

# Use of Grounded Theory in Information Systems Area: An Exploratory Analysis

José Esteves. Universidad Politécnica de Catalunya, Barcelona, Spain

Isabel Ramos. Escola Superior Tecnologia Gestão, Viana do Castelo, Portugal

João Carvalho. Universidade do Minho, Guimarães, Portugal

Lately, Grounded Theory method is gaining importance as a method for theory building. However, its application is not free of criticism due to lack of rigour and formality in research procedures and description of results. We analysed four cases where Grounded Theory method was used and, for each case, we identified several issues to the use of this research method. A number of recommendations and a list of critical success factors for practitioners has been generated as a result of the findings of this study. We think that this information might be useful for people that is starting a research project and want to use Grounded Theory method.

**Keywords:** Grounded Theory, Qualitative Research

## 1. Introduction

Grounded Theory (GT) method provides guidelines for data collection, analysis and inductive theory building. Data collection and analysis is performed in successive steps (Charmaz 2000). The interpretation of the data collected in one step helps focusing on the data collection in the next step.

This article addresses the usage of grounded theory in Information Systems (IS). Based on literature and on several studies carried out by the authors, it attempts to identify the benefits and difficulties of this method in IS research, and raises some issues related to the application of the GT method.

Our experience shows that often there were no worries about formality in the method usage. We also detected lack of rigour in several procedures. Moreover, in some cases, researchers were not worried about the generality of results when providing theoretical interpretations of the cases. One of the main criticisms to this method is that it lacks foundation for the relationships between the categories developed. Usually, these relationships are based in conceptual arguments and the experience of the researcher, and the data in some cases is insufficient or does not support at all these relationships or “do not account for social influences on the experiences of respondents” (Benoliel 1996, p. 412). Grounded theorists have been accused, with some justification, of slighting data collection (Lofland and Lofland 1984) and other authors have also pointed out some of GT limitations (e.g. Conrad 1990, Riessman 1990, Richardson 1994).

We will describe four studies developed using GT, and explain the different steps and problems found. These studies are: analysis of

adoption of Intranets in organisations, definition of critical success factors in ERP implementations, and explanation of the satisfaction felt with the support provided by a computer-based system to individual and group work, in two different organisational contexts. Based in these studies and some cases documented of GT method usage in literature we will discuss a list of issues related with GT in IS area. We also attempt to define which are the critical success factors in the method usage. It is the authors' opinion that the same issues are common in other areas of research. Although we have analysed information systems area in this study, we think that the results can be helpful to other research areas due to the common issues we focused on the use of grounded theory.

This paper is structured as follows. First we present a GT overview. Next we describe four GT cases where we have been involved. We draw implications of using GT in each case, detailing the main issues in each one. Then we present the general recommendations to use GT and a set of critical success factors in the use of GT. Finally, we present some conclusions.

## 2. Grounded theory overview

Grounded Theory (GT) method is a general methodology for building theories that are grounded in data systematically gathered and analysed (Glaser and Strauss 1967). This methodology was initially presented by Glaser and Strauss (Glaser and Strauss 1967) in their book *The Discovery of Grounded Theory*. The purpose of GT method is to develop theoretically comprehensive explanations about a particular phenomenon. Strauss and Corbin (1990, p. 23) explain GT approach as “one that is inductively derived from the study of the phenomenon it represents. That is, it is

discovered, developed, and provisionally verified through systematic data collection, analysis, and theory stand in reciprocal relationship with each other. One does not begin with a theory, and then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge". According to (Baker et al. 1992), "researcher's purpose in using the GT method is to explain a given a social situation by identifying the core and subsidiary processes operating in it. The core process is the guiding principle underlying what is occurring in the situation and dominates the analysis because it links most of the other processes involved in an explanatory network".

With the aim at collecting unbiased data, the GT method proposes a set of technical procedures. It should be noted that GT method proponents acknowledge that there might be several views of reality, which should be represented as accurately as possible. In this way, the imperfect and probabilistic nature of reality apprehension - a specific assumption of post-positivism - is recognised.

The techniques and analytical procedures enable investigators to develop a substantive theory that is significant, theory-observation compatible, generalizable, reproducible and rigorous such as other qualitative research methods. This is the traditional way of understanding the GT method. Recently, some authors used the GT method in accordance with the assumptions of the constructivist paradigm. GT method is then used as a flexible, heuristic strategy rather than a formal method (Charmaz 2000). A focus on meaning while using GT method furthers interpretative understanding. In this case, all developed theories would be contextual, shaped by the historical and sociocultural conditions that guide human action. The developed theory will serve, then, to highlight beliefs, meanings, contradictions, paradoxes, and taken-for-granted concepts that guide human action in specific contexts. It will help people questioning reality they are creating by their action and interaction, and finding useful new ways of thinking and acting.

Independently of the preferred approach, the results provide an idea where the data came from, how the data were rendered and how concepts were integrated. According to Haig (1995), a good *grounded theory* is one that is (1) inductively derived from data; (2) subjected to theoretical elaboration, and (3) judged adequate to its domain with respect to a

number of evaluation criteria. In order to evaluate the quality of the theory resulting from GT method, Turner (1983, p. 347) proposes two criteria: whether the theoretical accounts fits closely and adequately the social scene it is concerned with and second, whether they are accurate, understandable and enlightening to individuals who have some familiarity with the social phenomenon under investigation, either as participants or as 'lay' observers.

The main procedures of the methodology are: open, axial and selective coding:

- Open coding: labelling concepts that represent discrete happenings and other instances of the phenomena.
- Axial coding: procedures by which data are put back together in new ways after open coding, by making connections between categories.
- Selective coding: the process of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development.

The GT method was applied in a number of information systems studies, such as those by Orlikowski (1993), Scott (1998), and Pandit (1998).

### 3. Case studies description

In this section we present four studies where the GT method was applied. In the first two, the GT method was applied in its traditional form. In the cases studying user satisfaction, the method was applied according to a constructivist approach.

#### 3.1 Intranets

The goals of this study were to diagnose (identify and define) the critical success factors to the integration of intranets in organisations in three perspectives: technological, organisational and social (for more details see Esteves and Amaral 1999). Thirteen case studies already published about the success of Intranet's adoption were used as primary data of the research. The selection criteria for the case studies were: to be referenced in specialised bibliography, do not mention only technological aspects and, to be properly documented. The documentation of each case study was collected through the Internet, specialised literature, technical reports, manuals, newspapers and magazines. To increase validity and reliability in the model, in each case study the several sources of

information where triangulated, and inconsistencies were clarified with additional documentation. The model achieved is represented in figure 1. In terms of

relationships, all three perspectives are interrelated and all have implications on the other. The core category in this case is the organisational perspective.

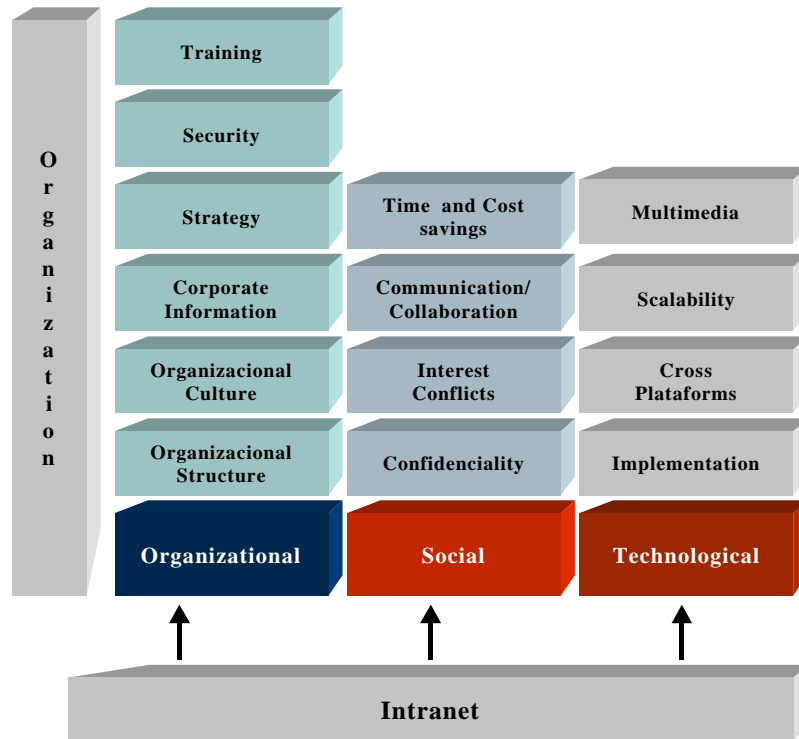


Figure 1: The Intramodel- critical success factors to the integration of intranets in organizations.

### 3.1.1 Relevant issues for the application of GT

In this section we present the main issues we dealt with in this case:

- Advantage of GT method in order to study a phenomenon** - What most differentiates GT method from other research methods is that the resulting theories are explicitly emergent. It does not test a hypothesis. Its aim, as Glaser (1992) states it, is to discover the theory implicit in the data. As Glaser (1992) frames, the distinction between “Emerging and Forcing” is fundamental to understand the GT method. Most researchers have been more exposed to hypothesis-testing research than to emergent research. Glaser (1992) suggests two main criteria for judging the adequacy of the emergent theory: that it fits the phenomenon and, that it helps the people in the phenomenon to make sense of their experience and to manage the phenomenon better. A point where GT is clearly different from other methods is in literature collection. In GT we start collecting data as soon as we
- Sampling** - This issue is related with the theoretical sampling used and its consequences in the credibility of the emerging theory. Strauss and Corbin (1990, p. 176) define theoretical sampling as “sampling on the basis of concepts that have proven theoretical relevance to the evolving theory”. Theoretical sampling helps to develop our emerging categories and to make them more definitive and useful (Charmaz 2000). According to Dey (1999, p. 30), “theoretical sampling requires the inclusion of many sites, for these are needed to generate the necessary similarities and contrasts required by the emerging theory”. One important aspect of GT method is that analysis is undertaken concurrently with the data gathering. Therefore, predetermined sample sizes are not appropriate because after initial selection, sampling is related to the findings of the study and where those findings take the

researcher (Sandelowski 1986). In our case, we started with five case studies and we added 8 more cases along the analysis. We stopped adding new cases when we detected that no new themes emerged. Other possible criteria are: density of theory, integration of the theory, depth of focus, variation of process and theoretical sensitivity of the analyst (Lye et al. 1997).

### 3.2 ERP project success

The goal of this study was to identify and define the critical success factors (CSFs) in an Enterprise Resource Planning (ERP) implementation project (more details can be found in Esteves and Pastor 2000). An ERP system is an integrated software package composed by a set of standard functional modules (production, sales, human resources, finance, etc.) developed or integrated by the vendor, that can be adapted to the specific needs of each customer. According to Rockart (1979), critical success factors are "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation". Our use of the grounded theory method was composed of the following phases:

- The first phase (research design phase) had two steps. The first step was the definition of the research subject and scope. Through the analysis of articles related with ERP systems, we detected a shortage of knowledge about the implementation of ERPs in organisations. Therefore, the goal of this study was to analyse (identify and define) the CSFs for ERP implementations. The second step consisted in the collection and analysis of specialised literature.

- In phase two (data collection phase) we located 10 papers related with CSFs models that became our primary research documents. These papers described case studies related with CSFs
- Phase three (data analysis phase) represents the operations where data are divided, conceptualised, and organised in new ways. We only made the open coding process. To increase validity and reliability of the resulting unified model, the several sources of information were triangulated and inconsistencies were clarified with additional documentation (namely with documents published in the trade press).
- The last phase (comparison phase) was a comparative analysis of the resulting model with other studies related with the subject.

We collected all the lists of CSFs found in the ERP literature and then, we determined the similarities or patterns of communality between them. The next step was to map them in a matrix (see Figure 2). In our view, the nature of the ERP implementation problems includes strategic, tactical, organisational and technological perspectives. Therefore, we propose that the CSFs model should have these four perspectives. The organisational perspective is related with concerns like organisational structure and culture and, business processes. The technological perspective focuses on aspects related to the particular ERP product in consideration and on other related technical aspects, such as hardware and base software needs. The strategic perspective is related with core competencies accomplishing the organisation's mission and long-term goals, while the tactical perspective affects the business activities with short-term objectives.

	<i>Strategic</i>	<i>Tactical</i>
<i>Organisational</i>	<ul style="list-style-type: none"> <li>• Sustained management support</li> <li>• Effective organisational change management</li> <li>• Good project scope management</li> <li>• Adequate project team composition</li> <li>• Comprehensive business process reengineering</li> <li>• Adequate project champion role</li> <li>• User involvement and participation</li> <li>• Trust between partners</li> </ul>	<ul style="list-style-type: none"> <li>• Dedicated staff and consultants</li> <li>• Strong communication inwards and outwards</li> <li>• Formalised project plan/schedule</li> <li>• Adequate training program</li> <li>• Reduced trouble shooting</li> <li>• Appropriate usage of consultants</li> <li>• Empowered decision-makers</li> </ul>
<i>Technological</i>	<ul style="list-style-type: none"> <li>• Adequate ERP implementation strategy</li> <li>• Avoid customisation</li> <li>• Adequate ERP version</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate software configuration</li> <li>• Legacy systems</li> </ul>

Figure 2: Unified critical success factors model.

As stated above, we only made the open coding step of GT method due to lack of information to define and argument the relationships between categories. Currently we are using a survey to collect data to define the relationships and we are using a technique called *partial least squares* to help the analysis of this survey.

### 3.2.1 Relevant issues for the application of GT

The main issues of this case were:

- **Coding process** – This process is one of the most important steps in GT method application. In this case, we started by predefined lists of CSFs and the objective was to unify these lists. The main concern was the concepts associated to CSFs and we found different meanings for the same terms, or the same meaning associated with different terms. This aspect is related to what is denominated in GT method as theoretical coding i.e., comparison, linking and reduction of categories. This process of theoretical coding has been detailed by Glaser (1978), Swanson (1986) and Strauss and Corbin (1990). We want to emphasise the importance of following the coding process as the process of coding line-by-line. Sometimes people used other processes that are associated with techniques such as content analysis (words are the central focus) or phenomenology (themes are the central focus). “Line-by-line coding keeps us thinking about what meanings we make of our data, asking ourselves questions of it, and pinpointing gaps and leads in it to focus on during subsequent data collection” (Charmaz 2000, p. 515).
- **Experience on the field** - The experience and knowledge about ERP field was one of the most important aspects in order to unify concepts and understand the documents collected. The ERP field is very specific and with implications in several areas of an organisation. The complexity of concepts and the broadness of the model evidence this. Concurrently with data collection it was made a literature review on ERP systems. Turner (1983, p. 335) states “the quality of the final product arising from this kind of work is more directly dependent upon the quality of the research worker’s understanding of the phenomena under observation than is the

case with many other approaches to research”.

- **Use of research techniques** – We advocate that GT method should encompass research techniques, qualitative or quantitative techniques, that can improve the rigor and explanation of the results achieved. For instance, researchers can use grounded theory techniques with varied forms of data collection (Charmaz 2000). Currently, in this case we are using a statistical method denominated Partial least squares (PLS). PLS is a “second generation regression model that combines a factor analysis with linear regressions, making only minimal distribution assumptions” (Gefen et al. 2000).

### 3.3 User satisfaction case studies

Two case studies were performed with the goal of studying the satisfaction felt by organisational actors with the computer-based systems used to support their work processes (Santos and Carvalho 1998). These studies addressed the use of the computer-based systems and the way their use was understood by the organisational actors. There was also the concern in studying the structural, social, political, and symbolic context in which that use was happening.

By focusing, both together and in alternation, the use and its context brought to evidence the transformation process through which the two work realities were undergoing. At the same time, it became possible to define how the use of the application influenced and was influenced by this transformation. In both cases, the aim was to understand how organisational actors interacted with the system, how they interpreted that interaction, and how they integrated the system into the work reality for which those actors were, simultaneously, responsible and constrained.

Data was gathered in dialogues and informal observations, reviews of managerial and technical documents, participative observation of the system usage and accomplishment of daily tasks, and semi-structured interviews with some organisational actors. The interviewees were those actors who appeared as the main actors in the reframing of the meaning structures and of the beliefs guiding the action of organisational groups. The transcripts of interviews and notes from observations were coded line-by-line, identifying central ideas (concepts) about how people interacted with

the system and the way they interpreted that interaction. The explanations and descriptions of the referred concepts formed themes that were then associated whenever they referred the same topic. Concepts and themes were then grouped into categories. Inconsistencies and contradictions in themes or concepts guided next steps of data gathering and analysis. The process stopped when the inconsistencies and contradictions were solved and no further concepts and themes emerged from new data.

The final theory explaining the reasons supporting the level of satisfaction felt with the system emerged by interpreting the grouped themes that explained the structural, social, political and symbolic aspects of satisfaction/dissatisfaction. The organisational implications of the emerging theory were discussed with the research participants. The developed theory gives voice to the several perspectives identified in each study.

### 3.3.1 Relevant issues for the application of GT

The main issues of the application of GT method in the two case studies briefly described in the above section were:

- **Sampling** – Participants were selected according to different criteria for participant observation and interviews. In participant observations, all actors in the research settings were included. In this stage of the research, the aim was to identify relevant meaning structures and work practices. Emerged from this stage that some participants were more influential to the transformation processes observed in the two settings that were studied. These key actors were then selected for interviewing. Because we wanted to arrive to a pluralist explanation of user satisfaction/dissatisfaction, while performing the interviews and their analysis, informal interviews were carried out with less influential actors. In these informal interviews, occurring during coffee breaks and at lunch hour, we tried to approach the conflicting topics emerged from interviews.
- **Coding process** – This process was much facilitated by an extensive review of literature in organisational theory and user satisfaction. From organisational theory, we elicited four abstract categories and sub-categories: the structural, social, political, and symbolic dimensions of work in organisations. From user satisfaction

literature we elicited the categories: needs, expectations, interests, and perceived support provided by the system. We were aware that while these a priori categories would help the process of data analysis, they could also introduce a bias in our interpretation of the data. For that reason we consciously searched for data that would contradict those a priori categories.

- **Iteration between data collection and analysis** – The process of data gathering and analysis was kept dynamic. Although we structured the inquiry in three main stages, namely, document review, participant observation, and interviews, what really happened is that during each stage we end up performing the other two in an informal way. This generated a huge amount of field notes very useful to clarify the contradictions and conflicting perspectives that emerged from the data. It also assured a close interaction with participants that facilitated a complete acceptance of the investigation, and a very good understanding of business and technical language specific of the research settings. The familiarisation with local language helped the identification of new categories relevant to the study.
- **Ethical considerations guiding the report of findings** – In this kind of study, where researchers seek to reach closeness and empathy with participants, ethics plays a relevant role. In one of the work realities studied the transformation of work concepts and practices was being implemented bottom-up. The conflicts and difference of perspectives were significant. The researcher realised that the research report could later be used to empower or weaken the parties in conflict. To avoid this, some interesting things that the researcher saw or heard were not included in the report or in the papers written after the research. The concern for expressing equally all perspectives was the main force driving the report writing. This was done with the full awareness that the GT emerged from the research was not being fully reported.

## 4. General recommendations for grounded theory use

As a result of the findings that emerged from our experience in applying the method, a number of recommendations can be drawn:

1. Researchers should be careful at the beginning of using the GT method; GT method does not start with hypothesis or research questions like deductive methods. Instead GT starts with a phenomenon, which the researcher finds to be inadequately explained in by existing theory.
2. Define the GT approach that will be employed, either the original Glaser and Strauss (1967) version, the Strauss and Corbin (1990) version, or the version corresponding to Glaser's (1978, 1992) interpretation. These versions are related with philosophical and methodological assumptions that must be taken into account when selecting and adopting a specific approach.
3. The data sampling should provide for a broad, deep and pluralist (constructivist approach) perspective on the studied phenomenon.
4. Collect all documents possible – as more documents related with phenomenon are collected, the better the emerging theory will be based on data related with that phenomenon and more generalizable the theory will be.
5. Make a literature review related with the phenomenon – this will help to define codes and coding the documents. It is also useful to understand the relationships between categories. However, the researcher must be aware that these a priori categories may constrain her/his interpretation. For this reason, researchers should always seek for local categories that eventually contradict the ones she/he brings to the setting.
6. Researchers must be prepared for a time-consuming task. One of the most time consuming tasks is to write memos that often takes longer than the observation itself. However, one must take into account that all the techniques and procedures must be done in order to obtain a valuable GT emerging theory (Glaser 1978 p. 83, Strauss and Corbin 1994 p. 277).
7. The GT report must describe several topics such as: statement of the phenomenon, purpose, method, sampling, data collection and analysis, empirical grounding of the study (i.e., findings), and define procedures for validation of theory. Kuhn (1996) insists that in addition to propose a theory the researcher must also provide recommendations for further validation of the theory using more formal deductive methods.

#### **4.1 Critical success factors**

Based on our experience and the literature review we made about GT method application we define a set the critical success factors for the use of GT method:

- Identification of the phenomenon with researcher not focusing in a hypothesis-driven approach. Instead, researchers should focus on emerge theory from data and avoid theoretical preconceptions (Dey 1999).
- Since the coding process is very difficult, the experience of the researcher both on GT method and within the phenomenon analysed is important to help finding the relevant concepts and categories. This factor helps in the initial period of research where the lack of an explicit set of research questions often provides a long period of ambiguity and uncertainty and only an experienced researcher can deal with. It also helps in coding process and to interpret the documents collected.
- One of the distinguish features of GT method is the manner in which the information collected is analysed. Turner (1983, p. 335) refers that "for this analysis to proceed, the researcher must develop a facility for discerning abstractions in the material collected and for processing these abstractions at several levels of generality. It is also important to foster an ability to use what we might call a 'creative theoretical imagination'".
- The saturation of categories is related with the aspects such as theoretical sampling (see section 3.1.1). The researcher must see when no themes are emerging and therefore, the categories are saturated. The saturation process provides more broadness and generalisation for the emerging theory.

#### **5. Conclusions**

Grounded Theory is a promising method to develop theory that is grounded on data. However, its application is not well done or sometimes not well understood. This article provides an overview of GT method and a discussion of some issues that arose when applying the GT method.

We analysed four cases were the GT method was used: adoption of intranets, ERP project success and, two cases related with user satisfaction felt with computer-based systems support to work processes. We think that the analysis of issues related with the use of GT

method is very useful for people that are starting a research project and want to use GT method. A number of recommendations and a list of critical success factors for practitioners have been generated as a result of the findings of this study. One of the most important benefits of GT method is the ability to derive theory from within the context of data collected. However this can be painful for the novice researcher due to his lack of knowledge to interpret data and the judgement to know when saturation is achieved.

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