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State of Multilevel Research Perspective in the Information Systems Discipline

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Abstract

Existing distinctions among macro and micro approaches have been jeopardising the advances of Information Systems (IS) research. Both approaches have been criticized for explaining one level while neglecting the other; thereby, the current situation necessitates the application of multilevel research for revealing the deficiencies. Instead of studying single level (macro or micro), multilevel research entails more than one level of conceptualization and analysis, simultaneously. As the notion of multilevel is borrowed from reference disciplines, there tends to be confusions and inconsistencies within the IS discipline, which hinders the adoption of multilevel research. This paper speaks for the potential value of multilevel research, by investigating the current application status of multilevel research within the IS domain. A content analysis of multilevel research articles from major IS conferences and journals is presented. Analysis results suggest that IS scholars have applied multilevel research to produce high quality work ranging from a variety of topics. However, researchers have not yet been consistently defining "multilevel", leading to idiosyncratic meanings of multilevel research, most often, in authors' own interpretations. We argue that a rigorous definition of "multilevel research" needs to be explicated for consistencies in research community.

Keywords

Multilevel Research; Content Analysis; Multilevel Theory; Information Systems Research.

INTRODUCTION

The coexistence of macro-level and micro-level research perspectives has led to diverse traditions of scientific investigation. Having an institutional view of organizations, macro-level researchers prefer to explain foundations, growth, changes, and other properties of organizations (House, Rousseau, and Thomas-Hunt 1995), while micro-level researchers prefer to investigate individual or small group cognitive, motivational, and behavioral processes (House et al. 1995) with more emphasis on psychological processes.

Both perspectives have been criticized for weaknesses in their paradigms. Macro theorists have been criticized for their view of individuals or groups as "black boxes" whose function is not clear (or of interest) and for too little focus on human interaction (House et al. 1995). Micro theorists are criticized for purporting theories that exist in a vacuum; individual or small group theories that ignore contextual variables (House et al. 1995).

These paradigm limitations suggest merit from further paradigm development, balancing strengths and weaknesses of both perspectives. Rousseau (1985) pivotally observed that organizational phenomena are multilevel – existing at 'both' macro and micro levels – suggesting that failure to consider multiple levels would lead to ecological fallacies, defined as errors resulted from inadvertently generalizing theory from one level to another (Rousseau 1985). Rousseau's (1985) call for multilevel research has been echoed by other organizational researchers (Chan 1998; 1998; House et al. 1995; Klein and Kozlowski 2000a; Klein, Dansereau, and Hall 1994; Kozlowski and Klein 2000b; Morgeson and Hofmann 1999). As phenomena are common at different levels or across levels, investigating one level, while ignoring similar phenomena at another level, can result in incomplete theories (House et al. 1995).

Multilevel research entails more than one level of conceptualization and analysis simultaneously. Example levels of frequent interest (implicit or explicit) are individual level, group level, and organizational level. In example, Lapointe and Rivard (2005) proposed a behavioral model explaining individual and group resistance to IT implementation. As multilevel research can examine how lower-level properties manifest at a

higher level, group behaviors were studied from bottom-up processes; group behaviors emerging from individual behaviors (Lapointe and Rivard 2005).

Organizational researchers generally consider and distinguish three types of levels – level of theory, level of measurement, and level of analysis (Rousseau 1985). The *level of theory* refers to the levels at which the proposed theory is manifested, or to which generalizations are made (Klein et al. 1994; Rousseau 1985). The level of theory is inevitably encountered when postulating rigorous theory, because no theory is 'level free' (Klein et al. 1994); one must implicitly or explicitly specify the level(s) of theory. When researchers explicitly or implicitly postulate single-level theory, but the phenomena are in essence multilevel, false conclusions may be drawn. The *level of measurement* refers to "the unit to which the data are directly attached" (Rousseau 1985, pp. 4); and the *level of analysis* refers to "the unit to which the data are assigned for hypothesis testing and statistical analysis" (Rousseau 1985, pp. 4). Issues also emerge from the level of measurement and the level of analysis in traditional macro- or micro-level paradigms. In example, researchers regularly employ aggregated data to measure collective constructs, often violating established principles for using lower level data to represent higher-level constructs. It is recommended that before lower level data can be aggregated, within-group agreement must be guaranteed (Kozlowski and Klein 2000b). Furthermore, traditional statistical techniques are inappropriate for analyzing multilevel data and testing related hypotheses. They assume that the data is independently collected from random samples from the population; this assumption of course is violated for multilevel hierarchically nested data (Hofmann 1997). For example, individual data collected from the same group are correlated to the same contextual variable rather than being independent of each other; this violates a basic principle of multiple regression (Luke 2004). These statistical analysis deficiencies can be accommodated through utilizing multilevel statistical analysis techniques, such as Hierarchical Linear Modelling (see Hofmann 1997 for an overview).

These issues with macro versus micro paradigms have become increasingly prevalent in organizational contexts because of the advent of modern information systems. For example, information systems tend to strengthen interactions among organizational members, such as through communication software. In more extreme cases, the structure of organizations may be facilitated or even dictated by information systems e.g. virtual collaborative teams in software development. In such circumstances, it is the existence of the information systems that facilitates interactions between the lower level (i.e., individuals) and the higher level (i.e., teams) thereby mediating multilevel phenomena within organizations. Here the cross-level nature of information systems makes it difficult to legitimately focus on only one level while ignoring others.

Lack of clarity has been a hindrance to the adoption of multilevel research in the Information Systems (IS) discipline. A preliminary literature review comparing and contrasting the work of authors who argued their work is "multilevel" (or "multi-level") revealed little agreement on what is multilevel. For example, multilevel has been represented as multiple steps within algorithms in lot-sizing problems (Benton and Srivastava 1985). It has also been used to refer to different management levels in strategic management research (Waldman and Yammarino 1999). Such vague and conflicting definitions and inconsistent meanings promote confusion, detract from rigor, and can frustrate cumulative research.

Multilevel research has been favored more by Management and Applied Psychology disciplines than the IS discipline. In these referent disciplines, multilevel research has evolved from mere theory building to widespread application and testing. In IS, the adoption of multilevel research is scant (Burton-Jones and Gallivan 2007). We echo notable organizational researchers (Rousseau 1985; Klein et al. 1994) and stress the potential from stronger multilevel research in IS.

The primary goal of this paper is to promote discussion on multilevel research within the IS discipline. In order to better understand the current status of multilevel research in IS, we ask the research question *'how has multilevel research been adopted in the current IS literature?'* Our interest is in such things as research trends, topics, publication outlets, and influences within the IS discipline. A cogent discussion on the current status of multilevel research in the IS discipline will establish a platform for further investigation. The study further seeks to identify confusions and reconcile inconsistencies in multilevel research within the IS discipline, by inventorying the diverse meanings of multilevel research employed. Clarifying explicit or implicit meanings of multilevel can help in linking different multilevel research efforts and in building consensus within the IS community. It is also hoped this study will stimulate adoption of multilevel research in IS, through revealing new and important research potential and by illuminating gaps in past and current multilevel research efforts.

We next discuss varying notions of the multilevel research perspective. We then present the research design; primarily content analysis of multilevel research literature within the IS discipline. The subsequent relates the state and diverse meanings of multilevel research distilled from the content analysis. Finally, implications and limitations are presented and conclusions are drawn.

DIVERSITY IN THE NOTION OF MULTILEVEL

Multilevel research implies a way of abstracting reality. Specifically, it is the abstraction of homogeneity of objects; the word 'level' is used to represent the abstraction. In this regard, the meaning of multilevel research implied by authors is equivalent to the abstraction of homogeneity of objects they implied. For example, while investigating technology usage intention (Cenfetelli and Schwarz 2011), the abstraction of homogeneity of objects is an organizational unit; in this case, multilevel research can be interpreted as studying technology usage intention both at an individual level and at a group level (where the individual and the group are the organizational units). Herein, we use the 'function-of-level', defined as 'the way that the level is used for abstraction of homogeneity of objects in research', to symbolize diverse notions of multilevel research.

Given the inconsistency in definitions of multilevel research in the IS domain, it is useful to inventory these diverse notions. In this attempt, we believe the varying and implicit functions of 'level' can be distilled from revisiting relevant past literature, such effort aiding in delineating confusion and inconsistency and in facilitating more precise and harmonious expression of the meaning of multilevel research into the future. With this intent, we systematically examined past multilevel research literature in the IS domain.

METHODOLOGY

Content analysis of multilevel research within IS is the primary investigation method in this study. Content analysis is "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff 2004, pp. 18). The texts that will be analyzed here are multilevel research papers retrieved from the IS literature. As a systematic qualitative data analytic approach, content analysis can extract meaning from a large quantity of textual data. Thus, it supports our goal of understanding the diversity of meanings and the status of multilevel research in IS.

The content analysis process followed in this study included five steps. First, we defined the domain and scope of the research. Second, we prepared strategies for a systematic search process. Third, constrained by the domain and scope of this study, a screening process was conducted to omit irrelevant papers. Fourth, coding was conducted. Finally, we analyzed the coded results and reported findings. Each step is described in further detail below.

Defining Domain and Scope

The domain of interest was specific to the IS discipline. As the goal was to capture the status of multilevel research in the IS discipline, we focused on articles published in well-regarded IS conferences and journals. We covered major IS conferences including: *Australasian Conference on Information Systems* (ACIS), *Pacific Asia Conference on Information Systems* (PACIS), *European Conference on Information Systems* (ECIS), *Americas Conference on Information Systems* (AMCIS), and *International Conference on Information Systems* (ICIS). We also covered the Senior Scholars' Basket of Eight Journals: *MIS Quarterly* (MISQ), *Information Systems Research* (ISR), *Journal of Management Information Systems* (JMIS), *European Journal of Information Systems* (EJIS), *Information Systems Journal* (ISJ), *Journal of Information Technology* (JIT), *Journal of Strategic Information Systems* (JSIS), *and Journal of the Association for Information Systems* (JAIS). These eight journals are endorsed by the AIS (Association for the Information Systems) Senior Scholar Consortium as "top journals in our field". We believe this range of conferences and journals to be representative of research in IS.

Though a thorough approach was followed in extracting papers deemed appropriate, we acknowledge the selection process may have excluded a small number of relevant papers; in example, IS papers applying multilevel principles that did not self-declare their multilevel approach, may not have been identified. Such exclusions are inevitable with any literature review (vom Brocke et al. 2009; Webster and Watson 2002); one can only define a feasible and appropriate scope and approach and demonstrate in a transparent manner, how all relevant papers that fit the specifications were included (Chiasson et al. 2008).

Searching, Screening and Coding

We searched for the terms "multilevel" and "multi-level" in article "title", "key words", and "abstract" fields (for consistency we searched only on author provided key words, rather than key words provided by certain databases). For feasibility reasons, only articles published in the ten-year period 2002-2011 were included. The database for searching was *Web of Science*, which covers the predetermined publication outlets and time span. In consideration of content validity, we conducted a screening process to exclude articles that do not align with our goal. First, we examined what the authors refer to when using the term multilevel in their papers. We included only articles that refer to multilevel research as addressing different levels of conceptualization or analysis. Despite multilevel conceptualization and analysis having quite different approaches and traditions, they are both aligned with the multilevel paradigm; hence we included them both to have a more complete view. We will revisit this issue in the 'Limitations' section. In our dataset, only one article was excluded. This article uses the term 'multilevel' to represent different components of an IT artefact that the authors were building, which is

neither conceptualization nor analysis. Second, we excluded two workshop proposals within conference proceedings because they did not represent completed or in-progress research. Finally, we coded meta-information (such as publication name and publication year) and other details such as research topic and function-of-level – which will be explained further as the analysis results are presented.

RESEARCH RESULTS

The final dataset used for this analysis contained relatively few publications – 36 conference papers[1] and 24 journal papers[2]. Except for *Journal of Strategic Information Systems* (JSIS), each conference and journal outlet has at least one article in our dataset. Although searching started from 2002, the first article from our sample appeared in 2003 with at least one article each year since, implying multilevel research is a relatively recent focus in IS. Though workshop proposals were excluded in the detailed analysis here, we note a workshop proposal at AMCIS 2009 titled *Conducting Multi-level Research in Information Systems,* perhaps again suggesting more recent growth in interest in multilevel research by the IS community.

In exploring the dataset, we asked the question "*What is the current status of multilevel research in the IS discipline?*" We thus sought to assess: (1) how popular/prevalent multilevel research is; (2) what are the main outlets; (3) what has been the more influential related work; (4) to what topic areas has it been applied; and (5) what functions-of-level are used.

We first calculated the quantity of multilevel research publications in major IS conferences and journals. As depicted in Figure 1, though quantity of conference publications fluctuates between 2003-2008, thereafter we see steady increase; the overall trend-line suggesting an emerging and increasingly prevalent perspective in major IS conferences. Similar to conferences, we observe a generally increasing trend-line with some fluctuation in IS journal publications.

For publication outlets, noting the extremes in publication outlets, AMCIS has published 13 related papers and ACIS only 1. *MIS Quarterly* has published the most (7 papers in total) among major IS journals, including three in the last year, 2011, suggesting endorsement of the perspective by this top IS journal. Nonetheless, this number and the total 24 in the eight journals, is relatively small compared with numbers in Management research[3].
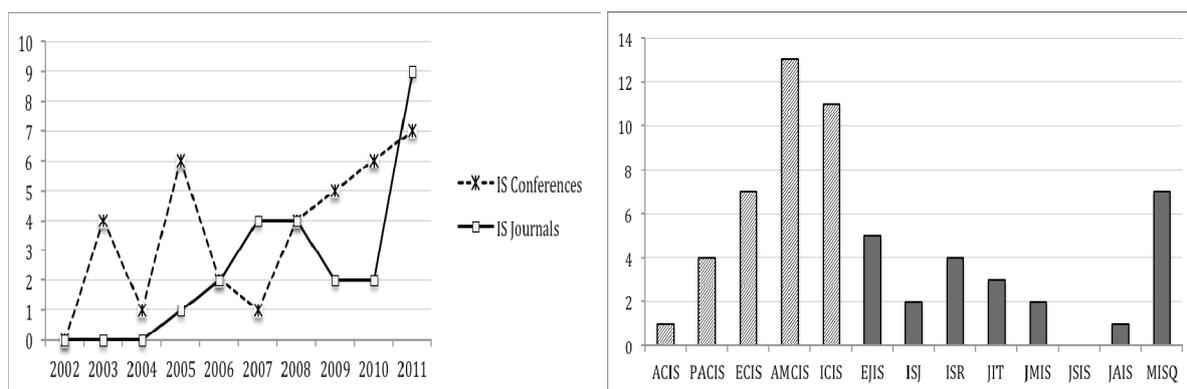

Figure 1: Multilevel Research Publication Number in IS Conferences and Journals from 2002 to 2011

To further understand how multilevel research has been applied in the IS discipline, we investigated topics for which researchers have been employing multilevel research. As journal articles are more likely to include completed rigorous research, we believe journal publications are more representative than conference publications for this purpose. Therefore, we included only journal articles for the following analysis. First, we tentatively identified the central topic of each journal article in our dataset; drawing on the title, key words and abstract of the article. We then classified these topics, arriving at twelve categories: IT/IS adoption, IT/IS implementation, IT/IS alignment, IT/IS usage, IT/IS value, compensation, customer loyalty, information privacy, innovation, IS change, IS proficiency, IS governance, price rigidity, and virtuality. From this exercise it would appear that the multilevel approach is applicable to a diverse range of IS research topics. As depicted in Table 1, the three most prevalent topics employing multilevel approach are IT/IS adoption, IT/IS implementation, and IT/IS alignment.

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[1] The list of 36 conference articles has not been included due to space limitations. Readers can contact the first author to acquire a full set of the conference articles.
[2] The 24 journal articles are cited in this paper as references.
[3] We also conducted a similar search within top Management journals. For instance, the publication number of *Academy of Management Journal*, *Academy of Management Review*, *Journal of Management*, and *Organization Science* from 2002 to 2011 is: 33, 14, 35, and 22 respectively.

Table 1. Prevalent Areas of Multilevel Research in major IS Journals

Topic	Number	Articles
IT/IS Adoption	4	Cho, Mathiassen, and Robey 2007; Kane and Labianca 2011; Lyytinen and Damsgaard 2011; Sarker and Valacich 2010
IT/IS Implementation	4	Aubert, Barki, Patry, and Roy 2008; Lapointe and Rivard 2005; Rodon, Pastor, Sese, and Christiaanse 2008; Rodon, Sese, and Christiaanse 2011
IT/IS Alignment	3	Benbya and McKelvey 2006; McLaren, Head, Yuan, and Chan 2011; Ravishankar, Pan, and Leidner 2011
IT/IS Usage	2	Burton-Jones and Gallivan 2007; Cenfetelli and Schwarz 2011
IT/IS Value	2	Pare, Bourdeau, Marsan, Nach, and Shuraida 2008; Rai, Maruping, and Venkatesh 2009
Compensation	1	Levina and Xin 2007
Customer Loyalty	1	Mithas, Ramasubbu, Krishnan, and Fornell 2006
Information Privacy	1	Belanger and Crossler 2011
Innovation	1	Cho and Mathiassen 2007
IS Change	1	Lyytinen and Newman 2008
IS Proficiency	1	Kane and Borgatti 2011
IT Governance	1	Rukanova, van Stijn, Henriksen, Baida, and Tan 2009
Price Rigidity	1	Kauffman and Lee 2010
Virtuality	1	Suh, Shin, Ahuja, and Kim 2011

We next searched *Google Scholar* (scholar.google.com.au) citation counts for each article in our dataset, thereafter employing these counts as a proxy for influence of research outcomes. Table 2 list the top five ranked articles based on citation counts. The large counts, given the relative recentness of the articles, suggest these are relatively influential works.

Table 2. Top 5 Ranked Articles based on Citation

Citing Number	Articles	Publication	Year	Topic
371	Lapointe and Rivard 2005	MISQ	2005	IT/IS Implementation
143	Burton-Jones and Gallivan 2007	MISQ	2007	IT/IS Usage
83	Lyytinen and Newman 2008	EJIS	2008	IS Change
72	Mithas et al. 2006	JMIS	2006	Customer Loyalty
68	Benbya and McKelvey 2006	JIT	2006	IT/IS Alignment

To investigate notions of multilevel research that authors implied, we coded the function-of-level, (as defined earlier in section 'Diversity in the Notion of Multilevel'). We first searched the occurrence of the term "level" in the article. Then, we analyzed how the term was used in context. For instance, Cho and Mathiassen (2007) explicitly stated they analyzed telehealth innovation at both stakeholders level and context level of analysis. In this case, the function-of-level – to differentiate telehealth innovation at different levels of analysis – can be extracted from the article. Meanwhile, having identified the function-of-level, we were also able to code instances of each level studied – e.g., in the example, stakeholders level and context level.

Table 3 presents the functions-of-level identified and their instances. The instances of levels are as distinguished by the authors in their article, as instances of how they investigated their study focal phenomena. Note that we do not provide detailed interpretations here for instances of levels in Table 3, as they are diverse in meaning and interpreted by the respective authors. Neither are all instances readily understandable – e.g., traditional level and configuration level in #5. We believe this confusion suggests value from a framework or taxonomy to delineate conceptual inconsistencies.

From Table 3, we make two main observations. First, author(s) generally used "multilevel" or "multi-level" to refer to different levels of 'analysis'; their understandings of levels of analysis however are inconsistent. For example, study #1 differentiated two levels - stakeholder-level and context-level. The authors posited two questions: (1) "*how do key stakeholders address industrial infrastructure issues during adoption of the telehealth innovation under study?*" (Cho and Mathiassen 2007, pp. 739), and (2) "*how do industrial infrastructure factors shape the adoption of the telehealth innovation under study?*" (Cho and Mathiassen 2007, pp. 739). This suggests the authors were addressing two completely different research questions pertaining to telehealth innovation. How and why stakeholder-level and context-level are two levels of the same phenomena

are not clear. Are they different levels of theory, measurement, or analysis? It might be more appropriate to characterize the level of analysis in this research as a viewpoint or perspective pertaining to a common research topic. Other researchers, such as #16 in Table 3, view the level of analysis differently. In study #16, individual virtuality and group virtuality were reported. These two kinds of virtualities were conceptualized as two different constructs. The level of analysis can be interpreted as level of theory; namely, conceptualizations of the same phenomena at different levels.

Second, scholars have been using disparate ways to differentiate levels in multilevel research, leading to inconsistency and incomparability across studies. For example, is group level equivalent to organizational level?; is industry level or country level equivalent to environment level? Researchers while adopting multilevel research rarely address comparability of levels across studies. If they are not equivalent, how can research results be compared across studies? If they are, to what extent are they comparable? For example, the study of inhibitors of technology usage intention in #11, investigated individual level and website unit level. Is their study comparable to another study of inhibitors of technology usage intention at individual level and group level? We argue that these questions need to be explicitly addressed in multilevel research, as they concern the issue of generalizability and progressive enhancement within a discipline, which forms the core of scientific investigations. In summary, more careful examination of what researchers mean by multilevel research and how their research compares with other multilevel research, are needed to facilitate a cumulative tradition of research in the IS discipline.

Table 3. Function-of-level in Multilevel Research

No.	Function-of-level	Instances of Levels Used
1	To Differentiate Telestroke Innovation at Different Levels of Analysis (Cho and Mathiassen 2007)	Stakeholder-level; Context-level;
2	To Investigate IT Impact at Different Levels of Analysis (Pare et al. 2008)	Individuals; Technologies; Organizational Constructs; Social Constructs;
3	To Differentiate the Context Of Information Systems Change at Multiple Levels (Lyytinen and Newman 2008)	Work System level; Building System level; Organizational Environment level;
4	To Differentiate Multiple Levels of Analysis on Governments of Inter-Organizational Systems (Rukanova, van Stijn, Henriksen, Baida, and Tan 2009)	Business Collaboration Level; Business Level; National Level; Economic Zone Level;
5	To Differentiate Levels of Analysis on Inter-Organizational Information Systems Adoption (Lyytinen and Damsgaard 2011)	Traditional Level; Configuration Level;
6	To Differentiate Levels of Analysis on IT Implementation (Aubert et al. 2008)	Project Level; Individual Level; Organizational Level;
7	To Differentiate Levels of Analysis on Inter-Organizational Information Systems Assimilation (Rodon et al. 2011)	Users Level; IOIS Management Level;
8	To Differentiate Levels of Analysis on IT Workers Compensation (Levina and Xin 2007)	Individual Level; Institutional Level;
9	To Differentiate Levels of Analysis on KMS Alignment and Implementation (Ravishankar et al. 2011)	Individual Level; Unit Level; Organization Level;
10	To Differentiate Levels of Analysis on IT Avoidance (Kane and Labianca 2011)	Individual Level; Shared Group Level; Configural Group Level;
11	To Differentiate Inhibitors of Technology Usage Intentions at Levels of Analysis (Cenfetelli and Schwarz 2011)	Individual Level; Website Unit Level;
12	To Differentiate Multiple Levels of Analysis on IT Alignment (Benbya and McKelvey 2006)	Individual Level; Operational Level; Strategic Level;
13	To Differentiate Levels Of Analysis on Resilience (Cho et al. 2007)	Within-Organizational Level; Between-Organizational Level;
14	To Differentiate Levels of Analysis on IT Implementation (Rodon et al. 2008)	Industry Level; Country Level;
15	To Differentiate Levels Of Analysis on Customer Loyalty (Mithas et al. 2006)	Within-Website Level; Across-Website Level;
16	To Differentiate Levels of Virtuality (Suh et al. 2011)	Individual Level; Group Level;
17	To Differentiate Levels of Analysis on Price Rigidity (Kauffman and Lee 2010)	Firm-Specific Level; Firm-To-Customer Level; Firm-To-Market Level;
18	To Differentiate Levels of Analysis on IT Implementation (Lapointe and Rivard 2005)	Individual Level; Group Level;
19	To Differentiate Levels of Analysis on System Usage (Burton-Jones and Gallivan 2007)	Individual Level; Group Level; Organizational Level;
20	To Differentiate Levels of Analysis on Offshore Information Systems Project Success (Rai et al. 2009)	Project Level; Project Leader Level;
21	To Differentiate Levels of Analysis on IT Adoption (Sarker and Valacich 2010)	Individual Level; Group Level;
22	To Differentiate Levels of Strategic Fit Measurement (McLaren et al. 2011)	Overall Level; Detailed Level;
23	To Differentiate Levels of Analysis on IS Proficiency (Kane and Borgatti 2011)	Individual Level; Group Level;
24	To Differentiate Levels of Analysis on Information Privacy (Belanger and Crossler 2011)	Individual Level; Organizational Level;

DISCUSSION

The unit nesting assumption states that before a collective can be analyzed as a unit, researchers must assume that unit exists, such as a team or a department. It is argued that scholars have been heavily relied on unit nesting assumptions that depend on formal organizational structure (Mathieu and Chen 2011). The unit nesting assumptions can be violated once the formal organizational structure becomes volatile. For example, if some members of a specific team are part-time employees, should they be considered part of the team? Furthermore, in related to multilevel analysis, should this team be analyzed as a unit if it is only a temporary team? This issue has been known since Rousseau (1985) summarized this nesting assumption as a hierarchy scheme for distinguishing one level from another. However, few researchers specified why a particular level was chosen for analysis or on substantiating rules for membership of a unit (Mathieu and Chen 2011). We believe this issue can be even more problematic in the IS discipline, as our results suggest the levels adopted in IS research are quite diverse. Thus we see future value in exploring several research questions. How and why researchers have been defining criteria for membership (for inclusion in a level) in IS research? How does the existence of the information systems context affect the unit nesting assumptions? For example, if employees from different groups are using the same information system, should they be aggregated as a single unit for analysis?

Though in this paper we advocate multilevel research; this does not suggest all research should be multilevel. Several scholars have observed that if the phenomena only exist at single level, there is no need to conduct multilevel research. Further, if the phenomena can be isolated to a single level for study, we still believe there is again no need to conduct multilevel research. However, we believe both situations are relatively rare since most phenomena are multilevel in nature. Emergent variables from lower levels or contextual variables from higher levels are both common and can influence the phenomena of interest. Thus, phenomena are usually either multilevel per se or intimately connected with phenomena at other levels.

We do not here dictate what is meant by multilevel. Rather, with the goal of more effective advancement of knowledge in the IS discipline, it is argued that scholars explicate their meaning of multilevel in order to facilitate cross-study comparison. Moreover, the IS discipline, as an interdisciplinary science, borrows theory from referent disciplines such as Management and Applied Psychology. Thus, increased consensus on the meaning of multilevel research can also contribute to improved cross-discipline communication, further facilitating theory development in our own discipline.

This study considered only IS literature that purported to be multilevel; yet, as observed at the outset and suggested by Klein et al. (1994), no theory is 'level free'. There is value in further revisiting the IS literature to consider the extent to which past research that does not claim multilevel, is in fact multilevel in terms of theory, analysis and statistical testing. As stated earlier, when researchers explicitly or implicitly postulate single-level theory but the phenomena is multilevel in essence, false conclusions may be drawn.

The multilevel research perspective can be criticized because it introduces complexity into theories or models, and thus, can work against the principle of parsimony. Intuitively, in most cases, more complex theories or models can have better explanatory power. We agree with this argument; however, the value of a multilevel research perspective should not be eschewed because of its complexity. Researchers may be more familiar with introducing additional constructs into the theory or model to gain more accurate explanation to the phenomena. Compared with the way of introducing more constructs, we argue that multilevel research perspective is an alternative to introduce complexity for better theory or model development, and sometimes, it is the only "right" way for achieving comprehensive explanation of phenomena. Both ways of introducing complexity should not be neglected.

Finally, we believe IS scholars can contribute to the development of multilevel research rather than merely borrow from other disciplines. In recent reviews of multilevel research, scholars consistently accepted that multilevel research originated from and contributed by several disciplines (Mathieu and Chen 2011; Rousseau 2011; Molloy, Ployhart and Wright 2011). The IS discipline has its own standing as a reference discipline in dealing with its own subject matter and unique contexts (Baskerville and Myers 2002). Therefore, it is useful for IS scholars to consider advancing multilevel research in our own tradition, unique contexts and subject matters. For example, how the existence of information systems would facilitate the emergence of levels, dissolve aggregated levels, or change the boundary of levels? Are there any values in our own thinking of multilevel phenomena in the IS context that can be transformed into other disciplines?

LIMITATIONS

First, results reported herein represent preliminary findings; an early attempt at better understanding the state of multilevel research in the IS discipline. Time and resource constraints limited the range of literature addressable, but more importantly the range of research questions. Although we have roughly identified the function-of-level in our results, a lot of future work can be done. Thus, we will focus on a detailed classification or taxonomy for delineating inconsistencies of multilevel research in the IS discipline. Specifically, several further research questions can be asked. For example, how a construct at one level is different from construct at another level?

What are the current state of multilevel research in conceptual versus empirical research? What are the differences between qualitative and quantitative multilevel research?

Second, as illustrated in the 'Methodology' section, we have deliberately chosen conceptualization and analysis in scoping multilevel research within the IS discipline. Although we acknowledge the differences of the multilevel research tradition in conceptualization and analysis, it can be more representative to include both multilevel conceptualization and analysis for our purpose. Alternatively, we can also explicitly compare and contrast multilevel research in literatures in terms of levels of theory, levels of measurement, and levels of analysis for future work. This exercise may generate interesting results. Such investigation will answer how multilevel research in conceptualization and in analysis are different. Do they have any interactions or even conflicts?

Third, this research is limited by its data searching method. Only researches that claimed "multilevel" or "multi-level" research, specifically, in the title, key words, and abstract sections, are included in our analysis. Other researches that conceptualized or analyzed more than one level, but did not claim multilevel research are ignored. It might generate interesting results to identify those kinds of researches for analysing in the future. Explicit comparing and contrasting researches that did and did not claim multilevel research but both conceptualized or analyzed more than one level may also help in clarifying confusions of multilevel research in the IS discipline. As multilevel research is an emerging field in our discipline, comparing and contrasting explicit and implicit multilevel research would scrutinize where and how confusions of concepts have been made in scholars' thinking of multilevel.

CONCLUSIONS

The goal of this paper is to encourage and facilitate high-quality multilevel research in the IS discipline. Content analysis of multilevel research articles published in major IS conferences and journals demonstrated recent state of multilevel research perspective, and uncovered what authors mean when they claim to be conducting multilevel research. Multilevel research has been scarce in the IS discipline; but it has been gaining more prevalence in recent years, and has been applied in a variety of topics to produce high quality research outcomes.

Multilevel research perspective has potential value for advancing the IS discipline, by avoiding fallacies in single level research or by developing more comprehensive understanding of phenomena. Errors from inadvertently drawing conclusions across levels can be avoided through multilevel perspective. Besides, multilevel theory complements single level theory in substantiating multilevel effects or cross level effects of phenomena. However, unresolved issues within the IS discipline still stand out. Among those issues, we argue that researchers need to pay more attention to the confusions and inconsistencies existing among multilevel research community within the IS discipline.

REFERENCES

Aubert, B. A., Barki, H., Patry, M., and Roy, V. 2008. "A Multi-Level, Multi-Theory Perspective of Information Technology Implementation," *Information Systems Journal* (18:1), pp 45–72.

Baskerville, R. L., and Myers, M. D. 2002. "Information Systems as a Reference Discipline," *MIS Quarterly* (26:1), pp 1-14.

Belanger, F., and Crossler, R. E. 2011. "Privacy in the Digital Age: a Review of Information Privacy Research in Information Systems," *MIS Quarterly* (35:4), pp 1017–1041.

Benbya, H., and McKelvey, B. 2006. "Using Coevolutionary and Complexity Theories to Improve IS Alignment: a Multi-Level Approach," *Journal of Information Technology* (21:4), pp 284–298.

Benton, W. C., and Srivastava, R. 1985. "Product Structure Complexity and Multilevel Lot Sizing Using Alternative Costing Policies," *Decision Sciences* (16:4), pp 357–369.

Burton-Jones, A., and Gallivan, M. J. 2007. "Toward a Deeper Understanding of System Usage in Organizations: a Multilevel Perspective," *MIS Quarterly* (31:4), pp 657–679.

Cenfetelli, R. T., and Schwarz, A. 2011. "Identifying and Testing the Inhibitors of Technology Usage Intentions," *Information Systems Research* (22:4), pp 808–823.

Chan, D. 1998. "Functional Relations Among Constructs in the Same Content Domain at Different Levels of Analysis: a Typology of Composition Models," *Journal of Applied Psychology* (83:2), pp 234–246.

Chiasson, M., Germonprez, M., and Mathiassen, L. 2009. "Pluralist Action Research: a Review of the Information Systems Literature," *Information Systems Journal* (19:1), pp 31-54.

Cho, S., and Mathiassen, L. 2007. "The Role of Industry Infrastructure in Telehealth Innovations: a Multi-Level

Analysis of a Telestroke Program," *European Journal of Information Systems* (16:6), pp 738–750.

Cho, S., Mathiassen, L., and Robey, D. 2007. "Dialectics of Resilience: a Multi-Level Analysis of a Telehealth Innovation," *Journal of Information Technology* (22:1), pp 24–35.

Hofmann, D. A. 1997. "An Overview of the Logic and Rationale of Hierarchical Linear Models," *Journal of Management* (23:6), pp 723-744.

House, R., Rousseau, D. M., and Thomas-Hunt, M. 1995. "The Meso Paradigm - a Framework for the Integration of Micro and Macro Organizational-Behavior," *Research in Organizational Behavior* (17), pp 71–114.

Kane, G. C., and Borgatti, S. P. 2011. "Centrality-IS Proficiency Alignment and Workgroup Performance," *MIS Quarterly* (35:4), pp 1063–1078.

Kane, G. C., and Labianca, G. 2011. "IS Avoidance in Health-Care Groups: a Multilevel Investigation," *Information Systems Research* (22:3), pp 504–522.

Kauffman, R. J., and Lee, D. 2010. "A Multi-Level Theory Approach to Understanding Price Rigidity in Internet Retailing," *Journal of the Association for Information Systems* (11:6), pp 303–338.

Klein, K. J., and Kozlowski, S. W. J. 2000a. "From Micro to Meso: Critical Steps in Conceptualizing and Conducting Multilevel Research," *Organizational Research Methods* (3:3), pp 211–236.

Klein, K. J., and Kozlowski, S. W. J. (Eds.). 2000b. *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions* (1st ed.). San Francisco: Jossey-Bass Inc.

Klein, K. J., Dansereau, F., and Hall, R. J. 1994. "Levels Issues in Theory Development, Data-Collection, and Analysis," *Academy of Management Review* (19:2), pp 195–229.

Kozlowski, S. W. J., and Klein, K. J. 2000. "A Multilevel Approach to Theory and Research in Organizations: Contextual, Temporal, and Emergent Processes," In *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions* (1st ed.). San Francisco: Jossey-Bass Inc.

Krippendorff, K. 2004. *Content Analysis: an Introduction to Its Methodology* (2nd ed.). Thousand Oaks, California: Sage Publications, Inc.

Lapointe, L., and Rivard, S. 2005. "A Multilevel Model of Resistance to Information Technology Implementation," *MIS Quarterly* (29:3), pp 461–491.

Levina, N., and Xin, M. 2007. "Comparing IT Workers' Compensation Across Country Contexts: Demographic, Human Capital, and Institutional Factors," *Information Systems Research* (18:2), pp 193–210.

Luke, D. A. 2004. *Multilevel Modeling*. Thousand Oaks, California: Sage Publications, Inc.

Lyytinen, K., and Damsgaard, J. 2011. "Inter-Organizational Information Systems Adoption - a Configuration Analysis Approach," *European Journal of Information Systems* (20:5), pp 496–509.

Lyytinen, K., and Newman, M. 2008. "Explaining Information Systems Change: a Punctuated Socio-Technical Change Model," *European Journal of Information Systems* (17:6), pp 589–613.

Mathieu, J. E., and Chen, G. 2011. "The Etiology of the Multilevel Paradigm in Management Research," *Journal of Management* (37:2), pp 610-641.

McLaren, T. S., Head, M. M., Yuan, Y., and Chan, Y. E. 2011. "A Multilevel Model for Measuring Fit Between a Firm's Competitive Strategies and Information Systems Capabilities," *MIS Quarterly* (35:4), pp 909–929.

Mithas, S., Ramasubbu, N., Krishnan, M. S., and Fornell, C. 2006. "Designing Web Sites for Customer Loyalty Across Business Domains: a Multilevel Analysis," *Journal of Management Information Systems* (23:3), pp 97–127.

Molloy, J. C., Ployhart, R. E., and Wright, P. M. 2011. "The Myth of 'the' Micro-Macro Divide: Bridging System-Level and Disciplinary Divides," *Journal of Management* (37:2), pp 581-609

Morgeson, F. P., and Hofmann, D. A. 1999. "The Structure and Function of Collective Constructs: Implications for Multilevel Research and Theory Development," *Academy of Management Review* (24:2), pp 249–265.

Pare, G., Bourdeau, S., Marsan, J., Nach, H., and Shuraida, S. 2008. "Re-Examining the Causal Structure of Information Technology Impact Research," *European Journal of Information Systems* (17:4), pp 403–416.

Rai, A., Maruping, L. M., and Venkatesh, V. 2009. "Offshore Information Systems Project Success: the Role of Social Embeddedness and Cultural Characteristics," *MIS Quarterly* (33:3), pp 617–641.

Ravishankar, M. N., Pan, S. L., and Leidner, D. E. 2011. "Examining the Strategic Alignment and

Implementation Success of a KMS: a Subculture-Based Multilevel Analysis," *Information Systems Research* (22:1), pp 39–59.

Rodon, J., Pastor, J. A., Sese, F., and Christiaanse, E. 2008. "Unravelling the Dynamics of IOIS Implementation: an Actor-Network Study of an IOIS in the Seaport of Barcelona," *Journal of Information Technology* (23:2), pp 97–108.

Rodon, J., Sese, F., and Christiaanse, E. 2011. "Exploring Users' Appropriation and Post-Implementation Managerial Intervention in the Context of Industry IOIS," *Information Systems Journal* (21:3), pp 223–248.

Rousseau, D. M. 1985. "Issues of Levels in Organizational Research: Multi-Level and Cross-Level Perspectives," *Research in Organizational Behavior* (7), pp 1–37.

Rousseau, D. M. 2011. "Reinforcing the Micro/Macro Bridge: Organizational Thinking and Pluralistic Vehichles," *Journal of Management* (37:2), pp 429-442.

Rukanova, B., van Stijn, E., Henriksen, H. Z., Baida, Z., and Tan, Y.-H. 2009. "Understanding the Influence of Multiple Levels of Governments on the Development of Inter-Organizational Systems," *European Journal of Information Systems* (18:5), pp 387–408.

Sarker, S., and Valacich, J. S. 2010. "An Alternative to Methodological Individualism: a Non-Reductionist Approach to Studying Technology Adoption by Groups," *MIS Quarterly* (34:4), pp 779–808.

Suh, A., Shin, K.-S., Ahuja, M., and Kim, M. S. 2011. "The Influence of Virtuality on Social Networks Within and Across Work Groups: a Multilevel Approach," *Journal of Management Information Systems* (28:1), pp 351–386.

Vom Brocke, J., Simons, A., Niehaves, B., Riemer, K., Plattfaut, R., and Cleven, A. 2009. "Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process," *Proceedings in the 17th European Conference on Information Systems* (161).

Waldman, D. A., and Yammarino, F. J. 1999. "CEO Charismatic Leadership: Levels-of-Management Levels-of-Analysis Effects," *Academy of Management Review* (24:2), pp 266–285.

Webster, J., and Watson, R. T. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review," *MIS Quarterly* (26:2), pp. xiii-xxiii.

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