



The Transient Collaborative Network Approach: Theoretical and Practical Considerations

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Abstract

This conceptual article analyzes and connects theory to the practice of a novel inter-organizational form we call the transient collaboration network or TCN approach. Field observations in China suggest that emerging entrepreneurs enter into collaborations with supply chain partners under very different mindsets regarding inter-organizational relationships, trust, collaboration and long-term expectations from traditional supply network practices. Briefly, these organizations cannot themselves build all resources needed for competitive advantages in volatile business environments. These entrepreneurs develop the TCN approach to allow their organizations to achieve full potential to locate and access the right resources at the right time through trusted collaborations in these dynamic or turbulent business environments. This paper analyzes principles that govern TCN interactions through the lens of Structural Contingency Theory, as extended to the inter-organizational level. Propositions explain how relations between structures and contingencies affect inter-organizational collaborative performances, and suggest how the TCN approach may be applicable to supply chain networks in general.

Keywords: Transient collaboration network; Supply Chain management; Structural contingency theory

Introduction

Is there a distinctively Chinese-style approach toward supply chain management in China, and if so, how does it operate, and how may the study and practice of supply chain management as a field benefit from understanding this approach? Our field observations determine that Chinese managers typically organize and conduct supply chain management within the context of mind-sets that markedly differ from those found among Western managers regarding inter-organizational relationships, trust, collaboration and long-term expectations. Interestingly, we found that this approach, which we refer to as the transient collaboration network or TCN approach, appears to be particularly suited to companies seeking to build sustained competitive advantages in dynamic or turbulent environments. This paper seeks to develop theoretical understanding of the TCN approach and to apply it beyond its original Chinese context.

Following a series of governmental policy changes in the 1980s, the Chinese economy seek to transition from a command economy, where the allocation of economic resources is according to government directives, to become a market economy, where the allocation of resources follows the signals of markets, companies or consumers [1,2]. The subsequent Chinese transition through the following decades has been remarkably successful in terms of economic growth and development, in contrast to attempts by other command-style economies that seek similar transformations. An important explanation for the Chinese success is the bottom-up emergence of a class of individual entrepreneurs to take advantage of top-down changes to government policies, and through collaboration with one

another created agile companies that are today's main engines of Chinese economic growth [3].

The rise of individual entrepreneurs also took place in the transition phase of similar command economies, but the difference in China lies in how these entrepreneurs leverage societal traits to create a unique and ultimately more successful approach to supply chain management. To note, early Chinese entrepreneurs typically lack sufficient capital or resources to perform effectively in their markets. The initial Chinese business law environment is underdeveloped and absent strong and consistent enforcement of contracts. Under these circumstances, though early Chinese entrepreneurs urgently needed inter-organizational collaborations to pool previously unavailable resources, they could rely only on mutual interpersonal relationships to build such collaborations [4]. Though not originally planned that way, over time these entrepreneurs successfully created interlinked consortiums within which they are able to operate in transient smaller groups based on mutual trust [5,6].

The primary aim in the TCN approach is to allow organizations to collaborate with the best available partners to attain any particular objective [5,6]. Earlier research show that to achieve this aim, such organizations will need to build and enter into strategic collaborative associations with selected partners, refer to here as "TCN meta-organizations". A meta-organization is a network of independent parties that agree to work together to enable access to each other's resources or capabilities [7]. In a TCN meta-organization, the members further agree to work in dynamically adaptive, goal-based collaborative groups by exchanging partners within the TCN meta-organization whenever necessary to meet any new production, organizational, or management goal. As such, meta-organizations that use the TCN approach can respond more quickly and effectively to

changing consumer and production landscapes or dynamic market requirements.

For instance, consider the "Shanzhai" companies found in South China [8]. Shanzhai companies first appeared as small entrepreneurial setups that did not individually possess all the resources or capabilities needed to compete in the Chinese cellphone market. However, they begin working with one another to create collaborations networks to overcome these limitations. Though individual Shanzhai companies are small and vulnerable, they are able to achieve production and innovation successes because of their ability to assemble collaborative groups of partners quickly from their larger collaboration networks to address specific opportunities or threats that may arise in their environments. In effect, these Shanzhai companies emergently created and operated TCN structures that allow them to develop and distribute innovative products that ultimately transformed the cellphone manufacturing industry in South China [9,10]. Other Shanzhai-type companies also proliferated to operate in other industries in China. Over time, some of these early companies grew to dominate their industries, notably BYD Auto in the Chinese automobile industry, Tianyu Communication in telecommunications and Li and Fung in supply chain management [11-13].

As of now, we do not have a theoretical explanation about the working dynamics of the TCN approach among companies. Without a viable explanation, it is not possible to generalize or replicate such field observations, to explain successes or to guide further practices in the field. This paper seeks to address this theoretical gap by identifying and describing the theoretical principles that make possible the operation of the TCN approach among organizations, and how it affects the performance of these organizations. Our intent is to understand the TCN approach, and to understand how it may be applicable beyond the Chinese context. In particular, we examine how organizations that engage in new product development (NPD) and innovation research efforts can make the use of TCN meta-organizations to meet performance challenges. To note, organizations engaged in new product development and innovation research efforts are particularly susceptible to environmental uncertainties [14-16]. Such efforts are explorative to an extent, as these organizations cannot tell in advance all the resources or capabilities that are eventually required in future stages of new product development or innovation research [17]. The challenges from these areas are therefore particularly appropriate to examine the effects of the transient collaboration process on performances.

The paper draws on concepts from Structural Contingency Theory to develop propositions on how internal structures in TCN meta-organizations and contingencies interact to affect performances. In strategic supply management literature, Structural Contingency Theory provides successful explanations on how organizations can organize their internal functions or structures to achieve overall performances for given external contingencies [18,19]. An underlying similarity exists between a TCN meta-organization and a traditional standalone organization in that a TCN meta-organization comprises a collection of individual organizations, while a traditional organization comprises a collection of individuals or individual functions. Their similarity is such that we infer that the use of Structural Contingency Theory can provide a useful lens to examine the topic. However, fundamental differences such as the independence of organizations within a TCN meta-organization set against the dependencies of individuals/functions within a traditional organization, or lack of hierarchical fiat in a TCN meta-organization in turn mean that we need to extend

Structural Contingency theory in certain aspects to develop the theoretical framework.

The organization of this article is as follows. The next section provides a review of the theoretical concepts and constructs that describe the topic. Next, we develop and illustrate the propositions. We then discuss practical implications of these propositions and the future research directions of the topic. The last section summarizes and concludes the article.

Concepts in the TCN approach

Globalization and technological changes create both risks and opportunities that set the stage for the formation of dynamic environments. For instance, the business environment during China's transition to a market economy underwent considerable volatility and uncertainty as suppliers, manufacturers, regulators and workers grappled with the impacts of opening up to the world's modern economy [1,20]. Dynamic environments will in turn threaten current markets, supply bases or alliances, and erode the existing competitive advantages of organizations [21]. Looking forward, most companies could therefore expect a future where dynamic environments are the norm. In such environments, sustained competitiveness means that competitive organizations must be able to build ever-new competitive advantages as quickly as when the need for these arises.

To do so, organizations require quick and reliable access to new resources or capabilities to act as the necessary building blocks for new competitive advantages [22]. However, a paradox arises because organizations cannot possibly foresee all the types of resources or capabilities they will require to build the unknown competitive advantages of the future. However, Gulati et al. [7] suggest that by strategically entering into collaborative associations, also refer to as meta-organizations, organizations can access the assets of collaborative partners to meet such requirements. However, collaboration properly conducted usually requires the establishment of multiple interconnected links between organizations, and unless otherwise controlled, unscrupulous partners can find opportunities to make use of these links to deceitfully appropriate propriety ideas, intellectual property rights or assets of other organizations [23]. Collaboration associations or meta-organizations can control for such opportunistic acts by setting boundaries to restrict their memberships only to those organizations that will undertake collaborations in trust and good faith. Within such associations individual organizations can then safely seek out and work with partners who can be quicker and more responsive than their own internal business units [7,24]. Another risk to collaborations is the issue of potential network inertia. Network inertia arise among organizations that have established such strong bonds with one another that they cannot move away from established relationships even if those connections no longer makes business sense. Clearly, if established, network inertia works against the benefits of collaborations [25-27]. In this regard, the process of transient collaborations as observed among Shanzhai companies becomes critical in a meta-organization. In this process, organizations collaborate under the mutual understanding that partners may change if requirements change, so to match the best set of available partners to a particular competitive goal at a time [6]. Organizations that adopt the transient collaboration process within a meta-organization can access a wider range of external resources, while maintaining the flexibility to adjust their resources mix in response to changing future requirements. This underlies the fundamental nature of the TCN approach as a business network that can benefit each individual

organization. In our view, an organization's competitive resources and capabilities will be mainly located within its inter-organizational network, and outside that of any one organization's boundary. In this aspect the TCN approach moves away from the traditional view that the competitive capabilities of an organization lies within the boundary of the firm [28,29]. Instead, the TCN approach builds on organizational literature that views competition among organizations as taking place at the level of their supply networks [30-33].

By definition, a collaboration meta-organization is an organizational space where independent organizations may come together to access, pool or combine diverse assets to support their joint efforts [7,34,35]. Clearly, the uncertainty of future resource requirements makes it very costly, if not impractical, for individual organizations to internally develop and hold all possible resource to meet their future needs. Structural Contingency Theory suggests that all organizations require the execution of three basic functions for effective performance, i.e., the management, production and coordination functions [36-38].

In our conception of a TCN meta-organization based on field observations in China, we identified these three basic functional entities as "network facilitator", "agent" and "hub". We use the term "network facilitator" to describe an organization or organizations that provide the function of managing or orchestrating their meta-organizations operations [13,38]. We interpret the management function in a network as the provision and enforcement of the governance rules, norms and expectations to coordinate and safeguard collaboration exchanges among network members [36]. A dominating organization, or group of dominant organizations, possess both the motivation and informal authority to host, facilitate and manage such a meta-organization [7]. Facilitator entities are critical in TCN meta-organizations because in addition to hosting and managing facilities, they also serve to arbitrate and resolve conflicts among members.

Next, we use the term "agent" to refer to organizations that contribute productive resources or capabilities for collaboration. We interpret the production function in a TCN meta-organization as the operation of the productive resources or capabilities of members within the meta-organization. These members are thereby the production entities within a TCN meta-organization. The joint operation of their differentiated resources or capabilities builds competitive priorities through co-specialized collaborations. These production assets of a TCN meta-organization are conceptually similar to the differentiated internal resources or capabilities that exist in a typical organization [37].

Finally, we use the term 'hubs' to refer to members that undertake these coordination or integration roles in a TCN meta-organization. The coordination function in a TCN meta-organization serves to order and integrate selected resources or capabilities across different organizations. This is in line with Amit and Schoemaker's [38] distinction between resources and capabilities. They define resources as the direct production factors in an organization such as tradable knowledge, financial or physical assets and human capital, and define capabilities as the information-based, tangible or intangible processes found in an organization that are used for deploying resources [22,39]. Adapting these definitions and integrating the concept to earlier studies, it is clear that at least one organization in a TCN meta-organization must take up the role of a coordinator entity to manage the productive functions of other organizations [13,37,40].

To note, these three functional roles are not necessary mutually exclusive for a given entity in a TCN meta-organization. For instance, it may happen that a single organization performs all three functional roles of "facilitator", "agent" or "hub" at different times within a TCN meta-organization. Indeed, Shanzhai companies are notably flexible in taking on different roles or functions depending on the requirements of their supply networks [9]. In this article, for explanatory clarity, we will treat and describe each functional role as performed by separate entities.

Figure 1 illustrates the functional entities and their primary roles in a TCN meta-organization.

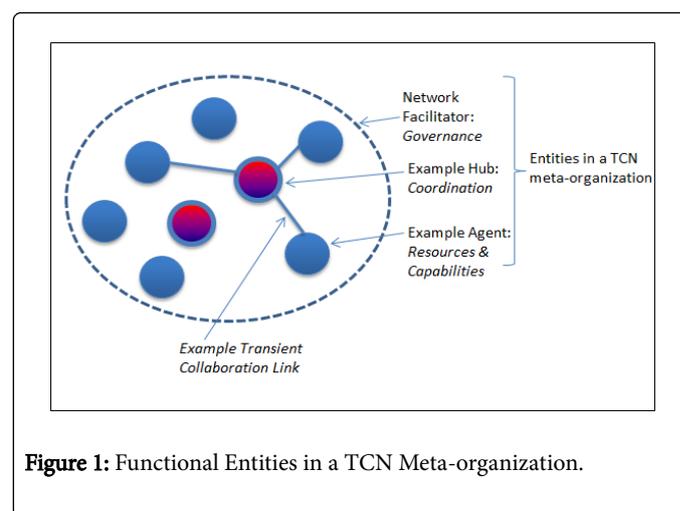


Figure 1: Functional Entities in a TCN Meta-organization.

Structural Contingency Theory Background

Structural Contingency Theory states that the structures and contingency factors of an organization will largely determine how effectively its members could bring together and organize relevant resources. The contingencies we explore in this paper to define the relationships of TCN meta-organizations are: (a) task uncertainty, (b) size, and (c) environment [18].

Task uncertainty in an organization has two interpretations. The first refers to the degree in which an organization is undecided in its choice of a final objective in some endeavor. The objective may still be undecided upon, or there may be multiple objectives possible. The second refers to the situation when an organization may be clear in its choice of a final objective, but it has a degree of ambiguity with regard to the exact methods or options required to achieve that objective [41]. In this work, we only consider task uncertainty in term of the ambiguity that a collaboration group within a TCN meta-organization may has with regard to the number of potential methods or options available to achieve some objective. In this sense, we study task uncertainty in reference to the task environment of a TCN meta-organization. Dess and Beard [42] define the task environment of an organization as the influences from all parties that an organization has to take into account in its strategic decisions and describe the three dimensions of the task environment as the munificence, dynamism and complexity of environments.

Size reflects the scope or responsibilities and number of members in a TCN meta-organization. In general, there is a positive correlation between increases in size and the internal specialization and formalization of an organization. For instance, an organization that

increases in size will also encounter the parallel emergence of increased hierarchical differentiation and coordination functions [37,43]. In the context of a TCN meta-organization, two size contingencies are relevant. The first is the number of members, and the second is the mission scope of the TCN meta-organization. The number of members can increase in relation to the search to increase the availability of resources or capabilities. All else being equal, a larger TCN meta-organization will possess correspondingly larger numbers and more diversity of available assets. The mission scope of a TCN meta-organization can also increase due to the motivation for constant growth and expansion among organizations. Both increases to member numbers and scope in a TCN meta-organization will increase functional differentiation, and thereby lead to the requirement for more integrative coordination among the members [37]. This in turn can lead to issues with surplus coordination resources and result in competition among hubs.

Environment refers to the type or degree of competition that an organization faces from its surrounding peers [44]. In the context of this paper, a focal TCN meta-organization will face competition in the form of other organizations or meta-organizations operating in its industry. These organizations or meta-organizations can compete with one another at different levels. For instance, at the basic level, they may compete to serve the same markets. In turn, this may lead them to compete for critical resources or capabilities either through internal development of these resources, or through recruitment of organizations with highly desirable assets into their networks. As part of the competitive process, some TCN meta-organizations may merge to maximize their joint access to resources [45]. However, it is clear that such TCN meta-organizations will still need to balance the maximization of resources available for all member firms in the network against the preference of their members to maximize the individual utilization rates for their own resources.

We have referred in a number of places to the performance of a TCN meta-organization. A TCN meta-organization's performance is grounded to the requirement that to be viable over the long term, a TCN meta-organization has to present an overall win-win proposition for all its members [46]. As an independent agent, a member company that could not derive a net positive benefit over time from its participation in a TCN meta-organization will inevitably exit from it. For example, a Shanzhai company is not necessarily obliged to collaborate within a particular group, if it sees no advantage in doing so [9,10].

At the same time, each member company would have its own unique determination of what constitutes net positive benefit. For instance, organizations may enter into collaborations for financial gain, reputation, to break into new markets, or to learn from its partners [47]. Similarly, each company may also uniquely determine what constitutes its collaboration costs. For instance, an organization may not only consider capital costs, but may also consider that its wider reputation is on the line when it enters into a collaboration effort. The balance between benefits and costs depends also on the time spreads for both as considered by the respective organizations, which again is likely to be different for each company.

In summary, the overall performance of a TCN meta-organization is effectively a summation of the respective benefits minus costs of each member company. Each company should have an expectation of positive utility from its membership over a required span of time as respectively determined by each company. A TCN meta-organization's performance is thereby a complex and multidimensional construct

obtained as a function of each company's performance. The literature suggests that the measurement of TCN meta-organizational performance should include financial, goal-objective attainment, flexibility, growth, and competitiveness dimensions [47,48].

TCN propositions

Figure 2 shows the map for the propositions of this paper as a guide to the following developments in this section. The propositions map illustrates the links between the propositions and the three main contingencies of task uncertainty, size and environment to TCN meta-organizational performance.

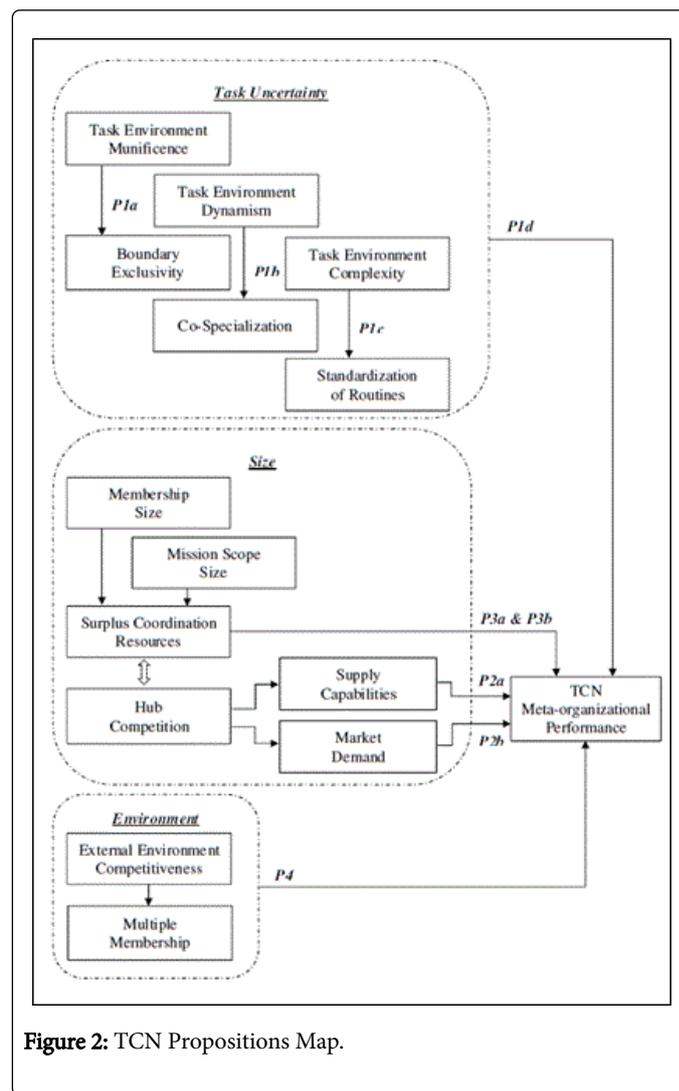


Figure 2: TCN Propositions Map.

Task uncertainty contingencies

We interpret the three dimensions of task uncertainty of munificence, dynamism and complexity in TCN meta-organizations as follows. We define munificence as the situation when the resources needed by the members in a TCN meta-organization are relatively available external to the meta-organization [49]. Munificence affects a TCN meta-organization's task uncertainty because it increases the number of possible partners for collaborations. Next, dynamism describes the situation when the rate of change of required resources is

unpredictable. For instance, the rate of technological change of certain resources may speed up or slow down without any pattern over time. Dynamism affects task uncertainty by introducing variance to the resources viability of collaboration partners. Finally, complexity describes the situation when an increased number or types of combinations of resources or capabilities become necessary for effective performance. For instance, some types of NPD research efforts may require the involvement of increased number of external parties with widely different scope or expertise such as government regulators, legal experts, or environmental stakeholders. Similarly, international agreements that allow cross-border research links may create access to new collaboration opportunities. Complexity affects task uncertainty by increasing the number of connections or factors that organizations have to take into account for their collaborations.

Task uncertainty contingency - munificent task environment

A TCN meta-organization resembles a traditional organization in the sense that there exists an organizational boundary whereby decisions have to be made on whether to include or to exclude the participation of independent market agents [50]. An important criterion for membership within the TCN meta-organizational boundary will be the relative desirability of the resources or capabilities held by a prospective company. Another important criterion for membership is the likelihood that a prospective company will be willing to abide by the terms and conditions for collaboration within a TCN meta-organization. While the possession of vital resources is an important criterion, agreeability to good-faith collaborations should also be an equally important consideration to support performance. The existence of inter-organizational trust exists when organizations believe that their partners will not take undue advantage of their vulnerabilities during the course of their interactions [51]. Trust can arise in various ways through repeated positive interactions, recommendations from other trusted parties or considerations of future expectations among collaborating organizations [52,53]. Once established, the presence of good-faith collaborations will increase task uncertainty in a TCN meta-organization, as members will have more potential partners with whom they can work. This improves performance because it increases the number of possible options for partners under the goal-based transient collaboration process. Setting a more exclusive boundary will allow a TCN meta-organization to admit only carefully vetted organizations that are amenable to good-faith collaborations. The ability to rely on transient but trusted collaborations within a bounded network of supply partners is a key component of how many Shanzhai entrepreneurs operate in practice.

Given an environment that is munificent in terms of resources, an exclusive TCN meta-organization can more easily find suitable replacements for renegade members that choose not to operate by acceptable rules of collaboration. Given an increased ease of replacement, a munificent environment can itself help to motivate members to work together based on good faith. Munificence thereby increases a TCN meta-organization's task uncertainty by enabling the inclusive of more good-faith organizations to replace bad-faith organizations. In a contrary situation, i.e., if the environment is not munificent, a TCN meta-organization that exercises exclusivity cannot as easily locate suitable replacements as substitutes. As such, the performance of an exclusive TCN meta-organization where munificence is lacking can degrade due to lack of appropriate resources or capabilities. The following proposition reflects the above arguments as framed in structural contingency terms;

PIa: Exclusivity to a TCN meta-organization's boundary increases good-faith collaborations to increase task uncertainty, positively moderated by the task environment munificence.

Task uncertainty contingency - dynamic task environment

Co-specialization refers to the extent in which partners develop interdependence on each other to function more effectively together [54,55]. In the co-specialization process, members in a TCN meta-organization will continually refine or adapt their resources to improve fit to their partners' resources through repeated collaborations. In effect, these organizations will increasingly build specific resources that could only be more effective if combined with the equally specific resources of other members. This process will lead organizations to favor moves toward the adoption of niche specialist roles for themselves, where each company will focus efforts to fine-tune different kinds of expertise to offer their collaboration partners. This does not imply that each company becomes a specialist in just a single niche. Rather, organizations always have the option to develop multiple specializations concurrently. The closer care, focus and attention that such organizations can bring to their various areas of specialization can greatly improve the overall quality of their particular resources. Supply networks in China are no different, in that niche specialization among supply partners will create unique resources that can improve overall network performance [12]. Niche specialization as a structural role of organizations in a TCN meta-organization will reduce task uncertainty as it effectively limits the number of potential collaborations to fixed sets of collaborators, even within the goal-based transient collaboration process. At the same time, the improvement to the quality of resources from specialization can act to improve performance to a degree. This may result in a cycle where improved performance will in turn promote increased co-specialization efforts among the members.

However, a major downside to niche specializations is that unexpected breakthroughs, discoveries or applications from different fields can often introduce sudden and unexpected changes to some focal technology [56]. The level of unpredictability, or dynamism, of the technological viability of resources can have a negative effect on niche specialists as this can make their areas of specializations more vulnerable to being outmoded. In fact, an important criticism of other collaboration networks such as the Japanese keiretsu and Korean chaebol is that their constant reliance on the same partners even in fast-changing times eventually led to reduced performances [57,58]. Under dynamic conditions, niche specialists thereby run higher risks of obsolescence of their products or processes, which will severely affect overall performance.

Organizations that face dynamic task environments are less able to predict the future states of their environment, to estimate the possible effects on their organizations, or to assess their potential responses to these changes [59]. Dynamism acts to increase task uncertainty as organizations will be less assured about the viability of the resources available to them. To cope, organizations may engage in uncertainty reduction strategies. For instance, these organizations will invest in increased scanning and forecasting efforts, seek to buffer their technical cores, permit more internal slack for flexibility, or accept less structured decision-making processes [56,59,60]. Though uncertainty reduction strategies are a necessity in dynamic environments, we argue that they do not necessarily create new value from dynamic situations. Rather, these strategies come at a net cost to organizations in terms of management attention, financial resources and opportunity costs, and

thereby further reduce performance. The above discussion suggests the following proposition framed in structural contingency terms;

P1b: Co-specialization in a TCN meta-organization reduces task uncertainty, negatively moderated by task environmental dynamism.

Task uncertainty contingency - complex task environment

In general, the standardization of routines is a strategy to reduce the variance of outcomes in organizations. The standardization process creates formal sets of procedures, fixes quality attainment targets, and establishes and monitors measures for compliance [61]. Organizations experience more complex task environments when greater interdependency of resources is required for effective performance. Complexity serves to increase coordination costs as the deployment of such resources will require major re-adjustments to meet each new requirement [62]. Standardizations to collaboration routines in a TCN meta-organization can confer clear benefits to the members. The initial standardization process allows members to share best practices and to align their internal innovation development processes with those of potential future collaborators [63]. Successful standardizations to these routines allow all members to make use of established processes to build smoother working relationships within the TCN meta-organization and to minimize collaboration setup costs. If a given task environment is complex, performance may suffer due to an increase in risks of unforeseen complications and errors. By way of response, standardized routines may arise in a TCN meta-organization to cope with the more convoluted or intricate collaboration operations needed due to complexity. Standardized routines will lead to collaboration routines alignment across a wider group of potential collaborators under the TCN meta-organizational processes. This wider pool of potential collaborators will permit the potential formation of more solutions, and will thereby increase task uncertainty to contribute positively to performance. Increased performance will in turn justify and reinforce routines standardizations.

However, collaboration alignment may also act to suppress instances of processes creativity by effectively limiting the consideration of alternative processes [61]. For instance, organizations that adhere to rigidly standardized collaboration routines may not be as flexible at engaging in new ways with their partners that could unlock previously inaccessible resources. Organizations that face complex task environments may find that they need to seek a balance between standardized routines and collaboration creativity to improve performance. This leads us to the next proposition;

P1c: Standardization of collaboration routines in a TCN meta-organization increases collaboration alignment to increase task uncertainty, negatively moderated by task environmental complexity.

Building on the above discussions, an increase to task uncertainty can benefit joint efforts because it will create or allow more choice or options for collaborations. As a result, it serves to improve overall TCN meta-organizational performance. This leads to the following proposition;

P1d: Increases to task uncertainty improve TCN meta-organizational performance.

Size contingencies

A TCN meta-organization requires inter-company coordination by hubs to manage all collaborations. This is due to an absence of hierarchical fiat in the collection of independent organizations [6,64].

The larger the number of hubs, all else being equal, the greater the corresponding amount of integrative capabilities available to a TCN meta-organization. By definition, each hub can integrate at least one group of collaborators, and hubs that possess more coordination capabilities can simultaneously coordinate multiple collaboration groups at a time.

A hub can obtain multiple benefits by virtue of its role as a coordinator. For instance, a hub occupies a more central position in a TCN meta-organization in terms of information links as compared with non-hub members. These links can reveal the onset of major economic trends, and provide advance knowledge of future opportunities or threats [65-67]. Hubs can use such information to benefit themselves, or by sharing them with other organizations, can increase their influence in a TCN meta-organization. These benefits can motivate many organizations to attempt to become hubs by developing coordinative capabilities. Therefore, a general trend towards the proliferation of hubs is a likely result for a TCN meta-organization.

However, a TCN meta-organization does not act as an actual company might to curb or reduce overlapping coordination activities. Rather, hubs in a TCN meta-organization can independently choose to produce surplus coordination resources and compete freely with each other in attempts to become the preferred hub integrator for other members within the TCN meta-organization. The TCN meta-organization process that makes all collaboration groups re-configurable allows hubs to compete without constraints among themselves based on their reputations, costs and evidence of competent integrative capabilities. As such, any hub proliferation in a TCN meta-organization will likely lead to the presence of inter-hub competition [68]. Competitive pressure may cause some hubs to give up the role, and revert to being just agents that only serve to provide productive resources. Hub mortality may occur in which uncompetitive hubs go out of business, or else exit the meta-organization to join other meta-organizations. The number of hubs in a focal TCN meta-organization is therefore changeable and under certain circumstances, it may even be possible that a TCN meta-organization ends up with a minimum of a single hub.

Hubs can also compete by acting as change agents for the TCN meta-organization. In this role, hubs can actively work with members to develop these members' resources or capabilities to match market demand. These hubs can seek to track demand patterns for new products or innovations, and be able to quickly identify, recruit and coordinate the most appropriate resources to satisfy such demands [69]. Hubs can also spur market demand for their TCN meta-organization's offerings by linking up with selected customers to open or create new markets [12,70]. Hubs that can succeed in these actions will reap the benefit of being in the central position to coordinate both the supply and demand sides of a new collaboration group. Such competitive moves or activities by hubs can serve to expand the supply capabilities of a TCN meta-organization as well as increase demand from the market for its outputs. The following propositions capture the above reasoning;

P2a: Hub competition increases a TCN meta-organization's supply capabilities, and improves its performance.

P2b: Hub competition increases a TCN meta-organization's market demand, and improves its performance.

It is likely that an increase to a TCN meta-organization's supply capabilities will in turn spur an expansion to its membership size. This

is because, all else being equal, increased supply capabilities will increase the potential in a TCN meta-organization for pursuing more opportunities. A TCN meta-organization where better opportunities exist will attract the entry of more members. Increase in membership size in turn gives rise to the possibility that more groups within the TCN meta-organization can emerge to work in parallel. These groups may employ different approaches or use different resources in their attempts. These simultaneous efforts will act to spur both competition and collaboration among these groups within the TCN meta-organization. However, the simultaneous formation of many different groups under the TCN meta-organization process is only possible if additional coordination resources exist to provide all the required integrative coordination. Additional coordination resources comes about when hubs anticipate increased opportunities in the future and take the initiative to build new integrative facilities in advance. The presence of additional coordination resources means that members in a TCN meta-organization can have more choices of coordination hub partners, and increase their possibilities to create different sets of collaborations to work on opportunities. Therefore, additional coordination resources have a positive performance effect on a TCN meta-organization, and the effect expands with an increase to membership size. The above statements bring us to the following proposition;

P3a: Surplus coordination resources improve TCN meta-organizational performance, positively moderated by its membership size.

An increase to a TCN meta-organization's market demand will by definition expands its mission scope size. This can in turn motivates an increase to resources differentiation within the TCN meta-organization. Resources differentiation, or resources heterogeneity, can come about with the recruitment of new members with novel resources, or with current members' development of novel resources required for an expanded mission scope. Increases in resource heterogeneity can allow the creation of more novel combinations of resources, some of which may result in positive contributions to performance [71]. However, novel integrative possibilities will be more likely if coordination resources are higher than that required for normal integrative purposes. As such, additional coordination resources have a positive performance effect on a TCN meta-organization, and the effect expands with an increase to mission scope. The associated proposition follows as below;

P3b: Surplus coordination resources improve TCN meta-organizational performance, positively moderated by its mission scope size.

The earlier discussion suggests that changes to market, technology or competition may cause reductions to membership size and mission scope in a TCN meta-organization. Coordination structures, being supportive rather than productive elements, tend to persist in organizations even if the need for them decline [72]. So, even if the number of members decreases or if the scope reduces, hubs may still maintain their original coordination capabilities within the TCN meta-organization. This situation can lead to the situation where hub hypercompetition occurs. We define hub hypercompetition as the situation when a TCN meta-organization faces a shrinking pool of coordination opportunities but while its coordination capabilities do not correspondingly decrease. To note, this differs from the situation where hubs build up additional coordination capabilities in anticipation of future growth to collaboration opportunities. Under hypercompetitive pressure, hubs need to undercut or undermine each

other to survive in the meta-organization. The TCN process allows undercutting or undermining activities as collaboration groups can quickly switch hubs to act as their coordinators. The eventual outcome of hub hypercompetition will depend on the interplay of the several factors described in the above propositions. For instance, hub hypercompetition may result in the survival of only the most viable hubs. These hubs could act to revive the TCN meta-organization to re-grow supply capabilities or market demand, and thus create more coordination opportunities. Alternatively, if the factors that cause the TCN meta-organization's decline become too dominant, the meta-organization may just dissolve.

Environment contingency

The primary function of a TCN meta-organization is to create spaces for trusted and successful collaborations among its members. A focal meta-organization faces competition from other meta-organizations (or from other types of organizations) on the basis of differences to their respective collaborative productivity offerings to their members [31,73]. A TCN meta-organization that can maximize successful collaborations or increase development opportunities among its members is more attractive and hence more competitive as compared with other meta-organizations. A member maximizes its number of collaborations within a meta-organization if it can achieve effectively complete utilization of all its resources. To note, it is apparent that some types of resources in a meta-organization will be more highly in demand than others. For instance, there are general resources that are deployable across many different types of goals, and there are specialized or technical resources are deployable only for specific and limited types of projects. A TCN meta-organization will typically require both general as well as specialized resources to complete most projects. Since general resources are deployable across more projects, while specialized resources are not, this will lead to the situation where general resources are insufficient, while specialized resources are under-utilized within a TCN meta-organization.

In the absence of competition in the external environment, both types of inefficiencies are possibly tolerable. Members can be willing to forgo the occasional project due to a lack of general resources, or to accept the risk that their specialized resources are from time to time not required. After all, membership in a TCN meta-organization is still a privilege where members have the assurance of conducting trusted collaboration with their fellow-members, as against the apprehension of risky cooperation with unknown external partners. However, the situation changes if other TCN meta-organizations appear in the same industry. Members that can join multiple meta-organizations can now collaborate with others across different meta-organizations. By doing so, members with general resources can more likely avoid sitting out projects due to insufficient resources, while members with specialized resources can now be better able to maximize their resources utilization. However, while collaborations across different TCN meta-organizations can be beneficial for some members, from the point of view of a focal TCN meta-organization, the existence of multiple memberships will degrade its performance as a whole. This is because if members collaborate with external organizations, it will reduce collaboration opportunities and resources utilization rates within the TCN meta-organization for the other members. To note, any given member should prefer to have the option to collaborate with other organizations across multiple TCN meta-organizations in order to maximize resources utilization, and to gain the opportunity to learn from new partners. In this particular issue, the interest of a member organization and the interest of a focal TCN meta-organization do not

coincide. However, in the presence of competition from other TCN meta-organizations, to avoid defections of its members to them, a focal TCN meta-organization will likely have no choice but to permit its members to take up multiple memberships across different TCN meta-organizations if they wish to do so. By permitting multiple memberships, the focal meta-organization may salvage some collaborative opportunities from those members by still keeping them on its roster. This leads to our final proposition;

P4: A multiple membership structure decreases TCN meta-organizational resources utilization and reduces its performance, negatively moderated by external environment competitiveness.

Discussion

Collectively, the above propositions suggest that the TCN approach enables companies to reach their full theoretical potential to match resources and capabilities to meet market requirements via participation in TCN meta-organizations. However, the performance effectiveness of a TCN meta-organization also depends on the set-up of its structures for given contingencies. In this section, we discuss how these propositions may translate to companies in practice. Propositions 1a, 1b and 1c connect the task uncertainty contingencies of munificence, dynamism, complexity in relation to the meta-organizational structures of exclusivity, co-specialization, standardization, whereas proposition 1d shows their link to TCN meta-organizational performance. Propositions 2a, 2b, 3a and 3b relate the size contingencies of membership size and mission scope size to hub competition and coordination resources availability, and TCN meta-organizational performance. Finally, proposition 4 links the environment contingency of external competitiveness to membership type and TCN meta-organizational performance.

Proposition 1a links a TCN meta-organization's boundaries to the contingency of environmental munificence. A typical TCN meta-organization's list of required resources is changeable over time. Different resources will come into prominence or fall out of favor for a given TCN meta-organization due to changes to demand requirements or technological progressive developments to resources [74]. The level of munificence need not be identical for different resources in a focal TCN meta-organization. For instance, a new type of resource may be relatively rare, while an older type of resource may be more easily locatable in the environment of a TCN meta-organization due to more organizations having time to build it. Given the possibility that munificence is likely always a mixed state for a meta-organization, an effective TCN meta-organization's structure should have a selective boundary that is either inclusive or exclusive depending on the respective munificence of a focal resource.

Proposition 1b links the contingency of dynamism to niche characteristic roles in TCN meta-organizations. Moving into the future, business environments, especially in new product development or innovation research areas, will become increasingly dynamic, competitive and complex. Products, processes or technologies, capabilities or competencies that in the past could be counted upon to be viable over long-term periods are more likely to become obsolete overnight due to changes in market preferences or the actions of global competitors [74-76]. The multiplication of linkages in global supply chains, and the increasing interdependencies of technologies suggest the complexity of business environments will also continue to increase [54,55,77]. To ensure a high level of quality in resources that can

support performance under such environments, a TCN meta-organization always needs strong niche operators as members.

TCN meta-organizations in practice should not impose overly rigid standardization of their collaboration routines. Proposition 1c links the contingency of complexity to standardization of routines in TCN meta-organizations. Although the establishment of standardized routines can potentially permit more collaboration to take place, under the expected conditions of increased complexity, TCN meta-organizations can perform better by allowing more flexible and creative forms of collaborations among its members. Proposition 1d connects the respective effects of these task contingencies to a TCN meta-organizational performance.

Propositions 2a, 2b, 3a and 3b describe how competitive pressure directs or motivates hubs to seek to build coordination resources, expand market share, develop members' resources, adjust meta-organizational membership numbers, or obtain innovation synergies from novel combination of resources. Competition among hubs expands the scope for collaboration opportunities, though it comes with the potential cost of increased hub mortality. However, the propositions imply that the benefits from competition among hubs outweigh its costs. In the same way, setting artificial limits to membership size or mission scope size in a TCN meta-organization serve to constrain its long-term viability. Rather, a more appropriate approach is to allow membership size or mission scope size to grow based on free-market supply and demand principles. In a similar way, the number of hubs in a meta-organization should also vary in an emergent way according to internal supply or demand for integrative purposes until the appropriate number of hubs is present. The presence of a sufficient number of hubs is especially important in new product development or innovation research efforts that may require simultaneous searches for solutions in multiple directions by different collaboration groups.

In a similar argument, though Proposition 4 shows that allowing multiple memberships will reduce a focal TCN meta-organizational performance, a desirable meta-organizational structure is one that allows multiple memberships especially in the face of external environment competition. Multiple memberships also provide increased learning opportunities and alternative options for collaborations to members, increases resources utilization, and reduce the risk of resources obsolescence among them.

Future research directions

A fundamental question raised in this paper is whether a collection of independent organizations working together as a self-motivating and self-correcting TCN meta-organization can be more effective than alternative forms of organization. These alternatives may include a group of organizations working together in fixed collaborative roles, or a single large monolithic company operating alone. Field observations of Shanzhai companies operating in China suggest that the first view is more likely correct because the transient nature of goal-based collaborations can enable faster renewals of competitive advantages within a collection of organizations. The process of goal-based transient collaboration prevents the build-up of organizational inertia. Inertia can arise due to overly embedded relations that make these entities unable to devolve or move away from some established configuration of relationships for any reason, even though that particular configuration may no longer result in efficient or effective operations from the business viewpoint. The existence of inertia serves to reduce overall organizational performances and innovation

outcomes [25,27]. In addition, the transient nature inherent in the collaboration approach also provides a very strong motivation to members or hubs to continually attempt to build or sustain best-in-class resources, as otherwise they could no longer be attractive to potential partners for collaboration efforts. By comparison, organizations in fixed or non-transient collaboration networks, or functions located within large monolithic organizations, are not easily replaceable on an individual basis. This serves as a form of protectionism for these entities, and it can result in the tolerance of lower quality resources used for productive purposes.

A related question is whether any focal company will fare better as a member in a TCN meta-organization, or as a collaborator to a single large and monolithic company. The conclusion here is not as clear because our definition of performance allows for wide latitude in how individual focal organizations may choose to consider as their relevant costs, benefits and timelines from their collaborations. For instance, a focal company may still conclude that its collaboration with a single large company as overall beneficial because of its increased learning experiences even if it suffers a financial loss from the association [78]. All else being equal though, it is likely that the power imbalance inherent in such a lop-sided partnership is such that a smaller focal company may not find the relationship as beneficial over time. For instance, the larger company may have more leeway in terms of power to alter the terms of a collaboration to be more detrimental to the interests of the smaller company at any time. The smaller company will need to consider such uncertainties when entering into such relationships. Power issues will still likely exist even in our proposed TCN approach, as organizations are rarely equal in their sizes or influences [79,80]. However, the more interdependent and resource-specialized nature of a TCN meta-organization provides more dispersion of power among its members. A focal company will thereby face less pressure due to power issues in a TCN meta-organizational setting, and will be able to realize more collaboration benefits.

Conclusion

This paper seeks to provide a novel but essential contribution to the literature of strategic adaptation in the face of volatile environments through improved inter-company collaboration. Our observations found that Chinese entrepreneurs who faced chaotic and unpredicted business environments evolved a pragmatic approach out of necessity toward supply chain management that combine the benefits of transient collaboration with the strengths of long-term relationships via transient meta-organizations. In this paper, we extended concepts from Structural Contingency theory to the network level, and analyze how the structures and contingencies of organizational networks may interact to affect their performance. Our analysis leads to the creation of propositions of theoretical principles that outline TCN meta-organizational collaborations. Specifically, these propositions link the contingencies of environmental munificence, dynamism, complexity, size and environmental competition to the structures of meta-organizational boundaries, niche characteristic roles, the critical roles of hubs, routines standardizations, coordination resources, hub competition and multiple membership options. The propositions may serve to provide a significant shift to current assumptions or current practices to improve NPD or innovation research outcomes. We assert that smaller organizations collectively operating as a coordinated organizational entity with flexible TCN activities can out-compete either single large organizations, or organizations operating within more rigidly structured collaboration associations. The practical

contribution of this paper is to provide understanding of how managers may design and set up TCN structures that can achieve sustained competitive advantages for their companies in volatile business environments. The propositions in this article will serve to set the foundation for conducting future research in related topics.

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