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RESEARCH ARTICLE

Enabling collaborative dynamic capabilities in strategic communities: Firm- vs. network-centric perspectives

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Abstract
This conceptual paper focuses on the importance of extending the *collaborative dynamic capabilities* (C-DCs) view and its emphasis on the boundary spanning *strategic communities* (SCs) from *firm*-centric to the *network*-centric perspective. The C-DC view is an original theoretical perspective that offers a good explanation of corporate-level transformations in the context of cross-sectoral convergence. Although the focus of prevailing research on large firms as cornerstones of SCs is valid, it does not fully capture the more complex dynamics that take in the horizontal networks of firms. We show that C-DC and SC theoretical perspectives can be adapted to the context of regional industrial clusters and contribute to their strategic renewal. The paper conceptualizes the different challenges and nature of leadership that prevail in SC-based firms networks. It also presents the different enabling aspects of collaborative DCs (with regard to trust building, co-specialization and capability synthesis) in firm- vs. network-centric environments.

Key words: Collaborative dynamic capabilities; dynamic capabilities; industrial clusters; strategic communities; trust

Introduction

Collaborative dynamic capabilities (C-DCs) represent a specific subset of dynamic capabilities research as 'unique hard-to-replicate corporate capabilities, which accelerate the asset orchestration process through strategic collaboration within and outside companies, <…> and promote the processes of co-creation and co-evolution that lead to the creation of new business models and value chains' (Kodama, 2018a: 5). Mainstream research on dynamic capabilities is concerned with corporate transformation and renewal, the creation of new sustainable business models and processes that combine *exploitation* and *exploration*, *ordinary* and *dynamic* capabilities (e.g., Teece, 2018; Zhou, Zhou, Feng, & Jiang, 2019). The perspective of collaborative DCs stresses the capabilities needed for continuously balancing these dialectical challenges within and outside the organization by embracing and building upon the dissimilar knowledge assets across the *organizational* and *sectoral* boundaries.

The strategic community (SC) is 'the corporate and organizational platform that supports the asset orchestration process <…> originating in the Japanese concept of *ba*, or place (Kodama, 2005; Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995; Nonaka, Kodama, Hirose, & Kohlbacher, 2014), and those unique, inherent capabilities of their practitioners (leaders and managers) and organizations that are difficult to replicate'. (Kodama, 2018a) Such boundary-spanning organizational knowledge platforms, which are not limited to the formal organization of the firm, enable the strategic renewal of firms through intersectoral synergies. For instance,

Fujicolor (unlike its key competitor Kodak) has built effective strategic communities (SCs) and achieved a successful transformation from film photography toward skincare and pharmaceutical products (Kodama & Shibata, 2016).

Extant research on C-DCs and SCs remains focused on corporations that have achieved successful transformation through cross-sectoral synergies (e.g., Akikawa, 2018; Okada, 2018). Collaborative DC research is concentrated on those firms where intense exchange of knowledge resources takes place across organizational boundaries, helping overcome the capability rigidity paradox (Schreyögg & Kliesch-Eberl, 2007). More recent collaborative DC research covers diverse corporate and cross-sectoral contexts. For instance, Insurtech companies driving tripartite convergence of IT, insurance, and healthcare sector solutions (Okada, 2018), traditional retailers, such as 7-Eleven, building SCs to provide financial, home delivery, and fee collection services (Kodama, 2018a), as well as cases of telemedicine where vertically integrated healthcare organizations build ICT partnerships and transform themselves into new platform leaders (Azuma & Kodama, 2018).

The element of collaboration and boundary spanning organizational partnerships is comprehensively covered in the general dynamic capabilities research. It is embedded in the classical definition of dynamic capabilities as a 'firm's ability to integrate, build and reconfigure internal and external competences to address a rapidly changing environment' (Teece, Pisano, & Shuen, 1997: 516). Extant research shows that dynamic capabilities are in a mutually reinforcing relationship with collaborative innovation (Agarwal & Selen, 2013; Alford & Duan, 2018), as well as practices of open innovation (Bogers, Chesbrough, Heaton, & Teece, 2019). Cooperation is critical to the strategic renewal of firms in environments of high technological intensity (Saez-Martinez & Gonzalez-Moreno, 2011). Researchers observe the reciprocal relationship between a firm's dynamic capabilities and its effective participation in strategic alliances for accessing and integrating the new resources needed for strategic renewal (Helfat et al., 2007; Mamédio, Rocha, Szczepanik, & Kato, 2019). Yet, the C-DCs view stands out from the mainstream research by helping explain the processes of renewal through cross-sectoral collaboration in a firm's SCs (Kodama, 2007b; 2018a). It is also important to stress that this view has thus far been limited to analysis at the firm level, and has not been adopted for the research of cross-sectoral networks, such as industrial clusters, which is indicative of a significant research gap.

Industrial clusters are spatially proximate networks of co-specialized firms with dissimilar competences along value chains, which enable dynamic knowledge interactions and the co-creation of value. Clusters create the conditions for cross-sectoral knowledge transfer and spillovers leading to the productivity growth of firms and regions (Lai, Hsu, Lin, Chen, & Lin, 2014). At the same time, the competitiveness and renewal of regional industrial clusters depends on the quality of their network structures and dynamic capabilities (Colovic, 2019). Clusters may also find themselves in decline due to aging technology, disruptive innovation, sunk costs and lock-ins (e.g., the Detroit automobile cluster), or even in situations where entrepreneurs are out-crowded by large corporations even in the modern high-tech value chains of specific economic regions, e.g., a wireless communication cluster in Denmark (Østergaard & Park, 2015). The effective functioning of a cluster depends not so much on the dynamic capabilities of its individual members, but on the capacity to sustain the trust-based collaboration of its autonomous actors (Niu, Miles, Bach, & Chinen, 2012). This shows the relevance of applying the collaborative DC perspective to cluster-level analysis. Adapting Kodama's terminology, they could be referred to as 'strategic community-based networks'. However, most industrial clusters are not centered on one focal firm with its vertical coordination mechanisms, which limits the direct applicability of established theoretical dispositions. This leads us to the research question – *how different are the key enabling aspects of C-DCs in strategic community-based firms and strategic community-based networks?*

There are several reasons why this *research problem* matters to the scientific community. The extant research on industrial renewal (including that of industrial clusters) stresses the role of innovating firms (Wallin & Dahlstrand, 2006), entrepreneurial competences (Landström &

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Schoen, 2010), institutional capabilities (Bjurström, 2011), digitalization (Yli-Viitala, Arrasvuori, Silveston-Keith, Kuusisto, & Kantola, 2020), and adoption of the technological advances (Berger & Frey, 2017), especially in the latest general-purpose technologies, such as ICT (Kander, Taalbi, Oksanen, Sjöö, & Rilla, 2019) or nanotechnologies (Palmberg & Nikulainen, 2006). These are all legitimate perspectives, yet they rarely address the issues of asset orchestration and cross-sectoral collaboration of diverse co-specialized firms, which are key for the renewal of network-level structures, such as industrial clusters. In other words, the prevailing approaches are more focused on elements instead of their linkages. Such situation calls for a more integrative dynamic perspective. This is where the concepts of C-DCs and SCs come into play, although so far they were only used in the context of corporate transformation. Their adaptation to the network-level analysis would provide us with a better understanding of the dynamics of strategic renewal in more complex cross-sectoral settings.

In this paper, we adapt and elaborate the key dimensions of SCs, such as trust, co-specialization and capabilities synthesis for the context of industrial clusters. In our discussion regarding the managerial 'enabling' of the collaborative DCs, we rely on the key conceptual assumptions of the original approach, which stresses the central role of *leaders* in building communities to resolve the dialectical tensions and integrate knowledge, as well as the importance of *organizational platforms* for accessing and orchestrating diverse cross-sectoral knowledge. We argue that the enabling of collaborative DCs depends on different kinds of ***leadership*** involved in the firm vs. network-centric SCs. The paper also reveals the diverse areas of ***strategic tension/synergy***, ***bases*** and ***architectures for asset orchestration*** in the two environments. The outcomes of our comparative analysis are summarized in accordance with these parameters. This conceptual paper integrates theoretical deliberations and secondary research findings with selected insights stemming from our own qualitative research, specifically adapted to the collaborative DC perspective.

Collaborative dynamic capabilities and strategic communities: concepts and contexts

The concept of **C-DCs** was proposed by Kodama (2018a) as a response to the resource-based view (Penrose, 1959; Richardson, 1972) and competition theory (Porter, 1980), which do not offer sufficient explanation of the corporate dynamics in a volatile environment and in cross-industry convergence (especially powered by ICT). The C-DC perspective attempts to fill the theoretical void in 'ecosystem strategies' research and to explain capabilities synthesis across different companies and industries. It builds on Teece's classical theory (Teece, 2007, 2014; Teece, Pisano, & Shuen, 1997), which also stresses the importance of ecosystem strategies and asset orchestration as a key aspect of DCs (Teece, 2007). Collaborative DCs are 'unique hard-to-replicate corporate capabilities, which accelerate the asset orchestration process through strategic collaboration within and outside companies, <…> and promote the processes of co-creation and co-evolution that lead to the creation of new business models and value chains' (Kodama, 2018a: 5). These are the capabilities of companies and industries to build enduring *relationships of trust*, to realize *co-specialization* and *capabilities synthesis* through strategic collaborations with ecosystem partners (Kodama, 2018a). The asset orchestration process leads to synergies from capabilities synthesis, an upgrade to the existing capabilities and new value creation. Capabilities synthesis can derive from both the combination of a firm's *internal* as well as its *external* resources and capabilities. The interest in collaborative DCs can be associated with the recent rise in research on innovation ecosystems both in the internal and external organizational contexts (Adner & Kapoor, 2010; Granstrand & Holgersson, 2020; Klimas & Czakon, 2021; Tsujimoto, Kajikawa, Tomita, & Matsumoto, 2018). Global companies like Apple or Cisco are strengthening their internal ecosystems by stressing the importance of spontaneous and informal collaborative interactions of employees through different formats, such as 'virtual dynamic teams' or informal networks similar to the Japanese *ba* (Kodama, 2007a, 2017). Such informal collaborative subsystems

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provide flexibility to the formal innovation processes, compensate for the corporate rigidities and help discover new niches for growth without compromising the firm's operational efficiency.

Collaborative DCs enable the integration of different technologies as well as the development of new products and services that span different industries. The emergence of ICT as a general-purpose technology permeates different industries leading to new technical solutions, products and markets. Although collaborative DCs draw a lot conceptually on the general paradigm of open innovation (Chesbrough, 2003), their particular focus is on addressing the challenges of *convergence* by enabling the integration of cross-sectoral competences of diverse actors and orchestrating knowledge assets through SCs located on both sides of a firm's boundaries (Azuma & Kodama, 2018; Okada, 2018; Tokoro, 2018). The discourse on collaborative DCs was provoked by the success stories of large diversified corporations, which have overcome the forces of disruption by successfully orchestrating their knowledge assets across different industries, technologies and markets. It is in these corporate contexts with many overlapping organizational layers that M. Kodama has introduced the concepts of collaborative DCs (Kodama, 2018a) and strategic community-based firm (Kodama, 2007b, 2010).

SCs derive from the Japanese concept of *ba*, indicating the shared space where knowledge is embedded and created, as well as the contexts which harbor shared meaning (Nonaka & Konno, 1998). They represent the arenas of collective growth and innovation permeating formal organizational boundaries. SCs also draw on the *small-world network* approach (i.e., emphasis on short connections between nodes and local clustering for reliable accessibility), where 'practitioners in diverse specializations realize innovations aimed at solving the issues facing them and implement problem-solving and creative strategies' (Kodama, 2009: 469). Such communities are characterized by *pragmatic boundaries* (Carlile, 2004) that allow diverse members to transform the existing knowledge. They often span the technical and business subsystems of firms, enable their interactions, learning and qualitative growth, e.g., integrating the technical knowledge of after-sales firms into the innovation process of automobile sector firms (Taifi & Passiante, 2012).

In our further analysis, we focus on enabling of the collaborative DCs in firm- and network-centric SCs. We distinguish the key differences in the nature of *leadership* for dealing with diverse sets of strategic tensions and turning them into synergies. We also reveal the different *bases* and *architectures for asset orchestration* in intra-firm and inter-firm contexts while highlighting the focal points of managerial action.

The strategic community-based firm: enabling collaborative dynamic capabilities through corporate leadership and design

Firms establish SCs for accessing, sharing, and integrating knowledge in diverse areas of technology and business *within* and *outside* the company in order to achieve and maintain a competitive advantage. Kodama's traditional approach focuses on the *large firm* as the initiator and central nucleus of SCs. Kodama (2018b: 13) claims that 'new knowledge that emerges from the various organizational boundaries both inside and outside the company is the very source of organizational capability'. SCs allow firms to capture and synthesize valuable knowledge across organizational and sectoral boundaries.

The original approach to SCs stresses the focal role of 'unique, inherent capabilities of practitioners – managers and leaders (and their organizations)' (Kodama, 2018a: 7). These kinds of leaders are found in every strategic community, they maintain relations with other firms from different sectors and their SCs (Azuma & Kodama, 2018; Takahashi, 2018). To highlight the role of leaders, Kodama (2007b) even introduces the concept of a *leadership-based strategic community* (LSC) that connects multiple SCs within and outside the corporation through the hierarchical network of their leaders. These connections enable the cross-functional and inter-corporate integration of resources and knowledge assets. To be successful in such environments, leaders must possess high-level *integrative competences* across different areas and levels.

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They have to manage the strategic, operational, technological and cultural paradoxes inside and outside their organizations, which is a hallmark of *'dialectical leadership'*. This kind of leadership becomes the key enabler of C-DCs in a strategic community-based firm when dealing with e.g. exploitation vs. exploration type of dilemmas. At first glance, the emphasis on managers/leaders and their competences appears to be related to the *dynamic managerial capabilities* stream of research (Adner & Helfat, 2003; Ambrosini & Altintas, 2019) that focuses on the manager's role in the transformation of the resource base of the firm. This is only partially true because leadership is highly embedded into the network structures of the strategic community-based firm and is not too dependent on the individual characteristics of corporate managers (which is probably a hallmark of a collectivist Japanese corporation as the specific context of the original research). One can argue to what extent *leadership-based strategic communities* (LSCs) are embedded in the cultural (i.e., hierarchical-collectivist) and governance (i.e., cross-shareholding companies) context of *keiretsu* Japanese corporate holding groups, which are often characterized as hierarchical networks (Ito & Medlin, 2011). However, the proponents of the concept also show a variety of successful strategic community-based firms outside Japanese contexts (e.g. Apple or Cisco) where the role of the central leadership in orchestrating knowledge assets is as pronounced.

The presence of 'dialectical leadership' is the backbone of the strategic community-based firm. To promote collaborative DCs, the leaders of SCs fulfill two contradictory yet complementary roles of 'innovative leadership' and 'servant leadership' to be both on the guiding and empathizing side with their employees. This kind of combination promotes growth on the individual, group, and organizational levels. It is also important to balance *autonomous, decentralized leadership* (in emergent communities) with *integrated, centralized leadership* (in traditional communities) in order to leverage *creativity* with *efficiency* of the business processes. The leaders of higher-level SCs (usually CEOs) transform conflicts between lower-level traditional and emergent organizations (and their middle management), and help integrate their competences so that they become sources of innovation (Kodama, 2007b).

Corporate leaders of strategic community-based firms must address the challenge of turning the organization's internal strategic contradictions into learning environments for the co-creation of new value. Large firms simultaneously pursue three different economies: *economy of scale* (i.e., infrastructure-related businesses), *economy of scope* (i.e., customer relationship-related businesses), and *economy of speed* (i.e., new product development-related businesses). These three corporate economies contain potentially conflicting business models and cultures. The originators of the concept (Hagel & Singer, 1999) suggest 'unbundling' the three business models in order to avoid strategic frictions and conflicts. However, we argue that the adoption of the C-DCs view calls for a more synergistic approach and integration of these three conflicting business cultures within a corporation. This does not imply creating SCs that are simply based on professional subcultures (and possibly leading to increased fragmentation), but creating SCs of shared meaning (*ba*) that integrate potentially conflicting mindsets and cultures (e.g., operations, sales, and new product developers). The creation of diverse, cross-functional SCs is not an easy process, but it helps improve corporate collaborative DCs, and convert potential tensions into opportunities for growth and innovation.

The leaders of SCs act as intelligent designers of three architectures that span the organizational boundary: *knowledge architecture* (for developing new businesses based on new knowledge), *strategic architecture* and *organizational architecture* (both acting as the supporting architectures). It is important to note that knowledge architects have to be the leaders of knowledge workers, enabling dialectic dialog between market and technology professionals inside the organization (Kodama, 2007b). They possess competences and create systems within the firm for the integration of diverse knowledge fields, which leads to continuous knowledge creation and innovation. Thus, successful knowledge integration within a firm and its C-DCs depend on the *integrative competences of visionary dialectical leaders*, *quality relationships across different SCs inside and outside the firm*, as well as the *supporting strategic and organizational architectures*. In short, a strategic community-based firm

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functions as a leadership-centered hierarchical collaborative system of new knowledge creation. It is open to the external environment, but at the same time has strong internal organizational mechanisms for knowledge absorption, integration, and learning.

A variety of corporate cases (Azuma & Kodama, 2018; Kodama, 2018a; Okada, 2018; Tokoro, 2018) show that asset orchestration in the strategic community-based firms occurs through two major corporate architectures – *vertical* and *horizontal*.

Vertical integrated architecture of asset orchestration means that large firms focus on in-house R&D activities in order to strengthen their internal capabilities, while their business platforms (with external partners) function as vertical value chains where coordination and collaboration is executed by the leader companies. One can expect that in this kind of model, collaborative DCs are enabled primarily through the *vertical coordination of internal learning processes*, and the key challenge is *matching these learning processes with the knowledge and capabilities of external partners*. It usually means building a number of networked SCs that complement the internal communities located at different levels of corporation.

Horizontal integrated architecture of asset orchestration means that a firm uses the networked SCs to develop new core competences and new value chains *outside* the existing business leading to diversification. Firms build networked SCs with dissimilar yet complementary business partners in order to design new value propositions that extend their current businesses. An example of this horizontal value chain could be Apple's expansion from its traditional personal computer business into the platform businesses of smartphones and distribution of audio-visual products. SCs surrounding modern mobile telecommunication firms include business partners from finance, broadcasting, healthcare, railroads, distribution, education, advertising, and the automobile industries. In such instances, the enabling of collaborative DCs relies on *diversifying the knowledge base* within the firm and *improving its absorptive capacity* from cross-sectoral collaborations.

One can also draw some valuable insights on enabling collaborative DCs from the general DC research. For instance, Eisenhardt and Martin (2000) stress the role of an organization's *cross-functional teams* and *boundary-spanning linkages* as enablers of dynamic capabilities, while others (e.g. Salvato, 2003) emphasize *leadership* and *trust*. Pablo, Reay, Dewald, and Casebeer (2007) conducted relevant research on organizations within the public healthcare sector where trust among diverse stakeholder groups becomes an important factor behind dynamic capability development. The DCs of public healthcare organizations were enabled through the supportive style of leadership that encouraged trust-based work relations, especially in cases where the mid-level managers found ways to re-socialize the work relationship between physicians and other health professionals. They needed to invest time and energy to encourage organizational learning by combining the skills and knowledge of (health) professionals with no prior experience of collaboration, as well as to create a secure environment that would enable learning through experimentation by taking incremental steps. The most important aspect of learning in such trial projects was 'finding out how to work together in different ways' (Pablo et al., 2007: 11). A key message of the research is that one should proceed with those processes of learning that the organization's members are most familiar and comfortable with, and those that are best aligned with the organizational incentives. Ideally, the DCs and processes of improvement should be based on the latent capabilities that are already accepted as valuable by the organization.

In the next part, we extend our discussion of enabling collaborative DCs in the environments of even greater organizational complexity.

The strategic community-based network: enabling collaborative dynamic capabilities through coordination of inter-actor trust

We have shown in the discussion above that until recently SCs and C-DCs were mostly analyzed from the perspective of large firms and their internal strategic tensions. Meanwhile, other important forms of SCs, such as horizontal informal networks of firms (e.g. clusters of co-operating

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actors specialized in different parts of the value chain) were left out from the analysis. Such networks, due to their decentralized, spontaneous and self-organizing nature, offer a valuable new perspective to the existing research on C-DCs. The development of network-level SCs (and their C-DCs) calls for a different kind of leadership compared to that existing in hierarchical corporate environments. The main difference from the earlier mentioned firm-centered approach lies in its primary focus on the *development of inter-actor trust* rather than organizational architectures and cross-functional subsystems.

Our paper does not delve into the general discussion of dynamic capabilities in industrial clusters, which has been covered in several other studies (Han & Chen, 2018; Hilliard & Jacobson, 2011). We specifically focus on the aspects of C-DCs with a particular emphasis on the development of inter-organizational trust. For instance, issues of ambidexterity, absorptive capacity or the dynamic capabilities of cluster firms dominate in DC-related research on industrial clusters (Cardeal, Abecassis-Moedas, & Antonio, 2012), yet they are of only indirect concern to the collaborative dynamic capacity view.

Trust, which leads to enduring relationships in SCs, is one of the three defining features of C-DCs (Kodama, 2018a). The classical definition offered by Mayer, Davis, and Schoorman (1995) considers trust as 'the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party'. This kind of approach becomes even more pronounced in flat inter-organizational network environments, where system-level dynamics do not depend on hierarchical managerial control, but rather on the evolving relations of many independent actors.

Industrial clusters represent a perfect context for extending our discussion on collaborative DCs and SCs from the firm to the network level. Adopting the classical definition, clusters are geographic concentrations of interconnected companies and institutions in a particular field, linked by commonalities and complementarities (Porter, 1998). Clusters are cross-sectoral agglomerations and networks of diverse autonomous socio-economic actors that cover entire value chains and share resources for the co-creation of value. Clusters enable the collaborating actors to achieve cross-sectoral synergies, converge their technical and business competences and co-create radically new value propositions allowing us to treat them as SCs in their own right. The emergence and sustainable functioning of clusters is not possible without C-DCs. However, they have to be gradually built and maintained, mainly by network facilitators, who help identify the shared interests, complementary assets, and mechanisms for capability synthesis, observe the dynamics of inter-organizational trust and make *ad hoc* interventions. Facilitators act as connectors and boundary spanners that are critical in building and sustaining horizontal networks of diverse actors. Their role in asset orchestration and synergy of diverse competences is comparable to that of leaders in strategic community-based firms, although more oblique.

The discourse on collaborative DC and SCs is inseparable from issues of inter-industry convergence. The strategic and technological renewal of industrial clusters (as a whole) depends significantly on the effectiveness of inter-industry convergence, which serves as an effective path for upgrading value chains and escaping the curse of industrial lock-in. The inflow of heterogeneous knowledge and resources is conducive to improving breakthrough innovation capacity (Alexander & van Knippenberg, 2014; Kodama, 2018b). There are numerous examples how the traditional industrial base was dramatically upgraded thanks to effective collaboration and convergence with actors representing high-tech general-purpose technologies (e.g., ICT, robotics, artificial intelligence or nanotechnologies) or high-end services (e.g., creative industries). At the same time, as we will see from further discussion, the intersectoral cooperation faces quite a few challenges that may disrupt the key aspects of C-DCs (trust dynamics, capability synthesis). They can only be addressed through effective network-level coordination.

The insights presented below are based on a theoretical analysis of the emergence of network-level trust in industrial clusters, as well as secondary empirical research on the development of trust and

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strategic renewal of industrial clusters. We relate the theoretical deliberations with more practical insights from our study of network facilitators. The study was based on interviews with leaders of industrial clusters representing diverse cross-sectoral areas, such as the Smart Housing cluster (integrating competences from construction and ICT) or the Laser & Engineering Technologies cluster.

Let us now consider the theoretical predispositions behind the development of network-level trust among diverse autonomous organizations inside an industrial cluster.

Inter-organizational trust is a multi-level construct. The growing body of research on inter-firm networks (e.g., industrial clusters) treats inter-organizational trust as a multidimensional concept that consists of *individual*-, *group*- and *system*-level trust (MacDuffie, 2011; Shockley-Zalabak, Morreale, & Hackman, 2010). In other words, inter-organizational trust is both the background and outcome of evolving relations among people (on an individual level), their groups, and organizations (on a group level), and is also influenced by the wider external environment (system-level conventions). Although high-level interpersonal trust inside organizations has an overall positive effect on their *inter*-organizational trust (Janowicz & Noorderhaven, 2006; Nooteboom, 2002), trust dynamics across firms cannot be explained by interpersonal variables alone. There is also a 'collective level of trust that members of one organization share towards another organization' (Zaheer & Harris, 2006). One can trust the system without knowing or trusting each of its elements, but by placing trust in the perceived organizational competence, role, and fairness of its rules and principles. Trust is also associated with the institutional environment that shapes the general conditions of the relationships of individuals/organizations. Legitimate and transparent institutions enable the emergence of spontaneous sociability and generalized trust (i.e., 'trust in strangers') that economic actors can draw upon when forming their networks (Fuglsang & Jagd, 2015; Uslaner, 2002).

Industrial clusters of firms are located in a proximate socio-geographical area, and draw upon its various resources. Social capital is regarded as 'one of the key resources in the social structure within which the actors are located' (Eklinder-Frick, Eriksson, & Hallen, 2011: 130) and 'the goodwill that is engendered by the fabric of social relations and that can be mobilized to facilitate action' (Adler & Kwon, 2002: 17). The presence of social capital in the wider environment and the sharing of common norms may facilitate the coordination efforts of cluster firms. On the other hand, underdeveloped social capital and over-embeddedness in closed social structures may inhibit the development of inter-firm trust and productivity growth in regional ecosystems.

Trust emergence in industrial clusters is a complex dynamic process with many iterations and feedback loops. Trust among organizations emerges in the process of many different interactions that take place at the individual, organizational and systemic levels. These processes take the form of feedback loops between trust and cooperation, where relationships can follow either an upward or downward spiral. In the business world, the conflicting interests of firms may lead to the erosion of trust, even in situations where interpersonal rapport has been established. Inter-firm trust cannot be characterized by the relational positive feedback loop, especially in the long run, as trust can always be destroyed. There is no relationship between the duration of an inter-firm relationship and their level of trust (Gulati & Sytch, 2008). Trust and mistrust can co-exist as firms adjust their mutual expectations over time (Davis, 2016; Dyer & Chu, 2000; Saunders & Thornhill, 2004). Although situations of 'cooperation without trust' are possible in relationships that involve the exchange of physical resources as in buyer-supplier relations (MacDuffie & Helper, 2007), it is difficult to imagine 'collaboration without trust' in organizational ecosystems that involve the sharing of knowledge. Therefore, C-DCs in more knowledge-intensive environments are inseparable from the development of a certain degree of trust. To create sustainable horizontal networks that involve knowledge sharing, it is critically important to avoid negative feedback loops and reinforce positive feedback loops in the dynamics of trust. It also calls for a network-level coordination effort.

Barriers to trust development in industrial clusters may be rooted not only in the interpersonal conflicts or underdeveloped social capital. They may reside in the conflicting organizational

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cultures, diverging professional profiles or market power differences of the partnering firms. More specifically for our C-DC/SC focus, an important barrier to trust may emerge from the attempt to synergize very diverse sectoral competences and strategic orientations (e.g. when addressing the challenge of cross-sectoral convergence or seeking the strategic renewal of ailing regional clusters through partnerships between modern GPT firms).

Younès (2012) research has shown that intersectoral cooperation often fails due to the incompatibility of sectoral conventions regarding core business aspects, such as quality and flexibility (the 'worlds of production' theory by Storper and Salais (1997)), which prevents firms representing different sectors from establishing stable ties. It was a major reason behind the collapse of an intersectoral platform that combined an automobile supplier, a telecommunications equipment supplier, a semiconductor firm, and three automobile industry suppliers (systems-on-chips, equipment, complex system testing) with the aim of accelerating digital technological updating through cross-sectoral synergy. Research has shown that some sectors are more willing to cut costs while maintaining quality (e.g., the automobile industry), others show greater flexibility to defects (e.g., the computer industry), while others have a zero-defects policy with little regard for the costs aspect (e.g., the aeronautics industry). This kind of fragmentation leads to the phenomenon of *hollow clusters* (Bathelt, 2009), where fragmented ties inhibit collective learning and capacity upgrading.

Network facilitators have to consider that differences in the strategic profiles of participating firms/sectors can be a source of both synergy and conflict. Here, we suggest at least several important takeaways from Kodama's C-DCs approach for the developers of industrial clusters. Although building and maintaining inter-firm trust is paramount, one should not disregard the other two pillars of collaborative DCs – ***co-specialization*** and ***capabilities synthesis***. First, *co-specialization* stresses the importance of considering the complementarity in participating firms' strategies, assets, technologies, and processes at the network (cluster) level. Second, *capabilities synthesis* stresses the need to envisage effective mechanisms and platforms for orchestrating these diverse assets. The above-mentioned examples show that identifying *de facto* complementary assets (competences, technologies) does not suffice. Firms in the network have to be encouraged to synergize their core competences and to compensate each other's weaknesses. The failure to ensure organizational platforms for maximizing the asset orchestration process' (Kodama, 2018a: 10) will eventually lead to the erosion of trust among the participating firms.

Trust development among firms in horizontal networks is the process of indirect managerial influence, not hierarchical leadership. Trust development in inter-firm relations rarely takes the shape of a natural positive feedback loop, and calls for managerial intervention at the network level in order to continuously build, strengthen and sustain trust (Dyer & Chu, 2000; Ruangpermpool, Igel, & Siengthai, 2020; Sydow, 2006). However, inter-firm trust cannot be developed in the managerial *top-down* fashion. Instead, it is a coordinated, emergent *bottom-up* process that involves repeated communication, multiple iterations and interactions. The development of trust in horizontal networks calls for a non-hierarchical type of leadership that spans the boundaries of different firms and sectors. More often than not, inter-firm relations in networks (regional industrial clusters in particular) are initially based on *characteristics*-based trust (i.e., trust based on the similarity of backgrounds and identities). They later evolve into *process*-based trust as relationship matures, i.e., trust that is based on the experience of relations (Bazan & Schmitz, 1997). Network facilitators play an important role in assisting the emergence of process-based trust. They help identify common business interests, building shared expectations and attracting the critical mass of participating firms (McEvily & Zaheer, 2004). In most cases, the development of network-level trust is an indirect process, characterized by the creation of adequate conditions for trust-based relations to emerge.

Facilitators address diverse challenges in different stages and contexts of trust development. Research shows that there are at least *three* different stages in the evolution of a *network* (Cannatelli & Antoldi, 2012) and the evolution of *trust* (Lewicki, Tomlinson, & Gillespie,

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2006), and each of these stages call for the specific role of a network facilitator. For instance, Cannatelli and Antoldi (2012) analyze the role of network facilitators in fostering inter-firm trust in the strategic alliances of SMEs located in North Italian industrial districts. At first, the network facilitator acts as a *pivot* of the alliance, later turning into the *mediator* before finally becoming an external *advisor* to the mature alliance. Thus, the facilitator role starts out at the center of the coordination initiative, but gradually moves into the fringes as the network matures. In a way, the facilitator contributes by reducing the uncertainty that surrounds inter-firm relations in the early phases of network building. Once the emerging process-based trust reduces the relational uncertainty, the facilitator's role becomes less central.

On the other hand, one can encounter the situations of mature, yet ailing industrial clusters, where proactive managerial intervention is needed in order to break the vicious cycle of 'dependence-oriented culture' (Hammar and Svensson, 2000). This type of culture emerges in closed, small economic localities with one or two dominant firms that historically used to provide subsistence to the critical mass of local actors (e.g., suppliers, employees) and reward them for their loyalty. It leads to the emergence of a social pattern in the regional economy where individual entrepreneurship that goes beyond the dominant player's influence is treated as a sign of betrayal, unwanted competition and is 'socially frowned upon' (Eklinder-Frick, Eriksson, & Hallen, 2011). In such localities, we can see the predominance of *bonding*, instead of *bridging*, social capital (Putnam, 2000) and strong ties (Granovetter, 1985). We claim that dependence-oriented culture is a sign of weak collaborative DCs and ineffective SCs, where strategic renewal is difficult to achieve without disrupting the established social patterns. The research by Eklinder-Frick, Eriksson, and Hallen (2011) focused on an unsuccessful cluster initiative that brought together two sectoral groups of companies in Söderhamn region of Sweden – electronics suppliers to Ericsson (the former dominant actor in the region) with metal welding and mechanical engineering firms (with no prior relationship with the Ericsson network) with the aim of achieving industrial renewal in the region. The over-embeddedness of the first group of firms in the dependence-oriented culture prevented them from understanding the benefits of strategic vertical collaboration in networks. Another key problem was the absence of a 'technology broker' that would bridge two very different social contexts, orchestrate their connections and manage the flow of information. It resulted in information flows being stopped at the organizational boundaries of two groups, low network mobility, an abundance of irrelevant information and falling trust inside the network. This example reinstates the importance of network-level coordination for ensuring C-DCs and putting the network initiative on track toward becoming an effective strategic community.

Holistic leadership is key in enabling the orchestration of assets for the co-creation of public value. Our earlier discussion on collaborative DCs in strategic community-based firms has illustrated the importance of 'dialectical leadership' for addressing numerous opposing challenges in corporate environments. Kodama (2018b: 19) stresses that 'a solid LSC and the dialectical leadership of leaders give birth to high integrative competences, and this can give birth to new product and service development, a platform of new business models'. Dialectical leadership is primarily oriented toward achieving a skillful balance between *efficiency* and *creativity*, and a synergy between the elements of *traditional* and *emergent* organizations. In other words, firm-centric SCs are mainly concerned with finding a dialectical solution to the exploitation–exploration dilemma.

The role of dialectical leadership is also pronounced, yet in a slightly different way, when developing collaborative DCs in network-level SCs. The above-mentioned example of the failed initiative to achieve the strategic renewal of an over-embedded industrial cluster through cross-sectoral synergies (Eklinder-Frick, Eriksson, & Hallen, 2011) reveals at least two possible sets of tensions calling for a dialectical approach.

The first tension inevitably concerns *exploitation–exploration* issues, as indicated by the attempt to revitalize the ailing sectoral entity (i.e., firms that were part of the old industrial cluster) through new cross-sectoral synergies. Network facilitators have to perform the role of

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technology brokers in order to address the challenges of integrating different 'worlds of production' (Storper & Salais, 1997; Younès, 2012), which are often inevitable in the context of intersectoral partnerships.

The second tension is related to the aforementioned issues of *bonding* vs. *bridging* social capital (Putnam, 2000), and finding a dialectical solution between the two. The presented example was an illustrative case of the excessive presence of bonding social capital in a regional network. Bonding social capital is used for describing strong relationships among actors of similar backgrounds and closed networks with few, but dense ties. Coleman (1988) stresses the importance of norms that strengthen (bonding) social capital in networks – the more open the network structure, the greater the chance that violation of norms will go unpunished. Bonding social capital facilitates information sharing in cohesive networks (Uzzi, 1997), but often leads to over-embeddedness and like-mindedness (Granovetter, 1985), and organizational lock-ins that close off networks from novel information (Parra-Requena, Molina-Morales, & García-Villaverde, 2009). *Bridging* social capital, on the other hand, is characteristic of the sparse networks with loose connections of actors, often with shared interests or goals, but a contrasting social identity (Pelling & High, 2005). It is based on the concept of 'structural holes' (Burt, 1992) as opposed to the above-mentioned norms of cohesive networks (Coleman, 1988). Structural holes open up opportunities for information brokerage, encourage the heterogeneity of information, and the emergence of new ideas. As a result, bridging social capital promotes entrepreneurship and innovation through technology brokerage, as well as open-mindedness and the integration of marginalized groups. On a more negative note, bridging social capital erodes the internal cohesiveness of networks, which may lead to the erosion of power structures needed for the strategic management of networks, or the low relevance of shared information to members of the sparse network (Eklinder-Frick, Eriksson, & Hallen, 2011). Enabling the C-DCs of regional industrial clusters often depends on a successful resolution of *bonding* vs. *bridging* social capital tension. From the network facilitator's perspective, it is about ensuring both the *proximate* relations of firms in the nucleus of the cluster, while at the same time keeping the cluster *open* to new members from different sectors, as well as creating global linkages. Our previous research has shown that the most dynamic industrial clusters are those that successfully combine tightly knit communities of diverse complementary professionals with global external linkages (Jucevičienė & Jucevičius, 2017).

To date, relatively few research attempts were made to transfer Kodama's concepts of collaborative DCs and SCs from the corporate into the public policy realm. Tokoro (2018), in one of the more recent attempts, adopted the C-DC perspective for an analysis of the health support ecosystem in the context of smart cities. The concept of a smart city is directly linked with various ICT solutions that permeate many of the traditional urban policies and infrastructures. The success of this initiative is based on collaborative DCs of different stakeholder groups from diverse areas of competence (ICT, energy, transportation, environment, healthcare, etc.). The implementation of an ICT-driven healthcare support system in the context of the Fujisawa SST smart city development relies on the technical leadership of private firms (e.g., Panasonic). However, institutional leadership was actually exercised by the Fujisawa SST Council that coordinated the entire strategic community of diverse actors behind the development of the smart city (Tokoro, 2018). The leaders steering the community have to respect the autonomy of its members, encourage free exchange, and avoid power differences leading to the conformity of minor members.

In the public policy realm, enabling collaborative DCs is more often associated with *institutional leadership* (focused on promoting not only trust, but also the shared values, philosophy and mission) and *'Phronetic' leadership* (focused on practical wisdom or *Phronesis*). Although Kodama (2018b) does not quite analyze the collaborative DCs outside the corporate environments, he refers to the combination of *institutional* and *'phronetic' leadership* as *holistic leadership*, especially when discussing those SCs that depend on collaboration among business, academia and government. We may also add, based on the discussion above, that the

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development of C-DCs in industrial clusters requires a specific kind of dialectical leadership, which would be more focused on addressing the tensions arising due to conflicting sectoral conventions ('worlds of production'), or the tensions related to the need for balance between *strong ties* vs. *weak ties* in the network. Cluster facilitators need to understand, but do not have to address the internal organizational tensions (exploration vs. exploitation, centralization vs. decentralization, efficiency vs. creativity), or build cross-functional teams (as in the firm-level LSCs). Their integrative role at the network level is expressed through their contribution to the main elements of collaborative DCs – trust building, co-specialization and capability synthesis. A coordinated effort is needed to help identify the shared interests of diverse actors and build shared meaning, to overcome their non-strategic differences, to create spaces for interaction, and to make positive, well-informed interventions into social dynamics at the network level. One of the strategic challenges of high-level network facilitators in equipping clusters with collaborative DCs for cross-sectoral synergies (e.g., in the Smart housing cluster) is helping align the professional knowledge backgrounds of participating organizations, finding instruments to improve the absorptive capacity of minor members, and balancing the potentially emerging power differences ('dependence-oriented culture') by encouraging new entrepreneurial members to join the network. If left unaddressed, such issues may gradually lead to the erosion of collaborative DCs. This erosion is signaled by deteriorating trust and a subpar cross-sectoral capabilities synthesis that ultimately leads to disinterested autonomous members leaving the network. It is easier to address these challenges when an industrial cluster and its members have their roots in other related professional communities, such as university departments, which improves the quality of the shared knowledge space or *ba* (e.g., as was the case in the Laser & Engineering Technologies cluster in our study). Thus, competent network facilitators can undertake the role of *knowledge architects* by designing ways of integrating the diversity of knowledge at the network level. Of course, clusters are in no position to adopt the *vertical integrated architecture* of firm-centric SCs (due to the absence of vertical control), but they can contribute a great deal to supporting the *horizontal integrated architecture* for the cross-sectoral asset orchestration of its members. An important takeaway in this context is that the differences observed in the enabling aspects of collaborative DCs (in firm vs. network settings) are much less important than the potential complementarities and synergies, which can be achieved from the interaction of SCs at both levels. Table 1 summarizes the main differences and similarities between the two levels of analysis that were extensively presented in the paper.

Concluding remarks

The relatively recent notions of C-DCs and SCs occupy a specific yet valuable niche in the general dynamic capabilities discourse. They contribute significantly to our theoretical understanding of the successful strategic transformation of business organizations that confront the challenges of cross-sectoral *convergence* in their technological and business environment. The collaborative DC perspective complements and to a certain degree challenges the established focus on internal organizational processes and capabilities that is still dominating mainstream dynamic capabilities research. The presented approach enables the theorization of the processes of strategic renewal in large corporations thanks to the effective vertically integrated boundary-spanning networks (SCs) and their less tangible 'fabric', such as trust and dialectical leadership. One can argue to what extent this fabric is susceptible to generalization and how specific it is to the cultural and institutional environment (research still mainly spans the Japanese and some American corporations). The collaborative DC perspective, however, can be universally adequate for instructing us about the processes of cross-sectoral innovation that inevitably contains the element of collaboration across organizational boundaries and the transformation of knowledge from different professional communities. Therefore, this paper had the natural ambition of extending this perspective from the level of firms (i.e., hierarchical and clearly structured corporate environment) into the

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Table 1. Enabling collaborative DCs in strategic community-based firms and networks

	Strategic community-based firm	Strategic community-based network
Leadership	Dialectical leadership	Holistic (institutional + phronetic) leadership
Areas of strategic tension and synergy	*Exploitation* vs. *exploration* *Traditional* vs. *emergent* organization *Unbundling* vs. *integrating* the conflicting corporate economies	*Bonding* vs. *bridging* *Closeness* vs. *openness* *Proximate relations* vs. *external linkages* *Traditional* vs. *new industry* actors
Basis for asset orchestration	• Integrative competences of corporate SC leaders • Collaborative structures in corporate hierarchy • Corporate architecture (knowledge, strategic, organizational) for the integration of diverse knowledge	• Network facilitation competences of network leaders/boundary spanners • Strategic complementarity of network actors (strategies, cultures, knowledge bases) • Inter-organizational trust and mechanisms for asset orchestration
Architecture for asset orchestration and key managerial focus	Vertical model: in-house R&D + external business platforms as vertical value chains. *Focus on:* • vertical coordination of internal learning processes; • matching internal learning processes with the knowledge and capabilities of external partners. Horizontal model: networked SCs + new value chains outside the core business. *Focus on*: • diversification of a firm's knowledge base; • improving a firm's absorptive capacity from cross-sectoral collaborations.	Intersectoral, trust-based platforms of autonomous firms and organizations *Focus on:* • Managing trust dynamics in networks through positive, well-informed interventions • Piloting/mediating interactions (emerging networks), orchestrating old/new connections (mature networks) • Achieving strategic cohesion in diverse intersectoral networks by helping to: • identify shared interests and construct shared meanings; • overcome non-strategic differences; • align professional backgrounds and knowledge bases of participating organizations; • balance out the power differences and dependence-oriented culture; • leverage the tightly knit network nucleus with new members and external linkages; • create interaction spaces.

level of networks and, more specifically, industrial clusters (i.e., environments with many diverse autonomous actors and cross-sector convergence in their DNA).

The *network*-centric approach to strategic community and C-DCs proposes an important additional dimension to the existing research. From the management point of view, it represents a higher level of complexity, due to the diversity of actors and the horizontal nature of relationships that must be continuously developed and nurtured. Our research focused on the main differences between the key enabling aspects of C-DCs in SC-based firms and SC-based networks (industrial clusters). Firm-level SCs rely on *dialectical leadership* that seeks to create synergies out of internal organizational tensions (exploitation-exploration, efficiency and control-creativity and learning), while network-level SCs rely more on *institutional* or *holistic leadership* that seeks to develop trust, platforms of interaction and spaces of shared meaning. The integrative competences in firm-level SCs are focused on managing cross-functional teams at different levels of the corporate hierarchy, whereas the integrative competences in network-level SCs are about designing and communicating shared interests and meanings, and achieving strategic complementarity among many autonomous actors. However, it is important to stress that complementarities between the two levels of analysis are

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much more important than their differences. Strong network-level C-DCs are very likely to have positive effects on firm-level C-DCs, and vice versa. However, this thesis would need further research.

The proposed network-centric perspective to SCs and development of C-DCs also offers promising policy potential. Network facilitators act as public agents that contribute to the strengthening of trust in inter-firm networks and beyond. Policy makers may give new energy to numerous 'dormant networks' (e.g., regional clusters or regional innovation systems caught in lock-in or industrial decline) by refocusing their attention away from supporting the fragmented elements in industrial structures, but rather by strengthening the C-DCs of a new critical mass of firms, and reconnecting them into new SCs.

Directions for future research

Our paper primarily represents the comparative perspective in its attempt to elevate the conceptual discussion of C-DCs and SCs from the level of firm to the level of networks. The scientific value of the original research on strategic community-based firms lies not so much in the presentation of universal conceptual frameworks for orchestrating cross-sectoral knowledge assets. It rather lies in the in-depth analysis and structured visualization of different corporate cases of strategic cross-sectoral transformation, which respects the diversity and complexity of corporate environments (while still adhering to common theoretical parameters, such as trust building, co-specialization and capabilities synthesis). Therefore, by instigating discussion on the strategic community-based networks, we also encourage future researchers to delve into more in-depth analysis of network-level transformations in a variety of national and industrial contexts. Future research can also benefit from more profound integration of insights and theories from knowledge management, especially on *sectoral knowledge bases*, *inter-sectoral knowledge flows, spillovers* and *intersectoral learning*. It would add a valuable dimension to the current research on C-DCs. We would also encourage in-depth studies into the aspects of *co-specialization* and *capabilities synthesis* in horizontal network environments. It would be valuable to see scientific discussion on the network *architectures* for an effective cross-sectoral orchestration of knowledge assets. Our paper focused on the specific context of inter-firm clusters (spanning the value chains of different sectors), but did not extend into wider knowledge and innovation *ecosystems*. Future research on strategic community-based networks would benefit from considering collaboration between firms and knowledge-producing institutions (universities, research institutes).

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