



# An Investigation into Methods and Concepts of Qualitative Research in Information System Research

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## Abstract

This paper is an initial review of literature, investigating qualitative research, to show its relevance in information system disciplines. Qualitative research involves the use of qualitative data, such as interviews, documents, and participant observation data, to understand and explain social phenomena. Qualitative research can be found in many disciplines and fields, using a variety of approaches, methods and techniques. In Information Systems (IS), there has been a general shift in information system research away from technological to managerial and organizational issues, hence an increasing interest in the application of qualitative research methods. Frequently used methods are the action research, case study, ethnography and grounded theory. Review of each research approaches in qualitative methods, will be discussed. Important considerations in the methods are identified, and cases for each research method are described. Then we will present some benefits and limitations of each method. Based on the result, a framework of an action research was proposed and might be useful in starting a research project in information system using qualitative method.

**Keywords:** Qualitative research, Information system, Action research, Grounded theory, Case study, Ethnography

## 1. Introduction

Methodology deals with the methods and principles used in an activity. Research methodology explained on how the research is done, the methods of data collection, materials used, subjects interviewed, or places visited. It details out the account of how and when the research is carried out. It also gives reasons on why a particular method is use, rather than other methods. There are many references in the IS literature of research in the area of Information System, such as the work of Alavi & Carlson (1992), Benbasat & Weber (1996), Olikowski & Iacono (2001), Yin (2002) and Myers (2006). Research in information systems is a relatively new one and without a research tradition that it can claim to be its own. In an awareness to cover other areas of the information systems spectrum, from technical perspectives of systems design and implementation, to social perspectives of the structural and social consequences of information systems, it lead the way to qualitative approaches, and the use of methodologies imported from those fields. Following a general shift in information system research away from technological to managerial and organizational issues, there is an increasing interest in the application of qualitative research methods as highlighted by Mangan (2004) and Singh et.al (2005). Matsuo et.al (2008) has compiled a series of case studies in answering research queries of an experimental learning theory in managing information theory.

The purpose of this article is to provide a perspective on the methods that could be applied to Information Systems disciplines research. This article addresses the usage of qualitative research method in Information System research. This paper is structured as follows. First we will review the research approaches in qualitative methods. Next we highlight the important considerations in the methods are identified, and cases for each research method in qualitative research are described. Then we put forward discussion on the benefits and limitations of each method and proposed a framework for a qualitative research study in IS. Finally we present some conclusions on the research methodologies in IS.

## 2. Qualitative Research Overview

Research methods can be classified in various ways, Myers (1997) however described that one of the most common

distinctions of research methods is between qualitative and quantitative research methods. Quantitative research methods were originally developed in the natural sciences to study natural phenomena. The focus of quantitative research is objective measures. Data is collected in an objective and replicable manner. Examples of quantitative methods include laboratory experiments, formal methods (e.g. econometrics) and numerical methods such as mathematical modeling. The tools of quantitative research include test performance scores, physiological readings, survey responses and spectrometer readings, Cresswell J. (1994), defined qualitative study as an inquiry process of understanding a social or human problem, based on a complex, holistic picture, formed with words, and reporting in a natural setting. Guba & Lincoln (2000), classified IS research paradigm as positivist, interpretive and engineering as define by Clark (1992) in Table 1. The engineering paradigm in information system is applied here as the result of the development of the application, testing, technology, conceptualization, and prototyping in IS. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions according to Myers (2006) and define with the following characteristics: exploratory, descriptive, emergent, natural setting emphasis on human and qualitative data collection.

### *2.1 Positivist*

Orlikowski and Baroudi (1991) classified IS research as positivist if there was evidence of formal propositions, quantifiable measures of variables, hypothesis testing, and the drawing of inferences about a phenomenon from the sample to a stated population. Yin's (2002), Straub et. al (2004), and the work of Marzanah (2007) has describe on an approach to qualitative research on case study research which is applicable in information system research.

### *2.2 Interpretive*

According to interpretive philosophy, the study of a phenomena involved researcher attempting to understand the complexities of the social work, which involved qualitative techniques, with the aim to develop a rich and complex understanding of each individual's interpretation of the world as stated in Orlikowski & Baroudi, (1991). It uses qualitative methodological and characterized by a belief in a socially constructed, subjectively-based reality, one that is influenced by culture and history. It still retains the ideals of researcher objectivity, and researcher as passive collector and expert interpreter of data. Interpretive methods of research in IS are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" Walsham(1993).

### *2.3 Engineering*

Research conducted within the computer science and engineering involves the conception, design and development of in information system using information technology according to Clark, R. (1997). The new technology is designed to intervene in some setting, or to enable some function to be performed, or some aim to be realized. The design is usually based upon a body of theory, and the technology is usually subjected to some form of testing, in order to establish the extent to which it achieves its aims as described and used in the work of Klien et. al (2006) in the use of group support system with respect to technological implication.

## **3. Qualitative Research Method in Information System**

IS research has been the study of processes related to the development of IS applications and the effects that IS applications have on people, particularly in formal settings such as organizations. The importance of IS research until now, has led to a number of different research approaches and methods, usually adapted from other disciplines such as sociology, natural sciences, and business studies. Harvard colloquium on qualitative IS research methods and QualIT conference in Griffith University in Brisbane on November 2005 have highlighted qualitative research, as a distinctive research approach. Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions. According to Northcutt & McCoy (2004), Myers (2006), and Hesse-Biber & Levy (2006), there are four research methods being used by IS researchers. The research methods are the case study research, ethnography, action research, and grounded theory.

### *3.1 Case Study*

Case study research is the most common qualitative method used in information systems (Alavi and Carlson, 1992). Yin (2002) defines the scope of a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Yin further suggested the following steps techniques for organizing and conducting the case study research. The steps are to determine and define the research questions, to select the cases and determine data gathering and analysis techniques, prepare to collect data, collect data in the field, to evaluate and analyze the data and lastly preparing the report. There are numerous case study research, in the organizational context for the implementation of information systems, to illustrate and investigate theories related to IS and organization.

### 3.2 Ethnography

This is the research method of anthropology with its emphasis on culture. It is undertaken by observation, interviews and examination of documents. In the research, the researchers observe their collaborators without prejudice or prior assumptions. Ethnography is widely used in the study of information systems in organizations, from the study of the development of information systems (Davies & Nielsen, 1992). Ethnography according to Avison and Myers, (1995) is suited to providing information systems researchers with rich insights into the human, social and organizational aspects of information systems development and application. The goal of ethnographic research is to improve our understanding of human thought and action through interpretation of human actions in context. Basic steps recommended as a general framework for an ethnographic study (Rose et al., 1995), used to conduct an ethnographic study. The steps include preparation to understand, familiarize setting goals and access to observe. Field study to establish rapport with managers and users, observe/interview and collect data. Analysis to compile the collected data, quantify data and compile statistics, preparing report and presenting the findings. Randall, D., et al. (1999), explore the issue of 'legacy' through the use of a long-term empirical investigation into how information technology is employed in a major UK bank. The closeness of their investigation into the day-to-day operations of the bank from the perspectives of individual users (using ethnographic techniques) identifies the embedded nature of the technology and the impact of cultural, organizational, and individual employees 'legacy' on organizational and technical change.

### 3.3 Action Research

Action research has been promoted and practiced as one way to conduct empirical research within Information System discipline. Information system action research (Davidson, 1998) is applied research to develop a solution that is of practical value to the people with whom the researchers are working, and at the same time to develop theoretical knowledge of value to a research community. According to Baskerville, R. (1999), information system research in has led to a number of different research approaches and methods, adapted from other disciplines such as sociology, natural sciences, and business studies and is often identified by its dual goal of both improving the organization participating in the research project, and the AR practitioner is expected to apply intervention on this environment. Action Research methodology was normally chosen as a research methodology as it provides the research with an inside and working view of the research matter. AR study done is characterized by the researcher applying positive intervention to the organization, while collecting field data about the organization and the effects of the intervention.

### 3.4 Grounded Theory

Grounded theory is a research method that seeks to develop theory that is grounded in data systematically gathered and analyzed. According to Corbin and Strauss (1990), grounded theory is theory discovery methodology that allows the researcher to develop a theoretical account based on concepts, categories and propositions. There are five phases of grounded theory building: research design, data collection, data ordering, data analysis and literature comparison, and each phase were evaluated against four research quality criteria: construct validity, internal validity, external validity and reliability. Orlikowski, (1993) uses grounded theory research in the findings of an empirical study into two organizations' experiences with the adoption and use of CASE tools over time. The study characterizes the organizations' experiences in terms of processes of incremental or radical organizational change. These findings are used to develop a theoretical framework for conceptualizing the organizational issues around the adoption and use of these tools and issues that have been largely missing from contemporary discussions of CASE tools. Singh et. al (2005) discussed on the challenge of methodological implication of moving from grounded theory to user requirement in IS design.

### 3.5 Results and Discussion

As research method is a strategy of inquiry to research design and data collection. The choice of research method will influence the way in which the researcher collects data. Specific research methods also imply different skills, assumptions and research practices. The main strength and limitations of each research methods are further discussed in Table 2. According to Benbasat et. al (1996), no single research methodology is better than any other methodology, and in order to ensure the quality of information system research, Clarke (1997) listed the following requirements to be present in an IS research: the research method, applied within the scientific, the interpretive or the engineering tradition, the explication of a body of theory, which in most cases needs to reach back into reference disciplines, and also the extension of the theory. This give rise to the following motivation in conducting qualitative research in IS: spending many hours in the field, collecting extensive data, and trying to gain access, rapport, as to gain an "insider" perspective in natural setting, and doing exploratory studies, where variables cannot be identified, theories are not available to explain behavior of participants or their population of study, and theories need to be developed.

The qualitative research does also present some challenges that the researchers might face in using the method. In grounded theory, the challenges for the researchers are to set aside, as much as possible, theoretical ideas or notions so that the analytic, substantive theory can emerge, the researcher must recognize that this is a systematic approach to

research with specific steps in data analysis. The researcher faces the difficulty of determining when categories are saturated or when the theory is sufficiently detailed. The ethnography is challenging to use for the researchers as the researcher needs to have grounding in cultural anthropology, time to collect data is extensive, involving prolonged time in the field, and there is a possibility to be unable to complete the study or be compromised in the study. In case study research, some of the challenges that the researcher must face is that whether to study a single case or multiple cases. The study of more than one case may dilutes the overall due to the lack of depth. In action research methods, lack of agreed criteria for evaluating action research, further complicates the publication review process, and makes this approach a difficult choice for academics. There is also an issue in both ethical and professional problems. Researchers who do not carefully explain their research orientation may mislead clients who are expecting consulting-type performance, creating an ethical breach regarding informed consent.

In the field of IS a variety of research methodologies has been explored by researchers for different aspects of research study depending on the research focus and application domain of the researchers. Whatever research method to use, there must be some way of assuring the quality of the data collected, and the correctness of interpretation. There is also the need of a framework to guide the effort, and to clarify such methodological details, as it will provide a set of guidelines for a good IS research as suggested by Checkland (1991) and Lau (1997). A framework in Table 3 is proposed and has been used by Marzanah (2007) to guide the effort, clarify methodological details as the role of the researcher, the process of problem diagnosis, the nature of the intervention, the extent of reflection and learning intended, and whether there is new knowledge to be gained in the research. The action research approach enabled us to understand the interaction of social organization and information systems, by introducing changes into these processes and observing the effects of these changes. The action research approach is proposed due to the value of capturing and explaining what is going on in real organization. By using action research, it enabled us to understand the interaction of social organization and information systems, by introducing changes into these processes and observing the effects of these changes. It serves as a checklist with its criteria and questions to assess the quality of the research.

### 3.6 Conclusions

The qualitative research methodology approach is viewed as significant in IS research due to the value of capturing and explaining what is going on in real organization. It enabled us to understand the interaction of social organization and information systems, the processes and observing the effects of these changes brought forward by IS. A research framework inaction research is proposed as guidance for the research activities to be undertaken to ensure the research objectives are met. The framework would guide the research effort and clarify methodological details of the role of the researcher, the process of problem diagnosis, the real world happening in an organization, the extent of reflection and learning intended, and whether there is new knowledge to be gained.

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Table 1. Research Methodologies: Clarke (1997)

Non-Empirical	Scientific	Interpretive	Scientific/ Interpretive	Engineering
<ul style="list-style-type: none"> <li>- Conceptual research.</li> <li>- Theorem proof.</li> <li>- Simulation.</li> <li>- Future research.</li> <li>- Scenario-building, and game- or role-playing.</li> <li>- Review of existing literature.</li> </ul>	<ul style="list-style-type: none"> <li>- Forecasting.</li> <li>- Field experimentation and quasi-experimental designs.</li> <li>- Laboratory experimentation</li> </ul>	<ul style="list-style-type: none"> <li>- Descriptive/interpretive research.</li> <li>- Focus group research.</li> <li>- Action research.</li> <li>- Ethnographic research.</li> <li>- Grounded theory.</li> </ul>	<ul style="list-style-type: none"> <li>- Field study.</li> <li>- Questionnaire-based survey.</li> <li>- Interview-based survey.</li> <li>- Case study.</li> <li>- Secondary research.</li> </ul>	<ul style="list-style-type: none"> <li>- Conceptual</li> <li>- Design</li> <li>- Development</li> </ul>

Table 2. Benefits and limitations of the qualitative research approach

Case Study	
Strength	Weakness
<ol style="list-style-type: none"> <li>1. Excels in understanding complex issue or object and can extend experience or add strength to what is already known through previous research.</li> <li>2. Captures the local situation in greater detail and with respect to more variables than is possible</li> <li>3. Applicable to real-life, contemporary, human situations and its public accessibility through written reports.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of control of variables.</li> <li>2. Different interpretations by different people</li> <li>3. Unintentional biases and omissions in the description due to intense exposure to the study</li> <li>4. Study of a small number of cases can offer no grounds for establishing reliability or generality of findings.</li> <li>5. Case study research as useful only as an exploratory tool.</li> </ol>
Ethnography	
Strength	Weakness
<ol style="list-style-type: none"> <li>1. Powerful assessment of users' needs: A crucial goal of an ethnographic study is to gain the capacity to view a system through the eyes of the user</li> <li>2. It uncovers the true nature of the system user's job: A goal of an ethnographic study is to uncover all tasks and relationships that combine to form a user's job. It is often the case that a user performs tasks and communicates in ways that are outside of their official job description.</li> <li>3. The ethnographer can play the role of the end-user: The high level of user understanding that an ethnographer can gain through his/her fieldwork can be a useful bonus.</li> <li>4. The open-ended and unbiased nature of ethnography allows for discovery: Other HCI research methods, such as task analysis and controlled experimentation, must formalize, categorize, and/or theorize how users interact with a system in order to yield quantitative results.</li> </ol>	<ol style="list-style-type: none"> <li>1. Time consuming</li> <li>2. (long time to do field work and analyzing)</li> <li>3. In-depth knowledge only of particular context and situations (lack of generalization)</li> <li>4. The highly qualitative nature of results can make them difficult to present in a manner that is usable by designers.</li> <li>5. Use a small number of participants and a small-scale environment (Hughes et al., 1995). Increasing the scale can be extremely difficult as it imposes a much greater amount of cost, communication, and effort.</li> </ol>
Action Research	
Strength	Weakness
<ol style="list-style-type: none"> <li>1. Captures the local situation in greater detail and with respect to more variables than is possible.</li> <li>2. It can be used in many research modes, both to generate new theory and to reinforce or contradict existing theory.</li> <li>3. Participatory action research enriches the research community by drawing researcher-practitioners into the research process.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of agreed criteria for evaluating action research</li> <li>2. Action research "looks like" consulting.</li> <li>3. Lack of control makes it difficult to apply action research as an instrument in an orchestrated research program</li> </ol>

Grounded Theory	
Strength	Weakness
<ol style="list-style-type: none"> <li>1. Ability to derive theory from within the context of data collected.</li> <li>2. No worries about the formality in the method of usage.</li> <li>3. Resulting theories are explicitly emergent, does not test a hypothesis.</li> <li>4. Start collecting data as soon as there is a research phenomenon to study.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sensitive to thoroughness and skills of individual researcher in interpreting data and the judgment to know when saturation is achieve</li> <li>2. Does not favor the novice researcher as they are likely to find the approach more difficult than more conventional methodologies; and the more experienced researcher is likely to produce better theory.</li> </ol>

Table 3. Research Framework

<b>Philosophical / Conceptual Foundation</b>	
<b>Dimension &amp; Criteria</b>	
Aim/Question	An approach to manage prototype development of group knowledge and competencies
Assumptions	Knowledge can be extracted and competencies of group could manage
Perspective/Tradition	Interpretive
Stream	Participatory action research
<b>Methodology Study Design</b>	
<b>Dimension &amp; Criteria</b>	
Background	The need and challenges in managing group knowledge and competencies
Intended Change	Introduction of an agent based KEPSNet framework to facilitate group tacit knowledge and competencies management
Site	Laboratory of learning and Multimedia Innovation, Multimedia and Software Institute, UPM
Participants	Technical Application Development Design Team
Data Sources	Participant observation, Interviews Electronic group discussion transcripts, Prototype evaluation and testing
Duration	18 months
Degree of Openness	System development design, Testing, Implementation
Access/Exit	Appointed as a researcher for the duration of three years. Enter as Quality Manager for the project.
Presentation	Case study with emphasis on method, results and implications on lessons learned.
<b>Research Process</b>	
<b>Dimension &amp; Criteria</b>	
Problem Diagnosis	Problem in managing group knowledge and competencies. Need to improve business processes in the organizations.

Action Interventions	Introduced the KEPSNet framework and to manage the extraction of group knowledge and the competencies management in the group. Usage of the prototype framework during the development life cycle.
Reflective Learning	Best practices learned and reuse knowledge.
Iteration	Knowledge Capture Accumulation of knowledge and competencies Expertise Identification Creation of Directory of expertise Competencies matching. Project management and System Development Life Cycle
General Lessons	Group members' competencies profiling and knowledge network creation had competing effects, and organizational implications.
<b>The Socialtechnical Design</b>	
<b>Dimension &amp; Criteria</b>	
Diagnosis and entry	From sociotechnical aspect, it is impossible to separate the organizational issues or social issues from the technical issues.
Management of the change process	During the design phase, the focus would be on how to capture group members' expertise and competencies as an informal process for the group.
System Design	In sociotechnical design analysis, analysis is based on the observation, and the understanding of the organizational context such as organizational structure, work and staff. As sociotechnical requirements are embedded in the work of activities of individuals, techniques such as participatory system design will provide a way of extracting the requirements.
Adjustment of coordinating mechanisms	Amendments to other subsystems. Changes in the system that might necessitate changes in other subsystem: Office Automation Application Human resource system Knowledge repositories
Implementation	Understand the outcome in the work practices and the social interaction in a group project implementation.
<b>Role Expectation</b>	
<b>Dimension &amp; Criteria</b>	
Researcher	Facilitated group processes, collected and analyzed research data.
Participants	Groups took part in workshops, provided data through questionnaires, interviews, etc. Team helped develop, define process and deliverables.
Competency	Staff can use the proposed knowledge extraction and competencies profiling framework. Increased group productivity, perceived outcome quality with the proposed framework.
Ethics	A contract with deliverables defined; team involved in decision making.