Our dissertation is on building a systems-based theory of organizational information and its implications for organization and management studies. Its brief describes (i) the final report organization, (ii) the thesis main contents that include research problems, methodology, data analysis, and research findings, and finally, (iii) the key conclusions of our research. Our selected publications are put in the back cover.

DISSERTATION ORGANIZATION

The dissertation report is organized in the following manner. Chapter 1 provides the study background including the research problems and the methodology. The objects of study identified are the nature of information in organizations and the process of organizational information formulation. Chapter 2 then, by reviewing some relevant studies, describes more the research gap and frames the research problems in the field of information systems (IS) including knowledge management (KM). The other major section of the chapter is to introduce some essentials of pragmatism and systems thinking such as Peirce's (1958) semiotics, and Gharajedaghi's (2005) systems model that play the role of theoretical perspectives for our research as a whole. Next is Chapter 3 that is devoted to present the methodological aspects of our theory building research including its justification of methodology as well as detailed descriptions of our methodical guidelines and research design. Another content of the chapter is to discuss the research reporting, evaluation of the research, criteria for case selection and the number of cases, case study protocol, research settings, and data sources. In addition, two pilot case studies of business

management consulting are presented. Then chapter 4 describes our operations of data collection and analysis and then derives empirical findings. The real world cases in four consulting organizations are examined and let conceptual constructs, categories and theoretical relationships emerging. The grounded theory of organizational information, which would be a systems-based model, is ultimately formulated. A great deal of space is spent for testing the resultant theory with four existing cases in management, yet outside the area of consultancy industry. Next is chapter 5 that concentrates on the intensive discussions of research findings and drawing out some implications that are primarily theoretical ones of the fields of organization, of research and of problem solving. Ultimately, chapter 6 concludes the dissertation by emphasizing the contributions, and finally discussing several limitations and strengths of the study as well as topics for future research.

MAIN CONTENTS

Research problems and questions

The field of organization and management in general and of KM and of IS in particular would suffer from the construct 'knowledge', in terms of both its nature and its creation process (e.g. Jakubik, 2007). The following challenges were identified. First, any new conceptualization of organizational knowledge is requested to provide a distinction among the notions of knowledge, information and data (Mingers, 2008). Second, any new conceptualization of organizational knowledge creation is required to present an emerging community view of knowledge (Jakubik, 2007). This in turn gets itself involved in three

interdependent issues. The first is to reconcile the perspective of knowledge as tacit knowing (e.g. Polanyi, 1966) and the perspective of knowledge as situated in organizational contexts (e.g. Brown and Duguid, 1991). The second is, with the widespread assumption of information as an important factor for knowledge creation, to specify the role of information in the process (Li & Kettinger, 2006). The final is to make sure the output produced from the process to be truth, or justifiability to some extent (e.g. Mingers, 2008). From those, we came up with the two research problems, and thus, research questions as follows. The first research problem is about the nature of the construct 'knowledge' in organizations. The respective research question is what the nature of information in organizations is. Quite equally, how organizational information is distinguished from knowledge and even data? The second research problem is on the knowledge creation process. This problem turns into the next question on what the aspects of the process of information formulation are, or how the process formulates information in terms of the states and transformations between them. In other words, that is, how do organizations create information?

Last but not least, due to the conceptual grassroots of such fundamental constructs are on ontological and epistemological levels (Jakubik, 2007), an approach of theory building, rather than theory testing, for organizational information is naturally devised.

Methodology

Assuming that organizational information is purposefully enacted reality or social construction (Newman, 2001), at Orlikowski and Baroudi's (1991) advice of the compatibility of phenomenon of interest and research approach, we argued that the nature of organizational information should be and needs to be investigated with the research tradition of critical postmodernism (e.g. Gephart, 2004). This tradition is useful here because it aims to describe the historical emergence of social structures and contemporary contexts for social action and human freedom (Gephart, 2004). To well adapt to the paradigm adopted, we followed the contextualism as our theory of method (e.g. Mjoset, 2009) in order to accommodate some salient points of the social and organizational phenomena in general and the organizational information in specific, which are historical, contextual and processual (e.g. Pettigrew, 1990). Relying on those, we ultimately adopted the Churchmanian philosophy of systems, or simply, systems approach (Britton & McCallion, 1994; Matthews, 2006) as our research paradigm. Next, we employed both Yin's (2003) case study strategy and Glaser and Strauss' (1967) grounded theory methodology as the research method to build a pragmatic theory of organizational information. The former is for our embedded multiple case design, and the latter for our method of data collection and analysis.

Data analysis

For theory building research, working with data is essential (Glaser & Strauss, 1967) in emergence of our grounded theory.

However, we were aware that the grounded theory research derives from researchers' ability and sensitivity to capture and interpret data patterns and tacit elements of qualitative evidence (Suddaby, 2006).

From two pilot case studies, we identified four sets of data in four organizational focal cases in consulting industries, which helped us reach a satisfactory theoretical saturation (e.g. Glaser & Strauss, 1967). Our number of cases and sets of data were also in line with Perry's (1998) and Martin and Turner's (1986) recommendations respectively.

Employing Gorry and Morton's (1989) classic framework for managerial activities, we considered organizational business activities as instances of organizational information. We analyzed data with our methodical guidelines sketched in chapter 3 of methodology, which is procedurally iterative, and reversible, or alternatively, emergent in the same manner as the resultant theory. In addition, data collection and analysis were simultaneous in accompany with theoretical sampling (Bowen, 2008). Wholly, working with data for theory building in fact was recursive cycling among case data, emerging theory and later, extant literature (Eisenhardt & Graebner, 2007). However, we went further by emphasizing that, in essence, the logic of discovery of grounded theory is Peirce's abduction (Reichertz, 2009), which is both insight and inference (Peirce, 1958). At a face value, this might also be in tune with Walsham's (1995) comment of uses of theory during the analysis.

Next three basic patterns (i.e. data, knowledge, information) of organizational information were directly identified from

empirical evidence, and then two grounded explanatory models of organizational information nature (i.e. DKI model) and formulation process (i.e. SDB model) were emerged with the supports of the relevant literature. All were elaborated for a systems-based theoretical model of organizational information (Figure 4.10 below) in consulting industries. Following that we conducted the test of our resultant model on four existing case studies in management yet outside consulting industries, to raise the theoretical level of the emerging grounded theory from the substantive to the formal one. Finally, two research findings that are organizational information as system and organizational information formulation as habit production were affirmed.

Concerning testing evidence, we adopted the following existing case studies: (i) Weick's (1993) the Mann Gulch disaster; (ii) Stenmark's (2005) organizational creativity in context; (iii) Tsoukas and Vladimirou's (2001) call centre in their work on organizational knowledge, and (iv) Braganza's (2004) case study of the data-information-knowledge hierarchy. The first two cases are for the theoretical replication, and the others for the literal replication (e.g. Yin, 2003).

Table 4.1: Organizations, cases, and embedded units of analysis

Organization	Number of cases and units of analysis
HY-ICT	*Case:* Enterprise package application implementation
	Embedded units: Project sales Training activities Client business process restructuring Customization in implementation

TP-DTF	*Case:* Cluster of projects of designing coastal ports to 2020
	Embedded units: Coastal port designing R&D in consultancy
NN-TCD	*Case:* Intra-business technological consulting
HL-POM	*Case:* Lean production solutions
Total: 4 organizations	Total: 4 organizational cases and 8 embedded units of analysis

Table 4.18. The distinction among three basic patterns of organizational information

	Data	*Knowledge*	*Information*
Structure	Source	Content	Effect
Function	Uncertainty	Equivocality	Disorganization
Process	Resource	Development	Product
Context	Inquiry	Action	Habit
Time	Past	Present	Future
Epistemology	Objective	Subjective	Inter-subjective
Universal categories	Firstness	Secondness	Thirdness

Research findings

The finding discussion revisited and extended our systems model of information from substantive area of empirical findings to formal area of theoretical findings. To do so, we made some thorough comparisons of our models with the extant literatures that were typically Mingers' (1996; 2006) comprehensive theory of semantic and pragmatic information, Nonaka and Toyoma's (2002) organizational knowledge

creation model. Along our work flow, three research findings were summarized: organizational information as system, organizational information formulation process as habit production, and the theoretical distinction among three information categories. Then our systems theory of pragmatic information was finally written up into two separate yet complementary scripts. The first is a more propositional version (Table 5.2) that primarily shows, in terms of a tabular summary, the conceptual relationships among properties of organizational information. And the second, a more narrative version of theoretically concluding comments of the nature and process of organizational information, is adopted to present here for a more descriptive comprehension.

Our resultant notion of organizational information emerged from a conceptual unity of three aspects often seen in the information and knowledge studies, which are data, knowledge and information itself. In essence, our organizational information was enacted with an indefinitely evolutionary process led by organizational actors within their communities. Moreover, the organizational information should be communicated with the triadic relation (among data, knowledge and information) for a full effect in some community. In other words, information itself should be viewed as irreducible into data or knowledge. Accordingly, the relationships among data, knowledge and information should be irreducible into the possible dyadic relations between pairs of them. Alternatively, organizational information could manifest itself as an association between data and knowledge, or a communal

justification for a social mediation between a natural one (which embodies data) and humanistic one (which embodies knowledge).

By our systems based conception, organizational information would well manifest itself as a triadic unity that comprises three states or ingredients (i.e. data/surprise, knowledge/doubt, and information/belief) and three respective relations or transformations (i.e. experience, abduction, and inquiry). Each state or relation could in turn be identified by its own fundamental specification of ontology, epistemology, and time. In specific, the ingredient of data is more of properties of thing, more objective, and more past oriented, the ingredient of knowledge is more of properties of human, more subjective, and more present-oriented, and finally the ingredient of information itself is more of properties of organization, more inter-subjective, and more future-oriented. Such a conceptualization of organizational information definitely helps us explain and predict more of, for example, organizational phenomena in which there may be some thing one considers information, another sees as data (e.g. Stenmark, 2002), or one's knowledge is another's data (e.g. Schreiber et al, 2000). In a similar vein, our conception of organization information as system also could facilitate to explain the phenomena that, despite "distributed knowledge" of some sort in society (von Hayek, 1945), our "knowledge society" is still progressing (e.g. Machlup, 1980). The former (i.e. distribution) may refer to one or all of three ingredients of our organizational information as system (e.g. personal knowledge), and the latter (i.e. knowledge

society) may attribute to societal information services or organizational information as a whole still formulated in some way for example, to successfully make organizational decisions. Furthermore, our systems model would also show the decisive roles of some community and its methods of belief fixation for the organizational information formulation, which were foundationally requested by Jakubik (2007) for the former (i.e. community), and by Mingers (2008) for the latter (i.e. justifiability).

Next, our semiosis model would consider information as a dynamic process that is evolutionary not only over time but also in space. For the former evolution, it should be additionally noted that organizational information is, instead of discovered or given, enacted or designed socially, and hence, to be path-dependent. One side effect observed at this point is that organizational information enacted is to cope with the previously enacted organizational information. The latter evolution basically relates to different communities including the ones of formulation (e.g. community of inquiry) and of use (e.g. community of practice), or more generally, of the affected and of the involved stakeholders (e.g. Ulrich, 1983). Thus, information or more exactly, sets of information are becoming more heterogeneous, and, meanwhile, as a result of the effect of path-dependence above, more interdependent. This, on the one hand, makes the problems relating to organizational information be messy (e.g. Ackoff, 1974), or wicked (e.g. Churchman, 1967), on the other hand, demands the approaches for organizational information investigation to be historical,

processual, contextual, or in general multiperspectival (e.g. Mitroff & Linstone, 1993).

Then, assumed information as historical, contextual, and processual entity, another basic theme of our study was to link, or emphatically to define, organizational information with organizational contexts. The following linking or definitions were reached. The objective data was defined in the context of action and linked to the material world, the personal knowledge - in the context of inquiry and to the personal world, and finally, the organizational information – in the context of habit and to the social world. It should be also noted that the worlds and hence, the contexts would be continuously transformed into each other, relying on the Peircean principle of continuity. On the reverse, ontologically assuming information categories are given, we could also partition organizational contexts into three segments in the same manner as above. Following that, given organizational information as system, its emergent property would be organizational habit, in the context of habit, and in the working space of the social or organizational world. In other words, organization would be also justified by its habit production led by its members.

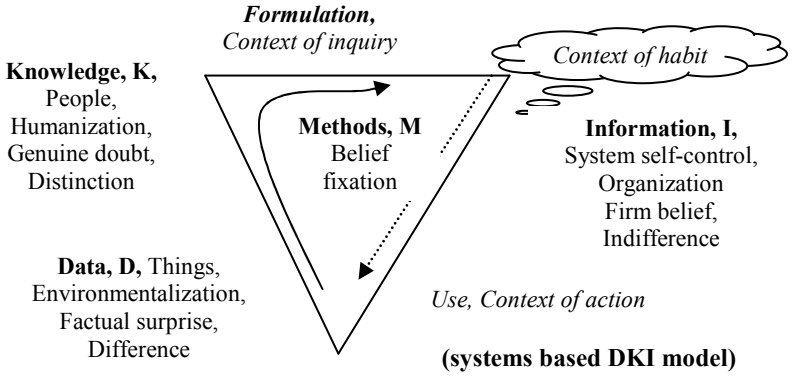

Figure 4.10. A systems based model of organizational information

Table 5.2. The systems based theory of pragmatic information			
Entity			
Ontology	Thing	Individual	Organization
Epistemology	Objectivity	Subjectivity	Intersubjectivity
Relation	Causal	Producer-product	Semiotics triadic
Axiology	Fact	Value	Judgment
Process	Data	Knowledge	Information
Time	Past	Present	Future
Formal system			
Structure	Sign	Object	Interpretant
Function	Design	Creativity	Culture
Process	Fact	Warrant	Claim
Context	Information system	People	Information

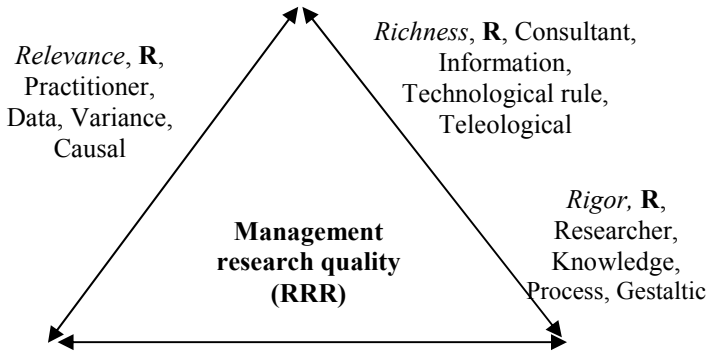

Figure 5.7. Proposal of management research quality (RRR)

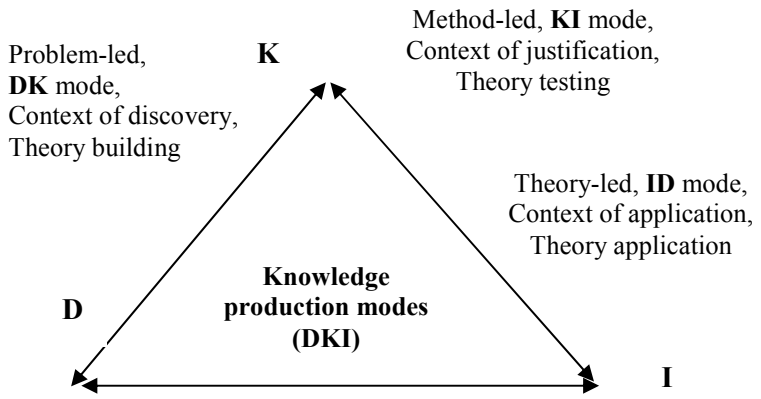

Figure 5.8. A new taxonomy of knowledge production modes and beyond

CONCLUSIONS

Research implications

Our research implications were emergent when we approached some subject areas relating to yet outside the conceptualization of organizational information. First, our grounded model of information helped us reach a pragmatic paradigm of information, which would position the philosophical foundations of the phenomenon of information in terms of its ontology, epistemology, methodology, axiology, and so on (e.g. Fitzgerald & Howcroft, 1998a). The paradigm would be our response to, for instance, Lauer's (2001) call for an information paradigm because information in our model would be substantially embedded in organizations (e.g. Walsh & Ungson, 1991).

Next, our resultant model of organizational information was also used to shed the light of evolutionary, systemic, and triadic information on organization studies. Assuming organizations as

information-bonded systems (Gharajedaghi, 2005), we showed that organizational theories and phenomena could be expressed via our systems based triads of organizational information. For example, we could open a new view on Barnard's (1938) theory of executive function as cited in Spender's (1998) work of the firm as a system of pluralistic knowledge. On the contrary to Barnard's view of the incommensurability of his subsystems, we considered our subsystems to be evolving by transformations to each other with the supports of human experience, abduction, and inquiry within some communities of practice of the firm.

Then, our systems model of organizational information suggested a pragmatic information theory of organization, which would consider organization a continuous stream of semiosis that is an indefinite process of information focusing on the formulation of organizational information as organizational habits. With its systemic and triadic nature, our habit-forming theory of organization would be more theoretical capabilities than Weick's (1979; 1995) sense-making theory of organization.

Next, we proposed an information based theory of the firm relying on the resultant model of information-as-system. Our suggested model might excel the other theories of the knowledge based school in two points. One, it would provide both a parsimonious yet powerful schema of information (or knowledge) categories and a firm mechanism of information formulation (or use), both of which constitute the fundamentally theoretical framework for the school. Two, it could combine the

resource-based, the process-based and the product-based views, hence go beyond the knowledge based school of the firm. Moreover, a theoretical framework of management research quality could be also derived from our triadic model of information (Figure 5.7 above). By this, the long debate or the dichotomy of rigor and relevance would be too simple to describe the quality of management studies, and thus, would be replaced with our suggested triad of relevance (i.e. practice), rigor (i.e. methodology), and richness (i.e. theory). Our new framework could shed a new light, for instance, on the interplay between theory and method in research (e.g. van Maanen, Sorensen & Mitchell, 2007), on the dialectical relationship between researchers and practitioners (e.g. Churchman & Schainblatt, 1965), and on the limited use of management research findings (e.g. van Aken, 2005).

In addition, our systems theory of information also revealed several fresh taxonomies of knowledge related phenomena, and in specific beyond Gibbons et al's (1994) widely-known two modes of knowledge production in management studies (Figure 5.8 above). With our DKI model as a basis, for example, we came up with the following four new triadic taxonomies: a triad of knowledge types (i.e. data, knowledge, information), a triad of knowledge production mode (i.e. problem-led, method-led, theory-led), a triad of context of research (i.e. context of discovery, context of justification, context of application), and a triad of type of research (i.e. theory building research, theory testing research, theory application research).

Then, relying on our model of information-as-system, we also suggested a new framework for problem solving process. It was strongly proposed here, there would be three, rather than two (e.g. Lang et al, 1978), stages of problem solving process: problem finding, formulation, and solving. Each stage in the new suggestion was clearly specified in terms of its substance or outcome and its operational method or process. Hence, our information based framework helped to fill a gap in the literature of problem solving as to what problem formulation is (substance) and how problem formulates (method).

Last but not least, our three managerial implications were shown: one, on organizational decision making; two, on design of organizations; and three, on a project proposal of a virtual clinic for business management consultancy.

2. Contributions of the research

Our study attempts to make several theoretical contributions to the IS field. It should be noted that the nature of the IS discipline has been turned, from primarily drawing on for example, organization science and management science, as "reference disciplines" to increasingly emerged as reference discipline for other fields, even organization and management studies (Baskerville & Myers, 2002; Katteratanakul, Han & Rea, 2006).

The research contributes to the IS literature a systems theory of organizational information. By the multi-faceted nature of and the unclear boundary of the phenomena of organizational information (Mingers, 2006; 2008), which are social products, of pragmatic uses and symbolic structures (Newman, 2001), and

by the research paradigm and then, the method adopted, which are the systemic pragmatism on critical postmodernism stance (e.g. Britton & McCallion, 1994; Gephart, 2004) and the case based grounded theory methodology (e.g. Glaser & Strauss, 1967; Yin, 2003), our pragmatic theory features the non-exclusive properties as follows: systemic, triadic, contextual and evolutionary. The contributive effects are seven fold.

In the first place, it could capture mostly the phenomena of information in organizations. Evidently, our resultant model of information-as-system could satisfactorily explain both sides of information at the same time, information as entity (e.g. its structural triad DCE, see also Buckland's (1991) information as thing) and information as process (e.g. its processual triad RDP, its triad of formulation process SDB, see also Callaos & Callaos' (2002) dialectic view of information). In addition, it was worthy noting that our entity view focuses more on the role of the information user (i.e. 'interpretant' rather than 'signifier'), and our process view concentrates more on the role of some relevant community and its methods of belief fixation.

In other words, with these emphases, our theory could completely accommodate the locus view of information (e.g. Swanson, 1978; von Krogh, 2009), which was transparently embodied in the dynamic balance in our information formulation process, between the individual perspective (i.e. especially personal knowledge, K) and the community perspective (i.e. especially methods of belief fixation, M). In short, showing simultaneously the three views mentioned, our single systems model could theoretically address satisfactorily

both the nature of and the formulation process of organizational information.

In the second place, our model could go beyond the dichotomy of categories or dyadic relations. This is the most striking point of our theory, and we were unaware of any literature that could approach the phenomenon of information this way. Our theory suggested a triadic model of organizational information, in which any piece of organizational information could be partitioned into three interdependent ingredients. The relationship would be recognized as a triadic one from Peirce's semiotics, which is beyond both the traditional cause-effect and Singer's (1959) producer-product relationship (e.g. Gharajedaghi & Ackoff, 1984). In other words, in our semiotic triad of organizational information, its three ingredients play the roles of Peirce's firstness, secondness, and thirdness respectively. From this, our model of organizational information would accommodate the three information related categories in the IS field, which is information, knowledge, and data (e.g. Mingers, 2006; 2008), and at the same time, would show the transformations or relationships among them. In short, data (D) as firstness would be real world facts and figures, knowledge (K) as secondness would be human understanding and meanings, which is created and emerged from data (D) through abduction activity within individual settings, and finally, information (I) as thirdness would be community belief and judgments building from both knowledge (K) and data (D), in the interactive contexts of organizational units with their inquiring methods (e.g. deduction, induction, authority).

In the third place, we posited that all ingredients of the triad (i.e. D, K, I) would be enacted or socially constructed within the respective contexts, conceptually. In this regard, our systems theory of pragmatic information also reveals two plus one contexts. The first two contexts are correspondingly context of inquiry and context of action, and singly mentioned in, for example, Mitroff's (1973), Lauer's (2001), and Churchman's (1971) works for the former and Ackoff's (1989), Davenport et al's (2001), and Simon's (1997) works for the latter. The remaining context is the one of habit that may bridge the gap between the first two contexts.

Following the Peircean epistemology that supersedes dualism (Debrock, 1994), our systems model of pragmatic information offers context of habit that could mediate between context of inquiry, which enacts information, and context of action, which uses information. Thus, we may designate context of habit as one to keep information. This potentiality in turn helps us theoretically solve March's (1991) tension between 'exploration' for new capabilities and 'exploitation' of existing capabilities, to smooth Churchman and Schainblatt's (1965) dialectical relationship between researchers and practitioners, or to be evident in line with Knott's (2002) empirical studies on knowledge exploration and knowledge exploitation as complements. Furthermore, for adequately shaping the contexts into the 'boundary', a key concept of systems thinking (Metcalfe, 2004), or the usual organizational settings, we would look to the Peircean universes, or alternatively, the Habermasian worlds. For this, the ingredient of 'data' of the

triad, which belongs to the context of action, would be put in the material world, the ingredient of 'knowledge', the context of inquiry, in the personal world, and lastly, the ingredient of 'information', the context of habit, in the social world.

In the fourth place, next, our contexts above could also explain the dialectical evolution of organizational information: one, as organizational habit, it enables us to guide organizational activities; two, it indirectly enables organizational changes that are resulted from the organizational activities just acted. The latter would also mean that information indirectly enables one to make changes into itself, which helps to formulate (new) information. Thus, based on the Peircean semiosis kernel, and started only with pragmatic information, our DKI model could ultimately get involved with the total of three levels of information (e.g. Weaver, 1949), which are the technical (i.e. our notion of data or D), the semantic (i.e. our notion of knowledge or K), and the influence (i.e. our notion of information or I). This would be a sort of the full theory of information as Bach and Belardo (2003) ever imaged.

In the fifth place, our theory of information-as-system could also provide a comprehensive but parsimonious framework for distinction among information categories such as data, knowledge, and information itself. Moreover, our systems model helps to mediate between Ackoff's (1989) conventional hierarchy and Tuomi's (1999) reversed hierarchy of knowledge. By this, the long standing confusing among these categories (e.g. Mingers, 2008) would be cleared up, which in turn would

make our theory much more powerful than those of the same purpose in the information and knowledge literatures.

In the sixth place, in reference to Lee's (2004) notion of information system including simultaneously the technical, the social, and the knowledge (sub)system, unlike other studies in IS focusing on either the technical or the social (sub)system, our research attempted to investigate the very concept of the knowledge system, which fundamentally centered on the notion of information (e.g. Lee, 2004). In other words, our resultant systems model could propose a fundamentally theoretical framework about the nature and the process of information, which would be also a theory native to the field. By this, we were in an effort of making information systems as a reference discipline in its own right (e.g. Baskerville & Myers, 2002).

Last but not least, based on the Peircean semiotics that is general, triadic, and pragmatic at once (Everaert, 2006), our systems model of information could cover, for example, all types of signs of human meanings in Mingers' (2006) comprehensive typology of signs, thus worth being investigated more in IS and other fields such as social theories and organizational behaviors as Mingers (1996) suggested for his theoretical version of information.

3. Limitations of the research

We identified several main limitations along our research process. First was about the research design and method. Because theory building was the central enterprise of our study, the strategy of case study design and grounded theory as data collection and analysis was our deliberate choice. The fact that

the design was emergent (Lincoln & Guba, 1985) and the method was iterative (Locke, 1996) made us be difficult to anticipate the study progress, and took us much time and efforts to control the study process and results. This also means that the researchers' creative capabilities, which were requested much for theory building research (Gurd, 2008), were affected to some extent.

Second, the strategy of triangulation of data was somehow restrictively implemented. Our expectation of up to three interviews at each different organizational hierarchical level (e.g. Perry, 1998) was mostly unsatisfied. However, we were able to overcome this weakness by consistently pursuing the emergent or tentative theoretical constructs and ideas.

Third, admittedly a firmly theoretical foundation of the process of theorizing, many researchers still identified the operational problem of how far back taking the literature review (e.g. Suddaby, 2006; Bourgeois, 1979). In our practice, we tried to keep up a somewhat balanced approach between our own ideas and the old masters as suggested by Bourgeios's (1979) theory building blueprints. However, an obvious difficulty in this study was how to evaluate such a balance. Moreover, we could not go far enough to devise a methodological framework to guide a generic process of middle-range theorizing.

Last but not least, during our extensive employment of the extant literature, we might learn that the online library of academic e-journals and e-books in our university was rather limited in its material content in terms of both its scope and scale. The latter shortcoming, we believed, much affected the

researchers' capabilities along their studies, especially those of theory-building.

4. Directions for future research

First of all, one avenue for future research is to follow our theoretical implications drawn out from this study. For example, it could be an elaboration of our information based theory of the firm, which may present a promising approach due to its inherent integration between resource-based, process-based, and product-based views of the firm, or an empirical study as how to improve the use of management research findings relying on our theoretically well-established triad of inquiry (research), action (practice), and habit (a mediation role like consulting, training, etc).

Next, another direction for future studies is to tackle the limitations of this research. There may be, for instance, empirical studies on either different substantive areas for theory building or different real-world business organizations for theory testing.

Then, one more interesting direction for further studies is how to empirically identify the reconcilement between information formulation and information use. With more or less the same research path, to approach the point, Grant (2002) proposed a strategy of coordination in the firm, and Knott (2002) identified the organizational features that engender the complement of 'exploration' and 'exploitation'.

Finally, one key area of future research is to deal in-depth with the information use process. To our study, this was readily identified as our sub-process consisting of several certain states

or concepts (e.g. information, data) and methods or relations (e.g. experience, actions, reflections). However, the relevant details and implications definitely need to be explored more.

6. Concluding remarks

In conclusion, the key contribution of our theory-building endeavor of information in organizations was to suggest a systems theory of organizational information. It was a middle range theory of pragmatic information, or of information in IS, which could be applicable for various organizations and socio-cultural systems in general, and also open for later empirical and even theorizing work (e.g. Bourgeois, 1979). Our grounded systems model could propose a fundamentally theoretical framework about the nature and the process of information, which would be also a theory native to IS. By this, our resultant middle range theory would be a distinctive contribution for making IS as a reference discipline in its own right.

Finally, our systems theory of organizational information is expected to be a promising starting point for future research centered on the phenomena of organizational information, of pragmatic information, or of information in IS and KM. Moreover, this is reflexive in the sense of helping at the same time to conduct better the inquiries on organization and management as information is in essence inter-subjective, in community, by community, and for community. In addition, due to its multi-faceted nature of information, with its effects at least implied for problem solving and for inquiry, future research on these each area shall also be advanced much more, we believe.

THE END