Relationship of Collective Knowledge Structures Concerning Transformational Change to Learning and Performing Actions

Margaret DeLaney Gorman
David R. Schwandt

Executive Leadership Doctoral Program
George Washington University
mgorman@gwu.edu, Schwandt@gwu.edu
http://chaos.va.gwu.edu
USA

The Sixth European Conference on Organizational Knowledge, Learning, & Capability
Bentley College, Waltham, Massachusetts, USA, 17-19 March, 2005

This empirical investigation sought to understand the dynamic social process of creating organizational knowledge during transformational change by investigating the nature of a firm's knowledge structure concerning organizational change. The study was based on the premise that the firm's ability to create new knowledge is a prerequisite for organizational transformation and that knowledge creation is a result of the recursive social process in which there is a dynamic interaction between the social actions of human collective and the cognitive structures that guide those actions. Mixed methods were used with two firms, one from the Financial Services Industry and e second firm was in newly deregulated Power Industry. Findings revealed the collective knowledge structures lacked the capacity to create knowledge about the change process, and in turn reinforced the performing orientation at the expense of generating new goal reference knowledge about plausible future actions.

Introduction

In a world concerned with speed, short cycle times, and rapidly changing markets, firms are looking to develop new knowledge as a transformational strategy for sustained competitive advantage (Jackson, Hitt, & DeNisi, 2003; Argote, McEvily, & Reagan, 2003; Lyles & Easterby-Smith, 2003; Tsoukas, 1996). Transformational change has emerged within popular business journals and within firms' mission statements as a dimension of the stated strategic intent to alter fundamentally how the firm approaches its business, the way it carries out the work, and relationships to customers relative to their industry. Distinct from organizational change, transformational change is used as a signifier to both external constituents (e.g., the stock market, shareholders, competitors, suppliers) and internal members that it's not going to be "business as usual" and that the firm plans to fundamentally alter how they approach their work, their customers, their market, and their complex network of relationships. Critical to transforming how they think about these dimensions, is creating a new understanding and generating new knowledge about the change to enable sustainable transformation.

Much of the literature on organizational transformation has centered on change being punctuated, environmentally determined, and based on the premise that performance pressures are the fundamental force for change (Lant & Mezias, 1992; Levinthal & March, 1981; Tushman & Romanelli, 1985). However, scholars are now presenting theories that provide powerful evidence that change can be internally created (Drazin & Sandelands, 1992; Nonaka, 1994), and recent organizational cognition theory argues that the driving force for organizational transformation occurs through learning actions of the collective

(Schwandt, 1997). If change is dependent upon the ability to create new knowledge (Hedberg, 1981; Lundberg, 1991; Nonaka, 1991), then understanding the dynamics of collective learning actions becomes a useful framework for understanding how organizations transform their cognitive orientation to their environments.

Although the creation of new organizational knowledge is seen as critical to a firm's success, few strategic management scholars incorporate a knowledge-creating process in their models. For example, scholars argue that change is dependent upon the capacity to create new knowledge, yet the predominant models of organizational transformation (Gersick, 1991; Miller & Friesen, 1980; Tushman & Romanelli, 1985) do not explicitly identify knowledge creation in their domains of organizational activity. Additional empirical work is needed that incorporates the micro-level process associated with how a firm learns, builds its range of knowledge and skills, and strengthens its potential for action (Weick & Quinn, 1999). This approach is focused on recurrent interactions, ongoing variations in practice, and emergent patterns, which allows researchers to understand how firms build their know-how about adaptation and in turn expand their repertoire of action and knowledge (Sitken, Sutcliff, & Weick, 1998; Weick & Quinn, 1999).

If the capacity to create new organizational knowledge is important to a firm's survival and core competencies (Prahalad & Hamel, 1990), then a richer understanding of knowledge creation as an organizational action is needed. However, even with this intense motivation, uncertainty exists about dimensions of and processes for the creation of organizational-level knowledge (Garud, 1997; Nicholls-Nixon, 1997), the role of existing knowledge (Brockman & Morgan, 2003), organizational defensive routines and/or cultural influences central to knowledge creation (DeLong & Fahey, 2000; Gieskes & Hyland, 2003), and the dual perspectives of knowledge as both a source and constraint for change (Hargadon & Fanelli, 2002).

The purpose of this paper is to report the findings from an empirical study of two organizations undergoing transformational change. It is predicated on the premise that knowledge creation is a result of the recursive human processes (Giddens, 1984; Schwandt, 1997) in which there is a dynamic interaction between the social actions of the collective and the cognitive structures that guide those actions. The objective of the study was to better understand the relationship between the firms' collective cognition in the form of their

knowledge structures concerning change and their actions associated with both learning and performing. More specifically, this paper will (1) provide a theoretical framework that links knowledge structures and collective actions, (2) describe the nature of firm's knowledge structures concerning organizational change and delineate patterns of social actions relative to learning and performing, and (3) advance a plausible explanation of the relationship between the firms' actions and their knowledge structures during transformational change.

Theoretical Framework and Relevant Literature

The concept of organizational knowledge used in this study is based on a constructionist perspective (Bougon, Weick, & Binkhorst, 1977; Brown & Duguid, 1991; Garud, 1997; Schwandt & Marquardt, 1999; Weick, 1979) and on social cognition (Taylor & Fiske, 1951). It emphasizes the dynamic interplay of knowledge creation as collective cognitive phenomena related to the real-time actions of the organization. Figure 1 represents this relationship in a less abstract format by considering the form of an organization's knowledge structure concerning change and the social actions associated with learning and performing during a period of transformational change. The knowledge structure represents organizational knowledge and any change in its structure results from the social actions of the organizational members. Distinct from data and information, organizational knowledge is valued information based on shared experiences of the collective that are mindfully applied for a specific purpose (Fiske & Taylor, 1984). Das (1997) argues that social imbedded nature of collectives and organizational cultures may explain variations in how information is transformed into organizational knowledge. This dynamic nature of knowledge structures necessitates a comprehensive theoretical framework that incorporates both an understanding of collective knowledge structures and social actions associated with both learning and performing.

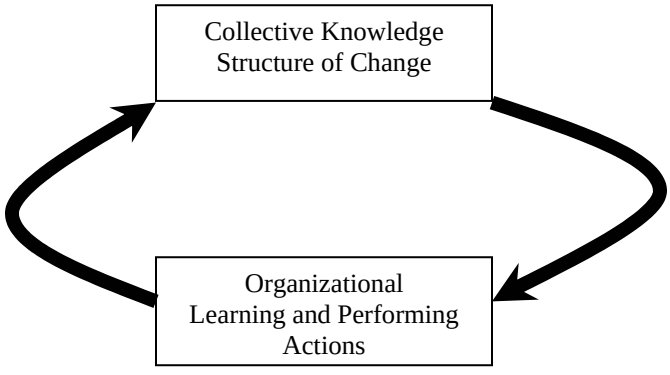


Figure 1. Knowledge structures and organizational actions of learning and performing.

Collective Knowledge Structures

"Knowledge structure" is a term used in organizational sciences to define a social collective's commonly held ideas concerning expected relationships, behaviors, and actions for organizational members (Argyris & Schön, 1978). It is broader than dominant logic, yet narrower than culture, and differs from personal schema in that it is socially created and relies on consensus agreement. Knowledge structures represent organized knowledge about a given concept (Fiske & Taylor, 1984) and guide organizational action and decision making. They differ across firms and strategic groups, impact strategic choice (Porac & Thomas, 1995), and impacts action of the firm's performance (March & Simon, 1958; McNamara, Luce, & Tompson, 2002). They also influence how a top management team responds to the environment (Bartunek, Gordon, & Weathersby, 1983) and helps them deal with ambiguous and inconsistent information (Schneier, 1979; Weick, 1979).

Empirical studies from the past decade have utilized knowledge structures to understand organizational change efforts (McNamara, Luce, & Thomson, 2003; Langfield-Smith, 1992; Bougon, 1992; Sackmann, 1992; Bartunek & Moch, 1987). These studies show how examining knowledge structures can be useful in understanding a firm's orientation to changes in the external environment, as well as internal changes and transformational efforts. They highlight the importance of understanding collective sense-making processes and discuss how imbedded knowledge structures may enhance or inhibit the ability of an organization to implement change (Lyles & Schwenk, 1992; Zander & Kogut, 1995). Finally, they reveal how past experiences held and shared by the collective impact a firm's capacity to create new organizational knowledge.

Knowledge structures represent shared assumptions at the organizational level that are socially constructed and reliant upon consensus among members: "These are shared understandings within organizations that influence behavior, though it is not necessary for knowledge to be shared in order to influence behavior" (Lyles, 1992, p.156). These widespread, agreed-upon assumptions represent broadly defined concepts that categorize related actions (elements) and portray the relative links between them (relationships) to form

the core and peripheral features of a firm's knowledge structure. Core elements are concerned with the beliefs and goals of the firm and are considered to exist at a broader level. Peripheral elements include knowledge about how to achieve the expectations set forth by the core set and how to interpret the environment. Lave and Wenger (1991) have further explored this notion of core and peripheral, postulating that it is through these peripheral features that sustained change may occur.

The elements of knowledge structure include both content and structure. The content of a knowledge structure is the "what" of the mental representation in terms of the meaning of the words themselves. The structure is how this meaning is organized. Both structure and content become the cognitive map for a firm and can be graphically represented with arrows, indicating direction and indicating positive and negative links. Structural properties of cognitive maps (Axelrod, 1976) include magnitude, emphasis, rate, level, confidence with linkages, and strength of association between the elements (McNamara et al., 2003). Although scholars have utilized a range of methods to measure and describe knowledge structures (Meindel, Stubart, & Porac, 1994; Eden & Spender, 1998: Nicolini, 1999), "maps" remain as the dominant platform for displaying findings (Bougon, 1992; Langfield-Smith, 1992; Laukkanen, 1996; Eden & Ackerman, 1998).

The complexity of a knowledge structure lies in the number of elements, both content and structure, and their relatedness (McNamara et al., 2002). Degrees of complexity (amount of information or number of elements), relatedness (the linkage between elements), and strength of ideology (Downey & Slocum, 1982; Brunson, 1985; Hill & Tyler, 1991) may be ascertained by examining the map formed by the firm's knowledge structure. Along with the sociopolitical processes that impact the degree of consensus, key factors identified for changing a knowledge structure include (a) environmental change; (b) alternative knowledge structures among operators versus line managers; (c) new knowledge structure communicated via public statements or symbolic actions; (d) assessment of opportunities or impact; (e) advocacy of assumptions and definitions via strategy planning process or special task force; (f) changes in core or peripheral features of knowledge structure; and (g) complexity and relatedness of knowledge structure (Lyles & Schwenk, 1992, p. 159): "Changes in the organizational knowledge structure occur as a result of the impact of the interpretation of environmental events, results of past organizational actions, the influence of key decision makers, and the advocacy position of coalitions within the firm" (Lyles &

Schwenk, 1992, p.158). All of these factors have implications for organizational actions of performing and learning.

Actions of Performing and Learning

Transformational changes in the collective are accompanied by new knowledge concerning either their internal or external environments (or both). The area of organizational learning provides us with a large and rich source of literature for better understanding this creation of new knowledge. For example, Nonaka (1994) defines organizational knowledge creation as a process that amplifies the knowledge created by individuals and crystallizes it as part of the knowledge system of an organization. The transfer of knowledge from the individual to the collective occurs in a dynamic spiral process involving various levels and carriers of knowledge (Nonaka & Takeuchi, 1995). This spiral of tacit and explicit knowledge forms four modes of knowledge conversion: socialization, externalization, combination, and internalization. Externalization is Nonaka's quintessential knowledge-creating process because it creates new, explicit concepts from tacit knowledge. According to Nonaka, the conversion of tacit to explicit is triggered by dialogue and collective reflection and is often driven by metaphor or analogy.

Crossan et al.(1999) shares Nonaka's conceptual perspective and has developed a prescriptive model and instrument with three levels of analysis based on a stock-and-flow perspective. Firms are seen as having "stocks of learning" at the individual, group, and organizational levels, and the "flows of learning" occur through feed-forward and feedback. The meta-processes that occur at the three levels are as follows: at the individual level, "intuiting" and "interpreting"; at the group level, "integrating"; and at the firm level, "institutionalizing" (Crossan & Bontis, 1998; Inkpen & Crossan, 1995). The difference between the group and the organizational level is that the organizational level contains the nonhuman elements of system, structure, and strategy. Similar to a production system, "bottlenecks" can occur as a result of lack of alignment with any of these nonhuman elements.

Although both of these models provide additional understanding of the organizational balance between the dynamics of exploitation (performing) and exploration (learning) (March, 1991), they do not provide a mechanism for cross-level analysis of the concrete micro-actions of the organization. Nor do they provide a basis for incorporating the

organization's culture as a major factor in determining organizational learning and subsequent knowledge structure changes.

An alternative to the economical nature of knowledge, as portrayed by Nonaka and Crossan, is the social action theory of knowledge creation. An action theory perspective is distinct because of its emphasis on understanding action, the social construction of the everyday world, the role of the environment relative to how a firm defines itself, and the use of organizational values or cultural patterns (Meyer, Tsui, & Hinings, 1993; Miller, 1996; Wheatley, 1994). These dynamic processes of the social action system involve actors, symbols, and processes that enable and/or hinder the transformation of information into valued knowledge. The environment is seen as a source of meanings through which members define their actions and make sense of the actions of others (Daft & Weick, 1984; Silverman, 1970; Schwandt, 1997). The focus is on interrelated systems of actions that adapt to the environment through changes that emanate from both performance and learning (Parsons, Bales, & Shils, 1953).

The Social Action Learning Model (Table 1) focuses on patterns of action that occur within and between the organization's four interactive subsystems of actions: *Adaptation through Environmental Interface, Goal Attainment through Reflection on Actions, Integration through Dissemination and Diffusion of information within the system,* and M*aintenance of Cultural Patterns through reinforcement of Meaning and Memory.* It is an operational extension of Parsons' General Theory of Action (1951) and explains how patterns of action may affect a firm's capacity to create knowledge.

Table 1. Subsystems of Action in the Social Action Learning Model

ADAPTATION	**GOAL ATTAINMENT**
The *environmental interface subsystem's* primary purpose is to function as the information portal for the organizational learning system. This subsystem is externally focused and has *new information* as its output.	The *action/reflection subsystem's* primary function is to accomplish the goals of the system. It includes activities such as strategic planning evaluation, decision-making processes, and group deliberations. *Goal-referenced knowledge* is the interchange medium or output of this subsystem.
PATTERN MAINTENANCE	**INTEGRATION**
The *memory and meaning subsystem's* primary function is to maintain the patterns of action within the system. Often viewed as organizational culture, this subsystem provides the foundation from which other subsystems draw guidance and control. It maintains the mechanisms that create the criteria for judgment, selection, focus, and control of the learning system. Its output or interchange medium is *sense making.*	The *dissemination/diffusion subsystem's* function is to integrate action within the system, including the formal and informal movement of information. Activities include communication, networking, management actions of coordination, and other actions based on social norms that support the movement of information and knowledge. *Structuration* is the output interchange medium for this subsystem.

The subsystems of learning actions are supported through mutual exchanges of four symbolic yet concrete interchange media: new information, goal-referenced knowledge, structuration, and sense making (Schwandt, 1997). New information includes variables such as customer feedback, changes in the marketplace, new government regulations, and employee surveys. Goal-referenced knowledge includes evaluation results, decision-making outcomes, and results from experimentation. Structuration includes variables such as organizational roles, management practices, group norms, and organizational structure. Sense making includes variables such as schema, scripts, language, symbols, values, and basic assumptions (Schwandt, 1997).

The Social Action Learning Model's interchange media introduce a level of concreteness that enables researchers to examine variables and patterns of action within the whole system and across levels of analysis. This concreteness of the learning actions, and their relationship to those of performing, when linked with an organization's knowledge (as represented by the knowledge structure) provide us with mechanisms to understand the dynamics of knowledge creation during a transformational change.

Methods

The study was designed to gain insight into the extent the firms' knowledge structures concerning organizational change are reflective of their performance and learning actions. A multi-site case study methodology using both qualitative and quantitative strategies was selected to allow for a comprehensive examination of both organizational actions and the knowledge structures. The combination of the methods added scope and breadth to the study (Creswell, 1994, 2003; Green, Caracelli, & Graham, 1989), allowed for triangulation of results, enhanced synergy, and potentially increased transferability (Eisenhardt, 1989; Mintzberg, 1979). Although relatively new in the social sciences, the use of mixed methodologies has been employed in recent empirical work on knowledge structures and change (McNamara et al., 2003: King & Zeithamal, 2003).

The case study method allowed the researchers to select two firms undergoing a self-proclaimed transformational change effort in response to alterations in their competitive landscape. Table 2 provides an overview of the two sites: FinCo and PowCo. To understand the "organizational actions," data were gathered through four sources: a survey, observations, documents, and interviews. To understand the existing and emerging

"knowledge structures," data were gathered using focus groups and interviews to get personal-level schema and collective-level knowledge.

Table 2. Site Descriptions for FinCo and PowCo

FinCo	**PowCo**
- Financial Services - Boutique firm, experts in bonds - 600+ employees - Expanding financial products - Attempting to shift away from a product base toward a customer relations firm with multiple products and services	- Newly deregulated power industry - Coal-burning generation facility - 90 employees (70 unionized) - Same production process, moving toward operating as a competitive business from a public service/utility - Attempting to shift away from utility to a competitive enterprise
Similarities between two research sites Management-directed, self-proclaimed transformation effort Emphasis on operational efficiency through cost center business model 1990s workforce downsizing and restructuring Top management team reformed, leadership agenda to guide transformation effort Experienced workforce, firm-specific knowledge	

Knowledge Structures

Consensus maps and element tables were developed for each focus group within each organization. They were based on the transcripts, individual maps, and group storyboards that were developed. In each organization, patterns within and across the data sources were then used for the development of a composite map to graphically represent a firm-level knowledge structure concerning organizational change. They were then examined with consideration for contextual elements concerning industry and approach to change drawn from the documents and observations.

A purposeful sample of informed sources was used to select focus group participants, which included 4-6 members representing the various functions or business units within the firm (Table 3). Informed sources were members considered to have an understanding of the stated strategic direction of the firm, as well as an understanding of the operational and programmatic levels of the business. In-depth individual interviews were conducted with top management team members using the same storyboard activity

redesigned at an individual level to confirm knowledge structures and/or amplify any knowledge distinctions (Garud, 1997; Sackmann, 1992).

Table 3. Population Delineation by Collection Source and Research Site

	SAMPLE POPULATION **FinCo** (total pop = 600)	SAMPLE POPULATION **PowCo** (total pop = 95)
SURVEY Broad representation across organization	N = 216 (1/3 population)	N = 45 (1/2 population)
FOCUS GROUPS Purposeful sample of informed participants knowledgeable of strategy and operational aspects	10 Focus groups (41 participants)	5 Focus groups (17 participants)
INTERVIEWS Senior management, top management teams	N = 8	N = 4
OBSERVATIONS Weekly management meetings, planning sessions, special announcement relative to change efforts; incl. trading desk (FinCo) and shift work (PowCo); observations of focus group story-mapping activity	300+ hours daily work & meeting 10+ hours of each focus group	300+ hours daily work & meeting 5+ hours of each focus group

Learning and Performing Actions

The Organizational Action Survey was used to gather perceptual data from members relative to actions associated with how the firm interfaces with its external environment, attains its goals, coordinates work and information, and maintains its culture. These analytical dimensions correspond with the Social Action Learning Model discussed earlier. In addition to capturing perceptions of learning and performing, the survey asked respondents about their perceptions of how the firm reacts to change. These items, along with responses about current firm action, enabled the researcher to describe the patterns of action as well as the relative performance-learning goal orientation of the firm.

The Organizational Action Survey is based on the belief that organizational effectiveness is dependent upon the firm's values and those processes, standards, and actions deemed critical by the firm for the accomplishment of its mission (Johnson, 2000; Parsons et al., 1953; Schwandt, 1997). The survey captures perceptions about organizational actions. It has eight factors corresponding to four sets of learning actions plus four sets of performing actions. The face validity of the survey has been tested with an expert panel and participants (Callahan, Mueller, & Fields, 1997). In addition, the validity

and reliability of the survey have been tested to solidify its strength (Johnson, 2000). To confirm the measure of reliability for the scales within the sample population used in this study, Cronbach alphas were computed separately for each of the two sample populations. The coefficients indicate that item clusters for the eight factors were strong (alphas ranging from 0.519 to 0.723) with the exception of the factor, Adapting to the Environment – Performance. Several conditions contributed to this low item reliability score, including a close examination of one item within the factor (Q: *technological advances make current practices obsolete*), which was negatively correlated to the other three, which cued the researcher to closely examine the item scores within this particular factor and be cautious about any advanced interpretation. Additionally, the large percentage of "don't know" responses for items associated with comparisons of PowCo's strategic group and the rating of PowCo's performance within the industry may indicate weaker awareness by the sample relative to items contained in this factor.

The data analysis was implemented in three phases, following Miles and Huberman's (1994) coding continuum. First, the qualitative data were initially analyzed. Second, the quantitative data were initially analyzed by preparing descriptive statistics for individual items and for item groups across the dimensions of the survey and by analyzing observational data concerning actual organizational action. Both the qualitative thematic areas and the quantitative findings were analyzed by coding the three data sources (focus group, interview, and document review) and concluding with cross-data source theme analysis and integration of the findings with the document review and survey findings. The data analysis methods were concluded with a final interpretation based on the meta-knowledge structure concerning organizational change for each of the sites. Context-specific elements, as well as each firm's approach to change, were considered.

Results

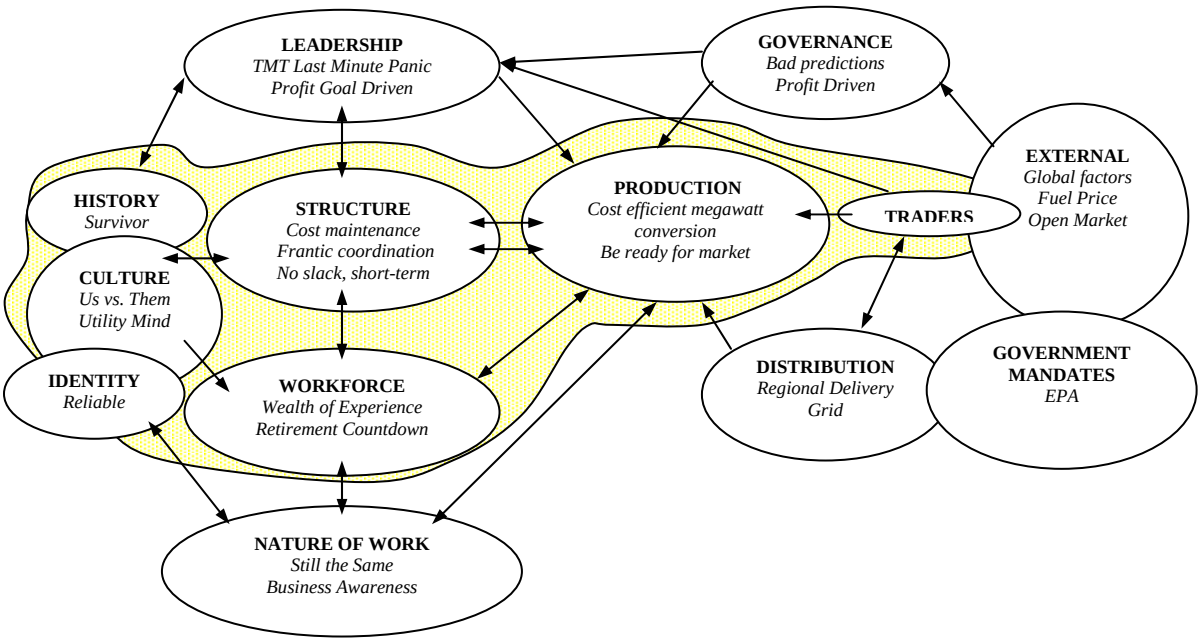
This section of the paper reports the analysis of both the qualitative and quantitative results for PowCo and FinCo. We will first present the knowledge structures as maps constructed from the qualitative data for each of the sites. The core elements of the knowledge structure, depicted by the shaded area, includes those elements and relationships that appeared as dominant features across the focus groups both in terms of the widespread agreement and relative importance to change. The elements not meeting

these criteria are considered peripheral. After presenting the maps, we present the quantitative data that is reflective of the "actions" of the organizations, both learning and performing.

PowCo Knowledge Structure

The PowCo knowledge structure (Figure 2) revealed electric *power production* as the central element within the map as evident by its links to other elements and by the number of references to it within the data. In all of the focus groups and interviews, the generation of electric power was the single dominant element: "You do what you have to do to keep the place competitive and keep it running." Also, *Workforce, Culture, Structure,* and *Traders* (individuals that buy and sell electric power) were identified as key interacting elements within the knowledge structure's core.

Figure 2. PowCo composite map, element descriptors inside circles, relatedness signified with arrows, core elements signified in shaded area.



The workforce was perceived as a critical element to enable the efficient operation of the facility, allowing it to "do more with less." Their knowledge and experience were seen as one of the key enablers of change, essential for PowCo's ability to produce power for profit:

“They’ll [workforce] take something that’s complex and really difficult and make it look easy because they’ve either been there before several times or something like that.” Two separate components or subcomponents emerged under culture as well: identity (reliability) and history (legacy, survivor). The nature of work was coupled positively with identity and history. This means that the participants’ description of their work included proud recollections from PowCo’s past in terms of how they perform their daily routines; they are “tradesmen.”

PowCo’s culture reinforced the “still the same” orientation. The subculture of “us versus them” (union versus management) was also perceived to reinforce the “still status quo, no matter how you look at it.” The climate was described as a “prison mentality” that “still [had] a utility mindset,” meaning that PowCo was not seen as an exciting developmental workplace that was operating as a competitive business. PowCo’s internal image was perceived to be constant and congruent with its desired image of reliable, cost-efficient power production: “We’ve always tried to find more efficient ways to run better.” Participants did not perceive this as anything different from the past: “Reliability has always been there.” Personal and collective histories of surviving threats of closing the facility, re-bidding for jobs, physical participation in the design and construction of the plant or the rebuilding of equipment, fatal and near-fatal injuries, family lineage, and long tenure with the facility instilled a sense of legacy and, for some participants, a sense of foundership.

Structure in terms of norms was tightly associated with electric power production. The emphasis on the cost-containment as the impetus for decisions and operational guidelines was reflected within the structure element: “The bottom line was the ultimate now, which has completely changed the rules.” Data revealed a shift toward short-term thinking. One example was changes in maintenance expenditures: [The old mindset was] “buy what’s needed — have spare parts in the storeroom and fix it,” [and the new mindset] was “we need to prioritize. We have less inventory. Now, [we] just patch it.” In addition, structure emphasized the impact of the new fiscal model and included a focus on cost maintenance, doing more work with less resources (personnel, equipment), and an overall short-term focus on just “fixing” versus long-term repair and investment.

Although *leadership* and the *nature of work* were present as core elements in some of the individual focus group maps, the analysis revealed little to no change in the nature of work: “Don’t see much of change, still a utility that was always running.” Participants had a

negative association with leadership, negative "relationships" between the elements indicates that the leaders "function as organized chaos," and were subsequently perceived as having a negative impact on the coordination of work within the facility. Corporate management and The Management Team (TMT) were perceived to be working "behind the scenes" and to be engaged in unnecessary last-minute planning: "We're in a panic all the time. You can do that sometimes, but not every day." Leadership was differentiated across the focus groups in terms of Chief Executive Officer (station manager technical competence), TMT (organized chaos), middle management (trying to be cost efficient), and corporate management (sometimes coupled with station leadership relative to the profit motive).

Whereas the *external environment* (new energy market, government mandates) was prevalent in the data, only the trading floor subcomponent was included as a core component because of the evidence regarding the impact of the bidding process on the interface with power production and the traders. "Now they have to bid every day. Where before, no matter when you returned [made repairs], you just went back into service. It doesn't work that way anymore."

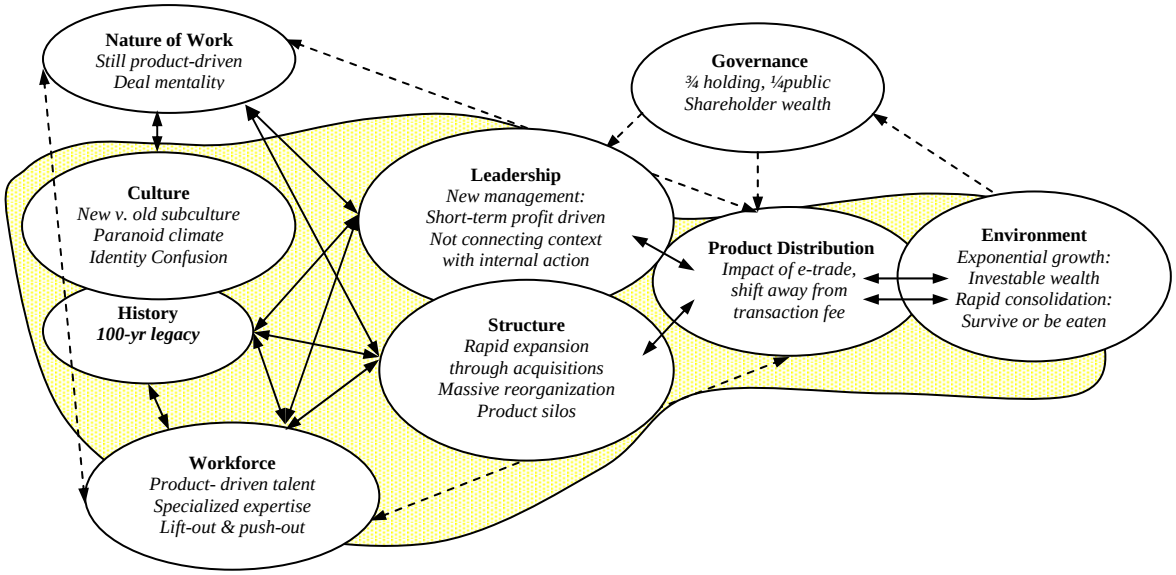
Overall, participants perceived that there was "no transformation." Despite recognition of the new corporate fiscal model that made PowCo and each of the facilities separate entities that were each financially accountable, the overall sentiment was still no change: "Now they've finally given the money back to our company. And in essence, how does it affect our day-to-day operations of the plant? Not a damn thing really." The sentiment was that "how" they did their work was still the same, with some evidence that they thought their work may have shifted slightly as a result of their interface with traders, who now also controlled or triggered "when" they did their work.

FinCo Knowledge Structure

FinCo's knowledge structure (Figure 3) appears to be driven by the internal elements and actions focused on enhancing product distribution in order to capitalize on market opportunities: "We're creating a new product line or new products to fill the needs and objectives of our clients." The conditions for *product distribution*, which include the impact of electronic trading on the nature of financial advisement, became an important consideration for FinCo's change effort and a core element. Additionally, the *external environment's*

conditions, also a core element, in terms of the expansion of the affluent wealth base and the rapid consolidation and changing competitive landscape were impacting FinCo's change orientation. The final external element, governance, was a peripheral element in FinCo's map, yet it contributed to an emphasis on profit from change. Overall, these three elements portray change as an "untapped potential" for which FinCo has a window of opportunity.

Figure 3. FinCo composite knowledge structure signifying core and peripheral elements.



Leadership and structure were identified as core elements and were seen as influencing the product distribution element. Specifically within the leadership element, the transition from the "old management to the new management," referring to the CEO and COO, was perceived as the critical incident that enabled change actions. Although the new management was positively credited for taking action to get FinCo into the competitive market after a dormant period with the previous team, leadership was seen as being unable to connect the external context with internal actions: "I don't know if they [leadership] know what market they're actually participating in. The goal might be to increase market share but they don't even take the time to. They have no idea how to measure that because they don't know what market they're looking at."

The rapid expansion and massive reorganizations as a result of the newly acquired firms were seen as a positive influence on product distribution. Although rapid action was perceived to be needed, the choice of action and short-term performance orientation were seen as destructive to the development of a business and lacking foresight: "Trying to make

a big splash short term — we want a big splash in the pond and not necessarily thinking towards the future." Their short-term focus was not perceived to be reflective of a business orientation. Overall, the leadership and structure elements portray change as "disjointed and driven by profits," with FinCo opting for a "rapid-fire," "buy your way into the market" approach.

Workforce, along with *culture and history*, was also identified as a core element and seen as influencing leadership and structuring actions of FinCo. Participants perceived a clear message from leadership that they wanted to change the culture, and workforce replacements and company mergers were seen as one of the key strategies leadership was employing to replace the old legacy with the new FinCo: "As new people come into the organization, the culture begins to change and evolve from the old culture, and then it starts to become real." One participant referred to "buying our way into the new business line by bringing in outside people and consultants, trying to get rid of the old legacy." This orientation was in conflict with historical practices that emphasized the development of talent within the firm: "The decision was made to hire talent with expertise and [to have] a short-term performance focus [rather] than what had been the historical way that the company works." The identity confusion, emerging conflict between the old and new subcultures, and a climate of paranoia and mistrust were seen as negative influences on leadership's efforts toward change. Conversely, leadership's lack of consistent and clear communication, zigzag decision making, and intentional actions to destroy the old culture had reciprocal influence: "Some [new] people are rapidly becoming the old cynical people." Overall, these three elements (leadership, culture, and structure) portray change as dichotomous, schizophrenic, or almost "push-me-pull-me" as evident by descriptions of past change attempts: "We've been trying real hard and we've just hit a couple walls that caused us to back up before we could move forward again."

The *nature of work* was characterized as a peripheral element in the composite map because it lacked the depth and intensity of evidence and the frequency of reference across focus groups. FinCo still perceived its daily activities, roles, and functions as organized around a sales company and focused on developing financial products. Participants indicated that the new personnel and new partnering firms still focused on products.

FinCo's 100-year-old legacy of pioneering product innovation coupled with specialized expertise was seen as an enabling force. Conversely, its infrastructure and lack

of coordinated action was perceived as inhibiting its ability to move successfully toward the stated goals: “The problem was that we’re ends-oriented. We don’t have the means, how we’re going to get there.” The lack of coordinated action and communication was contributing to the perceived lack of foresight and commitment to the change: “Our own cynicism was coming from our own tripping over ourselves, was hampering our ability to deal with such a great and exciting mission.”

PowCo and FinCo Organizational Actions

The quantitative analysis of PowCo and FinCo’s survey data enhances the composite picture of the firm-level knowledge structure and highlights relationships identified in the qualitative analysis of the composite maps. The survey ascertained perceptions about organizational actions associated with adapting to the changing environment by considering acts of environmental adaptation, structuring, culture, and goal attainment.

The Organizational Analysis Survey data depicts four sets of learning actions and four sets of performing actions across the four functional organizational prerequisite action frames. Table 4 delineates these eight factors. The table includes the description of each of the factors and the respective mean score and standard deviations for both PowCo and FinCo.

Table4. OAS Learning-Performing Factor Descriptors & scores PowCo & FinCO

	Factor descriptors	**PowCo**	**FinCo**
LEARNING			
Factor #1 **Environmental Interface** *Adaptation*	Proactive external interfacing: Seeking out information to meet unanticipated customer needs or emerging market; proactively gathering data to anticipate consumer or industry trends; tracking competitors, strategic group configurations, customer or supply chain satisfaction.	Mean: 2.99 (.80)	Mean: 2.84 (.72)
Factor # 3 **Action Reflection** *Goal Attainment*	Reflective planning: Reflecting on priorities and goal-oriented actions, critically examining criteria for success, focusing on new knowledge and innovation, creating goals for research and development; emphasizing plausible readiness over planned change approach.	Mean: 2.93 (.67)	Mean: 3.25 (.74)
Factor #5 **Dissemination Diffusion** *Integration/Coordination*	Network idea sharing: Taking opportunities for developing knowledge, skills, and abilities; sharing new insights; collaborating and networking; using situational approaches to resource allocation and communication.	Mean 2.82 (.75)	Mean 2.91 (.81)
Factor #7 **Meaning & Memory** *Pattern Maintenance*	Reinforcing flexibility and growth: valuing individual and firm development; viewing mistakes as learning opportunities; critically reviewing current standards to meet future needs; recognizing and rewarding intelligent risk taking; creating climate of trust and elasticity.	Mean 2.88 (.65)	Mean 3.18 (.66)
PERFORMNING		**PowCo**	**FinCo**
Factor #2 **Attaining Resources** *Adaptation*	Reactive external interfacing: Responding to intense industry competition or technological changes; reacting to governmental agencies' or consumers' requests; adopting new industry standards; market-driven.	Mean: 3.51 (.46)	Mean: 3.44 (.43)
Factor #4 **Production** *Goal Attainment*	Production-focused prioritizing: Establishing clear performance goals; consistently meeting deadlines; maintaining accountability for achieving goals; having an achievable mission; producing well-established products; emphasizing accurate planning to minimize unexpected.	Mean: 2.84 (.72)	Mean: 3.02 (.78)
Factor #6 **Control** *Integration/Coordination*	Communicating and coordinating effective actions: Implementing changes to make people more effective; holding leaders responsible for decision making; ensuring fair and equitable allocations of resources; enforcing formal/hierarchical communication structure; creating rigorous role responsibilities.	Mean 2.70 (.88)	Mean 3.03 (.78)
Factor #8 **Standards** *Pattern Maintenance*	Establishing performance standards: Rewarding performance achievement; maintaining established standards; emphasizing systemic equity over flexibility; ensuring consistent values to guide daily activity; minimizing risk taking and norm deviancy; reinforcing rule-bound reward-punishment based systems.	Mean: 2.78 (.76)	Mean: 2.83 (.73)

PowCo's data showed the action set Adapting: Performing (Resource) with the highest mean score (3.51), with lower mean scores for the other sets of actions. These analyses further reinforce the relatively lower perceived effectiveness of the internally driven actions such as coordination, integration, sharing of information, management practices, and process improvement. This difference reaffirms a performing orientation relative to the external environment, which was consistent with the knowledge structure and emphasizes

reliable production of power within the energy market. Learning actions rated lower, and include responses to items such as *predicting changes in the industry*, *seeking out information to meet unanticipated needs*, and *tracking of competitors to gauge changes*, and indicated PowCo's internal focus and lack of external orientation. Overall, PowCo respondents indicated general awareness of the externally driven competitive market and the need for their firm to continuously improve customer service and continuously change, but yet did not see the connecting relationships.

FinCo also reported their highest mean score (3.44) for action set Adapting: Performing (Resource). FinCo's second highest mean score is learning actions associations with Action Reflections (3.25). Both sets of actions are externally focused and constructed to ascertain perceptions about prioritizing goals and developing products in response to increased competition, technological changes, and new configurations within the financial services industry. Although, performing adaptive actions mean score were statistically significantly higher than for learning adaptive actions. Interestingly, the factor mean score for Culture: Learning was significantly higher than for Culture: Performing.

These analyses highlight a perceived lower emphasis on the learning actions of the organization as opposed to the performance actions. However, both PowCo and FinCo were highly aware of the need for performance-related actions directed toward environmental adaptation.

Discussion of Results and Implications

The primary focus of the investigation was to ascertain to what extent knowledge structures concerning change are reflective of their learning and performing actions during a transformational change. With respect to the two organizations studied, their knowledge structures encapsulated an emphasis on production in response to threatening conditions in highly competitive markets (situation) through enhancement of performing actions for the outcome of change (end) despite a prevailing culture of resistance and skepticism in response to a restrictive and traditional hierarchy (norm). Despite transformational change being perceived as an important characteristic, as evident by survey data and focus group responses, the knowledge structures did not portray learning and inquiry as part of the means for achieving change. The knowledge structure itself limited access to the external environment as evident by survey responses that strongly indicated that information sharing

was perceived as restricted by the hierarchy and limited to only management. The core element of production suppressed rather than enabled inquiry that in turn would enable continuous change. The knowledge structure's fascination with "the work" and focus on present action at the expense of exploring plausible future action is indicative of March's (1991) notion of exploitation. The knowledge structure was not creating new knowledge or exploring new future action; rather it was focused on present action and performing to produce a change, even though they cognitively acknowledged a need for transformation.

Six primary characteristics represented the nature of the relationship between the firm's actions and their knowledge structures concerning organizational change:

1) The knowledge structures were internally focused and represented a preoccupation with production. Although there was acknowledgement given to the changing complexity in the competitive landscape, the relative importance was placed on production of new financial products or of cost-efficient power generation. Similar to Tushman and O'Reilly's (1996) analysis of IBM and Sears in which they found an inward focus and "preoccupation with internal procedures rather than understanding the reality of the changing market" (p.23), the knowledge structure reflected a continued emphasis on production rather than generating new knowledge. This is indicative of Brenner and Tushman's (2003) finding in which they uncovered that firms too focused on enhancing efficiency inhibited their ability to engage in exploratory actions that might uncover new future possibilities.
2) Dominant core elements of the knowledge structure were quite simple and traditional and may have contributed to collective cognitive suppression. Brenner and Tushman (2003) indicate that how process management techniques stabilize and rationalize organizational routines while focusing on efficiency and customer service. And although increased efficiencies may result in the short run, they also trigger biases for certainty and predictable results and a system that favors exploitive action rather than exploratory actions (Brenner & Tushman, 2003). Additionally, the knowledge structure core was void of any type of reflective elements relative to the newly stated missions, and therefore resulted in little actions of inquire and new goal reference knowledge being generated.
3) Traditional negative and positive relationships among the elements contributed to the reduction of equivocality and inquiry. Levinthal (1997) argued that the ability of

established organizations to respond to changing environments is conditioned on the elements of the organizational form interacting with the environment, and it is the tightly coupled organizations that are subject to high failure rates. Empirical research in punctuated change has shown how tight coupling might lead to punctuated change while loose coupling facilitates continuous change (Spender & Grinyer, 1995). The implication therefore being that while a tightly coupled knowledge structure may be indicative of exploitation action rather than explorative action, the tightly coupled knowledge structure may evoke a need for radical change.

4) The knowledge structure reinforced an action orientation that was performance dominated rather than learning. The propensity to select “producing quality products” over “producing knowledge” was evident not only in the survey data, but in the structure of the knowledge structures themselves. The performing orientation, as evident in the lack of collective reflection and inquiry of the knowledge structure, inhibited the ability to explore alternative competitive landscapes because performing focus evoked replication versus creation. The knowledge structure was replicating or reinforcing the pattern of performing action, and without generating new goal reference knowledge to trigger the system, it will continue along the same path.

5) The knowledge structure defaulted back to the organizational memory, culture, and history when treated with dramatic change in the environment. This finding is consistent with defensive avoidance strategies (Hodgkins & Wright, 2002), the organizational memory literature (Casey, 1994), and previous change studies that examined knowledge structures in firms undergoing change (Geigle, 1997). The finding reaffirms the importance of organizational memory during change, as highlighted in the principles of the cybernetic hierarchy with the control of the culture on the social system.

6) Skeptical orientation of the knowledge structures limited the transformational change capability. With limited portals for gathering new information and a heavy reliance on the memory system, the knowledge structures became rigid and even defensive in nature. Additionally, change was positioned as an outcome, and not as a process within the system, which again limited the firms’ ability to generate knowledge for transformation.

In general, the knowledge structure was too simple given the complexity of their external environment. The focus was on present rather than future action, performing rather than learning, and driven by prevailing norms of resistance. The knowledge structure lacked capacity to create knowledge about its change process, and in turn reinforced the performing orientation at the expense of generating new knowledge through learning.

Conclusion

Although a focus on efficiency or process management activities might be good in stable contexts (exploitation), for those firms interested in 'transformational change,' they must create new knowledge in order to alter the nature of their work, the nature of their relationships, the nature of how they make sense of cues from the changing external environment, and build in a process for continually experimenting and updating their work processes and social practices.

The role of history, identity, and memory on the organization's knowledge structure was a critical factor in this study. The knowledge structure reflected the default to these elements that inhibited the ability to create new knowledge concerning change. In addition, while many theories such as institutional change highlight the role of these core values and subcultures, they don't delineate the sense-making process à la Weick (1995) as a trigger to break inertia. These theories view the sources of change as environmental and performance driven, occurring through changes in structure, strategy, and power relationships. Change is processional and involves ongoing human interaction, emergent patterns, and the translation of new information relative to the meaning and memory system triggered through learning actions. Critical questioning of the basic assumptions of the firm and how the firm makes sense of changes become essential for a firm to reframe its identity, leverage its legacy, and move toward a future orientation.

In these organizations, initial conditions of a changing industry and self-proclaimed change were not sufficient to guarantee the creation of new knowledge. Despite participants' recognition of external forces, despite changes in strategy, structure, and power relations, there was not evidence of learning in their knowledge structures concerning change. This finding highlights the need for new models that de-emphasize the external forces and highlight the role of internal knowledge-producing actions. Additionally, the findings demonstrate the strength of culture, history, and identity as impediments for change.

Therefore, firms interested in truly ‘transforming’ must take an in-depth look into the cultural patterns and basic assumptions about change. Additionally, they must review their approach to change (e.g., coercive versus re-education) and extent to which their approach is supported by or congruent with a culture that evokes inquiry and reflection in order to enable a transformation to emerge. These elements of critical inquiry, collective reflection, reflective practitioner, and communities-of-practices are all activities that build in a social learning and action perspective that may enhance the knowledge-creating and transformational capacity of firms.

References

Argote, L., McEvily, B., & Reagans, R. (2003). Introduction to special issue on managing knowledge in organizations: Creating, retaining, and transferring knowledge. *Management Science, 49*(4), v-viii.

Argyris, C., & Schon, D. A. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.

Axelrod, P. (1976). *The structure of decisions: The cognitive maps of political elites*. Princeton, NJ: University Press.

Bartunek, J., Gordon, J., & Weathersby, R. (1983). Developing complicated understanding in administrators. *Academy of Management Review, 8*, 273-284.

Bartunek, J. M., & Moch, M. K. (1987). First-order, second-order, and third-order change and organization development interventions: A cognitivist approach. *Journal of Applied Behavioral Science, 23,* 483-500.

Bougon, M. G. (1992). Congregate cognitive maps: A unified dynamic theory of organizations and strategy. *Journal of Management Studies, 29*, 369-389.

Bougon, M. G., Weick, K., & Binkhorst, D. (1977). Cognition in organizations: An analysis of the Utrecht jazz orchestra. *Administrative Science Quarterly, 22*, 606-639.

Brenner, M., & Tushman, M. (2003). Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, *28*(2), 238-256.

Brockman, B. & Morgan, R. (2003). The role of existing knowledge in new product innovativeness and performance. *Decision Science*, *34*(2), 385-419.

Brown, J. S., & Duguid, P. (1991). Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation. *Organization Science, 2*(1), 40-57.

Brunson, R. W. (1985). A top management personal values typology: Inverted factor analysis approach to a conglomerate. *Group & Organization Studies 10*(2).

Callahan, J., Mueller, R., & Fields, D. (1997). Validating of Organizational Action Survey: Expert Panel. Paper presented at the Academy of Human Resource Development, Atlanta, GA.

Casey, A. (1994). *Collective memory in organizations: Content, structure, and process*. Unpublished doctoral dissertation, The George Washington University, Washington, DC.

Creswell, J. (2003). Research Design: Quantitative, Qualitative, and Mixed Method Approaches (2nd ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage Publications.

Crossan, M., & Bontis, N. (1998). *The strategic management of organizational learning*. Paper presented at the Organizational Learning Conference, Ashburn, VA.

Crossan, M., Lane, H., White, R., & Djurfeldt, X. (1995). Organizational learning dimensions for a theory. *International Journal of Organizational Analysis, 3(4)*.

Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretation systems. *Academy of Management Review, 9*(2), 284-295.

Das, G. (1997). Exploring attribution of managerial work from dual dimensional perspective. *The Indian Journal of Social Work, 58*(3), 418-441.

DeLong, D. & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. *Academy of Management Executive*, *14*(4), 113-27.

Downey, H., & Slocum, J. (1982). Managerial uncertainty and performance. *Social Science Quarterly, 63*, 195-207.

Drazin, R., & Sandelands, L. (1992). *On the language of organization theory*. New York: Columbia University.

Easterby-Smith, M., & Lyles, M. (2003) Eds. *Handbook of organizational learning and knowledge management*. Malden, MA: Blackwell Publishing.

Eden, C., & Ackerman, F. (1998). *Making strategy: The journey of strategic management.* London: Sage Publications.

Eden, C., & Spender, J. (Eds.). (1998). *Managerial and organization cognition: Theory, methods, and research.* Thousand Oaks, CA: Sage Publications.

Eisenhardt, K. (1989). Building theories from case study research. *Academy of Management Review, 14*(4).

Fiske, S. T., & Taylor, S. E. (1984). *Social cognition (1st ed.)*. New York: Random House.

Garud, R. (1997). On the distinction between know-how, know-why, and know-what. In J. Walsh & A. Huff (Eds.), *Advances in strategic management* (Vol. 14, pp. 81-101). New York: JAI Press.

Gersick, C. J. G. (1991). Revolutionary change theories: A multilevel exploration of the punctuated equilibrium paradigm. *Academy of Management Review, 16*(1), 10-36.

Giddens, A. (1984). *The constitution of society: Outline of a theory of structuration*. Berkeley, CA: University of California Press.

Gieskes, J., & Hyland, P. (2003). Learning barriers in product innovation. *International Journal of Technology Management, 26*(8), 857-870.

Green, J., Caracelli, V., & Graham, W. (1989). Towards a conceptual framework for mixed-method education designs. *Education Evaluation & Policy Analysis, 11*(3), 255-274.

Hargon, A., & Fanelli, A. (2002). Action and possibility: Reconciling dual perspectives in organizations. *Organization Science, 13*(3), 290-302.

Hedberg, B. (1981). How organizations learn and unlearn. In P. C. Nystrom & W. H. Starbuck (Eds.), *Handbook of organization design* (pp. 8-27). London: Oxford University Press.

Hitt, M., & Tyler, B. (1991). Strategic decision models: Integrating different perspectives. *Strategic Management Journal, 12*(5), 327-352.

Hodgkins, G., & Wright, G. (2002). Confronting strategies inertia in a top management team: Learning from failure. *Organizational Studies, 23*(6), 949-997.

Inkpen, A., & Crossan, M. (1995). Believing is seeing: Joint ventures and organizational learning. *Journal of Management Studies, 32*.

Jackson, S., Hitt, M., & DeNisi, A. (2003). *Managing knowledge for sustained competitive advantage: Designing strategies for effective human resource management*. Jossey-Bass.

Johnson, C. (2000). *The duality of the action frame of reference: The development and initial validation of a theoretical model of organizational learning and performing action systems through confirmatory factor analysis*. Unpublished doctoral dissertation, The George Washington University, Washington, DC.

King, A. & Zeithaml, C. (2003). Measuring organizational knowledge: A conceptual and methodological framework. *Strategic Management Journal*, vol 24 (8), 763-772

Langfield-Smith, K. (1992). Exploring the need for a shared cognitive map. *Journal of Management Studies, 29*, 349-368.

Lant, T. K., & Mezias, S. J. (1992). An organizational learning model of convergence and reorientation. *Organization Science, 3*(1), 47-71.

Laukkanen, M. (1996). Comparative case mapping of organization cognition. In J. Meindl, C. Stubbart, & J. Porac (Eds.), *Cognition within and between organizations*. Thousand Oaks, CA: Sage Publications, p. 3-44.

Lave, J. & Wenger, W. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Levinthal, D., & March, J. (1981). A model of adaptive organizational search. *Journal of Economic Behavior and Organization, 2,* 307-333.

Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology, 14,* 319-340.

Lundberg, C. (1991). *Organizational learning and organizational culture*. Paper presented at the Eastern Academy of Management, Hartford, CT.

Lyles, M. (1988). Learning among joint venture sophisticated firms. *Management International Review, 28 (Special Issue),* 85-109.

Lyles, M. A., & Schwenk, C. R. (1992). Top management, strategy, and organizational knowledge structures. *Journal of Management Studies, 29*(2), 155-174.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science, 2*(1), 71-87.

March, J. G., & Simon, H. A. (1958). *Organizations.* New York: Wiley.

McNamara, G., Luce, R., & Tompson, G. (2002). Examining the effect of complexity in strategic group knowledge structures on firm performance. *Strategic Management Journal, 23,* 153-170.

Meindl, F.R., Stubbart, C.I., & Porac, J.F. (Eds.). (1996). *Cognition within and between organizations.* Thousand Oaks, CA: Sage Publications.

Meyer, A., Tsui, A., & Hinings, C. (1993). Configural approaches to organizational analysis. *Academy of Management Journal, 36,* 1175-1195.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Miller, D. (1996). A preliminary typology of organizational learning: Synthesizing the literature. *Journal of Management, 22*(3), 485-505.

Miller, D., & Friesen, P. (1980). Archetypes of organizational transition. *Administrative Science Quarterly, 25,* 268-299.

Mintzberg, H. (1979). *The structuring of organizations: A synthesis of the research.* Englewood Cliffs, NJ: Prentice Hall.

Nicholls-Nixon, C. (1997). Commentary: The importance of know-where and know-when. In J. Walsh & A. Huff (Eds.), *Advances in strategic management* (Vol. 14). New York: JAI Press, Inc.

Nicolini, D. (1999). Comparing methods for mapping organizational cognition. *Organization Studies, 20*(5), 833-860.

Nonaka, I. (1991). The knowledge creating company. *Harvard Business Review, 69(6),* 96-104.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science, 5*(1), 14-37.

Parsons, T. (1951). *The social system*. New York: Free Press.

Parsons, T., & Bales, R. F., & Shils, E. A. (1953). Working papers in the theory of action. New York: Free Press.

Porac, J., & Thomas, J. H. (1990). Taxonomic mental model in competition: Definitions. *Academy of Management Review, 15*(2), 224-240.

Prahalad, C., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, (May-June), 79-91.

Sackmann, S. A. (1992). Culture and subcultures: An analysis of organizational knowledge. *Administrative Science Quarterly, 37*, 140-161.

Schneier, C. (1979). Measuring cognitive complexity: Developing reliability, validity, and norm tables for a personality instrument. *Educational Psychology and Measurement, 39,* 599-612.

Schwandt, D. (1997). Integrating strategy and organizational learning: A theory of action perspective. In J. Walsh & A. Huff (Eds.), *Advances in strategic management* (Vol. 14, pp. 337-359): JAI Press.

Schwandt, D., & Marquardt, M. (1999). *Organizational learning: From world-class theories to global best practices.* Boca Raton, FL: St Lucie Press.

Silverman, D. (1970). *The theory of organizations: A sociological framework*. (1st ed.). New York: Basic Books.

Sitken, S., Sutcliff, K., & Weick, K. (1998). Organizational learning. In R. Dorf (Ed.), *The technology management handbook*. Boca Raton, CA: CRC Press.

Spender, J. & Grinyer, J. (1995). Organizational renewal: Top management's role in a loosely coupled system. *Human Relations, 48*(8), 909-926.

Taylor, S. & Fiske, S (1951). Getting inside the head: Methodologies for process analysis. In J. Harvey, W. Ickes, & R. Kidd (Eds.) *New directions in attribution research,* Volume 3. Hillsdale, NJ: Lawrence Erlbaum Associates.

Tsoukas, H. (1996). The firm as a distributed knowledge system: A constructionist approach. *Strategic Management Journal, 17* (Winter Special Issue), 11-46.

Tushman, M. L., & Romanelli, E. (1985). Organizational evolution: A metamorphosis model of convergence and reorientation. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 7, pp. 171-222). Greenwich, CT: JAI Press.

Tushman, M. L. & O'Reilly, C. (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review, 38*(4), 8-30.

Weick, K. (1979). *The social psychology of organizing* (2nd ed.). New York: McGraw-Hill.

Weick, K. (1995). *Sensekaming in organizations* Newbury Park, CA Sage.l

Weick, K., & Quinn, R. (1999). Organizational change and development. *Annual Review of Psychology, 50,* 361-386.

Wheatley, M. J. (1994). *Leadership and the new science: Learning about organizations from an orderly universe*. San Francisco: Berrett-Koehler Publishers, Inc.

Zander, U., & Kogut, B. (1995). Knowledge and the speed of transfer and imitation of organizational capabilities: An empirical test. *Organization Science, 6,* 76-92.