELATION	-0.382		
SPEARMAN CORRELATION	-0.382		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C R	0.134		
UNCERTAINTY COEFFICIENT R C	0.146		
UNCERTAINTY COEFFICIENT SYM	0.140		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V58

MODEPSTT MODE RATING OF THEORY AFTER READING V58 RELATES

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

THEORY Rating	Relates Theory to Issues to be Investigated: Yes 1	No 2	TOTAL
0 Low	23	15	38
	0.5	1.1	
	43.40	28.30	71.70
	60.53	39.47	
	62.16	93.75	
1 High	14	1	15
	1.2	2.7	
	26.42	1.89	28.30
	93.33	6.67	
	37.84	6.25	
TOTAL	37	16	53
	69.81	30.19	100.00

STATISTICS FOR 2-WAY TABLES

WARNING: OVER 20% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5.
TABLE IS SO SPARSE THAT CHI-SQUARE MAY NOT BE A VALID TEST.

CHI-SQUARE	5.492	DF= 1	PROB=0.0191
PHI	-0.322		
CONTINGENCY COEFFICIENT	0.306		
CRAMER'S V	0.322		
LIKELIHOOD RATIO CHISQUARE	6.590	DF= 1	PROB=0.0103
CONTINUITY ADJ. CHI-SQUARE	4.046	DF= 1	PROB=0.0443
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0171
(2-TAIL)			PROB=0.0220
GAMMA	-0.803	ASE1=	0.193
KENDALL'S TAU-B	-0.322		
STUART'S TAU-C	-0.266	ASE1=	0.090
SOMER'S D C R	-0.328	ASE1=	0.102
SOMER'S D R C	-0.316	ASE1=	0.100
PRODUCT MOMENT CORRELATION	-0.322		
SPEARMAN CORRELATION	-0.322		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C R	0.102		
UNCERTAINTY COEFFICIENT R C	0.104		
UNCERTAINTY COEFFICIENT SYM	0.103		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V49

MODEPSTT MODE RATING OF THEORY AFTER READING V49 DESCRIBE

THEORY Rating	Describes Potential Universe of Eligible Cases: Yes (1)	No (2)	TOTAL
0 Low	9	29	38
	1.2	0.6	
	16.98	54.72	71.70
	23.68	76.32	
	50.00	82.86	
1 High	9	5	15
	3.0	1.5	
	16.98	11.32	28.30
	60.00	40.00	
	50.00	17.14	
TOTAL	18	35	53
	33.96	66.04	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	6.324	DF= 1	PROB=0.0119
PHI	-0.345		
CONTINGENCY COEFFICIENT	0.327		
CRAMER'S V	0.345		
LIKELIHOOD RATIO CHISQUARE	6.129	DF= 1	PROB=0.0133
CONTINUITY ADJ. CHI-SQUARE	4.809	DF= 1	PROB=0.0283
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0152
(2-TAIL)			PROB=0.0224
GAMMA	-0.657	ASE1= 0.155	
KENDALL'S TAU-B	-0.345		
STUART'S TAU-C	-0.295	ASE1= 0.123	
SOMER'S D C R	-0.363	ASE1= 0.144	
SOMER'S D R C	-0.329	ASE1= 0.134	
PRODUCT MOMENT CORRELATION	-0.345		
SPEARMAN CORRELATION	-0.345		
LAMBDA ASYMMETRIC C R	0.157		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.091		
UNCERTAINTY COEFFICIENT C R	0.090		
UNCERTAINTY COEFFICIENT R C	0.097		
UNCERTAINTY COEFFICIENT SYM	0.094		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V202

MODEPSTT MODE RATING OF THEORY AFTER READING V202 CASE SE

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Uses Operational Procedure for Case or Respondent Selection

THEORY Rating	Yes 1	No 2	TOTAL
0 Low	11	27	38
	0.8	0.5	
	20.75	50.94	71.70
	28.95	71.05	
	55.00	81.82	
1 High	9	6	15
	2.0	1.2	
	16.98	11.32	28.30
	60.00	40.00	
	45.00	18.18	
TOTAL	20	33	53
	37.74	62.26	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	4.414	DF= 1	PROB=0.0357
PHI	-0.289		
CONTINGENCY COEFFICIENT	0.277		
CRAMER'S V	0.289		
LIKELIHOOD RATIO CHISQUARE	4.334	DF= 1	PROB=0.0374
CONTINUITY ADJ. CHI-SQUARE	3.191	DF= 1	PROB=0.0740
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0380
(2-TAIL)			PROB=0.0582
GAMMA	-0.573	ASE1=	0.214
KENDALL'S TAU-B	-0.289		
STUART'S TAU-C	-0.252	ASE1=	0.123
SOMER'S D C R	-0.311	ASE1=	0.146
SOMER'S D R C	-0.268	ASE1=	0.130
PRODUCT MOMENT CORRELATION	-0.289		
SPEARMAN CORRELATION	-0.289		
LAMBDA ASYMMETRIC C R	0.150		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.086		
UNCERTAINTY COEFFICIENT C R	0.052		
UNCERTAINTY COEFFICIENT R C	0.069		
UNCERTAINTY COEFFICIENT SYM	0.065		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V203

MODEPSTT MODE RATING OF THEORY AFTER READING V203 SINGLE C

FREQUENCY
CELL CHI2 Consists of Multiple Case Design
PERCENT
ROW PCT
COL PCT

THEORY Rating	No 1	Yes 2	TOTAL
0 Low	19 0.7 35.85 50.00 86.36	19 0.5 35.85 50.00 61.29	38 71.70
1 High	3 1.7 5.66 20.00 13.64	12 1.2 22.64 80.00 38.71	15 28.30
TOTAL	22 41.51	31 58.49	53 100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	3.987	DF= 1	PROB=0.0459
PHI	0.274		
CONTINGENCY COEFFICIENT	0.254		
CRAMER'S V	0.274		
LIKELIHOOD RATIO CHISQUARE	4.247	DF= 1	PROB=0.0393
CONTINUITY ADJ. CHI-SQUARE	2.847	DF= 1	PROB=0.0916
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0434
(2-TAIL)			PROB=0.0650
GAMMA	0.500	ASE1= 0.231	
KENDALL'S TAU-B	0.274		
STUART'S TAU-C	0.244	ASE1= 0.111	
SOMER'S D C R	0.300	ASE1= 0.131	
SOMER'S D R C	0.251	ASE1= 0.114	
PRODUCT MOMENT CORRELATION	0.274		
SPEARMAN CORRELATION	0.274		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C R	0.059		
UNCERTAINTY COEFFICIENT R C	0.067		
UNCERTAINTY COEFFICIENT SYM	0.063		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V98

MODEPSTT MODE RATING OF THEORY AFTER READING V98 QUANTITA

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

THEORY Rating	Presents Quantitative Tabulations: Yes (1)	No (2)	TOTAL
0 Low	22	15	38
	0.9	0.8	
	41.51	30.19	71.70
	57.89	42.11	
	88.00	57.14	
1 High	3	12	15
	2.3	2.1	
	5.66	22.64	28.30
	20.00	80.00	
	12.00	42.86	
TOTAL	25	28	53
	47.17	52.83	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	6.197	DF= 1	PROB=0.0128
PHI	0.342		
CONTINGENCY COEFFICIENT	0.324		
CRAMER'S V	0.342		
LIKELIHOOD RATIO CHISQUARE	6.564	DF= 1	PROB=0.0104
CONTINUITY ADJ. CHI-SQUARE	4.770	DF= 1	PROB=0.0290
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0132
(2-TAIL)			PROB=0.0162
GAMMA	0.592	ASE1=	0.189
KENDALL'S TAU-B	0.342		
STUART'S TAU-C	0.308	ASE1=	0.114
SOMER'S D C R	0.379	ASE1=	0.131
SOMER'S D R C	0.309	ASE1=	0.114
PRODUCT MOMENT CORRELATION	0.342		
SPEARMAN CORRELATION	0.342		
LAMBDA ASYMMETRIC C R	0.240		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.150		
UNCERTAINTY COEFFICIENT C R	0.090		
UNCERTAINTY COEFFICIENT R C	0.104		
UNCERTAINTY COEFFICIENT SYM	0.096		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

TABLE OF MODEPSTQ BY V58

MODEPSTQ MODE RATING OF QUALITY AFTER READING V58 RELATES

FREQUENCY CELL CHI2 PERCENT ROW PCT COL PCT	Relates Theory to Issues Being Studied Yes 1	 No 2	TOTAL
QUALITY Rating 0 Low	14	11	25
	0.7	1.6	
	25.42	20.75	47.17
	56.00	44.00	
	37.84	68.75	
1 High	23	5	28
	0.6	1.4	
	43.40	9.43	52.83
	82.14	17.86	
	62.16	31.25	
TOTAL	37	16	53
	69.81	30.19	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	4.283	DF= 1	PROB=0.0385
PHI	-0.284		
CONTINGENCY COEFFICIENT	0.273		
CRAMER'S V	0.284		
LIKELIHOOD RATIO CHISQUARE	4.347	DF= 1	PROB=0.0371
CONTINUITY ADJ. CHI-SQUARE	3.132	DF= 1	PROB=0.0767
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0380
(2-TAIL)			PROB=0.0706
GAMMA	-0.567	ASE1= 0.215	
KENDALL'S TAU-B	-0.284		
STUART'S TAU-C	-0.261	ASE1= 0.123	
SOMER'S D C R	-0.261	ASE1= 0.123	
SOMER'S D R C	-0.309	ASE1= 0.141	
PRODUCT MOMENT CORRELATION	-0.284		
SPEARMAN CORRELATION	-0.284		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.240		
LAMBDA SYMMETRIC	0.145		
UNCERTAINTY COEFFICIENT C R	0.067		
UNCERTAINTY COEFFICIENT R C	0.059		
UNCERTAINTY COEFFICIENT SYM	0.063		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

TABLE OF MODEPSTQ BY V49

MODEPSTQ MODE RATING OF QUALITY AFTER READING V49 DESCRIB

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Describes Potential Universe of Eligible Cases

QUALITY Rating	Yes 1	No 2	TOTAL
0 Low	4	21	25
	2.4	1.2	
	7.55	39.62	47.17
	16.00	84.00	
	22.22	60.00	
1 High	14	14	28
	2.1	1.1	
	25.42	25.42	52.83
	50.00	50.00	
	77.78	40.00	
TOTAL	18	35	53
	33.96	66.04	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	6.808	DF= 1	PROB=0.0091
PHI	-0.358		
CONTINGENCY COEFFICIENT	0.337		
CRAMER'S V	0.358		
LIKELIHOOD RATIO CHISQUARE	7.123	DF= 1	PROB=0.0076
CONTINUITY ADJ. CHI-SQUARE	5.376	DF= 1	PROB=0.0204
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0093
(2-TAIL)			PROB=0.0109
GAMMA	-0.680	ASE1=	0.178
KENDALL'S TAU-B	-0.358		
STUART'S TAU-C	-0.339	ASE1=	0.119
SOMER'S D C R	-0.340	ASE1=	0.120
SOMER'S D R C	-0.378	ASE1=	0.128
PRODUCT MOMENT CORRELATION	-0.358		
SPEARMAN CORRELATION	-0.358		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.280		
LAMBDA SYMMETRIC	0.153		
UNCERTAINTY COEFFICIENT C R	0.105		
UNCERTAINTY COEFFICIENT R C	0.097		
UNCERTAINTY COEFFICIENT SYM	0.101		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTQ BY V202

MODEPSTQ MODE RATING OF QUALITY AFTER READING V202 CASE SE

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Uses Operational Procedure for Case or Respondent Selection

QUALITY Rating	Yes 1	No 2	TOTAL
0 Low	5	20	25
	2.1	1.3	
	9.43	37.74	47.17
	20.00	80.00	
	25.00	60.61	
1 High	15	13	28
	1.9	1.1	
	28.30	24.53	52.83
	53.57	46.43	
	75.00	39.39	
TOTAL	20	33	53
	37.74	62.26	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	6.335	DF= 1	PROB=0.0118
PHI	-0.346		
CONTINGENCY COEFFICIENT	0.327		
CRAMER'S V	0.346		
LIKELIHOOD RATIO CHISQUARE	6.559	DF= 1	PROB=0.0104
CONTINUITY ADJ. CHI-SQUARE	4.987	DF= 1	PROB=0.0255
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0120
(2-TAIL)			PROB=0.0221
GAMMA	-0.644	ASE1= 0.184	
KENDALL'S TAU-B	-0.345		
STUART'S TAU-C	-0.335	ASE1= 0.123	
SOMER'S D C R	-0.336	ASE1= 0.124	
SOMER'S D R C	-0.356	ASE1= 0.123	
PRODUCT MOMENT CORRELATION	-0.346		
SPEARMAN CORRELATION	-0.346		
LAMBDA ASYMMETRIC C R	0.100		
LAMBDA ASYMMETRIC R C	0.280		
LAMBDA SYMMETRIC	0.200		
UNCERTAINTY COEFFICIENT C R	0.093		
UNCERTAINTY COEFFICIENT R C	0.089		
UNCERTAINTY COEFFICIENT SYM	0.091		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTQ BY V206

MODEPSTQ MODE RATING OF QUALITY AFTER READING V206 USED FC

QUALITY Rating	Uses Formal Data Collection Techniques: Yes (1)	No (2)	TOTAL
0 Low	6	19	25
	2.2	1.7	
	11.32	35.85	47.17
	24.00	76.00	
	26.09	63.33	
1 High	17	11	28
	1.9	1.5	
	32.08	20.75	52.83
	60.71	39.29	
	73.91	36.67	
TOTAL	23	30	53
	43.40	56.60	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	7.248	DF= 1	PROB=0.0071
PHI	-0.370		
CONTINGENCY COEFFICIENT	0.347		
CRAMER'S V	0.370		
LIKELIHOOD RATIO CHISQUARE	7.472	DF= 1	PROB=0.0063
CONTINUITY ADJ. CHI-SQUARE	5.830	DF= 1	PROB=0.0158
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0074
(2-TAIL)			PROB=0.0120
GAMMA	-0.661	ASE1= 0.171	
KENDALL'S TAU-B	-0.370		
STUART'S TAU-C	-0.366	ASE1= 0.125	
SOMER'S D C R	-0.367	ASE1= 0.126	
SOMER'S D R C	-0.372	ASE1= 0.127	
PRODUCT MOMENT CORRELATION	-0.370		
SPEARMAN CORRELATION	-0.370		
LAMBDA ASYMMETRIC C R	0.261		
LAMBDA ASYMMETRIC R C	0.320		
LAMBDA SYMMETRIC	0.292		
UNCERTAINTY COEFFICIENT C R	0.103		
UNCERTAINTY COEFFICIENT R C	0.102		
UNCERTAINTY COEFFICIENT SYM	0.102		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

Appendix G

THREE-WAY CONTINGENCY RESULTS FOR FIRST-LINE VARIABLES
(Each First-Line Correlate Related to Global Ratings,
Holding Other First-Line Correlates Constant)

Appendix G

THREE-WAY CONTINGENCY RESULTS FOR FIRST-LINE VARIABLES (Each First-Line Correlate Related to Global Rating, Holding Other First-Line Correlates Constant)

Main Variable	Variable Held Constant	Paired X^2 Values	p Value, 2 df
	Global Rating: PRACTICE		
Consists of multiple-case design	Appears to be an explanatory study	3.546 0.325	n.s.
	Uses multiple sources of evidence	5.185 0.650	n.s.
	Has operational definition for innovation outcomes	2.733 4.369	p<.05
Appears to be an explanatory study	Consists of multiple-case design	0.702 2.099	n.s.
	Uses multiple sources of evidence	2.217 0.462	n.s.
	Has operational definition for innovation outcomes	1.568 0.291	n.s.
Uses multiple sources of evidence	Consists of multiple-case design	4.426 0.797	n.s.
	Appears to be an explanatory study	0.860 2.438	n.s.
	Has operational defintion for innovation outcomes	1.722 0.485	n.s.
Has operational definition for innovation outcomes	Consists of multiple-case design	4.714 2.126	p<.05
	Appears to be an explanatory study	2.667 0.325	n.s.
	Uses multiple sources of evidence	0.767 2.340	n.s.

Main Variable	Variable Held Constant	Paired X^2 Values	p Value, 2 df
	Global Rating: THEORY		
Describes potential universe of eligible cases	Uses operational procedures for case or respondent selection	0.194 4.640	n.s.
	Consists of multiple-case design	0.222 4.918	n.s.
	Presents quantitative tablulations	0.048 6.601	p<.05
	Discusses previous implementation or innovation theory	2.505 3.958	p<.05
	Relates theory to issues to be investigated	2.575 4.622	p<.05
Uses operational procedures for case or respondent selection	Describes potential universe of eligible cases	1.059 0.606	n.s.
	Consists of multiple-case design	0.064 3.656	n.s.
	Presents quantitative tabulations	2.785 4.861	p,.05
	Discusses previous implementation or innovation theory	2.505 2.287	n.s.
	Relates theory to issues to be investigated	2.575 2.347	n.s.
Consists of multiple-case design	Describes potential universe of eligible cases	2.492 0.673	n.s.
	Uses operational procedures for case or respondent selection	2.780 0.674	n.s.
	Presents quantitative tabulations	2.272 7.000	p<.01

Main Variable	Variable Held Constant	Paired X^2 Values	p Value, 2 df
	Discusses previous implementation or innovation theory	0.731 1.809	n.s.
	Relates theory to issues to be investigated	1.244 1.778	n.s.
Presents quantitative tabulations	Describes potential universe of eligible cases	5.844 0.949	p<.05
	Uses operational procedures for case or respondent selection	5.690 0.971	p<.05
	Consists of multiple-case design	1.621 9.323	p<.01
	Discusses previous implementation or innovation theory	3.831 1.451	n.s.
	Relates theory to issues to be investigated	6.680 0.830	p<.05
Discusses previous implementation or innovation theory	Describes potential universe of eligible cases	1.286 5.431	p<.05
	Uses operational procedures for case or respondent selection	2.780 4.762	p<.05
	Consists of multiple-case design	4.168 2.273	p<.05
	Presents quantitative tabulations	2.678 4.215	p<.05
	Relates theory to issues to be investigated	4.359 0.246	n.s.

Main Variable	Variable Held Constant	Paired Values	p Value, 2 df
Relates theory to issues to be investigated	Relates theory to issues to be investigated	4.678 0.873	n.s.
	Describes potential universe of eligible cases	0.257 2.468	n.s.
	Uses operational procedures for case or respondent selection	0.800 3.110	n.s.
	Uses formal data collection techniques	1.436 1.172	n.s.

Appendix H

PAIRWISE RELATIONSHIPS BETWEEN SECOND-LINE CORRELATES AND FIRST-LINE CORRELATES

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V145 BY V84

V145 IS AN EXPLANATIRY STUDY? V84 DEFINES OUTCOMES OF

FREQUENCY CELL CHI2 PERCENT ROW PCT COL PCT	Defines Outcomes of the Innovation Process Yes 1	 No 2	TOTAL
Is An Explanatory Study 1 Yes	23	17	40
	0.6	0.6	
	43.40	32.08	75.47
	57.50	42.50	
	88.46	62.96	
2 No	3	10	13
	1.8	1.7	
	5.66	18.87	24.53
	23.08	76.92	
	11.54	37.04	
TOTAL	26	27	53
	49.06	50.94	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	4.652	DF= 1	PROB=0.0310
PHI	0.296		
CONTINGENCY COEFFICIENT	0.234		
CRAMER'S V	0.296		
LIKELIHOOD RATIO CHISQUARE	4.861	DF= 1	PROB=0.0275
CONTINUITY ADJ. CHI-SQUARE	3.377	DF= 1	PROB=0.0661
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0317
(2-TAIL)			PROB=0.0537
GAMMA	0.637	ASE1= 0.217	
KENDALL'S TAU-B	0.296		
STUART'S TAU-C	0.255	ASE1= 0.112	
SOMER'S D C R	0.344	ASE1= 0.141	
SOMER'S D R C	0.255	ASE1= 0.112	
PRODUCT MOMENT CORRELATION	0.296		
SPEARMAN CORRELATION	0.296		
LAMBDA ASYMMETRIC C R	0.231		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.154		
UNCERTAINTY COEFFICIENT C R	0.065		
UNCERTAINTY COEFFICIENT R C	0.082		
UNCERTAINTY COEFFICIENT SYM	0.073		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V58 BY V204

V58 RELATES THEORY TO ISSUES? V204 MULTIPLE EVIDENTIA

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Uses Multiple Sources of Evidence

Relates Theory to Issues Being Studied	Yes 1	No 2	TOTAL
1 Yes	14 1.2 26.42 37.84 51.85	23 1.3 43.40 62.15 88.46	37 69.81
2 No	13 2.9 24.53 81.25 48.15	3 3.0 5.66 18.75 11.54	15 30.19
TOTAL	27 50.94	26 49.06	53 100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	8.423	DF= 1	PROB=0.0037
PHI	-0.399		
CONTINGENCY COEFFICIENT	0.370		
CRAMER'S V	0.399		
LIKELIHOOD RATIO CHISQUARE	8.931	DF= 1	PROB=0.0028
CONTINUITY ADJ. CHI-SQUARE	6.775	DF= 1	PROB=0.0092
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0040
(2-TAIL)			PROB=0.0063
GAMMA	-0.754	ASE1=	0.157
KENDALL'S TAU-B	-0.399		
STUART'S TAU-C	-0.355	ASE1=	0.115
SOMER'S D C R	-0.434	ASE1=	0.125
SOMER'S D R C	-0.366	ASE1=	0.115
PRODUCT MOMENT CORRELATION	-0.399		
SPEARMAN CORRELATION	-0.399		
LAMBDA ASYMMETRIC C R	0.345		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.214		
UNCERTAINTY COEFFICIENT C R	0.122		
UNCERTAINTY COEFFICIENT R C	0.138		
UNCERTAINTY COEFFICIENT SYM	0.129		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V204 BY V84

V204 MULTIPLE EVIDENTIARY SOURCES? V84 DEFINES OUTCOM

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Defines Outcomes of the Innovation Process: Yes 1	No 2	TOTAL
Use Multiple Sources of Evidence: 1 Yes	9	18	27
	1.4	1.3	
	15.98	33.95	50.94
	33.33	66.67	
	34.62	66.67	
2 No	17	9	26
	1.4	1.4	
	32.08	15.98	49.06
	65.38	34.62	
	65.38	33.33	
TOTAL	26	27	53
	49.06	50.94	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	5.445	DF= 1	PROB=0.0196
PHI	-0.321		
CONTINGENCY COEFFICIENT	0.305		
CRAMER'S V	0.321		
LIKELIHOOD RATIO CHISQUARE	5.541	DF= 1	PROB=0.0186
CONTINUITY ADJ. CHI-SQUARE	4.238	DF= 1	PROB=0.0395
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0193
(2-TAIL)			PROB=0.0285
GAMMA	-0.581	ASE1= 0.192	
KENDALL'S TAU-B	-0.321		
STUART'S TAU-C	-0.320	ASE1= 0.130	
SOMER'S D C R	-0.321	ASE1= 0.130	
SOMER'S D R C	-0.321	ASE1= 0.130	
PRODUCT MOMENT CORRELATION	-0.321		
SPEARMAN CORRELATION	-0.321		
LAMBDA ASYMMETRIC C R	0.308		
LAMBDA ASYMMETRIC R C	0.308		
LAMBDA SYMMETRIC	0.308		
UNCERTAINTY COEFFICIENT C R	0.075		
UNCERTAINTY COEFFICIENT R C	0.075		
UNCERTAINTY COEFFICIENT SYM	0.075		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V206 BY V204

V206 USED FORMAL DATA COLLECTION? V204 MULTIPLE EVIDEN

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Uses Multiple Sources of Evidence

Uses Formal Data Collection Techniques	Yes (1)	No (2)	TOTAL
1 Yes	6	17	23
	2.8	2.9	
	11.32	32.08	43.40
	25.09	73.91	
	22.22	65.38	
2 No	21	9	30
	2.1	2.2	
	39.62	16.98	56.60
	70.00	30.00	
	77.78	34.62	
TOTAL	27	25	53
	50.94	49.06	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	10.046	DF= 1	PROB=0.0015
PHI	-0.435		
CONTINGENCY COEFFICIENT	0.399		
CRAMER'S V	0.435		
LIKELIHOOD RATIO CHISQUARE	10.401	DF= 1	PROB=0.0013
CONTINUITY ADJ. CHI-SQUARE	8.355	DF= 1	PROB=0.0038
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0017
(2-TAIL)			PROB=0.0023
GAMMA	-0.737	ASE1=	0.141
KENDALL'S TAU-B	-0.435		
STUART'S TAU-C	-0.431	ASE1=	0.123
SOMER'S D C R	-0.439	ASE1=	0.124
SOMER'S D R C	-0.432	ASE1=	0.123
PRODUCT MOMENT CORRELATION	-0.435		
SPEARMAN CORRELATION	-0.435		
LAMBDA ASYMMETRIC C R	0.423		
LAMBDA ASYMMETRIC R C	0.348		
LAMBDA SYMMETRIC	0.388		
UNCERTAINTY COEFFICIENT C R	0.142		
UNCERTAINTY COEFFICIENT R C	0.143		
UNCERTAINTY COEFFICIENT SYM	0.142		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

TABLE OF V85 BY V84

V85 DEFINES OUTCOMES OF INNOVATION? V84 DEFINES OUTC

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Defines Outcomes of the Innovation Process: Yes 1	No 2	TOTAL
Has Operational Definition for Innovation Outcomes: 1 Yes	23	14	37
	1.3	1.2	
	43.40	25.42	69.81
	62.16	37.84	
	88.46	51.85	
2 No	3	13	16
	3.0	2.9	
	5.66	24.53	30.19
	18.75	81.25	
	11.54	48.15	
TOTAL	26	27	53
	49.06	50.94	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	8.423	DF= 1	PROB=0.0037
PHI	0.399		
CONTINGENCY COEFFICIENT	0.370		
CRAMER'S V	0.399		
LIKELIHOOD RATIO CHISQUARE	8.931	DF= 1	PROB=0.0028
CONTINUITY ADJ. CHI-SQUARE	6.776	DF= 1	PROB=0.0092
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0040
(2-TAIL)			PROB=0.0063
GAMMA	0.754	ASE1=	0.157
KENDALL'S TAU-B	0.399		
STUART'S TAU-C	0.366	ASE1=	0.115
SOMER'S D C R	0.434	ASE1=	0.125
SOMER'S D R C	0.356	ASE1=	0.115
PRODUCT MOMENT CORRELATION	0.399		
SPEARMAN CORRELATION	0.399		
LAMBDA ASYMMETRIC C R	0.346		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.214		
UNCERTAINTY COEFFICIENT C R	0.122		
UNCERTAINTY COEFFICIENT R C	0.138		
UNCERTAINTY COEFFICIENT SYM	0.129		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V85 BY V101

V85 DEFINES OUTCOMES OF INNOVATION? V101 FIGURES?

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Presents Figures or Graphs: Yes (1)	No (2)	TOTAL
Has Operational Definition for Innovation Outcomes: Yes (1)	21	16	37
	1.1	0.9	
	39.62	30.19	59.81
	56.76	43.24	
	87.50	55.17	
Has Operational Definition for Innovation Outcomes: No (2)	3	13	16
	2.5	2.1	
	5.66	24.53	30.19
	18.75	81.25	
	12.50	44.83	
TOTAL	24	29	53
	45.28	54.72	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	6.512	DF= 1	PROB=0.0107
PHI	0.351		
CONTINGENCY COEFFICIENT	0.331		
CRAMER'S V	0.351		
LIKELIHOOD RATIO CHISQUARE	6.944	DF= 1	PROB=0.0084
CONTINUITY ADJ. CHI-SQUARE	5.068	DF= 1	PROB=0.0244
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0108
(2-TAIL)			PROB=0.0158
GAMMA	0.701	ASE1= 0.183	
KENDALL'S TAU-B	0.351		
STUART'S TAU-C	0.320	ASE1= 0.114	
SOMER'S D C|R	0.380	ASE1= 0.127	
SOMER'S D R|C	0.323	ASE1= 0.114	
PRODUCT MOMENT CORRELATION	0.351		
SPEARMAN CORRELATION	0.351		
LAMBDA ASYMMETRIC C|R	0.208		
LAMBDA ASYMMETRIC R|C	0.000		
LAMBDA SYMMETRIC	0.125		
UNCERTAINTY COEFFICIENT C|R	0.095		
UNCERTAINTY COEFFICIENT R|C	0.107		
UNCERTAINTY COEFFICIENT SYM	0.101		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R|C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V203 BY V98

V203 SINGLE OR MULTIPLE CASE? V98 QUANTITATIVE TABULA

Consists of Multiple Case Design

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Presents Quantitative Tabulations: Yes 1	No 2	TOTAL
1 No	15	7	22
	2.1	1.8	
	28.30	13.21	41.51
	68.18	31.82	
	60.00	25.00	
2 Yes	10	21	31
	1.5	1.3	
	18.87	39.62	58.49
	32.26	67.74	
	40.00	75.00	
TOTAL	25	28	53
	47.17	52.83	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	6.664	DF= 1	PROB=0.0098
PHI	0.355		
CONTINGENCY COEFFICIENT	0.334		
CRAMER'S V	0.355		
LIKELIHOOD RATIO CHISQUARE	6.797	DF= 1	PROB=0.0091
CONTINUITY ADJ. CHI-SQUARE	5.300	DF= 1	PROB=0.0213
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0103
(2-TAIL)			PROB=0.0131
GAMMA	0.636	ASE1=	0.173
KENDALL'S TAU-B	0.355		
STUART'S TAU-C	0.349	ASE1=	0.127
SOMER'S D C R	0.359	ASE1=	0.130
SOMER'S D R C	0.350	ASE1=	0.128
PRODUCT MOMENT CORRELATION	0.355		
SPEARMAN CORRELATION	0.355		
LAMBDA ASYMMETRIC C R	0.320		
LAMBDA ASYMMETRIC R C	0.227		
LAMBDA SYMMETRIC	0.277		
UNCERTAINTY COEFFICIENT C R	0.093		
UNCERTAINTY COEFFICIENT R C	0.094		
UNCERTAINTY COEFFICIENT SYM	0.094		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V57 BY V145

V57 DISCUSSES PREVIOUS THEORY? V145 IS AN EXPLANATIR

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Discusses Previous Implementation or Innovation Theory	Appears to be An Explanatory Study: Yes (1)	No (2)	TOTAL
1 Yes	29 0.4 54.72 85.29 72.50	5 1.3 9.43 14.71 38.46	34 64.15
2 No	11 0.8 20.75 57.89 27.50	8 2.4 15.09 42.11 61.54	19 35.85
TOTAL	40 75.47	13 24.53	53 100.00

STATISTICS FOR 2-WAY TABLES

WARNING: OVER 20% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5.
TABLE IS SO SPARSE THAT CHI-SQUARE MAY NOT BE A VALID TEST.

CHI-SQUARE	4.943	DF= 1	PROB=0.0262
PHI	0.305		
CONTINGENCY COEFFICIENT	0.292		
CRAMER'S V	0.305		
LIKELIHOOD RATIO CHISQUARE	4.793	DF= 1	PROB=0.0286
CONTINUITY ADJ. CHI-SQUARE	3.574	DF= 1	PROB=0.0587
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0308
(2-TAIL)			PROB=0.0443
GAMMA	0.617	ASE1=	0.203
KENDALL'S TAU-B	0.305		
STUART'S TAU-C	0.252	ASE1=	0.120
SOMER'S D C R	0.274	ASE1=	0.129
SOMER'S D R C	0.340	ASE1=	0.152
PRODUCT MOMENT CORRELATION	0.305		
SPEARMAN CORRELATION	0.305		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.158		
LAMBDA SYMMETRIC	0.094		
UNCERTAINTY COEFFICIENT C R	0.081		
UNCERTAINTY COEFFICIENT R C	0.069		
UNCERTAINTY COEFFICIENT SYM	0.075		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V57 BY V84

V57 DISCUSSES PREVIOUS THEORY? V84 DEFINES OUTCOMES

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Defines Outcomes of the Innovation Process: Yes 1	No 2	TOTAL
Discusses Previous Implementation or Innovation Theory: 1 Yes	22	12	34
	1.7	1.6	
	41.51	22.64	64.15
	64.71	35.29	
	84.62	44.44	
2 No	4	15	19
	3.0	2.9	
	7.55	28.30	35.85
	21.05	78.95	
	15.38	55.56	
TOTAL	26	27	53
	49.06	50.94	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	9.294	DF= 1	PROB=0.0023
PHI	0.419		
CONTINGENCY COEFFICIENT	0.385		
CRAMER'S V	0.419		
LIKELIHOOD RATIO CHISQUARE	9.749	DF= 1	PROB=0.0018
CONTINUITY ADJ. CHI-SQUARE	7.629	DF= 1	PROB=0.0057
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0025
(2-TAIL)			PROB=0.0038
GAMMA	0.746	ASE1=	0.143
KENDALL'S TAU-B	0.419		
STUART'S TAU-C	0.402	ASE1=	0.119
SOMER'S D C R	0.437	ASE1=	0.124
SOMER'S D R C	0.402	ASE1=	0.119
PRODUCT MOMENT CORRELATION	0.419		
SPEARMAN CORRELATION	0.419		
LAMBDA ASYMMETRIC C R	0.385		
LAMBDA ASYMMETRIC R C	0.158		
LAMBDA SYMMETRIC	0.289		
UNCERTAINTY COEFFICIENT C R	0.133		
UNCERTAINTY COEFFICIENT R C	0.141		
UNCERTAINTY COEFFICIENT SYM	0.137		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V58 BY V84

V58 RELATES THEORY TO ISSUES? V84 DEFINES OUTCOMES (

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Defines Outcomes of the Innovation Process: Yes 1	No 2	TOTAL
Relates Theory to Issues Being Studied: 1 Yes	22	15	37
	0.8	0.8	
	41.51	28.30	69.81
	59.46	40.54	
	84.62	55.56	
2 No	4	12	16
	1.9	1.8	
	7.55	22.64	30.19
	25.00	75.00	
	15.38	44.44	
TOTAL	26	27	53
	49.06	50.94	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	5.307	DF= 1	PROB=0.0212
PHI	0.316		
CONTINGENCY COEFFICIENT	0.302		
CRAMER'S V	0.316		
LIKELIHOOD RATIO CHISQUARE	5.499	DF= 1	PROB=0.0190
CONTINUITY ADJ. CHI-SQUARE	4.018	DF= 1	PROB=0.0450
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0215
(2-TAIL)			PROB=0.0352
GAMMA	0.630	ASE1=	0.201
KENDALL'S TAU-B	0.315		
STUART'S TAU-C	0.290	ASE1=	0.119
SOMER'S D C R	0.345	ASE1=	0.135
SOMER'S D R C	0.291	ASE1=	0.119
PRODUCT MOMENT CORRELATION	0.316		
SPEARMAN CORRELATION	0.316		
LAMBDA ASYMMETRIC C R	0.259		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.167		
UNCERTAINTY COEFFICIENT C R	0.075		
UNCERTAINTY COEFFICIENT R C	0.085		
UNCERTAINTY COEFFICIENT SYM	0.079		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF V202 BY V100

V202 CASE SELECTION PROCEDURE? V100 CHRONOLOGIES?

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

Uses Operational Procedure for Case or Respondent Selection	Uses Chronologies: Yes (1)	Uses Chronologies: No (2)	TOTAL
1 Yes	3 2.1 5.66 15.00 16.67	17 1.1 32.08 85.00 48.57	20 37.74
2 No	15 1.3 28.30 45.45 83.33	18 0.7 33.96 54.55 51.43	33 62.26
TOTAL	18 33.96	35 66.04	53 100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	5.150	DF= 1	PROB=0.0233
PHI	-0.312		
CONTINGENCY COEFFICIENT	0.298		
CRAMER'S V	0.312		
LIKELIHOOD RATIO CHISQUARE	5.540	DF= 1	PROB=0.0186
CONTINUITY ADJ. CHI-SQUARE	3.831	DF= 1	PROB=0.0488
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0221
(2-TAIL)			PROB=0.0357
GAMMA	-0.650	ASE1=	0.207
KENDALL'S TAU-B	-0.312		
STUART'S TAU-C	-0.286	ASE1=	0.113
SOMER'S D C|R	-0.305	ASE1=	0.118
SOMER'S D R|C	-0.319	ASE1=	0.122
PRODUCT MOMENT CORRELATION	-0.312		
SPEARMAN CORRELATION	-0.312		
LAMBDA ASYMMETRIC C|R	0.000		
LAMBDA ASYMMETRIC R|C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C|R	0.082		
UNCERTAINTY COEFFICIENT R|C	0.079		
UNCERTAINTY COEFFICIENT SYM	0.080		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R|C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

Appendix I

PAIRWISE RELATIONSHIPS BETWEEN SECOND-LINE CORRELATES AND GLOBAL RATINGS

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V57

MODEPSTP MODE RATING OF PRACTICE AFTER READING V57 DISCUS

PRACTICE Rating	Discusses Previous Implementation or Innovation Theory: Yes (1)	No (2)	TOTAL
0 Low	13	11	24
	0.4	0.7	
	24.53	20.75	45.28
	54.17	45.83	
	38.24	57.89	
1 High	21	8	29
	0.3	0.6	
	39.62	15.09	54.72
	72.41	27.59	
	61.76	42.11	
TOTAL	34	19	53
	64.15	35.85	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	1.901	DF= 1	PROB=0.1679
PHI	-0.189		
CONTINGENCY COEFFICIENT	0.186		
CRAMER'S V	0.189		
LIKELIHOOD RATIO CHISQUARE	1.903	DF= 1	PROB=0.1677
CONTINUITY ADJ. CHI-SQUARE	1.191	DF= 1	PROB=0.2752
FISHER'S EXACT TEST (1-TAIL)			PROB=0.1377
(2-TAIL)			PROB=0.2503
GAMMA	-0.379	ASE1= 0.250	
KENDALL'S TAU-B	-0.189		
STUART'S TAU-C	-0.181	ASE1= 0.130	
SOMER'S D C R	-0.182	ASE1= 0.131	
SOMER'S D R C	-0.197	ASE1= 0.141	
PRODUCT MOMENT CORRELATION	-0.189		
SPEARMAN CORRELATION	-0.189		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.125		
LAMBDA SYMMETRIC	0.070		
UNCERTAINTY COEFFICIENT C R	0.028		
UNCERTAINTY COEFFICIENT R C	0.026		
UNCERTAINTY COEFFICIENT SYM	0.027		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V58

MODEPSTP MODE RATING OF PRACTICE AFTER READING V58 RELAT

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

PRACTICE Rating

	Relates Theory to Issues Being Studied: Yes 1	No 2	TOTAL
0 Low	14	10	24
	0.5	1.0	
	25.42	18.87	45.28
	58.33	41.67	
	37.84	62.50	
1 High	23	6	29
	0.4	0.9	
	43.40	11.32	54.72
	79.31	20.69	
	62.16	37.50	
TOTAL	37	16	53
	69.81	30.19	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	2.742	DF= 1	PROB=0.0977
PHI	-0.227		
CONTINGENCY COEFFICIENT	0.222		
CRAMER'S V	0.227		
LIKELIHOOD RATIO CHISQUARE	2.750	DF= 1	PROB=0.0973
CONTINUITY ADJ. CHI-SQUARE	1.837	DF= 1	PROB=0.1753
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0877
(2-TAIL)			PROB=0.1357
GAMMA	-0.465	ASE1= 0.242	
KENDALL'S TAU-B	-0.227		
STUART'S TAU-C	-0.208	ASE1= 0.125	
SOMER'S D C R	-0.210	ASE1= 0.126	
SOMER'S D R C	-0.247	ASE1= 0.145	
PRODUCT MOMENT CORRELATION	-0.227		
SPEARMAN CORRELATION	-0.227		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.167		
LAMBDA SYMMETRIC	0.100		
UNCERTAINTY COEFFICIENT C R	0.042		
UNCERTAINTY COEFFICIENT R C	0.038		
UNCERTAINTY COEFFICIENT SYM	0.040		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V84

MODEPSTP MODE RATING OF PRACTICE AFTER READING V84 DEFINE

PRACTICE Rating

FREQUENCY / CELL CHI2 / PERCENT / ROW PCT / COL PCT	Yes (Defines Outcomes of the Innovation Process) 1	No 2	TOTAL
0 Low	10	14	24
	0.3	0.3	
	18.87	26.42	45.28
	41.67	58.33	
	38.46	51.85	
1 High	16	13	29
	0.2	0.2	
	30.19	24.53	54.72
	55.17	44.83	
	61.54	48.15	
TOTAL	26	27	53
	49.06	50.94	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	0.958	DF= 1	PROB=0.3276
PHI	-0.134		
CONTINGENCY COEFFICIENT	0.133		
CRAMER'S V	0.134		
LIKELIHOOD RATIO CHISQUARE	0.962	DF= 1	PROB=0.3267
CONTINUITY ADJ. CHI-SQUARE	0.494	DF= 1	PROB=0.4820
FISHER'S EXACT TEST (1-TAIL)			PROB=0.2413
(2-TAIL)			PROB=0.4117
GAMMA	-0.266	ASE1=	0.259
KENDALL'S TAU-B	-0.134		
STUART'S TAU-C	-0.134	ASE1=	0.135
SOMER'S D C R	-0.135	ASE1=	0.137
SOMER'S D R C	-0.134	ASE1=	0.135
PRODUCT MOMENT CORRELATION	-0.134		
SPEARMAN CORRELATION	-0.134		
LAMBDA ASYMMETRIC C R	0.115		
LAMBDA ASYMMETRIC R C	0.042		
LAMBDA SYMMETRIC	0.080		
UNCERTAINTY COEFFICIENT C R	0.013		
UNCERTAINTY COEFFICIENT R C	0.013		
UNCERTAINTY COEFFICIENT SYM	0.013		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V206

MODEPSTP MODE RATING OF PRACTICE AFTER READING V206 USED F

PRACTICE Rating	Uses Formal Data Collection Techniques: Yes (1)	No (2)	TOTAL
0 Low	10	14	24
	0.0	0.0	
	18.87	26.42	45.28
	41.67	58.33	
	43.48	45.67	
1 High	13	16	29
	0.0	0.0	
	24.53	30.19	54.72
	44.83	55.17	
	56.52	53.33	
TOTAL	23	30	53
	43.40	55.60	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	0.053	DF= 1	PROB=0.8172
PHI	-0.032		
CONTINGENCY COEFFICIENT	0.032		
CRAMER'S V	0.032		
LIKELIHOOD RATIO CHISQUARE	0.053	DF= 1	PROB=0.8172
CONTINUITY ADJ. CHI-SQUARE	0.002	DF= 1	PROB=0.9623
FISHER'S EXACT TEST (1-TAIL)			PROB=0.5193
(2-TAIL)			PROB=1.0000
GAMMA	-0.064	ASE1= 0.278	
KENDALL'S TAU-B	-0.032		
STUART'S TAU-C	-0.031	ASE1= 0.135	
SOMER'S D C|R	-0.032	ASE1= 0.137	
SOMER'S D R|C	-0.032	ASE1= 0.138	
PRODUCT MOMENT CORRELATION	-0.032		
SPEARMAN CORRELATION	-0.032		
LAMBDA ASYMMETRIC C|R	0.000		
LAMBDA ASYMMETRIC R|C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C|R	0.001		
UNCERTAINTY COEFFICIENT R|C	0.001		
UNCERTAINTY COEFFICIENT SYM	0.001		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R|C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTP BY V98

MODEPSTP MODE RATING OF PRACTICE AFTER READING V98 QUANTI

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

PRACTICE Rating	Presents Quantitative Tabulations: Yes 1	No 2	TOTAL
0 Low	12	12	24
	0.0	0.0	
	22.64	22.64	45.28
	50.00	50.00	
	48.00	42.86	
1 High	13	16	29
	0.0	0.0	
	24.53	30.19	54.72
	44.83	55.17	
	52.00	57.14	
TOTAL	25	28	53
	47.17	52.83	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	0.141	DF= 1	PROB=0.7073
PHI	0.052		
CONTINGENCY COEFFICIENT	0.052		
CRAMER'S V	0.052		
LIKELIHOOD RATIO CHISQUARE	0.141	DF= 1	PROB=0.7073
CONTINUITY ADJ. CHI-SQUARE	0.010	DF= 1	PROB=0.9211
FISHER'S EXACT TEST (1-TAIL)			PROB=0.4604
(2-TAIL)			PROB=0.7858
GAMMA	0.103	ASE1= 0.274	
KENDALL'S TAU-B	0.052		
STUART'S TAU-C	0.051	ASE1= 0.136	
SOMER'S D C R	0.052	ASE1= 0.138	
SOMER'S D R C	0.051	ASE1= 0.137	
PRODUCT MOMENT CORRELATION	0.052		
SPEARMAN CORRELATION	0.052		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C R	0.002		
UNCERTAINTY COEFFICIENT R C	0.002		
UNCERTAINTY COEFFICIENT SYM	0.002		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

TABLE OF MODEPSTP BY V101

MODEPSTP MODE RATING OF PRACTICE AFTER READING V101 FIGURE

FREQUENCY
CELL CHI2 Presents Figures or Graphs
PERCENT
ROW PCT
COL PCT

PRACTICE Rating	Yes 1	No 2	TOTAL
0 Low	10	14	24
	0.1	0.1	
	18.87	26.42	45.28
	41.67	58.33	
	41.67	48.28	
1 High	14	15	29
	0.1	0.0	
	26.42	28.30	54.72
	48.28	51.72	
	58.33	51.72	
TOTAL	24	29	53
	45.28	54.72	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	0.232	DF= 1	PROB=0.6304
PHI	-0.066		
CONTINGENCY COEFFICIENT	0.066		
CRAMER'S V	0.066		
LIKELIHOOD RATIO CHISQUARE	0.232	DF= 1	PROB=0.6301
CONTINUITY ADJ. CHI-SQUARE	0.042	DF= 1	PROB=0.8384
FISHER'S EXACT TEST (1-TAIL)			PROB=0.4197
(2-TAIL)			PROB=0.7826
GAMMA	-0.133	ASE1=	0.273
KENDALL'S TAU-B	-0.066		
STUART'S TAU-C	-0.066	ASE1=	0.135
SOMER'S D C R	-0.066	ASE1=	0.137
SOMER'S D R C	-0.066	ASE1=	0.137
PRODUCT MOMENT CORRELATION	-0.066		
SPEARMAN CORRELATION	-0.066		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C R	0.003		
UNCERTAINTY COEFFICIENT R C	0.003		
UNCERTAINTY COEFFICIENT SYM	0.003		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V100

MODEPSTT MODE RATING OF THEORY AFTER READING V100 CHRONOLO

THEORY Rating	Uses Chronologies: Yes (1)	No (2)	TOTAL
0 Low	13	25	38
	0.0	0.0	
	24.53	47.17	71.70
	34.21	65.79	
	72.22	71.43	
1 High	5	10	15
	0.0	0.0	
	9.43	18.87	28.30
	33.33	66.67	
	27.78	28.57	
TOTAL	18	35	53
	33.96	66.04	100.00

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	0.004	DF= 1	PROB=0.9516
PHI	0.008		
CONTINGENCY COEFFICIENT	0.008		
CRAMER'S V	0.008		
LIKELIHOOD RATIO CHISQUARE	0.004	DF= 1	PROB=0.9515
CONTINUITY ADJ. CHI-SQUARE	0.068	DF= 1	PROB=0.7939
FISHER'S EXACT TEST (1-TAIL)			PROB=0.6082
(2-TAIL)			PROB=1.0000
GAMMA	0.020	ASE1=	0.323
KENDALL'S TAU-B	0.008		
STUART'S TAU-C	0.007	ASE1=	0.117
SOMER'S D C R	0.009	ASE1=	0.144
SOMER'S D R C	0.008	ASE1=	0.130
PRODUCT MOMENT CORRELATION	0.008		
SPEARMAN CORRELATION	0.008		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C R	0.000		
UNCERTAINTY COEFFICIENT R C	0.000		
UNCERTAINTY COEFFICIENT SYM	0.000		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V145

MODEPSTT MODE RATING OF THEORY AFTER READING V145 IS AN EX

THEORY Rating	Appears to be an Explanatory Study: Yes (1)	No (2)	TOTAL
0 Low	26	12	38
	0.3	0.8	
	49.06	22.64	71.70
	68.42	31.58	
	65.00	92.31	
1 High	14	1	15
	0.6	2.0	
	26.42	1.89	28.30
	93.33	6.67	
	35.00	7.69	
TOTAL	40	13	53
	75.47	24.53	100.00

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

STATISTICS FOR 2-WAY TABLES

WARNING: OVER 20% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5.
TABLE IS SO SPARSE THAT CHI-SQUARE MAY NOT BE A VALID TEST.

CHI-SQUARE	3.606	DF= 1	PROB=0.0576
PHI	-0.261		
CONTINGENCY COEFFICIENT	0.252		
CRAMER'S V	0.261		
LIKELIHOOD RATIO CHISQUARE	4.306	DF= 1	PROB=0.0380
CONTINUITY ADJ. CHI-SQUARE	2.385	DF= 1	PROB=0.1225
FISHER'S EXACT TEST (1-TAIL)			PROB=0.0547
(2-TAIL)			PROB=0.0801
GAMMA	-0.732	ASE1=	0.254
KENDALL'S TAU-B	-0.261		
STUART'S TAU-C	-0.232	ASE1=	0.085
SOMER'S D C|R	-0.249	ASE1=	0.099
SOMER'S D R|C	-0.273	ASE1=	0.105
PRODUCT MOMENT CORRELATION	-0.261		
SPEARMAN CORRELATION	-0.261		
LAMBDA ASYMMETRIC C|R	0.000		
LAMBDA ASYMMETRIC R|C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C|R	0.073		
UNCERTAINTY COEFFICIENT R|C	0.068		
UNCERTAINTY COEFFICIENT SYM	0.070		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R|C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V84

MODEPSTT MODE RATING OF THEORY AFTER READING V84 DEFINES

THEORY Rating		Defines Outcomes of the Innovation Process: Yes (1)	No (2)	TOTAL
0 Low	FREQUENCY	17	21	38
	CELL CHI2	0.1	0.1	
	PERCENT	32.08	39.62	71.70
	ROW PCT	44.74	55.26	
	COL PCT	65.38	77.78	
1 High	FREQUENCY	9	6	15
	CELL CHI2	0.4	0.4	
	PERCENT	16.98	11.32	28.30
	ROW PCT	60.00	40.00	
	COL PCT	34.62	22.22	
TOTAL		26	27	53
		49.06	50.94	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	1.003	DF= 1	PROB=0.3167
PHI	-0.138		
CONTINGENCY COEFFICIENT	0.136		
CRAMER'S V	0.138		
LIKELIHOOD RATIO CHISQUARE	1.007	DF= 1	PROB=0.3156
CONTINUITY ADJ. CHI-SQUARE	0.485	DF= 1	PROB=0.4863
FISHER'S EXACT TEST (1-TAIL)			PROB=0.2434
(2-TAIL)			PROB=0.3718
GAMMA	-0.299	ASE1=	0.282
KENDALL'S TAU-B	-0.138		
STUART'S TAU-C	-0.124	ASE1=	0.123
SOMER'S D C R	-0.153	ASE1=	0.150
SOMER'S D R C	-0.124	ASE1=	0.123
PRODUCT MOMENT CORRELATION	-0.138		
SPEARMAN CORRELATION	-0.138		
LAMBDA ASYMMETRIC C R	0.115		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.073		
UNCERTAINTY COEFFICIENT C R	0.014		
UNCERTAINTY COEFFICIENT R C	0.016		
UNCERTAINTY COEFFICIENT SYM	0.015		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTT BY V204

MODEPSTT MODE RATING OF THEORY AFTER READING V204 MULTIPLE

THEORY Rating	Uses Multiple Sources of Evidence: Yes (1)	No (2)	TOTAL
0	19	19	38
	0.0	0.0	
	35.85	35.85	71.70
	50.00	50.00	
	70.37	73.08	
1	8	7	15
	0.0	0.0	
	15.09	13.21	28.30
	53.33	45.67	
	29.63	26.92	
TOTAL	27	25	53
	50.94	49.06	100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	0.048	DF= 1	PROB=0.8269
PHI	-0.030		
CONTINGENCY COEFFICIENT	0.030		
CRAMER'S V	0.030		
LIKELIHOOD RATIO CHISQUARE	0.048	DF= 1	PROB=0.8269
CONTINUITY ADJ. CHI-SQUARE	0.007	DF= 1	PROB=0.9312
FISHER'S EXACT TEST (1-TAIL)			PROB=0.5346
(2-TAIL)			PROB=1.0000
GAMMA	-0.057	ASE1=	0.304
KENDALL'S TAU-B	-0.030		
STUART'S TAU-C	-0.027	ASE1=	0.124
SOMER'S D C R	-0.033	ASE1=	0.152
SOMER'S D R C	-0.027	ASE1=	0.124
PRODUCT MOMENT CORRELATION	-0.030		
SPEARMAN CORRELATION	-0.030		
LAMBDA ASYMMETRIC C R	0.000		
LAMBDA ASYMMETRIC R C	0.000		
LAMBDA SYMMETRIC	0.000		
UNCERTAINTY COEFFICIENT C R	0.001		
UNCERTAINTY COEFFICIENT R C	0.001		
UNCERTAINTY COEFFICIENT SYM	0.001		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

TABLE OF MODEPSTQ BY V84

MODEPSTQ MODE RATING OF QUALITY AFTER READING V84 DEFINES

FREQUENCY CELL CHI2 PERCENT ROW PCT COL PCT	Defines Outcomes of the Innovation Process Yes 1	 No 2	TOTAL
QUALITY Rating 0 Low	10 0.4 18.87 40.00 38.46	15 0.4 28.30 60.00 55.56	25 47.17
1 High	16 0.4 30.19 57.14 61.54	12 0.4 22.64 42.86 44.44	28 52.83
TOTAL	26 49.06	27 50.94	53 100.00

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	1.553	DF= 1	PROB=0.2127
PHI	-0.171		
CONTINGENCY COEFFICIENT	0.169		
CRAMER'S V	0.171		
LIKELIHOOD RATIO CHISQUARE	1.551	DF= 1	PROB=0.2115
CONTINUITY ADJ. CHI-SQUARE	0.943	DF= 1	PROB=0.3315
FISHER'S EXACT TEST (1-TAIL)			PROB=0.1658
(2-TAIL)			PROB=0.2749
GAMMA	-0.333	ASE1= 0.248	
KENDALL'S TAU-B	-0.171		
STUART'S TAU-C	-0.171	ASE1= 0.135	
SOMER'S D C R	-0.171	ASE1= 0.135	
SOMER'S D R C	-0.171	ASE1= 0.135	
PRODUCT MOMENT CORRELATION	-0.171		
SPEARMAN CORRELATION	-0.171		
LAMBDA ASYMMETRIC C R	0.154		
LAMBDA ASYMMETRIC R C	0.120		
LAMBDA SYMMETRIC	0.137		
UNCERTAINTY COEFFICIENT C R	0.021		
UNCERTAINTY COEFFICIENT R C	0.021		
UNCERTAINTY COEFFICIENT SYM	0.021		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

CROSSTABS OF KEY VARIABLES IN EACH MODEL

TABLE OF MODEPSTQ BY V204

MODEPSTQ MODE RATING OF QUALITY AFTER READING V204 MULTIPL

QUALITY Rating	Uses Multiple Sources of Evidence: Yes (1)	No (2)	TOTAL
0 Low	14	11	25
	0.1	0.1	
	25.42	20.75	47.17
	56.00	44.00	
	51.85	42.31	
1 High	13	15	28
	0.1	0.1	
	24.53	28.30	52.83
	46.43	53.57	
	48.15	57.69	
TOTAL	27	26	53
	50.94	49.06	100.00

FREQUENCY
CELL CHI2
PERCENT
ROW PCT
COL PCT

STATISTICS FOR 2-WAY TABLES

CHI-SQUARE	0.484	DF= 1	PROB=0.4865
PHI	0.095		
CONTINGENCY COEFFICIENT	0.095		
CRAMER'S V	0.096		
LIKELIHOOD RATIO CHISQUARE	0.485	DF= 1	PROB=0.4862
CONTINUITY ADJ. CHI-SQUARE	0.177	DF= 1	PROB=0.6740
FISHER'S EXACT TEST (1-TAIL)			PROB=0.3373
(2-TAIL)			PROB=0.5857
GAMMA	0.190	ASE1=	0.267
KENDALL'S TAU-B	0.096		
STUART'S TAU-C	0.095	ASE1=	0.136
SOMER'S D C R	0.096	ASE1=	0.137
SOMER'S D R C	0.095	ASE1=	0.137
PRODUCT MOMENT CORRELATION	0.096		
SPEARMAN CORRELATION	0.096		
LAMBDA ASYMMETRIC C R	0.077		
LAMBDA ASYMMETRIC R C	0.040		
LAMBDA SYMMETRIC	0.059		
UNCERTAINTY COEFFICIENT C R	0.007		
UNCERTAINTY COEFFICIENT R C	0.007		
UNCERTAINTY COEFFICIENT SYM	0.007		

ASE1 IS THE ASYMPTOTIC STANDARD ERROR.
R C MEANS ROW VAR DEPENDENT ON COLUMN VAR.

Appendix J

THREE-WAY CONTINGENCY RESULTS FOR SECOND-LINE VARIABLES
(Each Second-Line Correlate Related to Global Rating,
Holding Pertinent First-Line Correlate Constant)

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