Designing a Case Study Protocol for Application in IS research

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Abstract

A review of the literature has shown that there is a growing call for the use of the case research method in IS research. However, it has been noted that there are few guidelines on how to conduct case research in the field of IS, particularly with respect to the development of Case Study Protocols. This article therefore endeavours to overcome this shortcoming by presenting a set of guidelines that may be used by in the development of such protocols. In essence, a Case Study Protocol (CSP) is a set of comprehensive guidelines that is an integral part of the case research design and contains the procedures for conducting the research, the research instrument itself, and the guidelines for data analysis. By developing a CSP, researchers are forced to consider all issues relevant to their research and this in turn contributes to more rigorous (case) research that has greater internal and external validity.

Keywords

Case Research, Case Study Protocol, Case Research Instruments, IS research

INTRODUCTION

In all academic and practical enquiry, there is a need for researchers to have a strategy that guides them in the execution of the research. In the sciences, research designs are typically structured processes that have been tried and tested many times and over an extended period. Consequently, it is expected that if one were to apply those processes to a given problem, the

results obtained would in each case be similar, if not identical. This characteristic allows for repeatability in method and contributes greatly to the validity and generalisability of said results (Sekaran 2000).

However, when one tackles an unstructured problem, scientific methods may not be appropriate and it is then necessary to develop a more suitable process with which to conduct the enquiry. This 'process' is what is termed the *research design* (Pare and Elam 1997; Cavaye 1996). Developing a unique research design has the advantage that it enables the researcher to adopt and adapt the most suitable research methods to explicate and understand the phenomena under investigation (Eisenhardt 1989).

The guidelines presented in this article are practical and have been extensively tested. Furthermore, the authors have successfully utilised the guidelines provided in this article to develop a Case Study Protocol (CSP) that facilitated the conduct of case research in a series of organisations within the Australian Financial Services Sector. Further, as the CSP does not stand alone and needs an overall research framework within which it can be applied, the development of a CSP itself also contributes significantly to the development (and execution) of the overall research design. For instructive purposes, the Eisenhardt (1989) framework will be used to demonstrate how a CSP was applied in the development of a conceptual model.

Further, despite growing calls for the use of case study research and evidence that it is becoming more acceptable as an IS research method, there are still few guidelines for conducting case research in IS (Trauth 2001). Furthermore, Chen and Hirscheim (2004) recently demonstrated that even though there may be a growing acceptability of interpretive approaches to research, the positivist paradigm is still very dominant. Given the foregoing, there is a need to ensure quality in the use of research designs that employ methods other than the survey so that these methods may gain more acceptance and use in IS research.

Thus, this article attempts to bridge that gap by providing such a set of guidelines and hence focuses on explaining the concept of a CSP and provides IS researchers with a set of guidelines which they may utilise to develop CSPs and associated instruments that are suitable for IS research.

Why Use a Protocol?

A Case Study Protocol (CSP) is a set of guidelines that can be used to structure and govern a case research project (Yin 1994). It therefore outlines the procedures and rules governing the conduct of researcher(s) before, during and after a case research project. In addition, a case study protocol can be particularly useful in research projects involving multiple researchers as it ensures uniformity in data collection and analysis (Yin 1994). CSPs also ensure uniformity in research projects where data is to be collected in multiple locations over an extended period. In addition to procedures, a CSP also contains the research instrument(s) that will be used to collect data during the research project. Depending on the research design and the problem(s) under consideration, the research instrument may either be quantitative, qualitative, or a combination of both, if the research design allows for a pluralist approach (Mingers 2001).

EISENHARDT FRAMEWORK

As alluded to earlier, the case research design proposed by Eisenhardt (1989) provides the context in which the guidelines for the development of a CSP as reported in this article will be discussed. However, it should be noted that these guidelines are sufficiently flexible that they may be adopted and adapted to other case research frameworks such as that of Yin (1994). The Eisenhardt framework was selected as it was found to be most ideal for use in IS research and when there is a need to build theory through the development of a conceptual model. The Eisenhartdt framework is illustrated in Figure 1 and its key features summarised in Table 1.

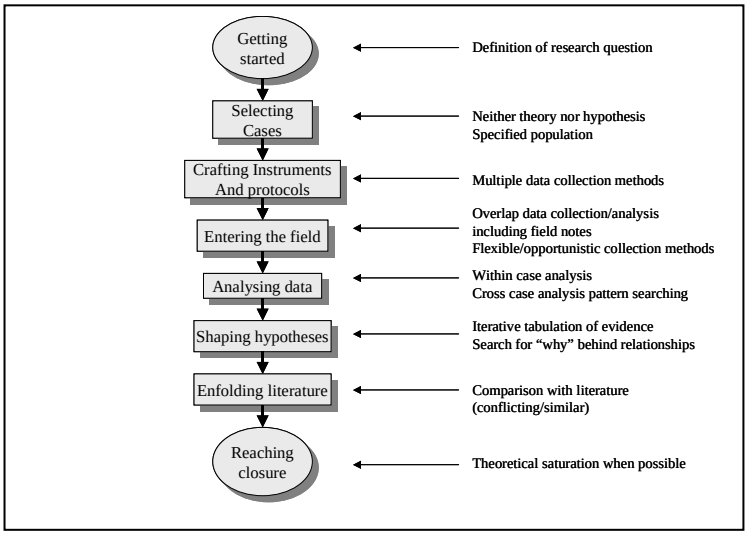

Figure 1: Original research framework (Eisenhardt 1989)

Phase	Stage	Activity	Reason
Phase One	Getting started	• Define of research question(s) • Possible a priori constructs	• Focuses efforts • Provides better grounding of measures
	Selecting cases	• Neither theory nor hypothesis • Specified population • Theoretical sampling	• Retains theoretical flexibility • Constrains extraneous variation and sharpens external validity
	Crafting instruments and protocols	• Multiple data collection method • Qualitative and quantitative	• Triangulation strengthens grounding of theory
Phase Two	Entering the field	• Iterative data collection and analysis • Flexible opportunistic data collection	• Speeds analysis • Facilitates emergent themes
	Analysing the data	• Within-case • Cross case analysis	• Gains familiarity with data and preliminary theory generation • Looks beyond initial impressions
	Shaping hypothesis	• Iterative tabulation of evidence for each construct • Replication logic across cases • Search for the cause, ie the 'why' behind relationships	• Sharpens construct definition, validity and measurability • Confirms, extends and sharpens theory • Builds internal validity
Phase Three	Enfolding the literature	• Comparison with conflicting literature • Comparison with similar literature	• Builds internal validity, raises theoretical level and sharpens construct definition • Improves generalisability, raises theoretical level and sharpens construct definition
	Reaching closure	Theoretical saturation	Ends process when marginal improvement becomes small.

Table 1: Framework for Case Research (adapted from Eisenhardt (1989))

To simplify execution, the Eisenhardt framework may be broken into three phases, 1) Model development (Phase 1), 2) Model testing (Phase 2), and 3) Model refinement (Phase 3) as shown in Table 1.

APPLICATION OF CASE STUDY PROTOCOL

The three phases of the Eisenhardt framework will now be described briefly to demonstrate the application of the CSP within this framework. It should be noted that the focus of this article remains primarily on the first phase, particularly on the task of crafting the CSP and research instrument. The inclusion and description of the other two phases is for completeness. Further, to enhance the explanation, an example of the use of such a protocol in the development of a conceptual model will be presented and discussed briefly.

Phase 1: Model Development

In this phase, the deliverables are a clear problem statement and the development of a conceptual model. To achieve these deliverables, the following issues and tasks should be addressed:

1. Comprehensive review of the literature: This activity is an integral part of the research project and although listed as a phase one activity, is continuous throughout the research project.
2. Develop research model: This process involves a number of activities, including the comprehensive review of relevant literature, an investigation and search for an appropriate research method, consultation with academics and key players within the industry studied. The model forms the basis upon which the research is conducted and provides the framework against which data is analysed.

3. Craft instrument(s) and protocol: The use of a CSP is crucial to the proper execution of case research (Yin 1994). The approach recommended in this article involves the inclusion of the research instrument(s) within the CSP.

4. Establish initial contact with industry and select sample: Ideally the procedures for initial contact with potential participants should be contained in the CSP, including guidelines for sample selection. Samples may be selected through theoretical or random sampling techniques as deemed appropriate by the researcher. Although there are no fixed rules about the number of cases necessary, it is recommended that, for manageability, cases should be limited to between six and ten (Eisenhardt 1989; Yin 1994).

Once the research problems have been clearly defined and a conceptual model has been proposed, the research then moves into the second phase in which the model is tested.

Phase 2: Model Testing

In the second phase, the conceptual model is further developed using data collected from the cases in the chosen sample. Activities in this phase include:

Data Collection

Data collection should be performed with two key objectives for analysis in mind:

- Triangulation of data from multiple sources.
- Triangulation of perspectives from multiple participants.

To facilitate data collection it is recommended that participants be provided with a copy of the research instrument (embedded in the CSP) prior to their scheduled interviews to familiarise them with the questions. Therefore, they are not surprised or made uncomfortable by any of the questions, and can consider the questions beforehand, thus enabling them to provide

quicker and better answers during the actual interview. These research tactics contribute to higher quality data and help to manage possible time constraints by ensuring smoother interviews. Thus, data collection from each case is conducted utilising the CSP and cases can be engaged sequentially or in parallel depending on the research design.

Data Analysis

One of the key features of case research is its ability to allow for iterative data collection and analysis using a variety of analytic techniques (Miles and Huberman 1994). These processes of successive approximation continue until theoretical saturation has been attained and the iteration process does not bring forward any new ideas (Eisenhardt 1989).

To bring structure to the complex task of analysing the significant amount of qualitative data generated by case research, a process of (qualitative) analysis is suggested. The exemplar utilised in this article (Figure 2) was derived utilising guidelines by Miles and Huberman (1994) and Yin (1994) and can be easily incorporated into the CSP. In this example, where a model was being tested and refined, the main data codes were established a priori and augmented in the analysis. In a purely positivist study these codes would all be defined a priori, whereas in a purely Interpretivist study they would arise from the analysis (Miles and Huberman 1994). Quantitative data on the other hand can be analysed by various statistical techniques as necessary.

According to Yin (1994), the a priori consideration of data analysis methods processes is critical to the development and execution of any research design as it forces the researcher to consider the type of data that will be collected, its purpose and how that data will be analysed.

Phase 3: Model Refinement

The final stage of the research project consists of activities directed towards refining and finalising the conceptual model. Once all testing has been completed, the resultant model will

need to be compared with existing models and the literature to verify its ability to explain the problem under investigation. Thus the main deliverable from this phase should be a more complete model that is both robust and generalisable. Consequently, the research will have been deemed to have reached closure once theoretical saturation has been reached and no new information can be deduced (Eisenhardt 1989).

To facilitate the attainment of saturation, the research design allows for a degree of iteration between the first two tasks in the third and final phase of the research design (Figure 1).

The following section describes the type of research instruments that may be developed for use with the CSP followed by the presentation of the CSP proper.

RESEARCH INSTRUMENTS

One of the key strengths of the case research method is flexibility and adaptability that enables the use of single or multiple methods in the investigation a given research problem (Cavaye 1996). These research instruments can be incorporated into the CSP.

Developing and Testing Research Instruments

Ideally, the following guidelines should be considered and applied when developing research instruments (Sekaran 1992):

- *Principles of wording*: including appropriateness of questions, level of sophistication of questions, sequence of questions, type/form of questions and any personal data that respondents may be asked to provide.
- *Principles of measurement*: Including scales/scaling techniques, a thorough assessment of overall validity and reliability of research instrument and a measure of the quality of data collected (see also Neuman (2000)).

- *General appearance/presentation of questionnaire*: including good readability, clear/concise instructions and an overall neat presentation.

Once complete, all research instruments should be tested prior to application. It should be noted that the treatment of case research instruments is somewhat different from survey instruments. In the survey method for instance, a pilot case is used as a pre-test. In case research however, the pilot case is used in the development of the case research instrument to assist "the investigator to develop relevant lines of questions – possibly even providing some conceptual clarification for the research design as well" (Yin 1994).

The foregoing activities when applied consistently should result in very robust research instruments that are technically sound and reliable.

CASE RESEARCH PROTOCOL

Structure and Content of Protocol

Eisenhardt (1989) and Yin (1994) both highlighted the need for a case study protocol that can be used as a guide in conducting case research. According to Miles and Huberman (1994), such a protocol should outline the procedures and rules that govern the conduct of the researcher and the research project. Despite the averred importance and criticality of case study protocols, it was surprising that there appear to be very few established protocols published in the literature relating to case research. Consequently, the CSP proposed here is unique. The structure and content of the CSP is summarised in Table 2.

The unique nature, flexibility and adaptability of the CSP guidelines provided here therefore makes this a significant contribution to the discipline of IS in general and the study of IS research methods in particular. The main features of a CSP will now be discussed (refer to Table 2).

Section	Contents	Purpose
Preamble	• Confidentiality and data storage • Publication • Documentation • Layout of protocol	Contains information about the purpose of the protocol, guidelines for data and document storage, publication
General	• Overview of research project • The case research method	Provides a brief overview of the research project and the case research method.
Procedures	• Initial approach to organisations o Selection of cases o Number of cases o Establishing contact • Scheduling of field visits • Length of sessions • Equipment and stationery	Detailed description of the procedures for conducting each case. These procedures should be utilised to ensure uniformity in the data collection process and consequently facilitate both within case and cross case analyses
Research Instrument(s)	• Research instrument(s) that may either be: a) Qualitative – interview guides utilising either open-ended or close-ended questions b) Quantitative – survey questionnaire applied in face to face interviews	Research instruments developed utilising guidelines by Neuman (2000) and Sekaran (2000). It is recommended that these research instrument be highly structured to facilitate the data collection process and uniformity in the collection of said data
Data analysis guidelines	• Overview of data analysis processes • Details regarding: a) How convergence of data from multiple sources will be achieved b) How triangulation of perspectives from multiple participants will be achieved • Description of 'Within case' analysis process: a) Descriptive Data b) Explanatory Data c) Individual case report • Description of "Cross case" analysis process • Description of 'Cross sectoral' analysis process (where necessary) • Data schema a) Summary of primary data types, sources and purpose b) Summary of secondary data types, sources and purpose • Description of data displays that will be used in analysis • A priori list of codes that will be used during qualitative analysis	Guidelines for data analysis based on guidelines such as those provided by Miles and Huberman (1994), Yin (1994) and Neuman (2000).
Appendix	• Participation request letter	Template letter sent to potential participants inviting them to participate

Table 2: Outline of Case Study Protocol

Section 1 – Preamble

The first section of the protocol contains general information about the protocol, guidelines for data and document storage, and publication.

Section 2 – General

The second section of the protocol provides an overview of the research project and the case research method, in terms of (a) what the aims of the research project are, (b) why it is important to conduct the research, and (c) how the research is to be conducted.

Section 3 – Procedures

The third second section of the protocol describes the procedures that will govern the conduct of the researcher during the course of data collection. The procedures should detail the manner in which organisations will be contacted, how field visits are to be scheduled and conducted and any equipment or stationery that will be required. Yin (1994) particularly recommends using uniform procedures when multiple researchers and/or multiple cases are involved. Thus, in any empirical investigation, uniformity of method in data collection contributes greatly to rigour of method and validity of results (Miles and Huberman 1994).

Section 4 – Research Instrument

The fourth section of the protocol contains the actual research instrument used to collect data in the selected cases. As suggested earlier, data may be collected from multiple sources. The use of more than one data source is a technique known as triangulation, that is highly recommended by many researchers (Miles and Huberman 1994; Yin 1994; Neuman 2000) as a mechanism for increasing both the reliability and validity of qualitative research (Chau 1999). Data from multiple sources should therefore be analysed using both inductive and deductive techniques to achieve convergence on a given set of facts.

Section 5 – Data Analysis Guidelines

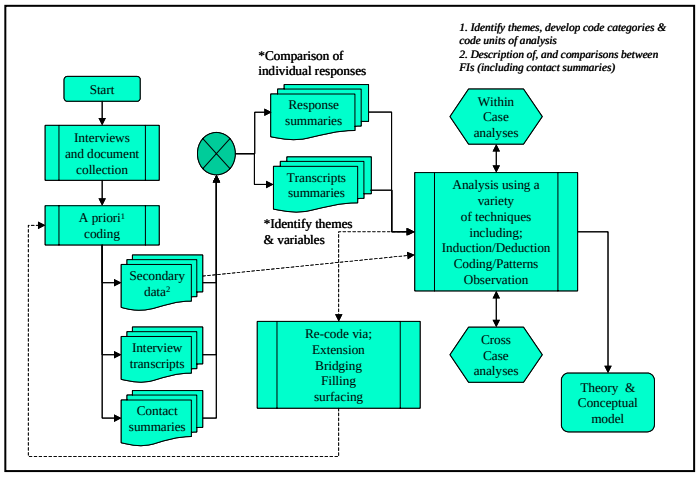

Figure 2: Data analysis process

This section of the protocol outlines the strategies and techniques for analysing the data. Figure 1 illustrates an exemplar data analysis process that may be included in a CSP. The exemplar process highlighted in this article was developed using recommendations by Miles and Huberman (1994) who argued that by developing such strategies and techniques a priori, a researcher was forced to consider the data that would be collected and its relevance to the research.

The process illustrated in figure 2 begins with the a priori coding of themes and pattern based on the case research instrument(s) (Yin 1994). These codes will later be used in the analysis of individual transcripts. Thus, individual transcript summaries are created from each participant's interview transcript and case response summaries are created for each case. This process is an analytical technique known as 'reduction' and helps researchers to develop a clearer picture of participants' responses to key questions posed during the interview (Miles and Huberman 1994). Similarly, a case response summary is a collation of all participants' individual responses to each question combined into a single document to facilitate comparative analysis of participant responses.

Together, these two sets of analyses facilitate the construction of case reports. Transcript and Response summaries are therefore useful for ‘within-case’ analyses and case reports for ‘cross-case’ analyses respectively. This process is described in detail in Figure 3 where interviews were conducted with sample participants such as Chief Executive Officers, Chief Financial Officers and Chief Information Officers in a selected industry.

In addition, analysis of secondary data, which also contributes to building the case reports, should be conducted in parallel to the analysis of interview transcripts described above. Secondary data may be collected from various sources and include, financial data (annual reports and financial statements), IS investment data, project documents, minutes of meetings to name a few. Secondary data may be analysed utilising the same techniques described earlier an in addition, analytical techniques such as ratio, trend and statistical techniques may also be used (Stake 1995).

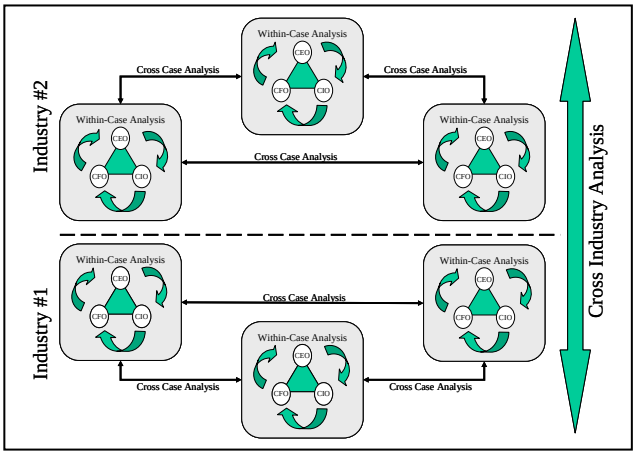

Figure 3: Within Case and Cross Case Analysis

Section 6 - Appendix

This section contains a sample of the participation request letter that should be sent to potential participants soliciting their participation in the study. This letter can be sent either by

email or by general post and should be personally addressed to potential participants as this enhances the probability of acceptance to participate by potential participants.

The final section of this article will now consider the important issues of reliability and validity to demonstrate how these issues may be incorporated into the development of the CSP.

RELIABILITY AND VALIDITY OF RESEARCH

Quality in the conduct of research has long been an issue of concern for IS researchers, (Galliers 1990; Chau 1999). Central to the idea of quality in research and its conduct are the concepts of Reliability and Validity.

Neuman (2000) defined reliability as the "…dependability or consistency of the measure of a variable". The foregoing definition suggests that a reliable instrument will produce the same or similar results when applied repeatedly. Neuman (2000) therefore identified the three constituents of reliability as stability, representative and equivalence reliability, that if addressed will result in dependable instruments that are accurate, and provide consistent measurement. For example, it is important that research instruments are clear and unequivocal so that respondents interpret them correctly. Further, it is also important to use multi-item measures that "increase the level of measurement" to fully capture the factors that make up a variable (Neuman 2000).

Measurement Validity

According to Neuman (2000), measurement validity depicts the 'truthfulness' of a research instrument. Consequently, a research instrument should have both internal and external validity. Neuman (2000) identifies the four components of validity as, content, criterion, concurrent and predictive validity and suggests that addressing all of these components will result in an instrument more closely approximates a true measure.

Effectively, any research design that incorporates the concept of reliability ensures repeatability or recurrence of results/findings under similar conditions, whereas incorporating validity ensures a higher level of confidence with the research instrument such that it can be argued that the issues being researched and reported by a researcher match reality. This is facilitated by the CSP.

BENEFITS OF CSP

The above methods were successfully utilised in conducting case research. Consequently, the authors utilised a number of techniques to ensure that the expected benefits were realised. These benefits included more effective/efficient data collection and enhanced communication with participants (Miles and Huberman 1994; Yin 1994).

During the development stage, the CSP and research instrument were discussed with potential participants to obtain feedback regarding the structure, content and usability. Feedback obtained was utilised to further refine the CSP and research instrument. It was observed that there were minimal changes suggested by the potential participants thus suggesting that research instrument was well structured and comprehensive.

In addition, during the data collection stage, the CSP protocol was discussed with participants prior to the actual data collection process. This approach was detailed as part of the procedures within the CSP. It was observed by all participants involved in the study that this approach was beneficial. It facilitated communication between researchers and participants, and the participants gained an appreciation of the overall research project, as well as the data collection and analysis processes. This contributed to the quality of results obtained.

CONCLUSIONS

The use of the case research method in IS research has gained mainstream acceptance as an empirical research method that can be used to develop theory and conceptual models that are

novel and grounded in the IS literature. Consequently, there have been a number of articles written arguing the suitability of case research and its applicability to IS research (Pare and Elam 1997; Pare 2001; Shanks 2002). However, it has been noted that despite the growing acceptance of the use of case research in IS research, there do not appear to be any well documented guidelines on how to develop Case Study Protocols that will enable IS researchers to efficiently and effectively execute their case research strategies and thus gain the maximum benefit from this research method. Furthermore, the lack of consistency in method has been identified as one of the more serious shortcomings in the development of the discipline of IS (Mason, Mckenney and Copeland 1997; Watson 2001).

This article has therefore attempted to address these shortcomings by presenting a set of highly flexible and adaptable guidelines that may be used to design Case Study Protocols for use in IS research. These guidelines are not only practical and effective, they have already been successfully applied in prior research by the authors.

The authors therefore recommend that IS researchers adopt such guidelines in order to develop uniformity and consistency in the conduct of IS research and thus contribute to the development of a tradition of cumulative research within the discipline oaf IS.

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