Understanding Organizational Agility: A Work-Design Perspective

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Abstract

This paper introduces a unified theoretical model of organizational agility and investigates the attributes of knowledge-intensive work-design systems, which contribute to achieving and sustaining organizational agility.

Even though there has been considerable research on the topic of agility, these studies are not unified regarding their conceptualizations of agility and/or tend to adopt fairly limited views of agility dimensionality. Here, we organize a review of existing definitions and conceptual models of organizational agility, and proceed to advance a relatively comprehensive model built from a work-design perspective. This new model offers a theoretical platform for understanding organizational agility.

This paper further investigates those attributes of a work design system that contribute to organizational agility. A knowledge-intensive work-design system is an example of an edge organization. Its governance mechanism (participant engagement governance, network governance, and system dynamic governance) involves three work-design levels: strategic, operational, and episodic. We contend that an entrepreneurial governance pattern has attributes contributing to organization agility, whereby the impetus for its work-design efforts stem not from some deep hierarchical authority pattern, but rather is distributed among participants and through their networking dynamics. These attributes allow each participant positioned at the edge of the system to stay alert and respond to environing trends and forces, on behalf of the system and in concert with the system. Results of an illustrative case study are reported.

1. INTRODUCTION

There is increasing recognition that agility is an imperative for success of contemporary firms as they face intense rivalry, globalization, and time-to-market pressures (Brown and Eisenhardt 1997; Goldman et al. 1995; Sambamurthy et al. 2003). As the beneficial impacts of agility are increasingly acknowledged and more empirical support emerges on the link between agility and firm competitiveness (Giachetti et al. 2003; Goldsby and Stank 2000; Sharifi and Zhang 2001; Vokurka et al. 2002; Yusuf et al. 1999), a question of great interest to both scholars and practitioners is: How can an organization can achieve and maintain agility?

Researchers and practitioners from diverse disciplines approach this issue from a variety of perspectives. For example, researchers in the manufacturing field focus on mass customization and postponement strategies, which allow more space to respond to demand changes in a flexible way (Goldsby and Stank 2000; van Hoek et al. 2001). Scholars in the field of information systems (IS) promote information technologies as platforms that foster agility by helping achieve time reductions and quality enhancements in product design and development (Frayret et al. 2001), and by facilitating communication necessary to coordinate work activities (Sharp et al.1999). Scholars in knowledge management contend that knowledge management practices can enable agility (Dove 2005; Holsapple and Jones 2005) by providing greater or faster awareness of changes.

Overall, what agility is and what factors comprise agility are still points of variation among scholars. Depending on one's perspective and discipline, terms such as

agility, flexibility, responsiveness, and adaptability are not treated uniformly. The same term has different meanings in different perspectives, and different terms sometimes have similar meanings. These notions of agility, flexibility, responsiveness, and adaptability are tangled in the literature. The lack of clarity about the nature of each term, as well as how they are related, inhibits progress in understanding conditions needed to achieve agility. Therefore, **the first mission of this paper is to develop a relatively comprehensive and general conceptual model of agility and its components.**

A general model of agility puts us in a position to better understand the nature of agile organizations. Some scholars conceptualize agile organizations from the perspective of organizational design, attempting to build up a nomological network of the theoretical relationships among agility, flexibility, adaptation, and responsiveness (Alberts and Hayes 2003; Sharifi and Zhang 2001; Yusuf et al. 1999). The rationale for adopting this perspective is explained by Alberts and Hayes (2003): "The capacity to change the organization and business rules by which we operate can make us more effective and efficient when dealing with different types of missions. This capacity also makes it more likely that we can be responsive, flexible and innovative because it frees us from roles, doctrines and practices that were designed and developed for old missions."(p.153).

Further, Alberts and Hayes (2003) describe the notion of an edge organization, which is characterized by decentralization, empowerment, shared awareness, and freely flowing knowledge required to push power for informed decision making and competent actions to the "edges" of the organization, where they interact directly with their environments and other players in the corresponding field. They conceive of agility as the key attribute of edge organization and argue that agile organizations are the result of an organizational structure, command and control approach, concepts of operation, supporting system, and personnel that have a synergistic mix of the "right" characteristics.

Extending the work of Alberts and Hayes (2003), Gateau et al. (2007) compare the performance of an edge organization with those of five other organizational forms in terms of time, cost, coordination, product risk, and so on. Their empirical results show that the edge organization demonstrates the greatest speed and lowest cost of all forms studied. However, the results also show that the edge organization experiences considerable rework and coordination difficulties, and exhibits a higher risk level than all other forms. Although their results make a case that the edge form of organization is advantageous in terms of productivity (speed and cost related doing work), it does not address the notion of organizational agility (i.e., an organization's alertness and response capability). The authors conclude that additional research is needed to identify parameters that enable organizations to not only operate productively (quickly and inexpensively), but also in an agile manner (e.g., with reduced coordination difficulties and risk, in the face of environmental change).

In response to this call, **a second mission of this paper is to advance a detailed conceptualization of organization agility.** To do this, we adopt a work-design view and investigate how to facilitate organizational agility through work design. In this conceptualization, which is based on the knowledge chain theory (Holsapple and Singh 2001), the concept of agility is quite distinct from the notion of productivity. Agility is very much concerned with alertness to changes (environmental and internal) and the capability to use resources in responding to changes in a timely and flexible manner. Productivity does not necessarily yield agility; conversely, agility does not necessarily

imply productivity. Indeed, there may even be tradeoffs between the two in some situations.

Work design refers to ways in which work routines are arranged and renewed. There are two major reasons for adopting a work-design perspective when looking at organizational agility. First, because agility is one trait exhibited by work routines, it is therefore shaped by work design. According to Teece et al. (1997), firms build competitive advantages in rapidly changing environments by dynamically renewing their organizational processes in ways that achieve congruence with those environments. Organizational processes are "the way things are done in the firm, or what might be referred as its routines, or patterns of current practice and learning" (Teece et al. 1997, p.518). We contend that a firm's dynamic capability to realize a new competitive advantage in the context of changing situations emanates from work design that is appropriately agile (i.e., timely, flexible, affordable, relevant). Support for this contention can be seen in dramatic changes to work practices over the past decade, as companies try to create or maitain competitive advantages in turbulent environemts (Sinha and Van de Ven 2005).

Second, work design (be it serendipitous or rigidly controlled) occurs in any type of organization. To understand how to build an organization that is agile, we need to investigate an organization's system for designing and implementing work (i.e., its work-design system). Here, we conduct this investigation at three levels: strategic, operational, and episodic. That is, an organization's agility manifests on multiple levels, and agility on each level is affected by the organization's work-design system. Ideally, an organization achieves a high degree of agility at each level of its work design. However, a particular agile organization may be more successful at this on some levels than on others.

The impetus for work-design efforts does not reside in some deep hierarchical authority pattern, but rather is distributed among participants via knowledge flows that comprise the currents of collaboration. In a sense, every participant is at this system's edge – monitoring and responding to environing (as well as internal) trends and forces. It does so on behalf of the system and in concert with the system – allowing work design in a turbulent environment to be more agile than what results for hierarchical counterparts. We contend that, in the interest of a high degree of agility, a work-design system must be cultivated and treated with an entrepreneurial spirit. The aim is to sustain superior performance by dynamically arranging work so as to ride atop the waves of change and maintain balance in weathering the inevitable, unsettling, novel storms that can strike any organization – often with little warning (Holsapple and Jin 2007)

Given the context of a general conceptual model of agility and organizational agility, the **third mission of this paper is to address the question of how to achieve and sustain organizational agility by identifying and investigating the attributes along an entrepreneurial work design path governing participant engagement, networking formation, and system dynamics.** This leads us to introduce a research framework that identifies three major governance factors affecting work design agility: 1) participant engagement governance, which deals with the level of fluidity among network participants – the extent of network participants' willingness and ability to change social relations; 2) network governance, which determines the formation of the work-design network in a way that allows its participants to collaborate in pursuit of work-design agility; and 3) system dynamic governance, which deals with inertia in system design and

redesign.

The remainder of this paper is structured into six sections. Section 2 begins by summarizing various agility definitions and research frameworks dealing with agility. This leads us to advance a definition of agility that subsumes prior work, to discuss dimensionality of the agility construct, and compare our unifying view of agility to other related constructs. Drawing on the conceptualization on agility, Section 3 develops a model of organizational agility from a work-design perspective. Building on this model, Section 4 introduces a research framework for understanding how agility can be achieved via entrepreneurial work design. To empirically investigate the real-world applicability of the foregoing ideas, Section 5 describes a research design and summarizes results from an illustrative case. Second 6 discusses future research that builds an the advances introduced here.

2. AGILITY AND ITS COMPONENTS

A review of prior research on agility reveals two kinds of issues: definitional issues and dimensionality issues. Here, we summarize relevant literature on agility definitions, and then advance a relatively comprehensive and general definition of agility that unifies prior characterizations of the concept. Drawing on entrepreneurship and strategic management research, we proceed to develop a conceptual model of agility – identifying its key dimensions.

2.1. A Review of Agility: Definitional Issues

Agility, as a business concept, was coined in a manufacturing context – particularly in relation to flexible manufacturing systems (Christopher and Towill 2002). Later, the idea of manufacturing flexibility was extended into a wider business context (Nagel and Dove 1991), and the concept of agility as an organizational trait was born.

The 1991 Iacocca Report recommends adoption of an agile manufacturing paradigm involving competitive foundations, characteristics, elements, and enabling subsystems of agility. Some scholars argue that the Report's conception of agility is ill-defined, and urge clarification and refinement of the concept (Burgess 1994). They assert that the concept of agility needs to be well grounded in management theory (Yusuf et al. 1999). Nevertheless the Report seems to have stimulated numerous publications about agility in manufacturing contexts (Goldman et al. 1995; Kidd 1994; O'Connor 1994; Pandiarajan and Patun 1994; Tracy et al. 1994; Kumar and Motwani 1995; Kusiak and He 1997). Together, academic and practioner publications such as these have stimulated development of an agile manufacturing (AM) paradigm.

Transcending the manufacturing context, researchers are carrying the paradigm forward, emphasizing varying facets and sketching out divergent views of agility. For instance, agility is conceived as broadly as being a total integration of business components (Kidd 1995, 2000) and as narrowly as being rapid changeover from assembly of one type of product to another (Quinn et al. 1997). In analyzing representative manufacturing definitions of agility, two points appear to be emphasized: a firm operates in a changing competitive environment and the firm can take effective action to benefit itself and its customers. In analyzing representative supply-chain definitions of agility, the main theme appears to be that a firm exhibits responsiveness to customers in a turbulent environment. In analyzing representative knowledge-management conceptions of agility, points that are stressed include utilization of

knowledge resources in responding to changing conditions and explicit recognition of a need for alertness. In analyzing representative information systems (IS) conceptions of agility, there is recognition of the importance of detecting market opportunities.

Considering the varied definitions, we observe some commonalities, some differences, and some oversights. No single definition appears to subsume all others. Giachetti et al., (2003) conclude that efforts to define factors and determinants of agility are still formative and lacking consensus. This makes it difficult to develop agility metrics, and there are few studies that discuss possible measures of agility. In turn, a lack of agility metrics hampers empirical investigation of possible relationships between agility and variables that gauge business performance (Sherehiy et al. 2007).

2.2. A General, Unifying Definition of Agility

By synthesizing facets of prior definitions, and filling in some gaps, we synthesize the following general-purpose definition of agility: ***Agility is the result of integrating alertness to changes (recognizing opportunities/challenges) – both internal and environmental – with a capability to use resources in responding (proactive/reactive) to such changes, all in a timely, flexible, affordable, relevant manner.*** Individually, neither alertness nor response-ability gives agility. Both competencies are necessary to realize agility. Both alertness and response-ability need to be timely, flexible, affordable, and relevant. Greater competitiveness can come from the effective integration of these two competencies. By including basic points that run through prior definitions, the result is a relatively comprehensive and unified conception of agility.

Pushing forward from this base, we draw on ideas from entrepreneurship and strategic management disciplines to further develop this conception of agility. There are several reasons for doing so. First, opportunity discovery is at the core of entrepreneurship studies, while means for developing distinctive capabilities to respond to change is a major focus in strategic management research. Second, some scholars have shown that understanding the complementarily between entrepreneurship and strategic management provides promising avenues for researchers examining how organizations sustain competitive advantages in turbulent environments (Barney and Arikan 2001; Ireland et al. 2003; Meyer and Heppard 2000). Third, as effective supply chain management has come to be regarded as major source of competitive advantage for many firms, supply chain researchers have increasingly applied theories and conceptual contributions from strategy to their research (Chang and Grimm 2006; Wisner 2003).

In this direction, we advocate an integration of concepts from the two disciplines into the two main dimensions of the agility construct: alertness to changes (opportunities/disturbances) and responsive capabilities to changes. Resultant components of agility are portrayed in Figure 1.

The alertness dimension highlights agility as an opportunity-seeking capability from both external and internal vantage points, while the response capability dimension emphasizes agility in terms of change-enabling capabilities, which are embedded in organizational processes. Although distinct, the two dimensions of the agility construct are complementary. Some researchers have pointed out that a precursor of effective responses is timely awareness of changes (extant or anticipated) that can affect an organization (e.g., Dove 2005, Holsapple and Jones 2005), which is alertness. Sambamurthy et al. (2003) argue that entrepreneurial alertness is essential for the activation of response capabilities.

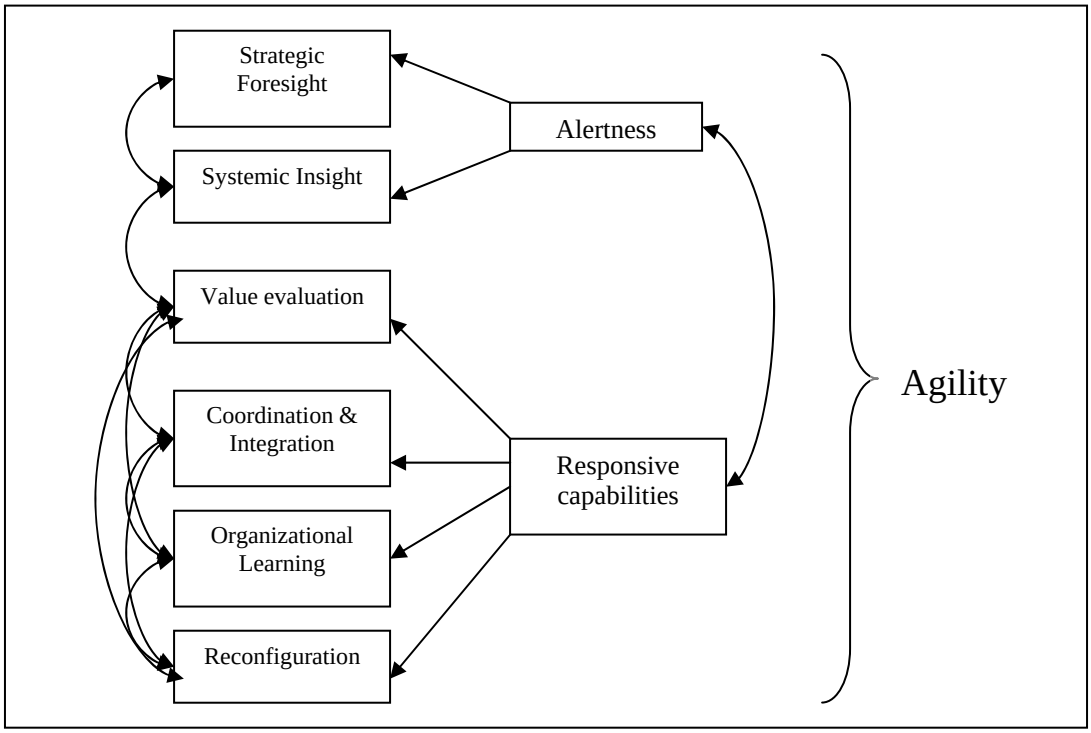

Figure 1. The components of agility

According to Sambamurthy et al. (2003), two specific capabilities describe alertness: strategic foresight and systemic insight. Strategic foresight is the ability to anticipate discontinuities in the business environment and the marketplace, threats and opportunities in the extended enterprise chain, and impending disruptive moves by competitors. Understanding that not every opportunity is proper for action, organizations need to be alert not only to opportunity options, but also to those alternatives that can be exploited with their resources and competencies. Systemic insight refers to the capability to consider the interconnections between the organization's capabilities and emerging market opportunities. Strategic foresight is positively correlated with systemic insight.

Responsive capabilities to opportunities and disturbances can be classified into two categories: capability to select actions and capability to enable actions. When relevant change is detected or anticipated, an organization faces alternatives courses of action. Good response ability requires intelligent decision making, based on insightful problem definitions and sound value propositioning skills (e.g., Dove 2005). The capability to enable actions, includes components of coordination, learning, and reconfiguration (e.g., Goldman 1995, Goldsby et al. 2001, Dove 1994, 1999, 2005).

The potential value of giving attention to a change varies across organizations in terms of relevance, significance, and priority (Chung 2006). To make good decisions as to which changes deserve responses, organizations must be capable of assessing the value of undertaking a response. The value evaluation component reflects an organization's response capability in making decisions in pursuit of competitive advantages (Dove 2005). Systemic alertness is positively correlated with value evaluation, because systemic insight enables an appreciation of the feasibility of seizing opportunities and treating competitive risks (Sambamurthy et al. 2003).

According to the theory of dynamic capabilities, an organization's capabilities for enabling change-responsive actions lie with their distinctive ways of accomplishing coordination, learning, and reconfiguration (Teece et al. 1997). Coordination refers to the ability to manage dependencies among activities and resources (Malone and Crowston 2001). Incentive systems, culture, routines, regulations, or trust are examples of coordination mechanisms. Learning includes the generation of new insights that have a potential to reshape behavior (Huber 1991), and – more broadly – alterations in the state of knowledge assets (Ching, et al. 1992). Reconfiguration refers to the ability to adjust an asset structure, and to accomplish the necessary internal and external transformations (Teece et al.1997). The responsive capabilities are determined by the interplay of value evaluation, coordination, learning, and reconfiguration as indicated in Figure 1.

The concept of agility effectiveness

We define agility effectiveness in terms of four elements or measures: timeliness, flexibility, relevance, and affordability. Timeliness refers to the delivery of value at an *appropriate* time. It is quite different from the notion of speed, which typically refers how fast production happens. Merely speeding up the work that is being done does not necessarily translate into higher agility, although it can certainly yield greater productivity. For example, just-in-time is an agility concept, not a productivity concept.

Flexibility refers to the range of ways available to achieve success. Rather than being limited to a small set of predefined options, high flexibility involves an active capacity and willingness to recognize new options, to overcome inertia, and to accommodate unstructured situations (e.g., unanticipated change). Preservation of flexibility is related to the retention of a "cushion" that leaves an organization poised to deal with the unexpected. When all resources are fully committed, the ability to be agile is diminished – degrees of freedom for being aware or being response-able are reduced, rendering the organization less agile. In essence, flexibility involves risk management through the cultivation of options.

We regard timeliness and flexibility as telling us about an organization's degree of agility. But beyond degree, there is the larger concept of agility effectiveness, which refers not only to agility degree – but also encompasses relevance and affordability. A high degree of agility with respect to an activity that is irrelevant for achieving the organization's mission does not contribute to the effectiveness of that organization's agility; it does not enhance the organization's competitiveness. The affordability measure recognizes that there are costs inherent in realizing a desired degree of agility. If these costs outweigh agility benefits, then agility becomes impractical, and its pursuit may even threaten an organization's long-term survival. That is, there are economic limits and consequences associated with achieving a certain degree of agility (i.e., levels of timeliness and flexibility).

These three measures apply to both dimensions involved in the definition of agility. Moreover, at a more detailed level, the measures apply to each component of the alertness and response-capability dimensions, as identified in Figure 1. For example, the timeliness of coordination (one of the response capability components) refers to appropriate timing in the management of dependencies, while flexibility of coordination refers to the ranges of ways available to manage dependencies. The cost of coordination and relevance of coordination are measures are measures related to an organization's agility priorities.

2.3. Agility and Its Related Constructs

The taxonomy of agility presented in Table 1 gives a structure for understanding and comparing alternative conceptions of agility. This taxonomy is formed by juxtaposing the components of agility (from Figure 1) with the four measures of agility described above, and is therefore firmly grounded in the findings of researchers from several fields.

Here, we highlight relationships between the unified agility concept synthesized from research literature and concepts proposed in CCRP publications. Albert and Hayes (2003), for example, identify six facets of agility: robustness, resilience, responsiveness, flexibility, innovation, and adaptation. Applying the taxonomy, Table 1 illustrates aspects of agility that are covered or implied in the six-facet conception offered by Albert and Hayes (2003). It also shows aspects of agility that appear to have received little attention.

Table 1. A taxonomy of agility

Dimension	Capabilities	Agility Effectiveness Measures			
		Degree of Agility		Relevance	Affordability
		Timeliness	Flexibility		
Alertness	Strategic Foresight				
	Systemic Insight				
Response Capability	Value Evaluation				
	Coordination				
	Learning				
	Reconfiguration				

Robustness refers to the ability to maintain effectiveness across a range of tasks, situations, and conditions. This notion of robustness is not explicit in the taxonomy, but is related to agility effectiveness in a temporal sense. For instance, over some time period, we can conceive of gauging an individual cell in Table 1 as being more or less robust (e.g., an organization's timeliness of strategic foresight or its flexibility of coordination may be high or low in terms of robustness). *Resilience* refers to the ability to recover from or adjust to misfortune, damage, or a destabilizing perturbation in environment. Although this notion is not explicit in the taxonomy, it refers implementing the response-capability dimension when dealing with challenging disturbances (as distinct from dealing with opportunities). *Responsiveness* refers to the ability to react to a change in the environment in a timely manner. The authors stress that a rapid incorrect action is not responsive, and responsiveness can be measured by the relative numbers of opportunities identified and exploited. We shade the cells for strategic foresight, systemic insight, and value evaluation under the timeliness measure to coincide with this conception of responsiveness. The authors describe *flexibility* as the ability to employ multiple ways to succeed and the capacity to move seamlessly between them. They also mention that a hidden capability in flexibility is to foresee multiple futures. Accordingly, we shade the cells for strategic foresight, systemic insight, and coordination under the flexibility measure to represent this view of flexibility. *Innovation* refers to the ability to do new things and the ability to do old things in new ways. In the knowledge chain theory, innovation has been found to be a distinct concept from agility as antecedents of competitiveness (Holsapple and Singh 2001; Hartono and Holsapple 2004; Holsapple and Jones 2005). That is, an organization can be innovative without being particularly agile, and can be agile without being particularly innovative. It is outside the scope of this

article to investigate the relationships, trade-offs, and complementarities between these two avenues to competitiveness. *Adaptation* refers to the ability to change work processes and the ability to change the organization. This notion resembles reconfiguration in a flexible way as represented by shading the corresponding cell in Table 1.

In all, the results shown in Table 1 give clues for expanding the ideas of Albert and Hayes to cover more of the cells. This same approach can be used for analyzing the extent of coverage afforded by other conceptions of agility.

3. ORGANIZATION AGILITY: A WORK-DESIGN PERSPECTIVE

A few frameworks have been proposed for characterizing how organizational agility depends on several variables. For instance, Sharifi and Zhang (2001) advance the notion that agility results from integrating agility drivers (environmental pressures and change that yield firm reactions), agility capabilities (strategic abilities of responsiveness, competency, quickness, flexibility), and agility providers (derived from areas of organization, technology, people, innovation) that express these capabilities. Unlike the agility definition introduced in Section 2, this framework of parameters is silent on the possibility of internal drivers (i.e., internal happenings that produce opportunities or challenges), does not consider the alertness dimension of agility, relegates the other major dimension of agility (i.e., response ability) to being an agility "capability," identifies "competency" as a separate "capability" rather than viewing it as effectiveness at being agile (i.e., competence on the dimensions of alertness and response-ability, or from standpoints of flexibility, timeliness, relevance, affordability), uses the speed-related concept of quickness rather than the appropriateness-related concept of timeliness, regards flexibility and quickness as "capabilities" of agility instead of measures or qualities of the degree of agility, appears to be unconcerned with the affordability and relevance of actions, and is restricted to four specific classes of "providers" rather than seeing all organizational resources as being potential "providers" (e.g., organizational knowledge resources or knowledge processing skills are not overtly included).

It has been suggested that agility manifests at multiple levels in an organization. Yusuf et al. (1999) identify three such levels: elemental, referring to the agility of an individual resource (e.g., person, machine); micro, referring to the collective agility of a firm; and macro, referring to inter-organizational agility. There is, however, no discussion of internal/environmental drivers for these levels, resource usage in achieving agility on these levels, how both agility dimensions are pursued on each level, measures of agility on these levels, or relationships among the levels.

To make further progress, we need a more comprehensive model of organizational agility. Accordingly, we postulate a model for studying, developing, and assessing agile organizations. Rooted in the definition of agility introduced in Section 2, this model embraces the strengths of prior studies, but also includes elements that have heretofore not been covered in a single conceptualization of organizational agility phenomena. In developing the new model, we adopt a work-design perspective – reflecting the idea that an organization's work is not random, but the outcome of a work-design system. Sinha and Van de Ven (2005, p.390) tell us that work consists of "the set of activities that are undertaken to develop, produce and deliver a product—that is, a physical and/or information good and service." A work-design system arranges work to fulfill an organization's mission in alignment with its strategy.

The agility definition tells us that the key dimensions of agility are alertness and

response capability. According to Teece et al. (1997), dynamic response capabilities are embedded in work routines. Thus, agility is influenced by the design of work routines. We extend Teece's idea to contend that dynamic alertness capabilities can also be embedded in work routines.

According to Drucker (1991), an organization's effectiveness (in pursuing its mission, while adhering to its strategy) stems from getting the right things accomplished in the right ways. This notion of "getting it right" suggests that work can indeed be designed in ways that allow an organization to "get it right" in the face of internal and environmental change (i.e., be effective from the standpoint of agility). How work is designed in an effort to realize this agility ultimately influences an organization's effectiveness. As an example, Ketchen and Hult (2007) regard agility as one criterion for evaluating effectiveness in the case of supply-chain organizations.

The work-design model of organizational agility, depicted in Figure 2, portrays three design levels: episodic, operational, and strategic. An organization can concentrate on achieving agility on any one or combination of these levels, and the organization's overall agility is a function of agility achieved at each of the three work-design levels. Solid arrows between levels in Figure 2 indicate top-down influences. Dashed arrows between levels indicate bottom-up, grass-roots influences. For instance, strategic design agility influences operational design agility, and operational design agility can influence episodic design agility. Conversely, agility in designing work episodes may lead to greater operational design agility, or agility improvement at the operational design level could enhance agility at the strategic level of work design.

As an organization works to accomplish a particular task, it engages in one or more knowledge-based *work episodes*. We adopt the definition posed by Frentz and Farrell (1976, p.336): an episode is a "rule-conforming sequence of symbolic acts generated by two or more actors who are collectively oriented toward emergent goals." An organization's work episodes may unfold simultaneously or asynchronously, and each may span multiple geographic locations. Within an episode, work gets done through a complex web of interactions among participating knowledge workers, where a knowledge worker could be a person, organization, or computer system (Holsapple 1995). To accomplish their organizational mandates, knowledge workers collaborate (more or less) in the sense of sharing their knowledge and knowledge-processing skills in ways that allow them to jointly accomplish more than they could individually (e.g., achieve greater agility).

The knowledge workers participating in a specific work episode are alert to opportunities or challenges (due to changing environmental or internal conditions) for task adjustments. In the course of using existing or acquired resources to accomplish a task, they integrate their alertness capability with their capabilities for response (proactively/reactively) to execute the episodic task in a timely, flexible, affordable, relevant manner. Where there is episodic agility, the execution of a work episode does not demand rigid adherence to some work design that has been specified at the operational level, but rather is subject to design modification (or even substitution) in response to conditions local to that particular episode. That is, the organization tends to operate at the episodic edge – in order to reap the benefit of agility at this level.

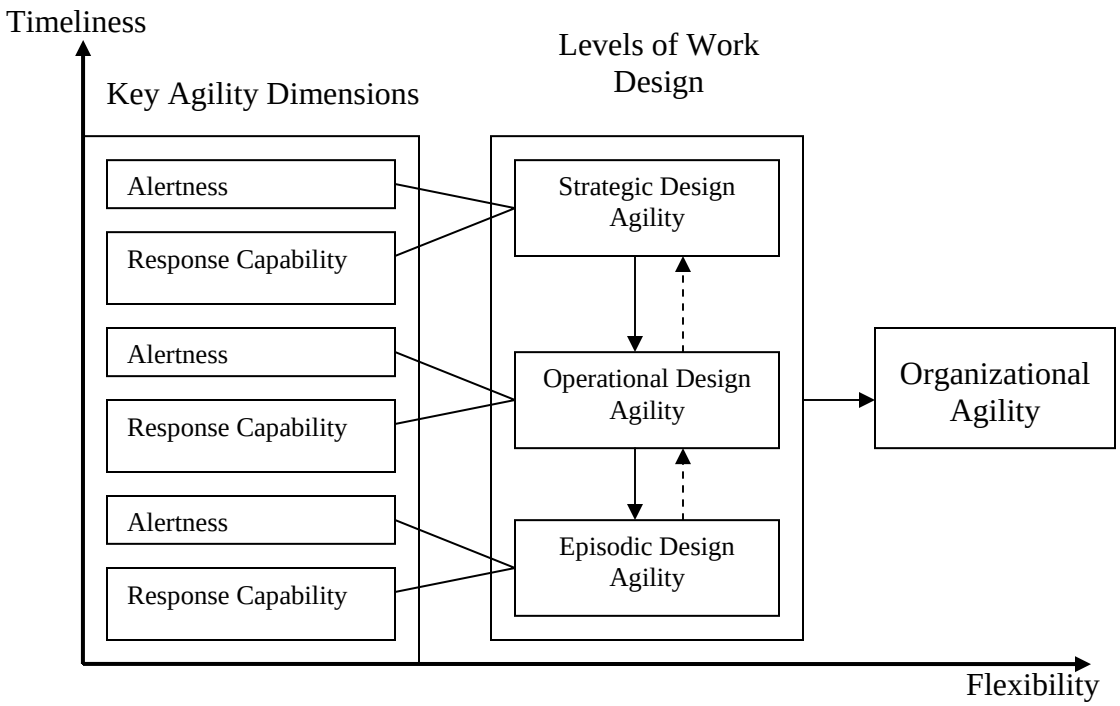

Figure 2. A work-design model of organization agility

Operational design is concerned with ways in which work episodes are initiated, performed, and terminated in reaction or pro-action to changes in demand and supply. Agility at this level is the result of integrating an organization's alertness to opportunities and challenges of demand/supply (environmental/internal) changes with the organization's capability to respond (proactively or reactively) to these changes by devising new templates for governing work at the episodic level, by allocating resources to work being done at the episodic level, by guiding the timing and duration of work episodes – all in a timely, flexible, affordable, relevant manner (i.e., yielding high agility at the operational work-design level).

The strategic level of work design is concerned with structuring and governing operational work design, so that the latter is aligned with the organization's mission and its strategy for accomplishing that mission. Such alignment is important for being able to create value by exploiting business opportunities, maintaining congruence with a turbulent environment, sustaining competitiveness, and ultimately surviving. Agility at the strategic level of work design is the result of integrating an organization's alertness to opportunities and challenges – both internal and environmental, and particularly in a macro sense – with the organization's capability to respond (proactively or reactively) to these changes by designing new kinds of operational work-design systems or reshaping existing operational work-design systems – all in a timely, flexible, affordable, relevant manner (realizing high strategic design agility).

From Figure 2, observe that organizational agility is a function of agility at the three levels of work design. Thus, the model postulates that an organization's agility is influenced by (or at least predicted by) the nature of its work design at each of the three levels, in concert with how it administers the relationships among these levels. Notice that the key facets found in the general definition of agility occur at each level. Alertness

and response capability are main dimensions for each level. Timeliness and flexibility for each dimension measure the degree of agility at each level. Affordability and relevance are considerations for each dimension on each level. To understand how to get the right work done in an agile way, a deep appreciation of relationships among episodic design agility, operational design agility, and strategic design agility needs to be developed.

4. RESEARCH FRAMEWORK

The prior two sections introduce a new theoretical conception of organization agility. In this section, we justify the selection of factors influencing organizational agility.

Work design appears to be, at least in part, a social process. In their framework of agile supply chains, Christopher et al. (2004) contend that an agile supply chain is achieved through the ability to manage or orchestrate the complex network and to focus on, or make the best use of, the core competencies and strengths of network partners. In their study, Sharifi and Zhang (2001) conclude that two sources of agility are concurrent team-working and virtual organization. This more social view of agile work design is supported by some empirical evidence. For example, (Liu et al. 2006) find that managing social aspects in work design, such as employee empowerment, has a significant impact on organization success. If work design is truly a social process, then focusing more explicitly on this social side should enhance an understanding of what it takes for an organization to be agile – in ways that allow every worker to contribute to work design.

There remain many unanswered questions about how patterns of relationships involved in work design, or work-design networks, affect work-design agility. For instance, we know that relationships involved in work-design networks are not homogenous: rather their content, intensity and depth vary widely. Should an organization purposely engage certain participants so that agility-oriented alignment can be more readily achieved? Are certain types of relationships helpful for work design to be agile? Social relationships may not always facilitate agility, so when are relationships constraining?

We address these questions by identifying and investigating the attributes along an entrepreneurial path to work design, as shown by the shaded path in Figure 3. This diagram displays a continuum of work-design governing possibilities, ranging from a static/one-shot practice to an ongoing entrepreneurial process.

The governance system for an *agile* organization is a knowledge-intensive work-design network that takes an entrepreneurial approach. The core of this path is the work-design network, comprised of a fluid set of participants that represent the multiple organizations participating in a work network and collaborating in the interest of inventing and improving work design. The foregoing is consistent with common practice in social network research, which focuses on specific types of networks, such as a "friendship network" or "advice network" (Brass 1984; Krackhardt 1990). Here, we focus on a “work-design network.” However, the concept of a "work-design network" has not been examined in social network research.

Work design networks do not emerge at random. Instead, they are collective achievements involving numerous participants from public and/or private sectors who pursue their different partisan interests in constructing an infrastructure that sustains the work-design system (Van de Ven 1999) through continuous network change involving dissolution with old partners and reformation with new ones (Ching et al 1996). In other words, a work-design network involves a process of *network entrepreneurship*, which

represents network actors' activities to create new work design networks, or transform existing ones, in an attempt to strengthen their collective capabilities – such as agility, the focus of this study.

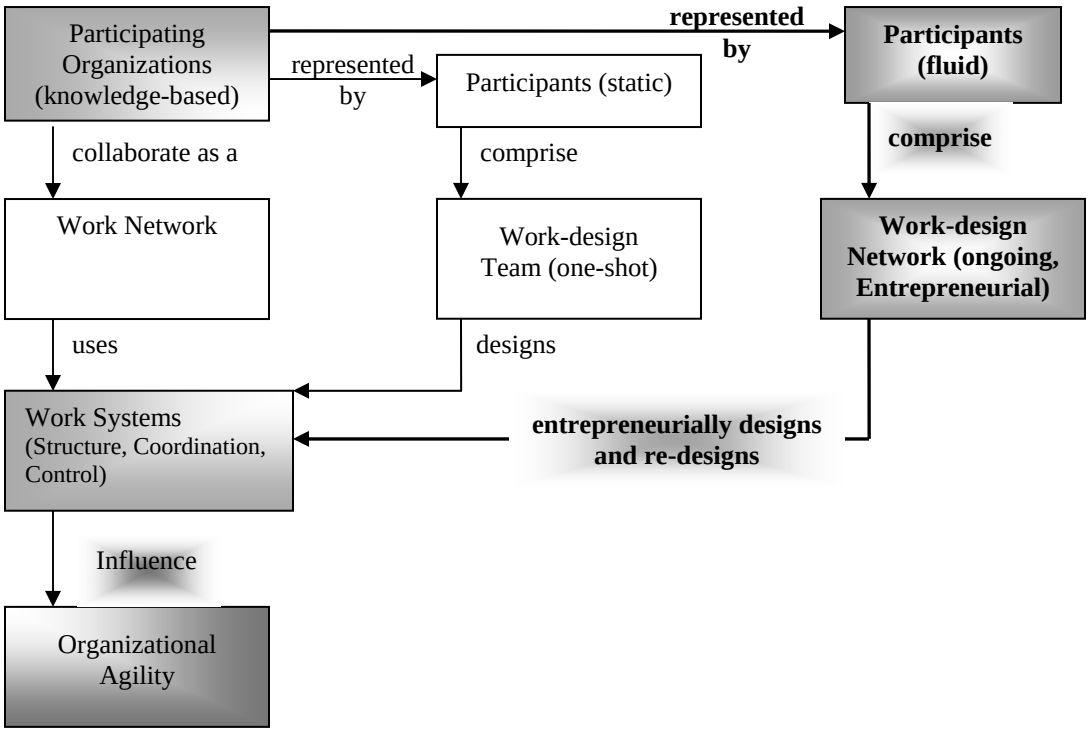

Figure 3. An entrepreneurial path for work design

However, network changes are constrained. We sometimes cannot dismiss a partner easily. Once relationship-specific routines, such as certain technology-based rules or embedded cultures, become institutionalized between parties, it is less likely that firms will replace their partners with new ones based solely on economic motivations. Research has conceptualized constraints on network change as network inertia – a persistent organizational resistance to changing inter-organizational ties, or difficulties an organization faces when it attempts to dissolve old relationships and form new network ties (Kim et al. 2006). The net benefits of network entrepreneurship are a function of how network inertia is managed.

The shaded entrepreneurial path indicated by Figure 3 amounts to a research framework that contends there are three major governance factors that affect work design agility: 1) participant engagement governance, which deals with the network fluidity level of participants, where network fluidity refers to the network participants' willingness and ability to change social relations; and 2) network governance, which determines the formation of a work-design network in a way that allows its participants to collaborate in pursuit of work-design agility; and 3) system dynamic governance, which handles inertia in system design and redesign. Network fluidity is a matter of culture – fostered by a culture that encourages participants to relate to others differently and to relate to different others. Network formation is a matter of infrastructure – the roles, relationships, and regulations that channel participants' activities in the network (Holsapple and Lou 1996).

4.1 Participant Engagement Governance: Network Fluidity

A network has social relations varying along three dimensions: structure, affect, and cognition (Kang et al. 2007). Social structure refers to the patterns of social connections among network participants. The affective dimension is concerned with motives, expectations, and norms among related parties. The cognitive dimension involves the importance of shared representation, understanding, and systems of meaning for doing work. A change in any of the three dimensions will cause the network to change or to be fluid. For example, (Zeggelink 1995) shows that individual preferences to establish relationships with similar friends or heterogeneous others cause networks to evolve into different networks.

Therefore, we investigate network fluidity, viewed as the characteristics of network participants from three aspects, relational adapting, relational alignment, and learning. These are parallel concepts to structure change, affect change, and cognitive change. We define network fluidity as network participants' willingness and ability to change social relations. The construct of network fluidity has three dimensions: learning fluidity, relational adapting fluidity, and relational alignment fluidity.

Learning fluidity refers to the willingness and ability of network participants to facilitate two types of knowledge flows: 1) common architecture knowledge – a shared understanding among participant organizations about the interconnections among all components in some domain of interest, or of how things fit together (Matusik and Hill 1998); and 2) common component knowledge – knowledge of the components themselves. Learning involves overlapping, complementary knowledge that relates to a discrete aspect of an organization's processes. To be agile, a work-design network needs to be alert to changes. The capacity for alertness benefits from the availability of knowledge that is sufficient in diversity and detail. Because of the cognitive limits of any given individual, knowledge availability is greatly enhanced by knowledge sharing among participants having complementary knowledge (Hartono and Holsapple 2004). In this sense, common architecture knowledge provides a cognitive mechanism to transfer and understand large amount of knowledge and complicated knowledge and experiences that are difficult to conceptualize adequately (Hill and Levenhagen 1995).

A work-design network involves coordinated effort and integration of various parties. To be agile, a work-design network also needs to be well-coordinated so that it can take timely responsive actions to changes. In this sense, common architecture knowledge is needed, which helps the participant organizations not only understand the larger picture, but also recognize the sometimes conflicting demands in different components of work design. It facilitates the efforts of the designers – no matter whether they are purchasing managers, suppliers, or industrial engineers – to integrate their knowledge with others, even if they do not have expertise in those other specialties.

Common component knowledge refers to the knowledge of parts or components. Specifically, it is overlapping knowledge that relates to a subroutine or discrete aspect of an organization's operations. Common component knowledge also can contribute to the design of agile work systems. To explore new work-design opportunities or alternative ways of design, designers must know enough about the content domain of other designers' expertise to assimilate it, interpret it, and recognize its value in work design. In other words, common component knowledge allows participant organizations to recognize, understand, and assimilate novel knowledge from a wide range of related

participants.

Relational adapting fluidity refers to the willingness and the ability of network participants to reshape their network structures when necessary (i.e., entering or exiting relationships) without ties to legacy issues or the way the network has been operated previously. Facing changes, firms take actions such as outsourcing, changing partners, and creating new work ties to arrange work. Social network literature suggests that weak and non-redundant networks rich in structural holes are more agile. The "hole" argument (Burt 1992) describes a world of change – a world of discovering and developing opportunities to add value by changing social structure with bridges across holes in the structure. In contrast, strong and dense networks are not easy to change due to the strong connections among parties (Kim et al., 2006).

Relational alignment fluidity refers to the willingness and ability of network participants to build trust, which functions as a governance mechanism to ensure consistency of interests among participants in a network. Participants in work-design networks tend to pursue their different partisan interests while collaborating in the construction of an infrastructure that sustains the work system. As a result, incentives must be organized in such a way that all parties' interests are aligned. When designers are simultaneously dependent on, and vulnerable to, the actions and decisions of others and where hierarchical authority does not exist, trust becomes a major organizing principle (McEvily et al. 2003).

The foregoing discussion suggests that organizations should engage participants whose aptitudes and attitudes are consistent with attributes of network fluidity – who are open to work-design agility, revealing an organization's entrepreneurial attitude – aiming to discover and exploit opportunities. Engaging static participants is a breeding ground for organizational inertia. We expect the network fluidity degree of participant engaged in work design will impact organization agility.

4.2 Network Governance

Once participants are engaged in a work-design network, how much they can contribute to work-design agility is affected by the governance mechanisms – which shape how they seek work-design help and their structural positions in the work-design network.

Figure 4 shows an example of a simple work-design network. It has three participants, A1, A2, and A3, connected through weak ties as represented by dashed lines. Each participant is at the edge or periphery of the work-design network and has connections to work-design supporters (e.g., S1, S2, ….S9) outside the boundary of the work-design network. These work supporters are ancillary participants (individuals or networks themselves). We contend that procuring work-design participants at peripheral positions, with many boundary-spanning ties outside the work-design network, is likely to be associated with higher work-design agility; also peripheral participants connected to each other with weak ties are better for work-design agility than if they had strong ties.

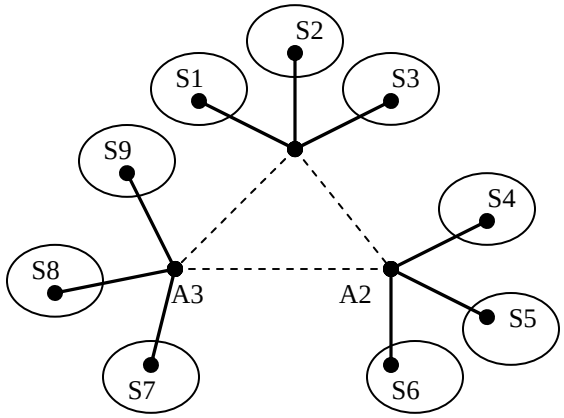

Figure 4. Example of an entrepreneurial type of work-design network

Strong and diversified boundary-spanning ties with work-design supporters. Researchers typically define network boundaries to reflect socially-defined groups from a participant's perspective or to include participants with similar attributes that have conceptual relevance to the research. Here, we study a work-design network comprised of participants who contribute to work design. Hence, we envision the network boundary as being drawn around the set of work-design participants (e.g., A1, A2, A3 in Figure 4).

Ties can be classified along two dimensions: tie diversity and tie strength (Brass 1995; Ibarra 1993). The first of these refers to the range (or the number of work systems) from which a participant draws and receives support for work design as an ego node in the social network. By network relationship strength, we mean duration, reciprocity, and frequency of communication. We assert that a participant with highly diversified and strong boundary-spanning ties contributes to more agile work design.

Suppose there is a network participant whose work design ties include suppliers, customers, scientists, and lean manufacturing consultants. The range of this actor's boundary-spanning ties is relatively high compared to a network actor having ties with four participants all of whom are suppliers. Burt (1992) shows that diversified network configurations, characterized by what he called "structure holes," can be valuable because they provide access to different sources of information. For a greater range of network ties, there are more different work-related ideas available to the work-design network participant. It is not just that the participant with outside connections is able to readily acquire and apply knowledge from outside sources, but that this knowledge expands the way the participant thinks about problems. Ideas from other areas may spark new thoughts, resulting in a greater set of options for work-design problems. Alberts and Hayes (2003) state that agility requires that available knowledge be combined in new ways, that a variety of perspectives are brought to bear, and that assets can be employed differently to meet the needs of a variety of situations. It follows that work-design agility requires dynamic knowledge flows among participants and an appropriate mix of these participants. In addition, a network participant with wide ranging network ties can bridge otherwise unconnected clusters of participants (and bring the knowledge of ancillary participants to bear on a work-design network) in a more timely and flexible manner, compared to one with less diversified ties.

Research from a variety of disciplines has shown that tie strength is associated

with such factors as network structural flexibility and affect variables, such as trust (Krackhardt, 1992). These factors are closely related to the ability to respond to changes (Krackhardt and Stern, 1988). To realize the benefit of entrepreneurial opportunities that can be provided by its diverse ties, an ego participant simultaneously needs to have strong ties with its work supporters, because strong ties motivate individuals to act on behalf of a local person (Granovetter 1982: Krackhardt, 1992). Otherwise, the value of the diverse ties cannot be realized if the work supporters (S1, S2, S3) are not motivated to help the ego network participant (A) in its work. Social network researchers have pointed out that strong ties lead to network density, because people with whom an individual has strong ties will tend to be affiliated (Berscheid and Walster 1978: Byrne, 1971). However, when work-supporting ties span organizational boundaries and emerge from different social systems, strong ties do not necessarily imply interconnections between the ancillary participants. Therefore, as shown by Figure 4, these ancillary participants are not connected. We expect that the intensity of participants in a work-design network who have diversified and strong boundary-spanning ties will impact work-design agility.

Peripheral positions. Benefits of boundary-spanning ties for work-design agility will not be fully achieved if the participants are not positioned at the periphery of the work-design network. For a couple of reasons, we suggest that an edge position can facilitate agility. First, compared to a highly centralized position that can access other members of the network with the fewest links (Freeman 1979), a peripheral participant is not as deeply embedded in the network. Thus, this participant should be more able to be alert and attend to new, divergent ideas sparked by outside connections to different networks, and be freer to take advantage of these ideas without the constraints of inertia (such as established network norms). Second, a participant with boundary-spanning ties will have flexibility in devising response possibilities – able to ponder solutions without considering peer pressures, thereby enhancing agility-related capabilities, such as value evaluation, learning, and reconfiguration. With participants positioned at the edge, a work-design network has low degree of density and is thus more agile.

Weak ties connecting participants. Compared to strong ties, which typically exist between people who share similarities (Ibarra 1982), weak ties are more likely to connect people with diverse perspectives, different outlooks, varying interests, and diverse approaches to problems (Granovetter 1982). Similar to our argument for the strength of diversified boundary-spanning ties, access to more non-redundant knowledge and diverse social circles provided by weak ties can be expected to facilitate a variety of processes, thereby enhancing agile work design.

Cognitively, the access to more perspectives should facilitate agility in terms of alertness, learning, and value evaluation. In addition, exposure to different approaches and perspectives can be expected to enhance skills for identifying different alternatives and fostering flexible thinking, thus improving reconfiguration capability, an important response capability for being agile. Exposure to a new process of working or a new approach to a problem may serve as a seed that causes integration into work more quickly when an opportunity to use it arises.

Structurally, networks with weak ties have less inertia to resist design changes, as opposed to those with strong ties. It is easier to exit a weak tie, because the participant is less likely to strongly identify with a group of participants. It is also easier to form a weak tie, because it requires less time and effort than for a strong tie.

However, we do need strong ties to boost trust and coordination. When facing uncertainties, the trust affect associated with stronger connections becomes more critical. Although weak ties facilitate autonomy (Perry-Smith and Shalley 2003), we still need some strong ties to take coordination initiatives. But, if the majority of participants have network-fluidity characteristics, it may still be possible to build trust and coordination across a network dominated by weak ties. We expect that connecting participants on the periphery of a work design network with weak ties will contribute more to agility than connecting them with strong ties.

4.3 System Dynamic Governance

To achieve and maintain agility, an organizations need to renew or redesign its work systems on an ongoing basis. We expect the existence of governance mechanisms for dynamic changes in work systems affects agility.

Work-design systems can emerge at every level of work design (strategic, operational, and episodic). Organizations vary in ways combing work-design-system governance factors contributing to agility, work-design levels, and agility mode (proactive or reactive). This is how organizations differentiate themselves from each other in achieving and sustaining desired level of performance through agility.

5. METHODOLOGY

5.1 Research Design

We can investigate organization agility by using a multiple-case design, which follows theoretical replication and literal replication logic (Yin 2003). Each case describes how a global firm uses its work-design system as governance mechanisms to achieve and sustain agility in its supply chain networks. We choose global firms because the success of global firms is heavily dependent on their ability to manage their collaborative relationships with their supply chain partners, so that they can be agile in arranging work to respond to changes (opportunities/challenges). We focus our investigation on supply chain networks for two reasons. First, a supply chain network is a network organization without formal hierarchical structure. It is an appropriate research subject for the edge form, because the focal company must empower its partners to arrange work. Second, in the modern business environment, the ultimate success of an individual organization depends on its management's ability to design and manage the company's intricate network of work relationships (Christopher 1997; Drucker 1988).

5.1 An Illustrative Case

To illustrate this methodology, we summarize results from a sample case. The informant for this case is the director of supply network design for a Fortune100 company, which we refer to as J. Appendix 1 shows Company J's practices in relating work-design-system factors to supply chain network agility.

At a strategic level, to achieve work-design agility in its supply network, J engages participants into work design that have, or have had, some type of partnering relationship with J (relational alignment fluidity), that are known for their skill sets of agility (learning fluidity), and that have cultures for change (i.e., they undertake change in organization structure as part of their agility efforts – adapting fluidity). As predicted, we find that the degree of participants' network fluidity affects work-design agility.

To leverage the knowledge and expertise of identified work-design partners, J establishes strong ties with them by involving them in its supply system – "making alertness the responsibility of the supply system" says our informant. To establish diversified ties, J forms different industry groups, for example a packaging group and a chemical group. Each industry group involves many companies associated with that industry. However, cross-industry groups are formed occasionally, but only when there is a need. Therefore, density in J's work design network is low. To ensure its supply network behaves in a timely and flexible manner, in the face of macro environmental changes, J renews its supply system every year, with a 5-year horizon.

Company J's strategic work design regulates its operational work design governance mechanism. To each critical work system, J assigns a global process owner (GPO), who is supported (alignment fluidity) by a horizontal process network (HPN) of participants. These participants are the work system's experts (learning fluidity), representing each business unit/region for that work system (adapting fluidity). The GPO has strong ties with its diversified supporters. To handle inertia in designing and redesigning work to respond to change, J make the GPO and supporting HPN accountable for the ongoing renewal of the work system based on the company's strategic objectives (role specification). They work monthly against this task and that of the continual qualification of the skills of the individuals executing the work (performance metrics). In anticipation of task changes, contingency plans are devised for every function based on task and scenario, and are practiced every year (contingency plan).

Although Appendix 1 displays J's strategic work design system and operational work design system separately, the two levels design are not happening sequentially, but concurrently. In addition, J always plays the driver/proactive role in changing its work design system. According to the informant, J does not need to consider work design at an episodic level, because its operational work design is a "design for exception" which already incorporates possible change elements that could occur at an episodic level. We also know from news resources, our research, and financial data, that J is well known for its ability to achieve and sustain agility in its supply chain network. Company J's governance pattern to achieve and sustain agility is summarized as shown in Table 2.

Table 2. Company J's work design governance pattern for supply network agility

	Strategic Work Design			Operational Work Design			Episodic Work Design		
	PEG	NG	SDG	PEG	NG	SDG	PEG	NG	SDG
Proactive	Yes	Yes	Yes	Yes	Yes	Yes	N/S	N/S	N/S
Reactive									
Simultaneity of work design at three levels									Yes
Supply Chain Network Agility									High

(Note: PEG refers to participant engagement governance, NG is network governance, SDG is system dynamic governance)

6. FUTURE STUDY

To begin the process of building a theory for organization agility, this study introduces a research framework, linking work-design-system governance pattern to organization agility. To proceed through an iterative research cycle of explanatory frameworks tested against reality and refined accordingly, we will continue to conduct case and field studies. At the same time, we can collect survey data or use simulation to test propositions drawn from the analysis results of case data.

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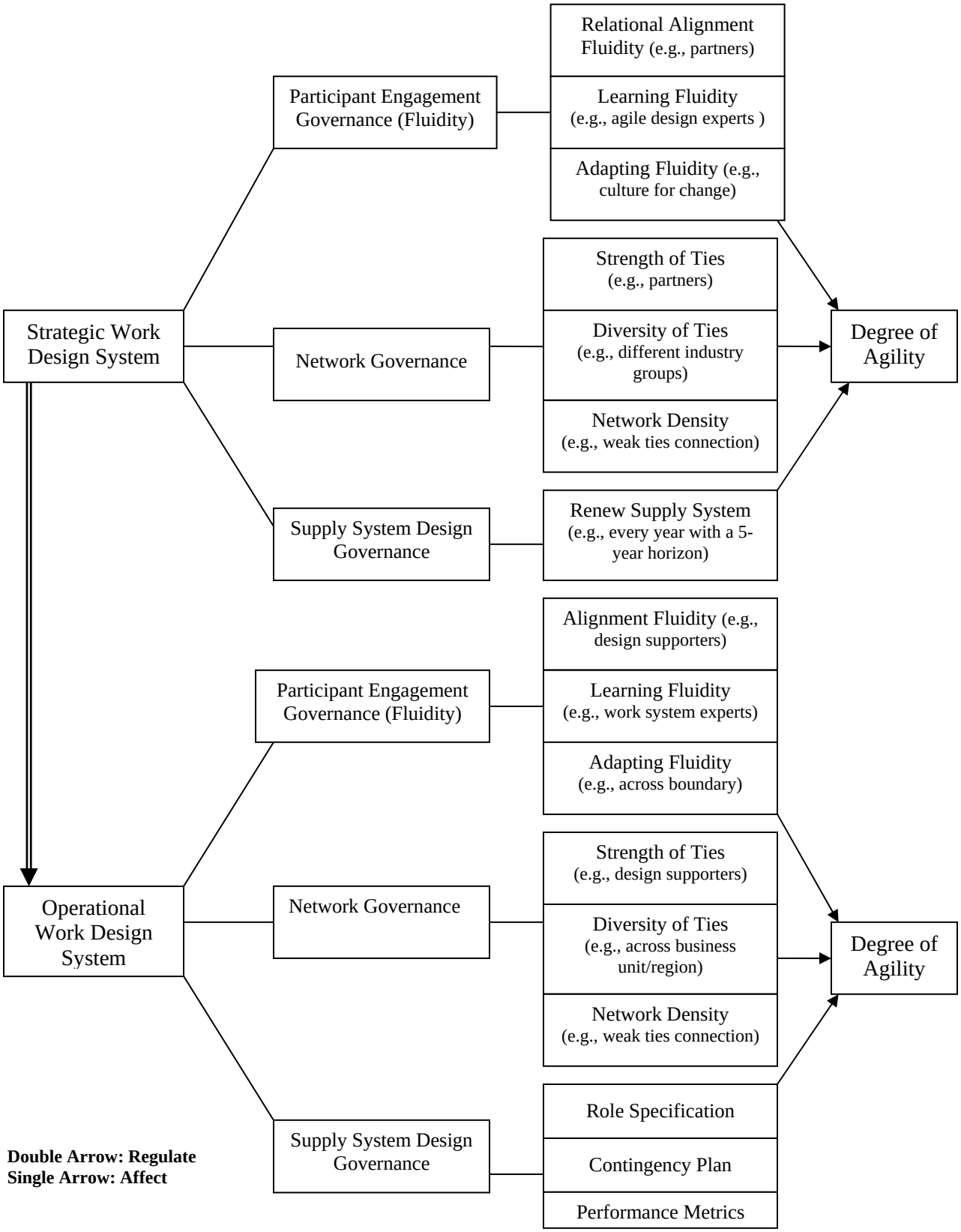
Appendix 1: Relationships between Agility and Contributing Factors (Company J)