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Does Distance Hinder Coordination? Identifying and Bridging Boundaries of Offshored Work

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ABSTRACT

We submit that offshoring research focused mostly about an empirical phenomenon and extending our understanding about it, rather than expanding our understanding of the underlying theory as illuminated by empirical evidence. To theoretically frame the implications of offshoring strategy and practice for organizational design, this paper centers on the interplay between coordination and geographical distance. Distance strains the traditional approaches to coordination – i.e. decomposability and communication – as it impacts on knowledge boundaries created by the decomposition scheme. This increases the inherent complexity of the international division and coordination of innovative labor and knowledge and calls for new organizational practices.

1. Introduction

Offshoring – the process of migration of productive tasks to low-cost countries – is considered as one of the stages of the evolution of firms' international sourcing strategy, which reflects a gradual evolution of sourcing from domestic purchasing to global sources (Monczka and Trend, 1991). Most studies underlined that, despite sectoral dissimilar trends, the evolution of sourcing strategies pertains to a multi-phased development process that firms implement using distinct business models at each stage to reduce costs, access to new geographical markets, tap specific talents and specialized capabilities of third-party providers (e.g. Ge et al., 2004). In short, offshoring has been reshaping the way the production process is organized.

Research on offshoring has primarily revolved around two theoretical perspectives: transaction cost economics (TCE) and the resource-based view of the firm (RBV). Whereas the TCE approach was mainly adopted in the first empirical accounts on offshoring, the RBV has been used more recently and increasingly so. This switch has been due to two related factors: (a) the increasing popularity of the RBV approach in the analysis of firms' boundaries and therefore make or buy decisions; and (b) the changing drivers of firms' offshoring strategies.

Offshoring has firstly emerged as a cost-based strategy, to become an opportunity to exploit talents available in most Eastern countries at a lower cost. TCE asserts that make-or-buy decisions are motivated by efficiency considerations (Coase, 1960; Williamson, 1985). When efficiency is the primary aim, the main determinants of offshoring are risk reduction, cost savings and access to low cost foreign labor (Khan and Fitzgerald, 2004). To gain access to new markets, firms established local production presence for reasons related to the nature of their business (e.g., service industries such as food retail or banking), local country tariffs and import restrictions (e.g., the auto industry) (Farrell, 2004), and to hit local "price-points" (produce at prices that enable sales in low-wage countries) (Kirkegaard, 2005; Mann, 2005). Also, knowledge of local specificities is the required entry ticket to some markets (Eppinger and Chitkara, 2006), and offshoring some activities may facilitate the

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acquisition of important local knowledge. Farrell (2004) recalled the many consumer electronics multinationals that initially were attracted by China's huge customer base and which now are taking advantage of its low costs to produce goods for export.

Using RBV to study offshoring has been recognized as a reply to the rapid diffusion of offshoring processes involving complex knowledge processes. Western firms extended offshoring practices to knowledge-intensive tasks (e.g. R&D, new product development, product design, tele-radiology, diagnosis, and clinical trials) delivered by skilled professionals (Kotabe and Swan, 1994) due to a variety of factors such as trade liberalization policies, advances in information technologies (Doh, 2005), and the continuous modularization of products and their underlying processes (Sako, 2003). Scholars described the adoption of offshoring by firms as a progressive learning-by-doing process whereby firms offshore increasingly advanced activities (Jensen and Pedersen, 2007; Lewin and Peeters, 2006; Maskell et al., 2007).

Lewin et al. (2008) found that US firms' offshoring of innovation activities was influenced by the interplay of managerial intentionality, firms' path dependency, and more importantly by growing shortage of home technical and scientific talent that limited their ability to staff innovation activities with domestic talents. Access to skilled talents around the world has been documented as a key strategic driver of offshoring as the number of offshoring projects involving qualified personnel has been increasing (Bunyaratavej et al., 2007; Farrell et al., 2006; Howells, 1999; Lewin and Couto, 2007; Manning et al., 2008).

Offshoring directs attention to the division and coordination of labor among organizations and across countries and therefore to the evolving relationships along the value chain, i.e. the patterns in which labor is divided and coordinated. Although literature on technological change (e.g. Patel and Pavitt, 1991) suggested that innovation activities should be kept in the home country, the recent trend towards offshoring of knowledge intensive tasks enlarges further the scope of division and coordination of labor to include innovative tasks (Apte et al., 2006; Ernst, 2005). Specific regions might be particularly advantageous locations for R&D facilities because of knowledge spillovers from networks of suppliers of tangible and intangible assets – e.g. training, knowledge, components – including research centers, universities, and other organizations (Feinberg and Gupta, 2004; Laursen et al., 2012a; Wesson, 1993).

Although recent contributions delved into some of the organizational challenges as entailed by offshoring of complex and innovative activities, we still know relatively little about the specific challenges it entails from an organizational design viewpoint. To theoretically frame the implications of offshoring strategy and practice for organizational design, this paper centers on the interplay between coordination (March and Simon, 1958) and distance (O'Leary and Cummings, 2007).

Offshoring poses coordination challenges due to the distance that puts into question the two basic approaches devised to achieve coordination: decomposability (Simon, 1969) and communication (Clark, 1996). Decomposability is used to create and simplify dependencies through the development of standard interfaces and rules to achieve coordination. Decomposability requires advanced knowledge of dependencies of activities to craft an architecture that defines interfaces, rules, and ranges within which components and tasks should function. A decomposed problem requires also that knowledge dependencies are defined and stable, as new knowledge bases and/or their uneven rates of change may create new dependencies and/or modify existing ones. Distance – understood as spatial, time, configuration, or demographic distance – strains decomposability as interfaces, rules, and ranges – and the knowledge encoded wherein – may be misinterpreted due to differences in functional or occupational knowledge, site and geographical practice and culture, and interests and goals.

Coordination may also be achieved using communication among actors or groups so that they reach reciprocal predictability of action (Srikanth and Puranam, 2011). Distance creates problems for communication due to logistical and time-related constraints that inhibit interaction among individuals engaged in pursuing a joint activity. In addition, distance strains also ongoing communication as distant individuals and groups may not share 'common ground' (Clark, 1996). Distance may well impede coordination as ongoing communication across distant locations may only occur via information and communication technologies (ICTs) that have indeed been proved to be relatively poor surrogates of personal interactions (Kiesler and Cummings, 2002).

The focus of this paper is on a decomposed problem that can be either a task or an activity that creates a coordination issue that can be solved either via plan – and therefore through the creation of stable, standard interfaces, rules and procedures; in short, an architecture – or via ongoing communication. In order to tease out the implications of distance on coordination, we rely on Carlile (2004). Decomposing a problem creates knowledge boundaries of different nature. Carlile (2004) identified different kinds of knowledge boundaries. Bridging such boundaries to achieve coordination requires different knowledge processes. *Syntactic boundaries* require knowledge transfer processes – via a common lexicon – as meanings of terms and concepts are unique, commonly held and well understood among actors. *Semantic boundaries* require knowledge translation processes, as meanings are not uniquely held, rather they vary across functional areas, occupations, and sites. Knowledge translation requires organizational solutions that lead to the creation of shared meanings, as knowledge is not uniquely understood among actors. *Pragmatic boundaries* require knowledge transformation processes – via such tools as boundary objects – as actors may have different interests and goals in relation to the specific task to be pursued (Carlile, 2004).

This paper aims to address the following research questions: Does distance impact on knowledge boundaries? If so, how? We posit that distance places a burden on each of the different types of boundaries challenging traditional organizational designs and calling for new coordinating solutions in terms of new practices (Leonardi and Bailey, 2008) or new coordination mechanisms such (Srikanth and Puranam, 2011).

The paper is organized as follows. The next section discusses decomposability and ongoing communication as the traditional approaches to coordination. Section 3 discusses the dimensions of distance as identified in the literature. Relying on Carlile (2004), Section 4 introduces the concept of knowledge boundaries to identify the implications of distance on coordinating offshored work. Section 5 presents a research agenda.

2. Achieving coordination: decomposability and communication

Srikanth and Puranam (2011) argued that research on coordination of interdependent activities revolved around dichotomies — e.g. plan vs. feedback (March and Simon, 1958), modular vs. integral (Baldwin and Clark, 2000), and loose vs. tight coupling (Orton and Weick, 1990). Such dichotomies can be boiled down to two generic approaches to coordination: (a) *decompose* activities through the definition of standard and stable interfaces among its components to reduce interdependencies; (b) create opportunity for *ongoing communication* for actors involved in the pursuit of interdependent activities (Srikanth and Puranam, 2011).

Decomposability (Simon, 1957, 1962) – even in its recent re-incarnation as modularity – has been used to study the evolution of products (Ulrich, 1995), components' underlying technological knowledge (Arora et al., 1998), organizations (Sanchez and Mahoney, 1996), and industry (Baldwin and Clark, 2000). Accordingly, organizations adopting a modular design strategy may fully specify and de-couple components and the different stages involved in the product development process and focus either on the development of the product architecture or of the different modules (Brusoni et al., 2001). A corollary of this is that a greater intra- and inter-organizational division of labor characterizes a variety of industrial settings (Brusoni and Prencipe, 2001). Decomposability therefore plays a key role in coordinating outsourced (Schilling and Steensma, 2001; Tiwana, 2008a, 2008b) or offshored work (Tripathy and Eppinger, 2011).

Taking a problem-solving perspective, Brusoni et al. (2007) argued that perfect decomposability entails a full understanding of sub-problems' interdependencies and their emerging properties, in that all sub-problems should be optimized in a totally independent way from the others. However, this is a rare case as most real technological and organizational problems are quasi-decomposable. Sub-problems may contain the most relevant interdependencies whereas less relevant ones persist across sub-problems. This entails that optimizing each sub-problem independently may not necessarily lead to the optimal, global solution, but to a good solution. Higher degrees of decomposability – and division of labor – may lead to higher speed of adaptation, at the expenses of the optimality of the solutions that can be reached (Brusoni et al., 2007).

Therefore, creating a decomposition scheme of a product and its underlying tasks does require articulated knowledge of product components' interdependencies and their underlying knowledge (Baldwin and Clark, 2000). Decomposability constitutes a necessary condition to effectively manage division and coordination of labor, but it requires technological and organizational efforts to be first achieved and then implemented.[1] In addition, a decomposition scheme may last for an intended period of time, contingent on the rate of change of product's underlying knowledge bases as well as their maturity. The emergence of new knowledge bases or the combination of existing ones may create new interdependencies and/or modify existing ones and therefore disrupt decomposition schemes (Pavitt, 2002).

Coordination may be also achieved via communication (Srikanth and Puranam, 2011). Communication literature argued that actors involved in interdependent activities require 'common ground' – the "sum of mutual, common, or joint knowledge, beliefs, and suppositions" (Clark, 1996: 93) – to achieve coordination.

Research on new product development found that members from different functional areas – such as marketing and R&D – generate diverse and idiosyncratic meanings of terms and concepts that hinder communication and collaboration (Dougherty, 1992). Whereas it may create opportunities to explore unchartered linkages across distant knowledge domains and therefore lay the basis for innovations that recombine heterogeneous knowledge inputs (Leiponen and Helfat, 2010), idiosyncratic meanings entail knowledge integration challenges because of the different worldviews that inform researches and engineers coming from different research and technology communities (March, 1991). Mihalache et al. (2012) showed that although offshoring has important benefits in terms of enhancing innovation, the relocation of primary functions exhibits decreasing returns to scale and eventually dampens innovative outcomes due to firm's inabilities to transfer and assimilate new knowledge due to a lack of overlap with the existing knowledge at the home location. Interestingly, Mihalache et al. (2012) found that firms' offshoring probability to innovate is moderated by the ability of the top management team to implement tools enabling the coordination of transnational knowledge transfer.

Research on the sociology of work also argued that members from different occupations struggle to understand each other due the different languages, jargons, and conceptualizations leading to cross-occupational misinterpretations and misunderstandings (Barley, 1996). Bechky (2003) contended that individuals from one occupational community managed to understand knowledge from another community through a transformation process that entails placing that knowledge within their "locus of practice" (Bechky, 2003: 321). Such transformation laid the basis to co-create common grounds, "in the creation of common ground, the members of the groups were able to re-contextualize local understandings, providing the context needed to create shared understanding across communities" (Bechky, 2003: 321).

In her study on collaboration in dispersed teams, Cramton (2001) observed, '…members of dispersed teams do not stand on common ground. Indeed, the usage "common ground" suggests how deeply engrained physical co-presence and shared physical setting may be to establishing shared understanding and affiliation'. She proposed 'mutual knowledge' – understood as 'knowledge that parties share in common and know they share' (Cramton, 2001: 247) – as a more appropriate construct to address coordination problems in distributed and dispersed settings as in offshoring.

[1] Tripathy and Eppinger (2011) found that modularity does not necessarily enable successful offshoring. This echoes research that argued that the implementation of modularity in highly innovative contexts requires a deep and articulated understanding of components' interdependencies and reinforced the idea that architectural capabilities are key to decompose products and their underlying organizational processes (Ceci and Prencipe, 2008; Hobday et al., 2005; Prencipe et al., 2003).

3. Dimensions of distance[2]

Early studies on geographical distance – and conversely on proximity – focused on its implications on communication frequency and probability of interactions in a variety of empirical contexts such as friendship (Festinger et al., 1950), technology (Allen, 1984), and industrial districts (Brusco, 1982). Relying on this early research, scholars singled out different dimensions of distance – i.e. structural (O'Leary and Cummings, 2007), demographic (Hinds and Mortensen, 2005), and cognitive (Nelson and Winter, 1982; Rodan and Galunic, 2004) – that influence the organization of interdependent tasks and amplify their inherent difficulties. Integrating knowledge-related tasks become more difficult (Mihalache et al., 2012): firms must deal with geographical, cultural, and institutional differences that require higher managerial attention and communication (Kotabe, 1990) and might eventually hinder the introduction of product changes (Markides and Berg, 1988).

Relying on field and laboratory studies on dispersed teamwork, O'Leary and Cummings (2007) proposed a framework within which link theoretical constructs of dispersion and empirical outcomes. They identified and discussed three structural dimensions of distance and their impacts on different instances of outcomes of geographically dispersed work. Spatial distance refers to the geographical distance of team members' locations and primarily affects face-to-face communication as it impedes direct inter-actor observation (Nemiro, 2000; Stringfellow et al., 2008). Temporal distance reflects the extent to which team members have overlapping working hours. An increase in temporal distance negatively impacts on real-time problem solving and task synchronization and therefore leads to communication breakdowns that render mutual adjustment – a feature of co-located work – difficult (Kumar et al., 2009; Stringfellow et al., 2008). Configurational distance is understood as: (a) the number of sites where members are located, (b) team members' isolation from each other, and (c) the balance between subgroups of members across sites. Configurational distance's effects are articulated as follows: number of sites affects team coordination; isolation impacts team members' awareness; imbalance between subgroups influences social conflicts.

Demographic distance in geographically dispersed work refers primarily to cultural and identity distance. Research on international business has documented pervasive and persistent differences across countries in term of cultural features, which refer to demographic, and status variables, affiliations, nationality, ethnicity, language, and religion — e.g. Dunning (2002). As offshoring entails working with individuals characterized by different cultural backgrounds, culture – understood as "the collective programming of the mind which distinguishes the members of one human group from another… the interactive aggregate of common characteristics that influences a human group's response to its environment" (Hofstede, 1980) – may work as a key enabler or hinderer of coordination in distributed settings. At the operational level, different context-dependent meanings may emerge across culturally distant sites that may render communication and coordination difficult (Bertolotti et al., 2005; Kumar et al., 2009; Meadows, 1996).

Members of dispersed team may be highly heterogeneous in terms of personal traits – e.g. sex, age, nationality, race and religion – as well as in terms of work-related traits – e.g. expertise, professional background, professional tenure, organizational tenure – and therefore show different identities (Connaughton and Shuffler, 2007; Mattarelli and Tagliaventi, 2010). The coexistences of multiple work identities may impact coordination of globally distributed work (Gupta et al., 2009; Mattarelli and Gupta, 2009). Heterogeneous identities might bring disadvantages – i.e. disrupting subgroup, perception of status differentials – or advantages – i.e. creativity and innovation.

4. The interplay between coordination and distance: the role of knowledge boundaries

With some notable exceptions – e.g. Andersson and Pedersen (2010), Dibbern et al. (2008), Kumar et al. (2008), Leonardi and Bailey (2008), Srikanth and Puranam (2011), and Stringfellow et al. (2008) – research has overlooked the impact of the distance on coordination as entailed by the international division of innovative labor and knowledge. Besides the additional search costs for suppliers in foreign locations (Grossman and Helpman, 2001), internationally dispersed activities lead undeniably to increasing coordination difficulties (March and Simon, 1958; Thompson, 1967) due to the cultural, temporal, and spatial barriers entailed by the international task partitioning. Such barriers constitute boundaries that must be faced to effectively manage work in a distributed setting. More specifically, distance requires explicit communication processes – primarily ICT-based tools – aimed at specifying task performance and outcomes to smooth coordination efforts (Ciborra et al., 1996; Kumar et al., 2009). As mentioned, specifying task performance and outcomes entails greater managerial efforts to articulate, codify, and formalize information (Aubert et al., 2011). Communication processes require also the development and support of IT-based collaborative work technologies (Kumar et al., 2009).

Carlile (2004) proposed a framework within which analyze the management of knowledge at boundaries. Boundaries emerge because of distinctive properties of knowledge — i.e. difference, dependence, and novelty. Difference refers to diverse amount of knowledge acquired by actors – i.e. novice vs. expert – or to diverse domain-specific knowledge — i.e. hydromechanics vs. digital electronics. Dependence refers to conditions where actors must take each other in consideration to pursue their goals (Litwak and Hylton, 1962) such as R&D and marketing personnel during a new product development process (Clark and Fujimoto, 1990). Dependence is a crucial concept in coordination theory, to the extent that "without dependence, difference is of no consequence"

[2] It is worth noting that distance has a direct effect on decomposability as it limits the likelihood of information and knowledge exchange among actors. Decomposability entails the definition and specification of tasks: a complex process of knowledge externalization – from tacit to explicit knowledge (Nonaka, 1994) – that requires face-to-face interactions so that knowledge can be articulated and codified (Dibbern et al., 2008). Distance strains decomposability as a process — i.e. the process of decomposition in terms of creation of interfaces and procedures that requires continuous, frequent exchange of knowledge and information among usually co-located actors. Distance also strains decomposability as an outcome — i.e. the outcome of the decomposition process, usually an architecture that defines rules and range within which components and tasks may function. Decomposability as an outcome is the focus of this paper.

(Carlile, 2004: 556). As Carlile argued, disentangling different kinds of dependence as in Thompson (1967) is as relevant as understanding how to manage them. Carlile (2004) submitted that managing dependencies requires establishing 'common ground' (Clark, 1996). Novelty constitutes the third property of knowledge. If novelty arises, new common ground is required to manage knowledge difference and dependence at a boundary (Carlile, 2004). Carlile (2004) submitted that such knowledge properties might be depicted as a vector: at the origin, difference and dependencies are known so that communication and coordination are relatively easy; as novelty increases, the complexity of the communication, and therefore the effort to manage knowledge boundaries increase.

Carlile (2004) identified three types of knowledge boundaries that reflected increasing levels of communication complexity. The least complex boundary is the *syntactic boundary* where a common lexicon is a necessary and sufficient condition to specify knowledge difference and dependencies as knowledge meanings are clear among actors or groups. A syntactic boundary requires only knowledge transfer.

The transition from a syntactic to a *semantic boundary* occurs when novelty makes difference and dependencies unclear so that a common lexicon is still necessary, but no longer sufficient to transfer knowledge at the boundary. New customer needs leading to new technical requirements or the emergence of new knowledge domains generate interpretative differences of terms and concepts so that knowledge must be translated in order to be transferred. Specific processes – such as cross-functional, co-located teams – must be established to help develop common interpretations or shared meanings (Dougherty, 1992) or the presence of specific types of individuals – such as brokers or gatekeepers – must be contemplated to translate domain-specific knowledge and to make it meaningful among parties.

A *pragmatic boundary* emerges when actors have different interests and goals to the extent that knowledge in one domain may have negative consequences in others. According to Carlile (2004), this is the most problematic boundary, as domain-specific knowledge must be transformed in order to be transferred and shared. Research that acknowledged this pragmatic boundary proposed boundary objects (Bechky, 2003; Star, 1989) – e.g. drawings, prototypes – as effective means to exemplify diverse interests and enable communication through negotiations in such contexts as new product development processes (Carlile, 2004).

4.1. Bridging knowledge boundaries in offshored work

Empirical studies focused on the firm-specific, context-dependent work practices – entailed by spatial, configurational, and cultural distances – to explain miscommunication problems among team members detracting from the development of effective working relationships and eventually team's performance (Sole and Edmondson, 2002). Hence, the focus of such research has been primarily on the impact of spatial, configurational, and cultural distances on semantic boundary (O'Leary and Cummings, 2007).

Spatial distance among individuals and groups engaged in joint activities limits the likelihood of face-to-face interaction hence reducing impromptu contact and direct inter-actor observation. Indeed, logistical and technological constraints limit informal, spontaneous interaction that inhibits communication among distant individuals and therefore create coordination complexity (Sole and Edmondson, 2002). Cramton (2001) found a set of problems entailed by spatial distance that created semantic boundaries and therefore impeded individuals to create mutual knowledge. For instance, lack of direct observation provides the basis to understand communication nuances, such as silence. Similarly, communication breakdowns render it difficult to understand the salience of information (Cramton, 2001).

Leonardi and Bailey (2008) discussed the case of automotive engineering tasks offshored to India. The automotive manufacturers thought that offshoring engineering tasks to India would have created a syntactic boundary that could have been easily managed via ICT-based technologies. Leonardi and Bailey (2008) found that although Indian engineers had been trained in automotive engineering disciplines and were skilled in using CAD and CAE technologies, they lacked implicit, technical knowledge, as they could not interpret the output of tools as devised by Mexican and US engineers. As Leonardi and Bailey (2008) argued 'our study makes clear that the structural configuration that is arguably the simplest of distributed work arrangements (one without cross-functional boundary, within the same occupation, with individuals employing the identical technologies, and therefore with a bedrock of mutual knowledge) is in fact rife with problems in transferring knowledge across time and space' (Leonardi and Bailey, 2008: 430). These results points that in the context of offshoring, structural distance may augment the complexity of the boundary – from syntactic to semantic. Using Carlile's (2004) terminology, Mexican and US engineers had to translate such knowledge before transferring it. They created new work practices to make explicit the knowledge embedded in the CAD and CAE tools used to channel work within the distributed team. These findings echo Dibbern et al. (2008), as they found that clients experienced higher costs due to the knowledge asymmetries between themselves and vendors.

Srikanth and Puranam (2011) argued that the coordination of dispersed, interdependent activities might also occur through a newer approach — i.e. tacit coordination mechanism, 'mechanisms that enable the formation and leverage of common ground without the need for direct, ongoing communication' (Srikanth and Puranam, 2011: 850). They found that investing in such tacit coordination mechanisms as 'leveraging pre-existing common ground' through staffing policy and 'building common ground through enhancing observability across locations … using technologies that enable observation of the work progress and context across site' (Srikanth and Puranam, 2011: 855) helped bridge semantic boundary between client and vendor and ameliorated the performance of business process offshoring. This result echoes Dibbern et al. (2008) who found that vendor's prior experiences with similar client projects reduced extra costs, though could not fully counterweigh their increase.

As regards configurational distance, individuals at each site develop situated knowledge – i.e. 'knowledge grounded in site-specific work practices' that transcend knowledge and task boundaries (Sole and Edmonson, 2002: 18) – that affects and indeed creates semantic boundaries across sites increasing coordination complexity. Sole and Edmondson (2002) proved that individuals at each site develop shared enterprise experience meanings that indicate what is distinctive and central about what

they do at the specific site. Working at the same site may lead to the development of a repertoire of historical, social, physical resources – also in terms of problem-solving rules and procedures that sustain a shared sense of communality in practice or mutual engagement in action (Wenger, 1998) – that spur and rely upon site members' knowledge and capabilities. This echoes Wegner's (1987) notion of transactive memory — i.e. the proximate awareness of co-located individuals' knowledge and capabilities: who know what around the site. These instances of situated knowledge are rarely articulated and codified; rather they are encoded in mutual, tacit understanding, and therefore undetectable by other members located across other remote sites. Sole and Edmondson (2002) also found that new practices may help semantic boundary. They observed that occasional relocation of otherwise distant team members minimized miscommunications as "it stimulated problem-solving through interaction with people immersed in local practices and perspectives, as well as through exposure to physical aspects of the setting" (Sole and Edmonson, 2002: 32). This echoes Mattarelli and Tagliaventi (2010) who explored the interaction among different work-related identities and their impact on globally distributed team outcomes. They found that shared organizational identity, cultural integration and diffused knowledge about the strategic objectives of virtual work ease the acceptance of virtual work and decrease negative effects on performances.

Cultural distance affects the quality of interaction and therefore the possibility of quick and efficient communication (Stringfellow et al., 2008). If the two parties speak different languages, communication becomes difficult, hampering knowledge transfer between the parties and increasing the likelihood of false specification due to misunderstandings. This affects the possibility to quickly and efficiently share knowledge about processes and tasks (Apte, 1990; Ceci and Masciarelli, 2010; Dibbern et al., 2008; Rao, 2004). Cultural distance can increase information acquisition costs (Kogut and Singh, 1988), increasing the cost for all processes where information exchange is required (Dibbern et al., 2008) and therefore reducing the possibility to efficiently share knowledge.

Stringfellow et al. (2008) and Dibbern et al. (2008) explored the effects of cultural and language distance between service providers and customers and found that distance influenced the invisible costs of offshoring in services, making offshoring less convenient. Ang and Inkpen (2008) proposed that firm-level cultural intelligence – understood as the capability to managing effectively in culturally diverse situations – is a predictor of organizational performance in offshoring strategy and suggested that only culturally intelligent firms (i.e. those that have invested in developing the requisite intercultural capabilities) might be able to leverage offshoring effectively.

5. Conclusion and research agenda

The aim of this paper has been to provide an illustrative – and not exhaustive – analysis of the implications of the international pattern of division of innovative labor for organization design. Synthesizing and integrating dispersed activities, pursued across locations characterized by heterogeneous cultures and institutions, entail the design and deployment of ad hoc organizational practices. The paper focused on the interplay of coordination and distance to disentangle the inherent challenges linked to the management of offshored work. Relying on the previous analysis, we detail as below avenues of research that may further enlighten the functioning of the interplay of coordination and distance and identify its underlying micro-mechanisms.

5.1. Cultural and cognitive distance

Research on industrial clustering submitted that spatial proximity is heavily intertwined with social and cognitive proximity. Cognitive proximity – i.e. sharing of disciplinary approaches to knowledge – has been found to be paramount for knowledge exchange within cohesive professional networks (Brown and Duguid, 2001). Cultural proximity — i.e. sharing of common values — has been revealed to explain collective learning processes in the literature on innovative milieu (Keeble and Williamson, 1999) and knowledge transfer (Masciarelli, 2011; Stuart and Sorenson, 2003; Zander and Kogut, 1995). The degree of overlap between geographical, cognitive, social and cultural proximity implies that knowledge creation becomes spatially constrained a fortiori. Although offshoring firms may exploit the inherent potential of proximity when offshoring tasks to tap specialized knowledge created in foreign regional clusters, synthesizing and integrating it with home-developed knowledge may turn out to be more difficult and costlier due to the aforementioned cognitive and cultural barriers.

Distilling the relationships between multiple cultures and behavioral patterns of coordination in distributed settings is a fertile research ground for future empirical research. In addition, we submit that a focus on localized social capital (Laursen et al., 2012a, 2012b; Putnam, 1993) may help develop a better understanding of the cultural and cognitive distance. Specifically, understanding how local social capital enables overcome the challenges and capitalize on the possible benefits brought about by multiple cultures in distributed settings may further provide interesting insights. Social capital comprises both the network (structural dimension of social capital) and the assets that may be mobilized through that network (both relational dimension of social capital – i.e. trust, obligations – and cognitive dimension of social capital — shared codes, language, and narratives). Exploring these dimensions of social capital may provide a more comprehensive understanding of the dynamics of intra-group communication in multicultural distributed settings and of their impact on integration.

5.2. Routinized behavior and internationally distributed innovation

Product and process innovations increasingly require the integration of multiple knowledge bases that a single firm can hardly master alone (Freeman and Soete, 1997; Rosenberg, 1982). Extant research illustrated the inner workings of a variety of coordination

mechanisms – e.g. concurrent engineering and project management procedures – and their successful organizational implementations (Becker and Zirpoli, 2009; Cooper, 1990; Griffin and Hauser, 1996).

Nelson and Winter (1982) argued that routines – understood as "regular and predictable patterns" – support and manage innovation activities. Pavitt (2002) introduced the concept of innovating routines: patterns of behavior that inform innovation efforts and are instrumental to coordinating and integrating internal and external sources of knowledge, coping with uncertainty, learning by analyzing, and by doing. Research argued that routines act as coordination mechanisms as they make actors understand what activities have to take place to accomplish the task (Feldman, 2000), when each activity in the sequence is completed and the successive one starts (Kellogg et al., 2006; Okhuysen and Bechky, 2009; Symon et al., 1996); they foster interaction among the actors in charge of the different interdependent actions (Feldman and Rafaeli, 2002) and they "create a common perspective" among the actors on the work necessary to accomplish the task (Edmondson et al., 2001; Okhuysen, 2005; Okhuysen and Bechky, 2009).

We submit that understanding the functioning of innovative routines and their underlying micro-mechanisms in distributed settings may shed light on coordination of internationally distributed tasks. As long as patterns of interdependence and ensuing division of labor and knowledge are fairly stable, coordination relying on procedures and routines, action plans and schedules can be effective (March and Simon, 1958; Nelson and Winter, 1982; Thompson, 1967).

Multiple locations, priorities, incentives, and interests of the distant individuals and organizations may undermine the commitment of each member (Orlikowski, 2002) and increase the chances of miscommunication, and possible misunderstandings that in turn increase the probability of conflicts (Cramton, 2001; Olson and Olson, 2000). Therefore, taking a routine approach to understand how the co-existence of multiple cultures affects the emergence and evolution of routines in distributed setting may represent a valid approach to understand coordination.

5.3. Learning, trust and organizational design

Organizational learning occurs over time during offshoring relationships in both home and host firms, as they acquire experience to better manage offshoring relationships through the establishment of common norms and reciprocities between parties (Jensen, 2009; Olsson et al., 2008). Research documented that the development of trust informing offshoring relationships and the co-creation of complementary evolution of offshoring relationships leads to relational governance modes as opposed to contract-based, formal relationships (Vivek et al., 2009). Cumulated offshoring experience may eventually modify initial objectives and expectations. For instance, Angeli and Grimaldi (2010) found that accumulated internationalization knowledge was instrumental to identify new business opportunities, become integrated into the offshore cultural context, and align home and offshore operations (Angeli and Grimaldi, 2010; Eriksson et al., 1997).

Taking a process perspective to study the evolution of offshoring relationships may provide the basis to develop a comprehensive understanding of the contingencies that enable and/or hinder learning processes and how the latter influence the management of the offshoring relationships.

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