

# Addressing Levels Issues in IS Qualitative Research

*Completed Research Paper*

**J.B. Kim**

Louisiana State University  
jkim73@lsu.edu

**James A. Love**

Louisiana State University  
jlove8@lsu.edu

## Abstract

In this study, we investigate levels of analysis employed in IS qualitative research. Five years of IS literature reviewed yields patterns across research activities supporting the multilevel nature of IS research settings. While level issues have been discussed in the context of quantitative research, this study specifically addresses the previously unexplored area of qualitative IS research. We put forth that qualitative research is also susceptible to issues regarding level specification. We illustrate the multilevel nature of IS qualitative research. We specifically highlight the analysis level conformity of research activities with the inferences of the research. We urge researchers to be sensitive to level-related issues in order to produce more rigorous IS qualitative research.

## Keywords

Level of analysis; multilevel research; qualitative research; research methodology

## I. Introduction

Issues resulting from research containing multiple levels have been identified as important considerations in quantitative research literature; however, they have not received attention in the context of qualitative research studies. The dearth of literature on this topic perhaps reflects the view that “qualitative case studies are not susceptible to levels of analysis issues” (Gallivan and Benbunan-Fich 2005, p. 94). We firmly disagree with this notion and put forth that qualitative research too necessitates diligent consideration as well because “key issues in understanding and correctly specifying levels of analysis for research are actually conceptual rather than statistical concerns” (Gallivan and Benbunan-Fich 2005, p. 90). In this study, the importance of adequately confronting issues resultant from level specificity is extended to address qualitative research.

Qualitative research helps the Information Systems (IS) field understand and explain IS related phenomena by using qualitative data such as interviews, documents, and participant observation (Myers 1997). By its nature, qualitative research methods provide researchers with relatively richer, more flexible, and context-oriented data so they can understand the real world better (Mason 2002). In the IS field, qualitative methods are widely accepted and are continuously growing in importance (Bandara, Fernandez, and Rowlands 2012). However, Corbin and Strauss (2008) claim a lack of experts exist to train new qualitative researchers in terms of level issues. This perhaps explains why so little explicit attention is given to these issues in research articles. Nevertheless, it is important to specify levels in qualitative studies because “problems of inference arise when concepts are defined and data are collected at levels of analysis inappropriate for the theoretical propositions being examined” (Markus and Robey 1988, p. 593).

Accurate level specification is one of the essential elements to achieving validity in organizational research (Berson, Avolio, and Kahai 2003), regardless of its methodological orientation. Many IS research studies are confronted with level issues due to the hierarchical structure of organizations. As Klein and Kozlowsky (2000) state, since organizations are multilevel systems, level issues are inherently present in organizational studies. As result, many qualitative studies in the IS area focus on social phenomena that include relationships at different levels such as individuals, groups, and organizations.

Although level specification issues are applicable to qualitative research, few IS studies considering level issues have incorporated qualitative research into their analyses (Burton-Jones and Gallivan 2007). Instead, the multilevel research discussion in IS has focused on quantitative methods with virtually no discussion of qualitative multilevel issues. Taking this into account, this study's overarching purpose is to raise awareness for appropriately considering level specification when conducting qualitative research.

This study has three objectives. First, it investigates levels usage in qualitative studies during four research activities appearing in two IS journal. Then, an examination of changes in levels used during four junctures of research assesses the prevalence of level changes in IS research. Lastly, attention is drawn to level specifications of research activities compared with the *inference* activity.

## II. Theoretical Background

### ***Research Issues Associated with Levels***

At the onset of a discussion regarding level issues, it is important to clarify the central concept of a level. Teddlie and Tashakkori (2009) define level of analysis as the “*level of aggregation in a multilevel organizational or societal structure. For instance, data collected in hospitals could be analyzed at the patient level, the ward level, the hospital level, and so forth*” (p.167). In this paper, we adopt their conceptualization of level.

Issues stemming from levels have been long debated amongst organization researchers (Markus and Robey 1988; Klein, Dansereau and Hall 1994) because they are acknowledged as important considerations to ensure validity when building theory (Markus and Robey 1988; Klein et al. 1994; Dionne, Randel, Jaussi, and Chun 2003; Bickman and Rog 2009). In their seminal work, Dansereau, Alutto, and Yammarino (1984) developed a conceptual framework that views people at different levels: persons, dyads, groups, and collectives. By distinguishing the levels of organizational settings, they claimed that researchers can analyze the process and characteristics occurring in social phenomena more accurately. Moreover, they pointed out that it is necessary to consider multiple levels when one level can have implications for other levels. They suggested that organizational theories should be based on a framework that incorporates the relationship between a particular construct or phenomenon and hierarchical entities of an organization.

Early works concerning levels (Dansereau et al. 1984; Rousseau 1985; Dansereau and Yammarino 2002) found two contexts regarding how level issues were applied in organizational research. The first is a single-level approach viewing only corresponding levels throughout the theory develop process. In this context, it is assumed that each level is independent from the other levels. In contrast, the second context is a multilevel approach which views different levels in combination or simultaneously and may take on a number of forms.

Various multiple level forms include multilevel models, cross-level models, and mixed effects/mixed determinants models (Dionne et al. 2003). Multilevel models try to find relationships between independent and dependent variables at different levels. Cross-level models try to depict the same patterns of relationships at different levels. Mixed effects models refer to situations when a factor affects multiple levels. Conversely, mixed determinant models refer to situations when multiple factors at various levels affecting a single level factor (Dansereau et al. 1984). Despite the distinctions among multiple level analysis approaches, they are collectively referred to as multilevel analysis. In this study, we will refer to the aforementioned multiple level approaches as multilevel analysis.

There are generally two ways to look at multilevel analysis in the social science research in terms of the research procedures. The first perspective views multiple levels within a single research activity. A common case of this happens when researchers use multiple levels of sources to gather data. For example, researchers can perform the activity of *data collection* from different levels including interviews of individuals, observations of team meetings, and reviews of organizational communications. The second approach looks at multiple levels across research activities. For example, the *data collection* activity can be performed at the person level. Then, an *inference* can be made at the organization level based on the data. This study addresses the level specification issues occurring both within and across research activities.

Researchers should be aware of potential biases or fallacies that could be present in multilevel studies. Diez-Roux (1998) pointed out that there are four types of fallacies occurring frequently in multilevel studies. The basic argument underlying these fallacies is that inferences made at one level based on data from another level could be problematic without careful considerations of level issues. Four distinct types of fallacies may be committed if multiple levels are involved. The ecological fallacy could be committed when inferences made at an individual level are based on group-level. Similarly, the atomistic fallacy might happen if inferences are drawn at the group level based on individual-level data. Third, the psychologistic fallacy might take place when relevant group-level factors are ignored in individual-level analysis. Lastly, the sociologistic fallacy can occur if relevant individual-level factors are ignored during in group-level analysis.

### ***Research Issues Associated with Levels in Qualitative Research***

Although most discussions regarding levels issues are in the context of quantitative approaches, the basic concepts are applied to qualitative approaches as well. For example, in a qualitative study, when individual perceptions toward a certain concept are gathered from individual interviews, researchers might consider the consensus perception of groups or organizations rather than just aggregating individual responses. Alternatively, researchers might consider weighing more to the perceptions of individuals in critical positions within the organization such as managers or executives.

Markus and Robey (1988) claimed that there is clear advantage exists when researchers studying the impact of IT on organizations consider both macro and micro level processes. They also claimed that clearly addressed levels will help researcher respond better to criticism and make the research decision better informed. Barley (1986; 1990) demonstrated using mixed-level analysis, that is, focusing on both micro and macro level, is more efficient to explain the inconsistent result of new technology in two organizations.

Yin (2009) addressed the issues regarding levels in case studies. He emphasized the importance of defining the unit of analysis to achieve validity in theory-building case studies. Specifically, he claimed that those who conduct the case studies should be careful of not being trapped in the confusion between unit of data collection and unit of analysis. According to this data collection procedure, the common confusion is caused by the differences between the data collection sources and the unit of analysis. Lau (1997) stated the necessity of considering the level of organization in IS action research process framework. Furthermore, he also proposed a multilevel approach used frequently for emergent action research framework.

By its nature, qualitative research seek meaning of phenomenon among organizational problems. In this sense, they are inherently concerned about level issues because qualitative studies look for a deep understanding of social phenomena at various levels (Glaser and Strauss 1967; Glaser 1978). Popay, Rogers, and Williams (1998) also claimed that the most significant characteristic of qualitative studies is to illuminate the meanings of people's behaviors which can be viewed from different levels (e.g. a culture, society, or group). On the other hand, regarding the analysis method, qualitative studies are inseparable from level issues. Coding is one of very common technique used in qualitative studies which is a process of abstraction from lower level to higher level concepts. Usually qualitative research begins at the item level to the pattern level (LeCompte 1986). Then it examines the meanings of items and patterns as well as the relationships of the meanings (Borman, LeCompte, and Goetz 1986). Poklinghorne (1995) also emphasized identification of relationships between categories in qualitative research. To find such meanings and relationships in social phenomena, accurate speculation of levels is indispensable.

## **III. Methodology**

This research review was comprised of four steps. First, the scope of articles to review was determined. Second, a level specification framework was developed to analyze the articles. Third, specific moments within each research study were chosen for analysis. Fourth, coding of the articles was carried out.

## Selection of Articles

Articles were selected from *Management Information Systems Quarterly* and *Information Systems Research*. Every article published in the two journals during the five-year period of 2007 – 2011 was searched. Articles implementing qualitative research approaches were retained for the literature review. The initial search returned a total of 39 studies using qualitative methods.

## Development of Seven-Tier Level Specification Framework

To consistently assign levels to the research studies, a classification framework was developed. We used a seven-tier level specification framework in this study borrowing from a framework of organizational levels appearing in Danserau, Yammarino, and Kohles (1999). The framework in Table 1 was constructed after initial coding to better reflect the corpus of literature analyzed.

A modification to Danserau et al.'s (1999) framework included the addition of a *Society* level. The society level captures references made to levels greater than an industry or marketplace. Another change to the framework was that levels larger than the organization were consolidated into a level referred to as *Network*. After the modifications, the resulting seven-level specification framework was applied to all articles reviewed. The levels identified are the basis for analysis of each of the four research activities within every research article.

Levels in Danserau et al. (1999)	Levels in Current Study	Examples from Literature
-----	Society	health care systems in developing countries, public health care system
Industry	Network	network of practice, multiparty collaboration [in offshoring]
Group strategic alliances		
Dyadic strategic alliances		
Firms or organizations	Organization	organization, company, hospital
Strategic business units	Strategic business unit	independent business unit
Groups	Group	globally-distributed ISD team, software development team
Dyads	Dyads	none in review
Individuals	Person	individuals, specialists, managers

**Table 1: Levels Specification Framework**

## Selection of Research Activities Analyzed

Each article was analyzed to ascertain the authors' usage of levels at the four specific activities during the research process. Since IS research tends to be functionalist and deductive in nature, a general functionalist research model guided the demarcation of activities in the research production process (Bhattacharjee 2012, p.20).

Previous quantitative research has conducted levels reviews assessing congruence of levels during *theory*, *data collection*, and *data analysis* activities (Gallivan and Benbunan-Fich 2005). In order to accommodate inductive (theory-building) and deductive (theory-testing) research techniques, this review analyzes the *research question* activity rather than presume the research goal is theory testing. Level usage for *data collection* and *data analysis* are examined as well. Lastly, the *inference* activity level is analyzed representing how findings are ultimately used. Examples of the coding process are shown in Appendix C.

## Analysis of Articles

Both authors independently coded the 39 articles for each of the four activities. All activities were assigned to one or more of the levels developed in the seven-tier levels specification framework. Following individual coding, the authors jointly reviewed the articles to resolve initial differences through consensus. The resultant codes were established as the final codes in the review. After the initial coding,

Cohen's Kappa between the two coders for all levels throughout the four research activities was 0.79. This is considered a substantial rate of agreement (Landis and Koch 1977). The average agreement rate was 85.3%.

## IV. Findings

Over the five-year period of 2007 to 2011, 363 total articles have been published in the two IS journals (184 in *MIS Quarterly* and 179 in *ISR*). This count includes research articles, research notes, special issues, but excludes editorial comments. Among these articles, 39 using qualitative methods are found comprising 10.7% of total articles published in the two journals. During the period, 30 qualitative studies were published in *MIS Quarterly* and 9 were published in *ISR*. Case studies were the most common method accounting for 23 articles. Grounded theory and action research methods followed with 6 and 5 articles, respectively. Five other methods were each utilized once.

The results are presented in three parts. First, an overall assessment of level usage is depicted using seven-tier level specification framework adapted from Danserau et al. (1999). Second, patterns of level usage are captured across the four research activity points to illustrate the changing nature of level specificity in research. Third, the levels used in the first three research activities are directly compared to the level in the *inference* activity to ascertain consistency.

### Levels Used

Although IS qualitative studies do not always specify the explicit levels throughout the research, levels can be inferred by reading the texts. Levels of each research activity for each of the 39 articles are displayed in Table 2.

	Research Question	Data Collection	Data Analysis	Inference
Person	9	36	12	10
Dyads	0	0	0	0
Group	6	8	9	7
SBU	1	1	1	1
Organization	15	4	17	16
Network	10	3	9	10
Society	3	2	3	3
Total*	44	54	51	47
*Totals do not equal n because multiple levels occurred for some research activities.				

**Table 2: Frequency of Levels Used by Research Activity**

The organization level appears most frequently in *research questions* reflecting that most qualitative IS research seeks relationships applicable to organizations. However, in the *data collection* activity, the person level is most commonly used. This finding makes sense because most qualitative research, especially case studies, elicits data from interviews with individuals as the primary data source. In the *data analysis* and *inference* activities, the organization level again is the most frequently utilized level. This reveals that researchers typically analyze data and draw conclusions at the same level as proposed in the conceptualization of the *research question* even though different levels are used during *data collection*.

### Levels Patterns

#### Seven-Tier Levels Framework Patterns

A view showing levels used across the research activities is needed to accurately assess the patterns that researchers follow. Appendix B depicts the different patterns of levels used in the 39 qualitative studies. Based on our coding scheme, 29 distinct patterns appear with 23 patterns appearing once. Appendix B also shows the O-P-O-O pattern is the most frequently occurring pattern followed by N-P-N-N pattern.

These patterns uncover that single-level research is rarely performed (e.g. P-P-P-P and N-N-N-N), hence the vast majority of the qualitative research is multilevel.

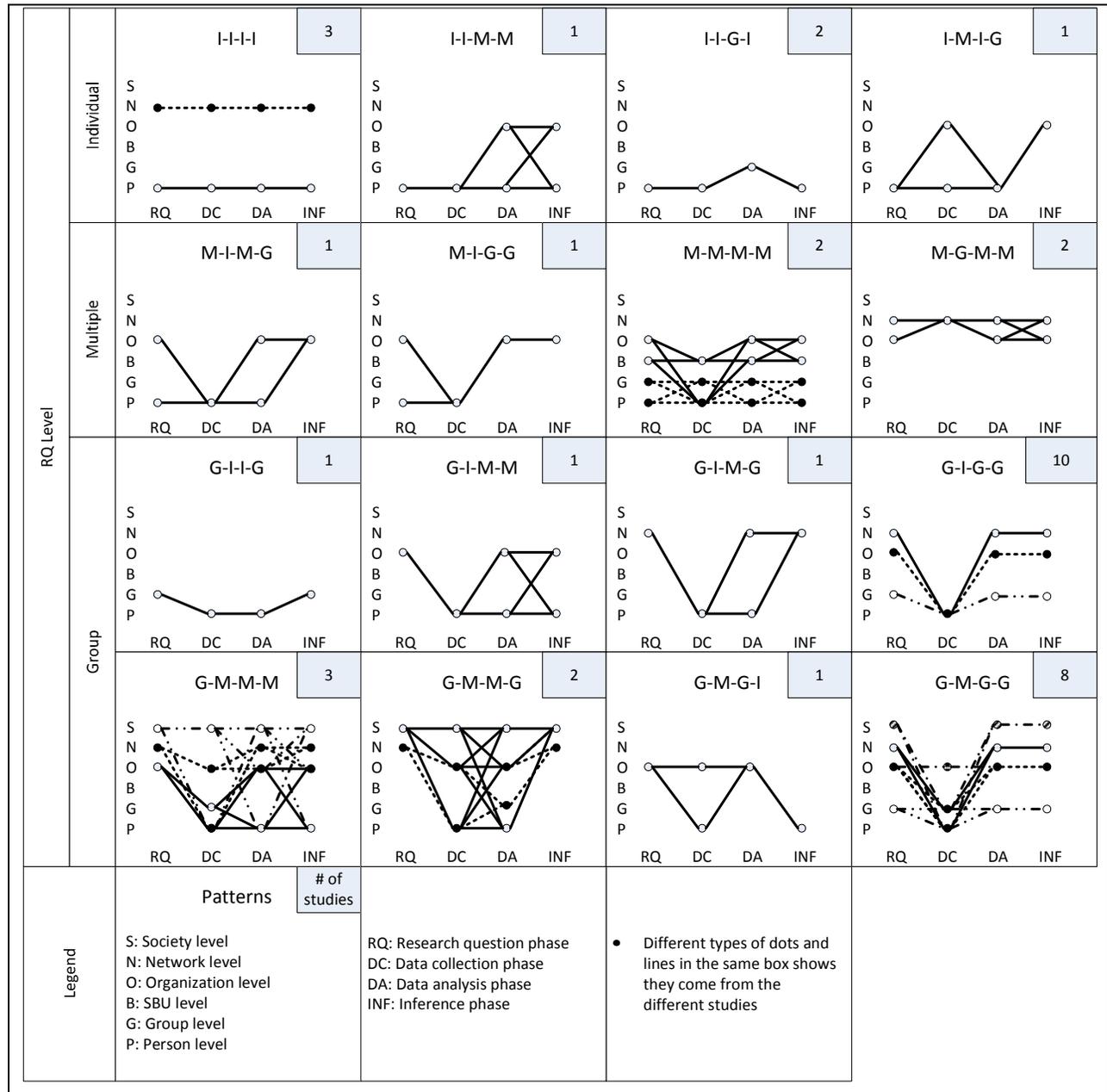


Figure 1. Patterns of Levels Used

**Two-Tier Levels Framework Patterns**

Though meaningful patterns in the analysis of articles appear, the volume of unique patterns limits the framework's utility in assessing overall trends. Thus, we modified the coding scheme to simplify the patterns of levels usage in qualitative IS studies. To do so, first we adopted two new codes, *individual* and *group*. The lowest level used in a particular study was designated the *individual* level as a basis level. Then, all higher levels occurring within a study were assigned to the *group* level. We also adopted a *multiple* level for studies using more than one level within a research activity. Dyad, group, or higher levels in seven-tier framework are converted to *individual* in two-tier framework if those levels are the lowest level in the particular study. For example, an O-G-GO-O pattern in the initial seven-tier framework

is now converted to a G-I-M-G pattern. Since the *group* level in the seven-tier framework is the lowest level in this example, the *group* actually serves as the *individual* level in the two-tier framework while the higher level of *organization* represents the two-tier framework's *group* level.

The two-tier coding framework reveals 16 different level patterns. Appendix B shows the patterns and frequencies for all 39 studies. The most frequent pattern is G-I-G-G followed by G-M-G-G, with 10 and 8 respectively. This shows over half of studies use *group* or higher levels in their *research questions*, *data analysis*, and *inference* activities, while using *person* or mixture of *person* and higher levels for *data collection*.

Combining the patterns from the seven-tier and two-tier frameworks, a more complete understanding of level usage in IS research emerges. Figure 1 is a graphical display of the patterns found. The types of lines represent distinct research publications, and dots indicate the levels used during the four research activities within the study. A study can potentially have multiple lines if it has multiple levels occurring in a research activity. In this case, multiple dots signify the levels used in the research activity. Using the *research question* activity as a starting point, Figure 1 illustrates the paths that research projects follow. The figure is sorted using the two-tier framework to isolate the patterns into rows. The frequency of each pattern is denoted in the upper right corner of the respective pattern.

The graphical illustration of the patterns reveals some interesting insights into the research studies reviewed. For example, only three instances of single level pattern research surfaced. All other research reviewed is multilevel as demonstrated by the changes of the lines across the research activities. The illustration highlights consistency of matches in levels by comparing the distinct points within each research project.

### **Conformity of Inference Activity Levels with Prior Activities' Levels**

Issues can arise when the levels of research activities do not match one another. Most commonly, two types of concerns are related to the mismatching levels. First, the mismatch between levels of *research question* or *data analysis* activities with the *inference* activity may generate potential problems with conclusions of the study. For example, when a qualitative study's purpose is stated to reveal a relationship at the organization level, but its conclusion is at the person level, the study's credibility could suffer. Second, if the conceptualization of a study specifies a multi- or cross-level analysis, but during *data collection*, the study fails to gain full consideration of multilevel interaction, the conclusion from the analysis could be less believable (Gallivan and Benbunan-Fich 2005; Rousseau 1978). In other words, using individual level data without the appropriate data aggregation strategy could yield an inappropriate conclusion.

The levels of first three research activities were matched with the levels of the *inference* activities to assess conformity. Table 3 shows the results of this examination. Of the 39 qualitative studies, 29 studies match levels at the *research question* and *inference* activities. Of the remaining, 7 partially matched, and 3 did not match. More specifically, one study's *research question* is at the organization level while its *inference* is at the group level. In a second study, the *research question* is at organization level, while its *inference* is at the person level. The third mismatched study contains a *research question* at the person level, yet its *inference* is at organization level.

	Research Question	Data Collection	Data Analysis
Match	29 (74%)	6 (15%)	30 (77%)
Partially Match	7 (18%)	15 (38%)	3 (8%)
Mismatch	3 (8%)	18 (46%)	6 (15%)
Total	39 (100%)	39 (100%)	39 (100%)

**Table 3: Level Conformity with Inference Activity**

Regarding conformation between *data collection* and *inference* activities, only 6 cases show matches between the two activities' levels. Again, this reflects that many IS qualitative studies use data at the person level or at the person level in conjunction with other levels. The studies then make conclusions at higher levels, such as group or organization based on the lower level data. Levels used in *data analysis* activity show high conformation percentage (match: 77%, partially match: 8%) to the levels used in *inference* activity.

However, six studies (15%) contain levels used in *data analysis* that differ from levels used in *inference*. Specifically, two studies analyze data at group level while their inferences are made at person level. A separate article analyzes data at person level, but its *inference* is made at the group level. One study performs *data analysis* at the group and organization level while its *inference* is made at the network level. Another study does *data analysis* at the organization level but its *inference* is made at the person level. In contrast, a final study mismatches by *analyzing data* at the person level and drawing an *inference* at the organization level.

## V. Discussion

We recommend that researchers with explicitly specified levels in qualitative studies. Although Spiggle (1994) finds, “qualitative researchers do not generally specify the unit of analysis (p.493)”, we believe that explicitly specifying levels is a preferential option. Only with clearly specified levels can a study properly postulate what it is trying to find (*research question*), what data should be gathered (*data collection*), how the data should be analyzed (*data analysis*), and how the results (*inference*) are interpreted. Many qualitative methods are adopted in IS research because of their ability to integrate multiple levels of contexts in organizations. Although, without proper level specification, the existence of meaningful relationships among entities is questionable, thereby reducing the advantage of qualitative approaches.

Case study researchers commonly cite Walsham (1995) stating their results are not intended for statistical generalization from sample to the population, rather their case study findings are intended to develop concepts or generate theory. We urge qualitative researchers conducting case studies to be mindful that their resultant concepts or theories still face level-related issues. Even when generalizing to a theory, the result of improper level specification will potentially lead to an inappropriately applied conclusion (Dionne et al. 2003; Yin 2009).

The findings in this study offer contributions to the IS field in several perspectives. First, by showing the actual usage of levels of the qualitative studies in the two top-tier IS journals, a widely-distributed usage of the levels is revealed, ranging from individual level to society level. As shown in Appendix B’s seven-tier framework, the levels throughout the four research activities used in 39 qualitative studies are not confined to one or two levels, which demonstrates the diversity of research topics in qualitative IS studies. This supports the fact that qualitative methods are beneficial to enrich the diversity of the IS field (Bandara, Fernandez, and Rowlands 2012).

Second, despite of the wide range of levels used in qualitative IS research, patterns of level changes across research activities are illuminated via graphical representation in Figure 1. As shown, the most common practice of level usage is the G-I-G-G pattern, which sets up a *research question* at group (or higher) level, gathers data from person level, then aggregates and analyzes the data at group (or higher) level, and finally makes conclusions at the group (or higher) level. Another frequently used pattern is G-M-G-G pattern, which is the same as the former but uses multiple levels of data sources. It makes sense that those patterns are common because many qualitative IS studies are focused on organizational level topics, but they get data mainly from individual sources or in combination with other sources.

It is of utmost importance to reiterate here that mismatches of levels among the research activities does not necessarily mean the study is flawed. If data are collected at an individual level and aggregated to a group or higher level with an appropriate aggregation strategy, level problems might not exist at all. However, in many cases of qualitative studies, aggregation strategies are not deeply considered possibly leading to flaws in the study. Researchers who use qualitative data can apply appropriate procedures to aggregate individual level data to the higher level (i.e. group, organization) to avoid fallacies related to analysis levels.

Since the aggregation of data does produce possible issues, steps should be taken to preempt the possible issues from becoming problematic. As mentioned earlier, to answer *research questions* at higher levels, qualitative IS researchers typically use individual level data. Merely aggregating the data without an appropriate strategy, may generate mistakes in *data analysis* and consequently in the *inferences*. Most organizational settings have hierarchical structure, and each individual data point does not necessarily have equal importance. By ignoring this asymmetry in data importance, researchers may eventually have information that is far from representing the real status of the organization. To avoid the problems that may occur in the individual data aggregation process, researchers may use multiple levels of data sources.

As we can see in Appendix B, a large portion of levels patterns do include multiple levels for *data collection* (17 studies). However, the remainder of the studies use a single level for *data collection*, which must be done carefully.

The more alarming issue stemming from the changes in levels is that some patterns are not intuitively reasonable, warranting further analysis. For example, a pattern in Appendix B's seven-tier framework appears as O-PO-O-P, meaning that the *research question* is raised at organizational level, but the *inference* is presented at person level. In this example, it is highly questionable whether the *inference* made from the study addresses the initial *research question* since the two levels do not match. This led us to investigate the conformity of levels between the *inference* activity and the other research activities. As Table 3 shows, the *inference* activity is commonly mismatched or partially matched with the *research question* activity (26%) and the *data analysis* activity (23%). This demonstrates a significant issue exists since activities with non-matching levels can jeopardize the legitimacy of the *inferences*.

Lastly, even though qualitative research methods may be less systematic in many aspects, they must still be done in a rigorous way (Mason 2002). In order to conduct more rigorous research, qualitative researchers need to seek more systematic practices such as clear level specification. Ultimately, the crux of this argument is that qualitative studies dealing with phenomena at multiple levels should keep track of types of the interactions, data aggregation models, and multilevel fallacies to ensure they draw accurate conclusions.

## VI. Limitations

This study is limited in regards to the breadth of journals covered. This study focuses on two top IS journals. The findings in this study may not be representative of the overall publication trend in the IS field, nor of other research projects that did not successfully complete the journal publication process. The decision was to closely investigate the articles in IS's premier journals to obtain a rich understanding of the current state of research practices. To that end, the study is also restricted to a 5-year corpus of publications. Since research practices are continually evolving in light of research findings, the scope of the research articles reviewed was limited to only five years in order to assess the state of the art in research practices with regards to handling level issues.

Another limitation of the study is that the research methodology utilized relies on the published research articles as sample observations. This was deemed a sufficient representation of the researchers' actual research practices, so no additional methods were employed to triangulate findings regarding the research studies reviewed. We are not suggesting that publications might contain misleading representations about level specification issues; however, this research does not attempt to verify the authenticity beyond the researchers' written claims.

Lastly, future work could be conducted to analysis other journal's research articles. It would be interesting to note whether similar trends exist within the various IS journals. This was not the intent of the current research; however, by initializing a dialogue on the problem and providing a conceptual framework, this study serves as a launching point for future inquiry.

## VII. Conclusion

This research study aims to raise awareness that qualitative research is susceptible to level issues. In doing so, the study reveals that qualitative research in IS literature is performed frequently on many different levels ranging from individual to societal. After demonstrating the existence of wide-ranging level usage, the study embarks on a more targeted investigation by analyzing changes in levels within specific studies. Levels commonly change across research activities throughout the research process, and multiple levels are sometimes present at each juncture due to the hierarchical nature of organizations.

While mismatching of level specifications does not guarantee that research results are invalid, the presence of incongruent level specifications warrants additional scrutiny to ensure appropriate accommodations are carried out. The importance of congruency is especially noteworthy in relation to the levels of inferences drawn from the research. Approximately 26% of articles reviewed contain some degree of level mismatch between *research question* and *inference*. This shows that conditions are present for multiple level problems to exist even in our best journals.

Though the patterns of level usage indicate that IS qualitative studies are exposed to level problems, steps can be taken to prevent or mitigate them. With greater awareness towards the issues explored in this study, IS qualitative researchers can increase the rigorousness of their research ultimately resulting in an overall strengthening of the discipline's research methodologies.

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## APPENDIX A: LIST OF ARTICLES ANALYZED

Journal	Year	Vol.	Iss.	Author	Title
MISQ	2011	35	1	Koch, H. and Schultze, U.	Stuck In The Conflicted Middle: A Role-Theoretic Perspective On B2b E-Marketplaces
MISQ	2011	35	1	Leonardi, P. M.	When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, And The Imbrication Of Human And Material Agencies
MISQ	2011	35	3	Furieux, B. and Wade, M.	An Exploration Of Organizational Level Information Systems Discontinuance Intentions
MISQ	2011	35	3	Berente, N., Hansen, S., Pike, J. C., and Bateman, P. J.	Arguing The Value Of Virtual Worlds: Patterns Of Discursive Sensemaking Of An Innovative Technology
MISQ	2011	35	3	Kohler, T., Fueller, J., Matzler, K., & Stieger, D.	Co-Creation In Virtual Worlds: The Design Of The User Experience
MISQ	2010	34	1	Thomas, D. M. & Bostrom, R. P.	Vital Signs For Virtual Teams: An Empirically Developed Trigger Model For Technology Adaptation Interventions
MISQ	2010	34	3	Smith, S., Winchester, D., Bunker, D., and Jamieson, R.	Circuits Of Power: A Study Of Mandated Compliance To An Information Systems Security De Jure Standard In A Government Organization
MISQ	2010	34	3	Spears, J. and Barki, H.	User Participation In Information Systems Security Risk Management
MISQ	2010	34	4	Strong, D. M. and Volkoff, O.	Understanding Organization–Enterprise System Fit: A Path To Theorizing The Information Technology Artifact
MISQ	2010	34	4	Puhakainen, P. and Siponen, M.	Improving Employees' Compliance Through Information Systems Security Training: An Action Research Study
MISQ	2009	33	3	Cyr, D., Head, M., Larios, H., and Pan, B.	Exploring Human Images In Website Design: A Multi-Method Approach

MISQ	2009	33	4	Wang, P. and Ramiller N. C.	Community Learning In Information Technology Innovation
MISQ	2008	32	1	Xue, Y., Liang, H., and Boulton, W. R.	Information Technology Governance In Information Technology Investment Decision Processes: The Impact Of Investment Characteristics, External Environment, And Internal Context
MISQ	2008	32	2	Vlaar, P. W. L., van Fenema, P. C., and Tiwari, V.	Cocreating Understanding And Value In Distributed Work: How Members Of Onsite And Offshore Vendor Teams Give, Make, Demand, And Break Sense
MISQ	2008	32	2	Olsson, H. H., Conchúir, E. Ó. Ågerfalk, P. J., and Fitzgerald, B.	Two-Stage Offshoring: An Investigation Of The Irish Bridge
MISQ	2008	32	2	Levina, N. and Vaast, E.	Innovating Or Doing As Told? Status Differences And Overlapping Boundaries In Offshore Collaboration
MISQ	2008	32	2	Dibbern, J., Winkler, J. and Heinzl, A.	Explaining Variations In Client Extra Costs Between Software Projects Offshored To India
MISQ	2008	32	2	Ågerfalk, P. J. and Fitzgerald, B.	Outsourcing To An Unknown Workforce: Exploring Opensourcing As A Global Sourcing Strategy
MISQ	2008	32	2	Leonardi, P. M. and Bailey, D. E.	Transformational Technologies And The Creation Of New Work Practices: Making Implicit Knowledge Explicit In Task-Based Offshoring
MISQ	2008	32	4	Pries-Heje, J. and Baskerville, R.	The Design Theory Nexus
MISQ	2008	32	4	Adomavicius, G., Bockstedt, J. C., Gupta, A., and Kauffman, R. J.	Making Sense Of Technology Trends In The Information Technology Landscape: A Design Science Approach
MISQ	2007	31	2	Watson-Manheim, M. B. and Bélanger, F.	Communication Media Repertoires: Dealing With The Multiplicity Of Media Choices
MISQ	2007	31	2	Avgerou, C. and McGrath, K.	Power, Rationality, And The Art Of Living Through Socio-Technical Change
MISQ	2007	31	2	Silva, L. and Hirschheim, R.	Fighting Against Windmills: Strategic Information Systems And Organizational Deep Structures
MISQ	2007	31	2	Puri, S. K.	Integrating Scientific With Indigenous Knowledge: Constructing Knowledge Alliances For Land Management In India
MISQ	2007	31	2	Braa, J., Hanseth, O., Heywood, A., Hohammed, W., and Shaw, V.	Developing Health Information Systems In Developing Countries: The Flexible Standards Strategy
MISQ	2007	31	2	Miscione, G.	Telemedicine In The Upper Amazon: Interplay With Local Health Care Practices
MISQ	2007	31	4	Davis, C. J. and Hufnagel, E. M.	Through The Eyes Of Experts: A Socio- Cognitive Perspective On The Automation Of Fingerprint Work

MISQ	2007	31	4	Davidson, E. J. and Chismar, W. G.	The Interaction Of Institutionally Triggered And Technology-Triggered Social Structure Change: An Investigation Of Computerized Physician Order Entry
MISQ	2007	31	4	Chua, C. E. J., Wareham, J., and Robey, D.	The Role Of Online Trading Communities In Managing Internet Auction Fraud
ISR	2011	22	1	Ravishankar, M. N., Pan, S. L., and Leidner, D. E.	Examining the Strategic Alignment and Implementation Success of a KMS: A Subculture-Based Multilevel Analysis
ISR	2011	22	3	Chen, Y.-D., Brown, S. A., Hu, P. J.-H., King, C.-C., and Chen, H.	Managing Emerging Infectious Diseases with Information Systems: Reconceptualizing Outbreak Management Through the Lens of Loose Coupling
ISR	2011	22	3	Oborn, E., Barrett, M., and Davidson, E.	Unity in Diversity: Electronic Patient Record Use in Multidisciplinary Practice
ISR	2011	22	3	Goh, J. M., Gao, G. and Agarwal, R.	Evolving Work Routines: Adaptive Routinization of Information Technology in Healthcare
ISR	2010	21	3	Vannoy, S. A. and Salam, A. F.	Managerial Interpretations of the Role of Information Systems in Competitive Actions and Firm Performance: A Grounded Theory Investigation
ISR	2009	20	1	Ransbotham, S. and Mitra, S.	Choice and Chance: A Conceptual Model of Paths to Information Security Compromise
ISR	2009	20	3	Vidgen, R. and Wang, X.	Coevolving Systems and the Organization of Agile Software Development
ISR	2009	20	3	Sarker, S. and Sarker, S.	Exploring Agility in Distributed Information Systems Development Teams: An Interpretive Study in an Offshoring Context
ISR	2009	20	4	Vaast, E. and Walsham, G.	Trans-Situated Learning: Supporting a Network of Practice with an Information Infrastructure

**APPENDIX B: LEVEL PATTERNS FOUND IN EACH FRAMEWORK**

Seven-Tier Framework				Two-Tier Framework		
Patterns	Frequency		Patterns	Frequency		
O-P-O-O	5		PO-P-O-O	1	G-I-G-G	10
N-P-N-N	3		S-PG-S-S	1	G-M-G-G	8
G-P-G-G	2		S-PS-POS-POS	1	G-M-M-M	3
P-P-G-P	2		G-P-P-G	1	I-I-I-I	3
G-PG-G-G	2		N-P-PN-N	1	I-I-G-I	2
P-P-P-P	2		N-PN-N-N	1	G-M-M-G	2
BO-PB-BO-BO	1		N-PO-ON-ON	1	M-M-M-M	2
N-N-N-N	1		O-PG-G-G	1	I-M-I-G	1
N-PG-N-N	1		O-PG-PO-PO	1	M-I-G-G	1
N-PO-GO-N	1		O-PO-O-P	1	G-I-I-G	1
O-P-PO-PO	1		P-P-PO-PO	1	G-I-M-G	1
O-PG-O-O	1		PG-PG-PG-PG	1	I-I-M-M	1
O-PGO-O-O	1		PO-P-PO-O	1	M-I-M-G	1
ON-N-ON-ON	1		S-POS-POS-S	1	M-G-M-M	1
P-PO-P-O	1				G-I-M-M	1
					G-M-G-I	1
P: Person, G: Group, B: SBU, O: Organization, N: Network, S: Society				I: Individual, G: Group, M: Multiple		

**Table B-1: Levels Framework**

## APPENDIX C: EXAMPLES OF RESEARCH ACTIVITY CODING

This illustrates an example of the coding process for each of the four research activities:

<b>Research Activity</b>	<b>Example from Review</b>
1. Research Question	Level: Person Berente, Hansen, Pike and Bateman's (2011): <i>"In analyzing the data, we ask the following questions: 1. How do <u>individuals</u> discursively make sense of the potential organizational value of Second Life? 2. What forms of arguments might they advance to justify their evaluation of that potential organizational value? 3. Finally, what patterns exist in those arguments for, or against, the potential organizational value?"</i>
2. Data Collection	Levels: Person, Group Oborn, Barrett, and Davidson (2011): <i>"Interviews (28 total) 16 <u>physicians</u>, 4 nurses, 3 IT administrators, 3 office staff, 2 patients... Observation: 23 <u>multidisciplinary meetings</u> (MDMs), 11 other meetings, 19 multidisciplinary clinic sessions"</i>
3. Data Analysis	Levels: Strategic business unit, Organization Ravishankar, Pan, and Leidner (2011): <i>"Our analysis focuses on the experiences of the three <u>business units</u> (ITS-VU, ITS-HU, and ITS-OS) with the KMS as separate cases. We first present a within-case analysis of the subcultural patterns and their role in the respective unit's KMS experience. We then present a cross-case analysis, which examines the alignment and implementation factors present in each of the three business units, as well as in the <u>corporate unit</u>."</i>
4. Inference	Level: Strategic business unit, Organization Ravishankar, Pan, and Leidner (2011): <i>"Drawing on the above analysis, we next build a subculture model depicting the intersection of alignment and implementation. For subcultures best described as Enhancing (Martin and Siehl 1983), alignment at the <u>organization level</u> effectively ensures alignment at the <u>subunit level</u>, as well as fit with individuals' values in the organization."</i>

**Table C-1: Levels of Analysis Framework**