

A REVIEW AND CRITIQUE OF NONAKA AND TAKEUCHI'S THEORY OF ORGANIZATIONAL KNOWLEDGE CREATION

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Introduction

Since the early 1990's, interest of the topic of knowledge (e.g., knowledge management, knowledge sharing, knowledge creation, etc.) as it relates to organizations and value creation for organizations has increased dramatically in both the popular and scholarly literature (von Krogh, Ichijo, & Nonaka, 2000). As is often the case in applied fields, it appears that the practices related to the phenomenon of knowledge management and knowledge creation have accelerated faster than the scholarly work to explain them. Numerous books have been written documenting the practices organizations are using to try to capitalize on the value that knowledge management and knowledge creation promise. Organizations are spending millions of dollars each year on information systems to capture knowledge and consultants to help organizations better share and use knowledge. Organizations rely on innovation for new products and services to provide them with growth in revenue. And yet, one must ask the question, "What do we really know about how knowledge is created within and shared across organizations?" The purpose of this paper is to answer the question--Does the theory of organizational knowledge creation, put forth by Nonaka and Takeuchi (1995), and contributed to by others (Nonaka, Toyama, & Byosière, 2001; Von Krogh, Ishijo, & Nonaka, 2000), constitute a theory? Or, is what they have articulated just hypotheses and conjecture at this point?

This first part of this article reviews and discusses what defines theory, the purpose of theory in both academia and practice, and how theory can be evaluated. Next, Nonaka and Takeuchi's (1995) Theory of Organizational Knowledge Creation is reviewed at a general level for the benefit of the reader. Finally, Nonaka and Takeuchi's theory of organizational knowledge creation is critiqued for the purpose of understanding its level of development and for making it a more fully mature theory.

What Is a Theory and how is One Developed?

While there does not appear to be consensus in the literature about what constitutes a theory, nor what process can be used to establish a theory in applied social science disciplines, a number of authors have written on various aspects of theory in applied disciplines including "...Dubin (1976, 1978) from industrial psychology, Hearn (1958) from social work studies, Reynolds (1971) and Cohen (1991) from sociology, Patterson (1986) from social psychology, and Bacharach (1989), Gioia & Pitre (1990), Eisenhardt (1989), Van de Ven (1989), Weick (1989), Whetton (1989) and others from organizational studies" (as cited in Lynham, 2000, p. 160).

Torraco and Holton (2002) compiled a number of definitions of theory which were divided into two categories monoparadigmatic and multiparadigmatic. These categories recognize that theory can be built from one or multiple research paradigms. For the purposes of this paper, the following multiparadigmatic definition of theory will guide the discussion. Senge, Roberts, Ross, Smith, and Kliener (1994) wrote that a theory is a fundamental set of propositions about how the world works, which has been subject to repeated tests and in which we have gained some confidence.

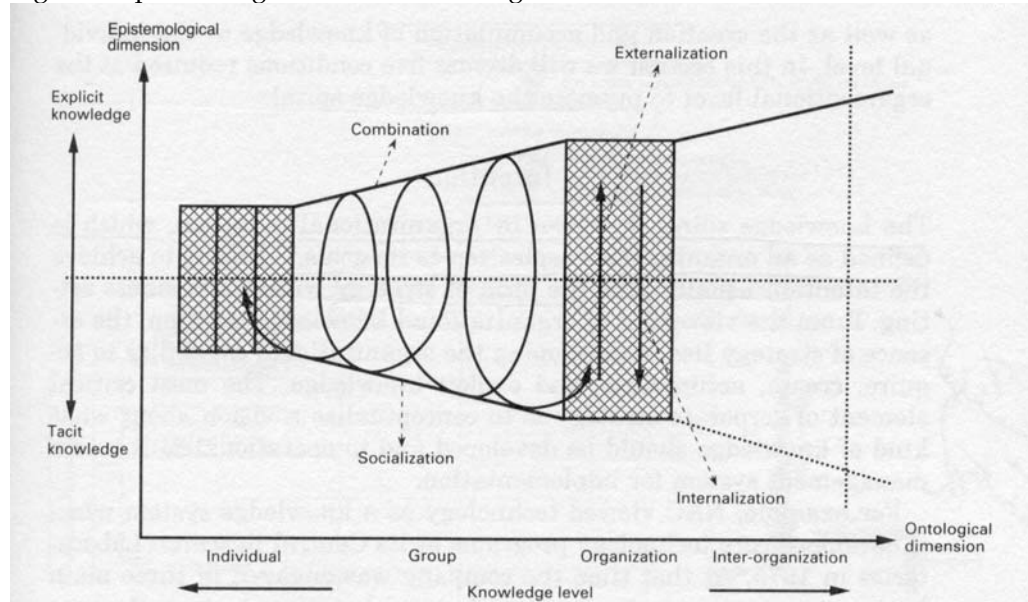
Theories can be evaluated from two perspectives. First, a theory can be evaluated based on how it was derived and developed. Just as with any research effort, the quality of the way in which the theory was created (i.e., the process) speaks to the quality of the product (i.e., the theory) and

how much credibility it should be given. Lynham's General Method of Theory-Building in Applied Disciplines (2002) can be used as a framework for discussing the process by which a theory is created. Secondly, the theory itself (i.e., the product) can be assessed as to its quality and maturity. A number of authors (Patterson, 1983; Bacharach, 1989; Corbin & Strauss, 1990; and Whetten, 1989) have set forth criteria against which theory can be evaluated to judge how robust it really is. For the purposes of this paper, Nonaka and Takeuchi's theory of organizational knowledge creation will be evaluated using Patterson's (1986) set of criteria for evaluating theory. Patterson's set of criteria was chosen over others because this author felt that it was most comprehensive and useful in evaluating a theory.

Overview of Nonaka and Takeuchi's Theory of Organizational Knowledge Creation

In their 1995 book titled The Knowledge-Creating Company, Nonaka and Takeuchi proposed a theory to explain the phenomenon of organizational knowledge creation. They defined knowledge as "justified true belief" (p. 21) to reflect the context in which knowledge exists. Organizational knowledge creation was defined as "...the capability of a company as a whole to create new knowledge, disseminate it throughout the organization, and embody it in products, services and systems" (p. 3). Nonaka and Takeuchi argued that knowledge is initially created by individuals and that the knowledge created by individuals becomes organizational knowledge through a process described by the theory (see Figure 1). They described two dimensions of organizational knowledge creation—epistemological and ontological. On the epistemological side, the authors recognize two types of knowledge—tacit and explicit. Explicit knowledge is the knowledge that can be written down and relatively easily transferred from one person to the next. Tacit knowledge on the other hand is more difficult to articulate because it often arises out of experience. The ontological dimension ranges from the individual at one end of the range and moves from there to team, group, organization and beyond. "A spiral emerges when the interaction between tacit and explicit knowledge is elevated dynamically from a lower ontological level to higher levels" (Nonaka & Takeuchi, 1995, p. 57). This spiral is created by the four modes of knowledge conversion through which knowledge is converted from one knowledge type to another. The modes of knowledge conversion include socialization (from tacit to tacit knowledge), externalization (from tacit to explicit knowledge), combination (from explicit to explicit knowledge), and internalization (from explicit to tacit knowledge). Their theory also explains how individual knowledge is "amplified" into and throughout the organization through these four modes and under five conditions that enable and promote organizational knowledge creation. These conditions include Intention, Autonomy, Fluctuation and Creative Chaos, Redundancy, and Requisite Variety. Finally, the theory consists of a five-phase organizational knowledge creation process. These five phases are: 1) sharing tacit knowledge, 2) creating concepts, 3) justifying concepts, 4) building an archetype, and 5) cross-leveling knowledge. In developing this theory, Nonaka and Takeuchi (1995) drew on the work of numerous scholars including Brown and Druguid's (1991) work on communities of practice, Polyani's (1966) work on tacit and codified (explicit) knowledge, Anderson's (1983) and Signley and Anderson's (1989) declarative (explicit) and procedural (tacit) knowledge from cognitive psychology, Johnson-Laird's (1983) work on shared mental models, and Donnellon, Gray, and Bougon's (1986) work on metaphors, among others.

Figure 1. Spiral of organizational knowledge creation.



Discussion of Organizational Knowledge Creation Relative to Lynham's General Method of Theory-Building in Applied Disciplines

When Dubin (1978) wrote his classic book titled *Theory Building*, the hypothetico-deductive approach to the theory building process reflected the research paradigm of the day (Lynham, 2002). Since then, many other research paradigms, primarily qualitative approaches such as grounded theory, case study research, and social construction research, have been used to develop knowledge and have become more broadly accepted in applied sciences. As will be discussed in more detail later in this paper, Nonaka and Takeuchi relied heavily, if not exclusively, on qualitative methods to develop their theory of organizational knowledge creation. Lynham's General Method of Theory Building in Applied Disciplines embraces multiple research paradigms as a process for theory building (Lynham, 2002). It will serve as the framework that will guide the discussion of the process by which the theory of organizational knowledge building was created.

Lynham's method consists of five phases. They include: 1) conceptual development, 2) operationalization, 3) confirmation or disconfirmation, 4) application, and 5) continuous refinement and development. Depending on the research method being used to develop the theory, the order of these phases may differ from one theory-building effort to the next. For example, a hypothetico-deductive approach to theory building, as put forth by Dubin (1978), would follow the order that the phases are listed above. However, using a grounded research or case study approach, the theorist would begin in the application phase and move on from there.

The next sections of this article briefly explains each phase of the method and then compare it to how the theory of organizational knowledge creation/development was created. The order of the sections will generally follow the order which Nonaka and Takeuchi (1995) followed in developing their theory. Nonaka and Takeuchi developed their theory primarily by using a case study methodology. As they began their journey, the stated goal of their study was "...to formalize a generic model of organizational knowledge creation" (Nonaka & Takeuchi, 1995, p. ix). The two researchers identified a number of Japanese companies that they thought typified innovation and organizational knowledge creation over an extended period of time. According to the authors, the companies used in this study reflected representative case studies as opposed to

success stories. The authors conducted in-depth, personal interviews with approximately 130 managers in these organizations to collect the necessary field data for the case studies.

Application

The “application phase” of the General Method of Theory Building can play different roles in theory development when using case studies depending on the theorists approach to theory building (Dooley, 2002). In the case of organizational knowledge creation, it was used first to provide the data to conceptualize and operationalize the theory, and later, to provide a basis for confirming or disconfirming the theory.

Application of the theory is demonstrated, again, primarily through case studies. Some questions that will need to be explored further relate to the extent to which the theory applies in various contexts. Assuming, for the moment, that the theory applies in the situations described in the book (primarily in the product development processes in Japanese for-profit organizations), will the theory apply to other processes in organizations? To organizations outside of Japan? To other organization types aside from for-profit ones, such as not-for-profit organizations, governmental organizations, school systems, and so on.

Conceptual Development

According to Lynham (2002), the purpose of the conceptual development phase is “...to develop an informed conceptual framework that provides an initial understanding and explanation of the nature and dynamics of the issue, problem, or phenomenon that is the focus of the theory” (p. 231). Nonaka and Takeuchi (1995) extensively drew on both the existing body of knowledge on topics related to organizational knowledge creation, as well as the data they collected in the form of case studies from multiple Japanese organizations.. Nonaka and Takeuchi devoted an entire chapter of their book to identifying and systematically critiquing other theories and perspectives that relate to knowledge in organizations. The work of scholars such as Simon’s (1973) information-processing paradigm, Cohen, March, and Olsen’s (1972) garbage can model of the organization, Weick’s (1993) theory of organizational sensemaking, and Senge’s (1990) work on organizational learning, among others. Nonaka and Takeuchi conducted this extensive review of the literature, evaluated existing theories and concepts with a critical eye, pointed out the shortcomings they perceive in those existing theories, and clearly identified and defined new concepts for a new theory. In addition to the literature, much of the thinking that went into this conceptualization came from real-life case studies where data were gathered using a case study research methodology. These case studies were used to address the gaps that Nonaka and Takeuchi identified during their literature review. Overall, Nonaka and Takeuchi have done a quality job conceptualizing their theory of organizational knowledge creation.

Operationalization

This phase of the method relates to Patterson’s (1986) operability criterion so will be covered more extensively in that section. Within the context of Lynham’s (2002) general method, in the operationalization phase “...the theoretical framework must be translated, or converted, to observable, confirmable components/elements. These components/elements can be in the form of, for example, confirmable propositions, hypotheses, empirical indicators, and/or so-called knowledge claims (Cohen, 1991). As it relates to the theory of organizational knowledge creation, the operationalization phase leaves a number of questions. Due to the relatively abstract nature of the subject matter, it is understandable why the concepts included in the theory are difficult to operationalize. The authors attempt to operationalize the concepts through case examples, conceptual models, and general statements about the concepts. However, the work to operationalize this theory appears to lack explicit, testable hypotheses that would show how the concepts relate to each other beyond these general statements.

Confirmation or Disconfirmation

"This phase results in a confirmed and trustworthy theory that can then be used with some confidence to inform better action and practice" (Lynham, 2002, p. 233).

Until the theory is operationalized to a greater degree it will be difficult to confirm or disconfirm the conceptual model that the authors have put forth. At the time The Knowledge Creating Company was written (Nonaka & Takeuchi, 1995), the only confirmation or disconfirmation of the theory's concepts and hypotheses was in the form of case studies, depending heavily on case studies from Japanese for-profit organizations. The authors did a thorough job explaining how these case studies related to their theory. It is difficult to tell, however, whether the case studies were used in developing the theory, or whether the theory was developed and the case studies were being used to either confirm or disconfirm the theory. More recent works on the theory (Nonaka & Nishiguchi, 2001) attempt to broaden the original work by presenting additional research that is "...grounded in extensive qualitative and/or quantitative research" (p. 3). These studies broaden the context in which organizational knowledge creation has been studied, but again relies heavily on case studies and falls short of laying out explicit hypotheses that the research intended to test.

Continuous Refinement and Development

In the introduction of Nonaka and Nishiguchi's (2001) most recent book, the authors state, "the field of knowledge creation is still at an infant state" (p. 3). And the "...recursive nature of applied theory-building research requires the ongoing study, adaptation, development, and improvement of the theory in action and ensures that the relevance and rigor of the theory are continuously attended to and improved on by theorists through further inquiry and application to practice and theorizing components of applied theory-building research" (Lynham, 2002, p. 234). Since the release of Nonaka and Takeuchi's book in 1995, it has generated enormous interest in both industry and academia. Forty thousand copies of that book were sold. Two more books on the topic, Enabling Knowledge Creation (von Krogh, Ichijo & Nonaka, 2000) and Knowledge Emergence (Nonaka & Nishiguchi, 2001) have been published along with numerous articles. These works have touched on the four other phases of the method. For example, in the conceptualization phase, three levels (knowledge conversion, "ba" or place, and knowledge assets) have been added to the other components to more fully describe the phenomenon of organizational knowledge creation (Nonaka, Toyama & Byosière, 2001). In the confirm or disconfirm stage, many additional case studies have been developed that reflect a broader range on contexts in which the theory can be applied (Nonaka & Nishiguchi, 2001). The continuous refinement and development of a theory is an on-going effort to ensure that it is improved and remains relevant.

The previous several sections discussed the process by which the theory of organizational knowledge creation has been developed. Lynham's (2002) General Method of Theory Building in Applied Disciplines served as the framework for evaluating the theory based on its development process. The next several sections will assess the product, or the theory itself, using Patterson's (1986) criteria for evaluating theory as a framework.

Comparison to Patterson's Criteria of Good Theory Importance

"A measure of the importance of a theory is its applicability to more than a limited, restricted situation. Another measure of the importance of a theory is its persistence over time in the research literature" (Torocco & Holton, 2002, p. 134). According to Patterson (1986), "Importance is very difficult to evaluate...since the criteria are vague or subjective" (p. xx). Nonaka and Takeuchi (1995) make a strong argument as to the importance of the theory by 1) linking

knowledge creation to competitive advantage for firms competing for markets, and 2) demonstrating how existing models and theories don't adequately account for how knowledge is created in organizations. While initial case studies focused exclusively on Japanese organizations, more recent work has been done to show the applicability of the theory to non-Japanese organizations (Nonaka & Nishiguchi, 2001). Given that the theory is less than ten years old, only time will tell if the theory gains broad, lasting acceptance in management and organizational fields of study. However, there is evidence that interest in the theory is strong. A search of the ISI Web Of Knowledge Citation Index for works citing *The Knowledge-Creating Company* yields more than 1000 hits. Overall, importance is relatively high with the caveat that only time will tell if it sustains its importance.

Preciseness and Clarity

"A theory is clear and precise if it is understandable, internally consistent, and free from ambiguities. These qualities of a theory can be tested by the ease with which a theory can be related to practice and the degree to which a theory yields hypotheses that can be tested" (Torocco & Holton, 2002, p. 134). On the whole, the authors do a decent job of precisely and clearly articulating a very complex process. By identifying and describing the process through concepts such as modes of knowledge conversion, conditions for knowledge creation, and levels in the process, they have made this process easier to understand. At the same time, however, many of the concepts are somewhat abstract leading to a certain amount of ambiguity. This theory is lacking most in the area of preciseness and clarity due to the lack of explicitly testable hypotheses.

Parsimony or Simplicity

"Parsimony means that a theory contains a minimum of complexity, is economically constructed with a limited number on concepts, and contains few assumptions" (Torocco & Holton, 2002, p. 134). Patterson (1986) makes reference to the fact that it is difficult to judge parsimony and simplicity since until we know everything there is to know about the area to which the theory applies, parsimony may just be oversimplification. Therefore, Hall and Lindzey (n.d. as cited in Patterson, 1986) propose that "...parsimony is important only after the criteria of comprehensiveness and verifiability have been met" (p. xxi). While the theory of organizational knowledge creation appears to be parsimonious considering the complexity of the phenomenon it is attempting to describe, since the field is still so young, it is likely that the theory, in its present state, is parsimonious at the expense of comprehensiveness. Overall, further research on the topic should enable the theory to be evaluated more accurately on this criterion.

Comprehensiveness

"A theory is comprehensive if it completely covers the area that is modeled by the theory. Comprehensiveness means that a theory accounts for all known data in the field to which it applies" (Torocco & Holton, 2002, p. 134). On one hand, Nonaka and Takeuchi (1995) cover this criterion through their extensive review of the literature. By reviewing what is already known in areas related to knowledge creation, identifying gaps in the existing knowledge base, and demonstrating how their theory addresses these gaps, it inspires confidence that the theory they created is more comprehensive than any other perspectives on the phenomenon of organizational knowledge creation. At the same time, the extent to which the theory has been articulated to this point lacks sufficient explanation to fulfill the criterion of comprehensiveness completely. For example, the theory identifies five conditions under which organizational knowledge is created. However, the theory does not make any claims about how to measure whether or not these conditions exist, nor does it suggest how to assess the extent to which they exist. Nor does the theory draw any conclusions about how these variables affect the output, organizational knowledge other than that they are necessary. While the theory explains the "what" components of knowledge creation, and to a certain extent, the "how" organizational knowledge is created,

what is missing is “What are mechanisms, at a detailed level, that explain how these concepts work together to create knowledge in organizations?”

Operationality

Patterson (1986) describes operationality as determining how capable the theory is of being reduced to procedures for testing of its propositions and predictions, establishing the precision of its concepts for measurement, and identifying the concepts used to indicate the relationships and organization among the concepts. At the same time, “...not all the concepts of a theory need to be operational; concepts may be used to indicate relationships and organization among concepts. Operationality is an apparent shortcoming in the theory as discussed in relation to the operationalization phase of the general method of theory-building in applied disciplines above. The theory identifies the concepts and processes to explain the phenomenon, but it is lacking in its capacity to more precisely assess these concepts and predict changes in outputs based on the measurements. Therefore, the extent to which the theory has been operationalized remains in question.

Empirical Validity or Verifiability

“The degree to which a theory is supported by experience and experiments that confirm its validity” (Torocco & Holton, 2002, p. 134). In the area of empirical validity or verification, Nonaka and Takeuchi’s (1995) original book and many studies since attempt to demonstrate validity exclusively via case studies. This author suspects that one of the main reasons for this is that the concepts in the theory have not been operationalized to such a point where other research methods might become useful in contributing to the empirical validity or verifiability of the theory.

Fruitfulness

Fruitfulness is “The potential of a theory to yield hypotheses or predictions that can be tested” (Torocco & Holton, 2002, p. 134). Nooteboom (2000) has raised questions and potential hypotheses that speak to both fruitfulness and operationality of the theory. While the existing literature does not reflect the fruitfulness of the theory of organizational knowledge creation, this author sees great potential for it to become fruitful. The theory, as it exists today, is full of concepts, processes and relationships at a fairly macro level that suggest implications at the micro level. This situation makes it ripe for segmenting off pieces of the theory for confirmation, disconfirmation, or refinement of the theory. For example, within the knowledge conversion process, future research might focus on the variables that influence each of the interfaces for the various forms of knowledge.

Practicality

“A theory is practical if it is useful to researchers and practitioners in organizing their thinking about the phenomenon modeled by the theory” (Torocco & Holton, 2002, p. 134). While the theory simplifies a very complex phenomenon, thus making it easier to understand and potentially put into use, how useful is the theory, first for researchers, then for practitioners? Whether or not a theory is useful for researchers depends primarily on some of the other criteria discussed above, namely operationality and fruitfulness. Given that those criteria were found to be lacking, but held potential, the practicality to researchers is moderate. As for usefulness for practitioners, the authors themselves evidently felt that their initial efforts required further explanation in order to be useful to practitioners. In the preface of Enabling Knowledge Creation (von Krogh, Ichijo, & Nonaka, 2000), the authors state about their first book, The Knowledge-Creating Company, “...it was not as helpful as it might have been in telling readers how to go about actually creating knowledge” (p. vii). The potential for practicality is limited by the lack of operationalization in this theory. Once the theory has been better operationalized and more research is done to confirm or disconfirm it, the theory’s practicality will increase.

Towards Further Development of the Theory of Organizational Knowledge Creation

When this author first set out on this journey to explore and evaluate Nonaka and Takeuchi's theory of organizational knowledge creation, the question of whether or not it was even a bona fide theory was in question. Having researched the theory and using Lynham's (2002) General Method of Theory-building in Applied disciplines to assess the process by which the theory was developed and Patterson's (1986) criteria for good theory to evaluate the theory itself, this author has reached the following conclusions. The theory has been well-conceptualized drawing upon extensive review of the literature and significant data from the field in the form of case studies. In its current state, the theory is important and has been articulated to be precise and clear and has the potential to be fruitful in contributing to the existing body of knowledge on organizational knowledge creation. However, to take the theory to the next level of maturation, the theory needs to be operationalized and an aggressive research agenda needs to be undertaken to work towards confirmation or disconfirmation of the theory. Work on operationalizing and confirming or disconfirming the theory will lead to continuous refinement and development, better application, a clearer and more precise theory, and, ultimately, a more practical theory, both to researchers and practitioners. This author has concluded that the theory of organizational knowledge creation put forth by Nonaka and Takeuchi (1995) is indeed a theory, but it is an emerging one that will grow more robust over time. Even Patterson (1986), against whose criteria the theory of organizational knowledge creation was evaluated, had this to say about his own field: "If we looked for a theory of counseling or psychotherapy that met all these criteria, we probably would not find one. Nor would we find such a theory of personality or of learning. Existing theories are at a primitive stage, and the criteria constitute goals toward which theorists should strive" (Patterson, 1986, p. xxi). Certainly all theories are in one state of development or another and if theories in such fields as personality and learning, which have been around for decades if not centuries, can't point to a mature theory, then it is not surprising that a theory in a field that has only been around for several years is an emerging one at best.

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