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The Geographies of Knowledge Creation over Distance: Toward a Typology

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Abstract

In the globalizing knowledge economy, firms have become less reliant on local production and market networks and increasingly expand their reach to an international or global scale. The argument of this paper suggests that this has given rise to distinct geographies of knowledge creation over distance, which rely on periodic or regular temporary face-to-face contacts. While some of these settings of knowledge creation have existed for a long time, they are now being intensively applied throughout the economy. In this paper, we develop a typology of these geographies based on three dimensions that characterize the conditions for knowledge exchange: (i) framing, (ii) cognitive focus and goals, and (iii) trust and risks involved. Based on these variables, we identify eight configurations of knowledge creation that build upon temporary face-to-face interaction, classified as (1) occasional, periodic global community gatherings, (2) regular international business travel and (3) ongoing transnational network relations. Systematic comparison reveals that with growing uncertainty in economic interaction and with increasing commitment between the agents, trust-based linkages tend to become more important and the number of interacting agents declines, while the frequency of temporary face-to-face meetings increases.

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Keywords: Geographies of knowledge creation over distance; temporary vs. permanent proximity; occasional global community gatherings; regular international business travel; ongoing transnational network relations

JEL Codes: D80, F20, L00, R10

1. Introduction

In the context of the globalizing knowledge economy, economic growth and competitiveness are increasingly dependent on trans-local, inter-regional and international knowledge flows between firms and their distant partners. The underlying debate about spatial architectures of learning and knowledge creation has given rise to what could be called a bifurcated literature. One stream of the literature focuses on localized learning and knowledge networks in territorial production systems that develop into regional clusters or innovation systems based on local culture and trust (Porter 1990; Cooke and Morgan 1998; Malmberg and

Maskell 2002). Another stream emphasizes international/transnational networks in organizing production and marketing within value chains and facilitating knowledge flows across local settings (Gereffi 1994; Dicken et al. 2001; Humphrey and Schmitz 2002). While the former literature discusses the advantages of local/regional relationships and networks based on permanent spatial proximity, the latter work focuses on the organization and coordination of wider international and transnational production networks highlighting issues of governance and power relations in learning and knowledge creation.¹

In recent years, investigations from both streams of literature have emphasized the need of combining local/regional with national/international perspectives of knowledge flows (Humphrey and Schmitz 2002; Malmberg and Maskell 2006; Bathelt and Glückler 2011). Along with this, it has been recognized that it is important to link distant economic centers of activity through various forms of ongoing, periodic or temporary face-to-face interaction. Indeed, the argument in this paper is that combinations of electronic and digital trans-local communication with temporary face-to-face meetings provide efficient ways of linking different locations of production, research and marketing with one another. Such settings form distinct ‘geographies’ that connect local, regional, national and international production contexts and generate linkages across them. They provide the architecture for flows of goods, people and knowledge and generate the basic conditions for expansive globalization processes in current capitalism (Giddens 1984). In fact, one could argue, that these practices are common to large and small firms, as well as manufacturing and service processes, in both urban and peripheral contexts,

¹ While trying to integrate these perspectives, we realize, of course, that our primary distinction of local versus non-local, or global, connections is an ideal-type and does not fully reflect the complex interrelationships involving multiple scales. In structuring our argument, we are primarily interested in the types of connections that develop between distant places, not so much on whether these are national or truly global in character.

thus greatly supporting the radical integration of global economic structures and activities in contemporary capitalism.

Although the importance of such configurations has also been recognized as being key to economic interaction in the globalizing knowledge economy (Thrift 2000; Amin and Cohendet 2004; Bathelt and Glückler 2011), limited comparative analysis has been conducted to explore the diverse nature and pervasive role of these settings. While the literature provides a rather fragmented picture of these geographies of global knowledge creation, systematic comparison allows us to identify the specific conditions of and potential complementarities between different global learning settings. In this context, the agenda of this paper is to structure the elements and characteristics of the geographies of knowledge creation that link distant settings through regular – occasional, periodic or frequent – temporary face-to-face meetings.

To formulate a framework that integrates the various settings of transnational knowledge creation, we first identify the specific agendas and circumstances of temporary face-to-face meetings, thereby distinguishing different contexts of interactions. Second, by building on previous empirical studies we describe the nature and the conditions of knowledge exchange and learning in these settings. Third, we reveal the corresponding relationships between different forms of permanent versus temporary proximities, spatial versus non-spatial affinities and trust versus risk trade-offs. Based on these fundamental dimensions, this paper develops a typology as an initial framework for further development, thereby contributing to the growing literature on knowledge creation over distance.

To conduct an analysis of different constellations of knowledge creation that is both conceptual and comparative in nature, we focus on typical constellations of knowledge generation over distance, rather than discussing all possible outcomes or deviations. As such, our

choices are selective² (Maskell et al. 2006; Rallet and Torre 2009; Bathelt and Turi 2011), and our characterization necessarily simplifies some of the processes involved in order to identify common characteristics and practices of trans-local business relations in the globalizing knowledge economy (Amin and Cohendet 2004).

Using this as a starting point, section 2 presents a conceptual discussion of the different geographies of making trans-local or global connections by combining temporary with permanent settings of interaction. From this, the principal dimensions for the development of a typology of knowledge creation settings over distance are discussed in section 3. The sections that follow systematically characterize the framing, cognitive focus/learning and trust/risk contexts of different settings of knowledge creation, distinguishing between occasional, periodic global community gatherings (section 4), regular international business travel (section 5) and ongoing transnational network relations (section 6). Section 7 concludes.

2. Making Global Connections – Combining Temporary and Permanent Settings

In the past decade, cross-national knowledge flows have increasingly attracted the interest of economic geographers and have resulted in different strands of literature: First, research on local/regional clusters and innovation systems has emphasized that industrial agglomerations, in order to be successful in the long-run, have to move beyond the range of regional networks/resources and connect systematically with resources, transaction partners and

² For instance, we do not include virtual interaction contexts, such as global virtual teams or Internet-based social networks (e.g., Maznevski and Chudoba 2000; Grabher et al. 2008), which sometimes also require face-to-face meetings. In fact, our assumption is that electronic and digital communication complement and enable the knowledge generation contexts discussed here.

markets outside the regional boundaries on a worldwide basis (Malmberg and Maskell 2006; Bathelt and Glückler 2011). It is the existence of such trans-local pipelines that generates access to new knowledge pockets, thus providing the basis for discontinuous innovation (Owen-Smith and Powell 2004). From a knowledge-based perspective of clusters, it has been emphasized that the nature of knowledge flows within localized industry settings – i.e., so-called local buzz – is much different from the more selective, directed and sometimes costly trans-local knowledge linkages – i.e., so-called global pipelines (Bathelt and Turi 2011; Fitjar and Rodriguez-Pose 2011).

Second, in recognizing the importance of international and transnational economic linkages, the literature on global value chains and production networks has emphasized the challenges and complexities in organizing and maintaining knowledge linkages that cut across national borders (Humphrey and Schmitz 2002; Gereffi et al. 2005; Coe et al. 2010). In such contexts, firms are connected that operate under fundamentally different institutional settings and are influenced by different cultural traditions. The corresponding literature analyzes how different transaction settings and power relations play out in various industry configurations and how this leads to different types of chains and learning dynamics that have distinct consequences for the development and upgrading of industries in different parts of the world. Typically, the focus of such studies has been directed towards the governance of highly complex global production and knowledge networks involving large numbers of firms (Humphrey and Schmitz 2002; Coe et al. 2010).

Third, research on proximity dimensions acknowledges that the organization of such cross-national production configurations is not a routine process. Rather, in focusing on the control mechanisms of economic processes, it has been argued that the shift from local towards

international and global production settings is accompanied by increasing diversity in institutional and cultural contexts, thus adding uncertainties and risks to these forms of organization (Rallet and Torre 1999; Boschma 2005). This literature suggests that firms can use specific strategies to overcome potential hurdles and reduce the degree of uncertainty in production – for instance, by generating new or exploiting existing organizational or relational affinities (proximities) associated with foreign affiliates. This can be controlled more easily through pre-existing ties, for instance through professionals who have known each other from joint former work or study experience (Malecki 2010).

Although research on local clusters, transnational networks and proximity relations applies different perspectives to analyze trans-local knowledge creation processes, individually these approaches are limited in developing a comprehensive framework. What appears to be lacking is, first, recognition of the importance, widespread character and multiplicity of different constellations of knowledge creation over distance. Second, a systematic discussion does not exist of how different forms of knowledge creation over distance can be initiated or enabled, and how these forms provide preconditions for the establishment of global pipelines in transnational production networks.

Similar to economic geography, discussions in social psychology have traditionally emphasized the importance of face-to-face-based interaction, suggesting in the so-called ‘social-presence theory’ that such interaction is superior to other forms of interaction (Walther et al. 2005). This strain of literature emphasizes the importance of simultaneous verbal and non-verbal cues in face-to-face interaction. Through its multiple informational and integrational functions (Short et al. 1976), face-to-face communication enables efficient discussions of complex economic and technological issues. Topics discussed in face-to-face interaction can immediately

be adjusted to feedbacks thus making complex messages and concepts easy to comprehend (Storper and Venables 2004). At the same time, so-called 'equilibrium theory' has shown that social relations in economic interaction can also be established without permanent co-location, based on computer-mediated, text-based communication alone (Olsen and Olsen 2003; Walther et al. 2005). If one firm is interested in a new partnership with a distant firm, it will likely provide abundant information about itself and its products, thus hoping to stimulate a similar reaction of the potential partner. Such a reaction would signal to the first firm that it should continue to provide knowledge and engage in further communication and, eventually, in transactions. Accordingly, firm representatives provide each other with additional knowledge until they reach an equilibrium comfort level that suffices to engage in ongoing transactions (Bathelt and Turi 2011). Of course, modern Internet-based social networks, providing more sophisticated means to establish social relations over distance (e.g., Leamer and Storper 2001; Jeppesen and Molin 2003), add even more cues and complexity to economic interaction, compared to text-based communication.

If computer-mediated communication can already stimulate the development of reciprocal ongoing inter-firm relations, we can imagine how much greater the potential for close relationships is, if patterns of Internet-based and face-to-face interaction are combined with one another. Rather than viewing such different contexts of communication as competing with one another, their potential appears much greater when applied simultaneously (De Meyer 1991; McDonough et al. 1999). In reality, we find widespread practices of economic interaction that make use of multiple constellations of interaction and communication thus enabling knowledge creation at an international scale in efficient ways and at relatively low risk. This includes, as

emphasized in this paper, combinations of temporary co-presence and face-to-face interaction between actors from permanently separated entities.

Recognizing the importance of knowledge creation in temporary face-to-face settings, the recent literature on temporary clusters emphasizes the importance of international trade fairs during which broader communities of a global industry or technology field meet over a few days to discuss the development of their industry, new innovations and market trends and to make contact with potential partners (Maskell et al. 2006; Borghini et al. 2006). Such processes are based on face-to-face communication during these events and possibilities for observation. Large business conferences and conventions operate in a similar manner. While the definition of such events as ‘temporary social organizations’ applies to almost every conference or trade fair, related studies have been primarily interested in so-called field configuring events (Lampel and Mayer 2008). This term is used to describe hierarchically organized events in periods of radical technological change which serve to establish joint visions and understandings of a new technology and its future directions, as described in case studies by Garud (2008) or Möllering (2010). Such an approach, however, can hardly characterize the functioning of most trade fairs and conferences. What appears to be more typical for these events is the way in which industrial and technological development is shaped in incremental and decentralized ways,³ rather than through top-down agenda-setting.

Other forms of professional mobility and temporary proximity become important when one or several complex organizations establish international or global presence and are being

³ For example, knowledge gained during planned and unplanned meetings between producers and potential users or through systematically scanning the exhibits of competitors provides a vital source for product improvements when applied to the individual firms’ specific contexts (Bathelt and Glückler 2011).

linked with one another. In these configurations, interaction and knowledge exchange are more focused and goal-oriented, compared to trade fairs and conferences. Hsu and Saxenian (2000), for instance, show how highly-skilled re-migrants from Taiwan (called the ‘new Argonauts’) who have worked in Silicon Valley and later establish new businesses in Taiwan have provided crucial growth triggers to the development of the Hsinchu high-technology park in their home country, while simultaneously increasing the competitiveness of their clients in Silicon Valley. Such successes have been found to rely on close social relations and networks supported by regular temporary meetings around these transnational entrepreneurs, who travel back and forth between the various contexts.

Building upon a unique type of strong social relations, transnational family enterprises are similarly characterized by international production settings that connect different permanent locations through temporary forms of interaction. The mechanisms at work in such settings become clear in studies such as that of the Palanpuris family-business networks which connect different locations in the global diamond production and trade (Henn 2012; 2013). Here, temporary proximity meetings are based on relational ties between family members that are distributed across different countries. A similar concept, but without equally strong ties, is that of transnational corporate networks that are connected through managers, who reside, for a certain time period, at different corporate locations worldwide and create ties to the headquarter locations (Coe and Bunnell 2003; Depner and Bathelt 2005; Ivarsson and Alvstam 2005; Millar and Salt 2008). All of these cases are characterized by durable inter-personal relationships between experienced professionals that are tied to the same sets of loyalties, while being located in different places or occasionally switching their home base.

Another set of configurations relies on hyper-mobile managers and technical specialists who regularly move between different corporate locations, for instance, to coordinate different production stages. They use modern air travel to access different corporate sites, thus connecting them physically (Aguilera 2008; Wickham and Vecchi 2008; Beaverstock et al. 2009). The more frequently they go back and forth, the closer the respective affiliates become in terms of unified governance (Jones 2007; Faulconbridge et al. 2009).⁴ This context of knowledge creation over distance includes managers commuting between different corporate affiliates, as well as technical specialists connecting a producer with its user industries by making frequent site visits, repairs and adjustments. It also includes business meetings between managers and executives of different firms who get together on neutral ground over an extended time period in preparation of a radical change in operation, related, for instance, to a merger, acquisition or joint venture.

All these constellations of knowledge generation are characterized by the fact that different parts of the business are spatially separated and need to be connected through temporary face-to-face-based linkages. Air travel, international airports and their infrastructures play an important role in enabling such meetings and corresponding forms of knowledge creation over distance (Beaverstock et al. 2009).⁵

Based on this discussion, we develop a typology of settings and systematically analyze the different forms of interactions as expressions of distinct global geographies of knowledge creation over distance. While the various configurations have been treated in the literature as separate phenomena, we suggest that they have collectively gained in importance as

⁴ As suggested by Lassen (2006), such hyper-mobility involves complex interrelations between work, travel and leisure activities.

⁵ It should be emphasized that much of this traffic takes place within national boundaries and, due to dense networks of flight connections, can be conducted on a daily basis.

globalization processes have intensified since the 1990s and as international and global production settings have become widespread learning platforms in the modern knowledge economy.

3. Dimensions of Knowledge Creation over Distance

Rather than treating different phenomena as separate constellations, this section aims at developing a typology of combinations of distant and co-present economic interaction that represent the diverse global geographies of knowledge creation over distance. Any such typology needs to focus on the way how interaction is organized, the combination of individual and collective goals and incentives involved, as well as the specific forms of how knowledge is exchanged. As argued below, this interaction is fundamentally structured by and dependent upon (i) the context and framing of knowledge exchange, (ii) the cognitive focus and goals of face-to-face meetings and (iii) the risks of interactions and associated trust requirements. These dimensions are used to further differentiate specific subcategories of knowledge creation over distance.

(i) *Framing*. Depending on the basic environment and set-up of the respective meetings, such as periodicity, duration, place and size, the participants have different expectations, notice different features and act differently. Temporary meetings can also be viewed as sociological frames (e.g., Skov 2006) that help actors to define situations in which they can present themselves in an adequate manner and make sense of their perceptions, thereby ‘setting the stage’ for knowledge transfers during these meetings (Goffman 1974; Bateson 1972).

(ii) *Cognitive focus and learning*. The creation of new knowledge requires that the actors have sufficiently different knowledge bases (Nooteboom 2000). At the same time, however, they need to have similar cognitive foci in order to efficiently communicate and understand each other

(Cohen and Levinthal 1990). While this is clearly necessary for interaction at the local level, it seems even more important in an international context, in which agents act upon different norms and speak different languages – all of which may hamper knowledge flows (McDonough et al. 1999; Gertler 2003; Bathelt and Glückler 2011). In our typology, we incorporate related aspects by investigating the common basis of interaction, which strongly impacts cognitive proximity between the actors. As the transfer of knowledge may be facilitated through different types of affinities or proximities (e.g., Rallet and Torre 1999; 2009; Boschma 2005), we identify those proximity dimensions that are particularly characteristic of the different settings. Additionally, these features impact the type of knowledge exchanged. Due to regular interactions, for example, ongoing network relations enable the establishment of trust (Gulati 1995) which helps to facilitate the transfer of tacit knowledge (Gertler 2003), while occasional meetings favor the exchange of codified knowledge (e.g., brochures and reports).

(iii) *Trust and risks*. The exchange of certain types of knowledge may involve risks related to opportunistic behavior of partners. Such risks become more likely when firms originate from geographically distant locations and meet only temporarily. In such settings, it may be difficult to monitor others or to prosecute parties that fail to comply. Different kinds of trust may be mobilized to deal with behavioral uncertainties in interaction thereby reducing existing risks (Gulati 1995; Gertler 2003; Murphy 2006). Furthermore, potential sanctions enforced through third parties (e.g., courts) or collective action (e.g., discharge from families) may help to avoid the misuse of trust and stabilize interactions and knowledge flows between the actors (Coleman 1990; Portes and Sensenbrenner 1993; Herreros and Criado 2008). Our typology considers the potential risks associated with different settings of knowledge creation over distance, the kinds of

trust that exist between the agents involved (or that is required) and the potential sanctions which can be imposed upon other agents to secure cooperation.

Based on these criteria, we identify three types of configurations of knowledge creation over distance that systematically involve temporary face-to-face meetings. According to the frequency of face-to-face interaction and the combination and number of actors engaged, we refer to these types as: (1) occasional, periodic global community gatherings,⁶ (2) regular international business travel and (3) ongoing transnational network relations.⁷ These different configurations and their subcategories are discussed below.⁸

4. Occasional, Periodic Global Community Gatherings

Occasional community gatherings involving a broader – sometimes global – community of specialists and firm representatives from a technology or industry field, encompass trade fairs – especially international flagship fairs – as well as corporate conferences and conventions (Table 1). These gatherings have in common that they are highly planned, last only one or few days and occur with a periodicity of one meeting per year or every few years. They often involve additional spectacle and cultural events and take place in dedicated trade fair, conference or

⁶ Even though these meetings are temporary in nature, the involved agents may be part of permanent communities of practice or epistemic communities.

⁷ We have to consider that all of these temporary face-to-face meetings may give rise to different forms of routinized or follow-up contacts. Such follow-ups will, however, not be dealt with in this paper.

⁸ In our discussion, projects are not listed as a distinct category since each of the settings may “provide the social and organizational fabric for temporary and recurrent collaboration in projects” (Grabher 2003: 75), thereby facilitating the formation of project ecologies.

convention centers. Places of such events also include luxury hotel complexes with integrated large-scale conference facilities (McNeill 2009), often characterized by modern infrastructure and flamboyant architecture. The location of these centers in the urban landscape varies. In many cities, they are located close to the downtown area or even in the center of a metropolitan area, while other cities have modern meeting places at peripheral locations, close to a larger airport. In many cases, the destination of an event becomes an “ ‘add-on’ to the essential purpose of the meeting itself” (Hiller 1995: 376). Occasional community gatherings bring together hundreds or even thousands of firm representatives.⁹ Agents, who attend, have broad, often not clearly defined agendas and are interested in short-term intensive exchanges. Long-term relationships between firms may develop, but this is not imperative and happens later. Such relationships are sometimes intended or occur as a by-product of meeting new business partners.

Insert Table 1 about here

4.1 Trade Fairs

(i) *Framing*. International trade fairs bring together large communities of executives, technical specialists, sales managers, researchers, as well as media representatives and multipliers, related to an entire industry or value chain. They sometimes form a “microcosm of the industries they represent” (Rosson and Seringhaus 1995: 87) engaging in broad, intensive, short-term interaction with each other. The participants have clear roles as exhibitors, buyers, potential customers/suppliers, economic partners or multipliers – or perform several roles at the

⁹ Depending of the size of the related industry context and the specific characteristics of its knowledge base, some events may also be smaller having less than one hundred participants.

same time (such as being both exhibitors and visitors). Most trade fairs also involve convention and conference elements through which they share similarities with the latter types of events. Participants at trade fairs get in contact with one another in different ways, for instance by visiting exhibition booths or during dinner conversations. Sometimes, face-to-face meetings are arranged prior to the gathering or follow a prepared pattern, but, often, there are also spontaneous random interactions through combinations of on-site and off-site meetings (Bathelt and Schuldt 2010).

The goals of the participating firm representatives are manifold, diverse and diffuse. Many exhibitors just want to present their production program and innovations to a broad audience or to inform themselves about new developments in a global industry setting. However, other firms have more specific goals. While some may look for new technologies or artifacts to be applied to their production context, others may be interested in new ideas for future innovation, or their goal may be to find potential future customers and suppliers, or deepen contact with existing ones. Additionally, some firms may interact in more conventional ways and buy or sell products or negotiate contracts during a fair.¹⁰ Often these gatherings do not end with a specific set of actions or a final conclusion, but are starting points for further inquiries and become integral parts of decision-making processes that take place later on. As a consequence of the diffuse practices of learning by interaction and learning by observation (Rinallo and Golfetto 2006), trade fairs generate what has been referred to as ‘global buzz’ – a specific knowledge ecology that helps to reduce uncertainties of market and technology development (Maskell et al. 2006; Bathelt and Schuldt 2010). As a result, participants, when they return home, share up-to-

¹⁰ Empirical studies identifying these practices include Borghini et al. (2006), Power and Janssen (2008), Ramírez-Pasillas (2008) and Schuldt and Bathelt (2011).

date knowledge within their firms about the state of the industry, supporting decisions regarding future production and helping to make adjustments to existing production patterns.

(ii) *Cognitive focus and learning*. The common basis for interaction during a trade fair is the industry, technology or value-chain focus of the participants. The participants have a partly overlapping, partly deviating knowledge basis, related to their positions and functions (Bathelt and Schuldt 2010) and thus share a knowledge base that is cognitively related (e.g., Nootboom 2000). Interactions during trade fairs are generally focused on the artifacts presented and their characteristics (Borghini et al. 2006). The type of knowledge that is exchanged and circulated varies, however. It is often primarily codified in character, but also involves important systemic/architectural or design elements that allow experienced participants to make implications about tacit components of the exhibits and their foundational principles.

(iii) *Trust and risks*. Although repeated meetings during the annual cycle of trade fairs in an industry help to create personal relationships and trust over time (Power and Janssen 2008), trust usually does not play a key role in interactions.¹¹ This is because initial commitments are low and risks limited. Some visitors may steal ideas or copy designs but organizers establish rules to minimize such adverse behavior, for instance, by systematically separating out exhibits with evidence of intellectual property right infringements or by banning visitors from taking photos (Bathelt and Schuldt 2010).

4.2 Conferences and Conventions

(i) *Framing*. Conferences (and similarly conventions) bring together firm representatives from a specific community defined around a joint topic of interest, such as investment specialists

¹¹ Of course, this may be different for producers and users who have already developed a close relationship from prior interactions.

in an investment conference or members of a professional association in an annual meeting. The participants establish a closely defined community of specialists with similar educational backgrounds, functions and experiences in their respective firms. They form an epistemic community (Knorr Cetina 1999) that shares certain codes of conduct in doing business. Such a setting even stimulates discussions between representatives of firms that are direct competitors in the same market segments. A key component of conferences, more so than of trade fairs, is their organization around well-known researchers and broadly-respected experts in the field. By giving keynote speeches and presentations, these key individuals contribute fundamentally to the collective sense-making that takes place at these events. Through their statements and comments, they become reference points for evaluations of other participants. When conferences are rigidly planned and arranged by the organizers around a new core technology, they may develop into field-configuring events (Lampel and Mayer 2008), but such events are not very frequent. Participants join conferences based on self-selection or designation, depending on the specific topics discussed and the likely presence of other participants. The more specific a business conference, the more likely firm representatives know other attendees or similar specialists from previous such events. Often conferences have a trade fair component where producers – sometimes the participating firms themselves – exhibit artifacts closely related to the conference topic and the specific community that meets.¹²

Conventions in the sense of total-membership meetings (e.g., annual meetings of professional associations) (Lawson 1980)¹³ also involve keynote speakers, such as politicians or

¹² Although empirical evidence regarding knowledge creation is limited, an illustrative case study can be found in Möllering (2010).

¹³ There is no generally accepted definition of a convention (Weber and Chon 2002). Hiller (1995), for example, uses the term when referring to large conferences, while Kerr and King (1984) distinguish both types.

industry leaders. Compared to conferences, however, these events do not primarily aim at presenting new developments, but rather at creating a sense of togetherness by stressing the role and relevance of the organizing body. In addition, conventions include presentations that inform about past developments, future plans and the distribution of resources, as well as about awards and charities. As they bring together members of an organization or association in a particular technological or industrial field, there is a high probability that the participants get to know each other over time. Often, conventions include elements of trade fairs and/or conferences (Zelinsky 1994).

The principal agenda of firms participating in conferences is to listen to state-of-the-art presentations in specific business areas, for instance related to technological or market developments, and to discuss the relevance of these topics with other participants. Several goals can be associated with this (e.g., Garud 2008): Firms may be interested in a rigorous discussion of competing technical solutions and in participating in collective interpretation and sense-making processes. Additionally, firms may try to achieve a temporary competitive advantage or a head start from the conference discussions, compared to other firms that do not participate. Aside from official discussions and debates, off-site lunch or evening discussions can be important in evaluating the potential of new solutions, making new contacts and searching for solutions to shared problems. In contrast, conventions aim at legitimizing past developments and at finding consensus about intended future developments (i.e., in the form of roadmaps) (Ladkin and Spiller 2000). This may include elections of board members and discussions about future

Accordingly, conventions include delegates or representatives related to a specific membership organization or association, whereas conferences can also encompass other interested individuals of a community, not bound to a specific membership.

strategies. Like conferences, conventions also generate opportunities for informal discussions (e.g., receptions) that allow for the establishment of contacts and the exploration of future cooperation (McIntyre et al. 2007).

(ii) *Cognitive focus and learning.* In the case of conferences and conventions, the attendees' cognitive focus that enables important knowledge exchange is closely related to the knowledge base of the respective epistemic community (Knorr Cetina 1999) and the existence of similar goals of participation. Exchanges are based on cognitive and social proximity as many participants have similar positions in their firms and face similar sets of problems. While the knowledge circulated via presentations is largely codified in nature, the participants share similar tacit experiences associated with this knowledge when translating it into corporate contexts (Möllering 2010).

(iii) *Trust and risks.* The risk of interaction is low as long as participants avoid talking about sensitive contexts. Interaction is not based on and does not require personal trust, but, instead, builds upon professional and institutional trust related to the code of conduct of the profession (e.g., Bachmann 2001; Murphy 2006). If individuals misbehave or gossip too much, or if they are biased and prejudiced, other participants can easily avoid them or immediately end a discussion. In general, however, attendees come with a mindset of sharing ideas and knowledge. An important learning mechanism of such events is thus related to transferring experiences of others into their own business context and focuses on horizontal learning from competitors (Li 2013).

5. Regular International Business Travel

In comparison with occasional global community gatherings, regular international business travel involves fewer individuals – usually executives, decision-makers or highly

specialized technical staff – who meet in order to coordinate production between different spatially separated corporate sites, engage in ongoing producer-user collaboration or prepare strategic business decisions, such as takeovers, mergers or strategic alliances (Table 2). These meetings take place several times a year, from weekly coordination meetings to bi-annual meetings with corporate customers discussing ongoing collaborations. Meeting places are often the corporate plants or specific sites of production that are of interest. An exception are negotiation meetings in preparation of strategic decisions between two firms, which tend to take place on neutral ground, possibly in luxurious conference or airport hotels (e.g., McNeill 2009).

The duration of these meetings is relatively short, ranging from several hours to a few days. When agents travel to such meetings, they have a clearly defined, well-prepared agenda that is directed to maintaining or adjusting existing trans-local relationships or creating new ones. As opposed to the diffuse community gatherings, these forms of business travel involve medium- or long-term commitments. Two types of practices can be distinguished in this respect: On the one hand, business travel may be open-ended and become standard practice in ongoing producer-user relations or intra-firm communication. On the other hand, such travel may be project-related and continue only until an intra-firm or inter-firm project has been terminated (Grabher 2004; Ibert 2004), or a collaboration or merger agreement has been signed. In most cases, firms connect with their international business environment by the means of regular air travel (Wickham and Vecchi 2008; Beaverstock et al. 2009; Faulconbridge et al. 2009).

Insert Table 2 about here

5.1 Intra-firm Business Coordination

(i) *Framing*. These meetings typically involve middle/upper management and technical specialists who travel back and forth between different corporate affiliates. Such meetings are directed at maintaining corporate business relations, product flows or research projects. They take place in different ways (Millar and Salt 2008): In their most intensive form, management representatives may have numerous offices simultaneously at different sites and travel on a weekly basis between these sites that are located in different cities or even countries. Or, technical specialists may go back and forth to make sure that different production settings are in synchronicity with each other. This travel is often hierarchical in nature and involves center-periphery connections, directed from the headquarters to decentralized business locations, and vice versa.¹⁴

Goals of these meetings are related to the contextualization of knowledge as in the case of global R&D communication (De Meyer 1991), as well as the maintenance of trust and the assurance of smooth and efficient relationships between different corporate units. The individuals going back and forth ensure a high consistency in production, reliability in working on joint contracts, a clear-cut division of labor between corporate sites and/or enable ongoing coordination in day-to-day decisions. To date, relatively little is known about the specific practices of knowledge generation in such configurations, other than that they seem to have gained in importance since the 1990s – despite increasing efforts to cut costs and despite the use of video-conferencing (Lu and Peeta 2009). It appears that such practices generate a high level of control and ensure coherence across spatially decentralized production settings.

¹⁴ Empirical studies dealing with some forms of intra-firm business coordination include, for example, De Meyer (1991), McDonough et al. (1999) and Adenfelt 2010.

(ii) *Cognitive focus and learning.* The cognitive focus allowing for complex knowledge circulation in these settings draws upon professional and personal continuity within a corporate setting and is driven by organizational proximity (Bathelt and Turi 2011). Through hyper-mobility, such configurations may generate settings of quasi-co-presence without permanent co-location, based on very regular temporary meetings (e.g., Lassen 2006). One could almost say that distant production sites become neighbors through such practices. Rather than constantly communicating between diverse knowledge bases across different locations, it is the embodied knowledge base of one or few key managers that is being shared in these settings through frequent commutes. This allows for maximum synchronicity and fine-grained adjustments. Such practices of regular business coordination enable the transfer of both codified and highly complex tacit knowledge. Learning processes that are particularly important in such settings are based on participating simultaneously in different contexts.

(iii) *Trust and risks.* While the general production context may be highly complex and sensitive to coordination failure, such settings provide the most secure basis for interaction aside from permanent co-presence and close spatial proximity. Through practices of temporary co-presence at different locations, trust is established and transferred between these locations. Regular interaction generates professional trust, but also stimulates personal trust (e.g., Glückler 2004). Mechanisms to prevent or sanction deviating behavior are basically the same as in the case of unified governance at a single location, ranging from replacing to firing key individuals.

5.2 Producer-User Meetings

(i) *Framing.* These meetings are part of ongoing producer-user relations, in which technical specialists visit their clients' production facilities or in which service staff members regularly visit customers to adjust or renew existing relationships (Lundvall 1992; Gertler 2004).

Such visits typically take place once or twice a year, or if some unexpected changes occur in the production or market context. Alternatively, such meetings may be driven by joint projects and involve collaboration with respect to the specific project goals. In these cases, meetings may occur more frequently (e.g., on a monthly basis), supported by frequent electronic and digital communication.

The agenda behind such meetings involves maintaining a well-functioning inter-firm production setting, preparing new cooperation projects between firms and/or enquiring about the efficiency of existing producer-user arrangements. Goals are, on the one hand, to strengthen existing business relationships, and, on the other hand, to learn from customers and clients about ways of how to improve products and gain insights for future innovation. As such, these meetings are driven by processes of learning by interaction (von Hippel 1987; Lundvall 1992).¹⁵

(ii) *Cognitive focus and learning.* The cognitive focus of such meetings results from involving specialists who are part of specific communities of practice (Wenger 2000), although their basis can also be broader. The individuals engaged have complementary knowledge bases that generate interdependence between the respective firms over time within a common value chain context. When interaction is focused on specific artifacts, such as complex machinery, knowledge exchanges involve specialized implicit knowledge, while discussions about potential future projects benefit from a balanced mixture of codified and tacit knowledge. Interaction that takes place in regular intervals is based on cognitive-technological and quasi-organizational proximity (e.g., Rallet and Torre 2009).

¹⁵ Empirical studies can be found in Britton (2003) and Gertler (2004), or, more generally, in Grabher et al. (2008).

(iii) *Trust and risks*. The overall risk of interaction in such settings increases with growing transaction costs, especially related to higher frequency and factor specificity of transactions (Williamson 1985) – although pre-existing long-term relations with specific partners and joint histories of problem-solving may serve to keep uncertainties at bay. In any case, if deviant behavior becomes a problem, firms may enforce contractual penalties and eventually choose to exit existing relationships. Although this apparently does happen, inter-firm relationships in many industry contexts are characterized by continuity and open-ended relations (Bathelt and Glückler 2011). In producer-user relationships that have existed over a longer time period, professional and personal trust may become intermixed (e.g., Ettlinger 2003; Murphy 2006).

5.3 Inter-firm Business Negotiations

(i) *Framing*. In such settings, meetings may take place when a small number of firms prepare an intended strategic move in the near future. Related meetings involve only a few people, especially decision-makers and upper management representatives, sometimes also third parties like lawyers, consultants or subcontractors. They take place in a convenient, relaxed atmosphere (Ghauri 2003), preferably on ‘neutral ground’ (Mayfield et al. 1998), to allow participants to fully focus on developing their joint agenda further. The representatives of the firms might not know one another well and have possibly only met briefly at trade fairs or conventions in the past or been introduced to each other by e-mail through a lawyer or business association. In any case, these meetings bring together individuals from highly specialized communities that engage in both important pre-negotiations in which they analyze each other’s positions and exchange corresponding knowledge (Ghauri 2003) and the negotiations themselves (so-called due diligence process), while, at the same time, getting to know one another better.

Due to the complex task at hand, they meet regularly over a certain time period until their negotiations come to an end, or until they are broken up. Because of the severe potential consequences of the outcome on either of the firms (e.g., in terms of employment or stock market effects), these meetings tend to be highly secretive and only few people might be informed about them. In terms of empirical evidence, little has been published about the knowledge generation practices during such meetings (e.g., Reynolds et al. 2003) – aside from negotiation tactics and styles (e.g., Zhao 2000; Elahee and Brooks 2004) and aside from the goal of preventing that knowledge about the nature of the negotiations leaks out, similar to what Owen-Smith and Powell (2004) describe as a sprinkler effect.

The goal of these meetings is to prepare and sign a contract regarding a merger, acquisition or partnership between a limited number of firms, or to prepare some other strategic decision (e.g., a radical technological shift). This might, on the one hand, be a normal process during which goals are agreed upon and details of the contractual arrangements – including potential sanctions regarding deviant behavior – are discussed. On the other hand, such meetings might involve elements of collusion and may be directed toward illegal market practices, such as hidden price fixing (Genesove and Mullin 2001). The meetings may end with a signed contract or without any agreement. In the latter case, there is a possibility that firms may depart from such meetings with bad feelings or adverse relationships, which may negatively impact future business performance.

(ii) *Cognitive focus and learning*. Such meetings are based on (perceived) identical goals, a shared knowledge base and joint understanding of the future industry or technology field. The agenda of such meetings may be to reconfirm cognitive proximity and transform this into

organizational proximity (Nooteboom 2000) and to establish a knowledge base that contains tacit and codified elements in a codified form (e.g., technical hand-/codebook).

(iii) *Trust and risks*. Since the results of such negotiations have substantial consequences and since the involved parties do not necessarily know one another well, the meetings are characterized by a high degree of uncertainty. If the parties do not know one another, regular communication in a series of meetings may serve to create a professional trust basis (e.g., Bachmann 2001). Decision-makers use such meetings also to better understand each other's intentions and capabilities. All of this requires that the parties negotiate potential sanctions in detail, as described in transaction-cost theory (Williamson 1985). From the very beginning, exit is a realistic option in each party's set of possible actions. It is the combination of a relaxed atmosphere in a series of one-to-two-day project-related meetings, while also sharing personal information and getting to know each other better, through which both sides build up professional trust and reduce uncertainty. In other words, they use these meetings to check out the congruence of intentions and the existence of a 'shared chemistry' between the firms and individuals involved.

6. Ongoing Transnational Network Relations

In comparison with occasional global community gatherings and regular international business travel, ongoing transnational network relations represent a fundamentally different setting of knowledge creation over distance. In the internationalization process, such settings are the expression of attempts to provide stronger corporate control over and closer ties to subsidiaries and branches in different countries often across different cultural and institutional settings (Dicken 2007). Corresponding network relations are organized in a way to provide access to decentralized local knowledge and markets in one or several host countries (Malecki

2010). Different constellations that can be found have in common that they are the result of firms seeking permanent proximity for some operations at the expense of long-distance relationships with the corporate core (Table 3). Often this involves that certain activities or functions are being relocated. Relationships with foreign operations are based on co-location (e.g. Ivarsson and Alvstam 2005), while former ties are transformed into long-distance relationships.

Strategic moves to establish such networks involve foreign direct investments and are the expression of open-ended quasi-permanent commitments. Individuals linking these spatially separated sites involve transnational entrepreneurs, expatriates and/or family members. As boundary-spanners (Coe and Bunnell 2003), these agents create durable corporate linkages based on personal and professional relationships. They engage in ongoing communication and interaction through electronic and digital media that benefit from pre-existing – sometimes primordial – relational ties (Amin and Cohendet 2004; Bouba-Olga and Grossetti 2008; Bathelt and Glückler 2011). Personal meetings take place more or less regularly and may last a few days, in the case of specific intra-firm projects possibly even some weeks or months. Such transnational network settings are characterized by ongoing interaction punctuated by personal meetings with temporary face-to-face communication.

Insert Table 3 about here

6.1 Transnational Corporate Networks

(i) *Framing*. Transnational corporate networks are created when firms from one country establish subsidiaries or branches in another country via foreign-direct investments. As expressed in Dunning's (1988) eclectic paradigm, such investments involve decisions regarding

organization, localization and internalization. No matter whether new affiliates are established as Greenfield or Brownfield investments, their activities eventually have to be integrated into the firm's overall activities (Glückler 2006). To guarantee control over this process and establish knowledge flows with other corporate affiliates and decision-making centers, firms designate experienced managers or technological experts quasi-permanently to the new location, arranging a rotation of personnel after a period of one to four years (Millar and Salt 2008). These agents connect the different cultural and institutional settings between home and host country and communicate with their corporate headquarters on a daily basis (Coe and Bunnell 2003). In addition, the distant localities are also linked through face-to-face meetings at the foreign branch or headquarter sites.¹⁶

Although boundary-spanning individuals may not always be at the top of the corporate hierarchy, their roles can be central to the success of such ventures (Depner and Bathelt 2005). The goal of this organizational form is to provide access to specific cultural and institutional characteristics of the host market that may stimulate rounds of innovations for the entire firm. The sort of market or technological knowledge targeted in this process may be difficult to access over distance (Dicken 2007). Boundary-spanners are, therefore, in place to secure predictable and reliable production flows across the corporate value chain (De Meyer 1991; Coe and Bunnell 2003). Their role is to mediate between different cultural and institutional contexts and to translate messages and structures between them, thus creating affinity and consistency.

(ii) *Cognitive focus and learning*. The common basis of communication between these sites is joint governance within a hierarchical corporate structure. The corresponding affiliates

¹⁶ Interesting empirical studies can be found in Ivarsson and Alvstam (2005), Depner and Bathelt (2005) or Glückler (2006).

are characterized by organizational integration and generate permanent spatial proximity to new markets – while, at the same time, creating new distances on other ends of the corporation (Bathelt and Turi 2011). They connect knowledge pools in different countries and, depending on communicative capabilities and corporate-wide legitimacy, contribute to intra-firm cross-fertilization of these knowledge bases. Although initial investments may be experimental in character, commitments increase over time, while uncertainties persist. By investing in foreign markets, firms aim at getting access not only to explicit knowledge, but especially to implicit knowledge that is characteristic of such contexts (Ivarsson and Alvstam 2005).

(iii) *Trust and risks*. Uncertainties involved can be kept at bay through ongoing interaction, albeit that certain risks remain – for instance, related to intellectual property right infringements or conflicts between the domestic labor force and foreign leadership (Depner and Bathelt 2005). Such settings are based on high professional trust into the capabilities of the boundary-spanners. Due to regular communication, trust-filled personal relationships may develop over time with contacts both in the home and host country. If, however, a boundary-spanner does not perform as well as expected or is not able to solve communication problems, the person will be displaced and relocated.

6.2 New Transnational Firms

(i) *Framing*. Like transnational corporate networks, transnational family firms generate transnational connections between the production and knowledge spheres of two or more countries. Corresponding linkages may be established by so-called ‘new Argonauts’ (Saxenian 2006) who originate from developing countries or emerging markets and have left their country of origin to study or work in developed economies. Over time, they have developed competencies that enable them to identify market gaps and to establish new businesses in both

their home and host countries while, at the same time, maintaining their contact networks and research activities on both sides. Other types of transnational firms are related to so-called transnational entrepreneurs who also typically originate in developing countries and establish new firms in their industrialized host countries (Portes et al. 2002). These entrepreneurs perform at least two decisive tasks at both ends of the networks they have established. First, they become executives and determine the direction of production and research across the different sites. Second, they operate as boundary-spanners and actively bridge the different cultural and institutional systems between the countries (Saxenian 2006). By exploiting intercultural knowledge, these firms gain competitive advantages compared to those who are located at just one location (Drori et al. 2009). As a consequence, the entrepreneurs frequently have to go back and forth between the production sites in both countries. Although this is organized along a planned schedule, the need for spontaneous meetings and business travel makes such schedules obsolete at times. Aside from temporary face-to-face coordination and decision-making, ongoing electronic and digital interaction guarantees synchronicity of actions.¹⁷

The goal of these transnational firms is to establish ongoing production networks between the home and host country locations in order to achieve specific cross-country competitive advantages (Hsu and Saxenian 2000; Drori et al. 2009). Since the governance structure of these firms is hierarchical, it is less difficult to exercise control over all contexts. As such, the firms benefit from cognitive, cultural and spatial proximity, through which they stimulate growth at each end.

¹⁷ Insightful studies of such transnational firm networks include Hsu and Saxenian (2000) and Portes et al. (2002).

(ii) *Cognitive focus and learning*. The common basis for interaction is related to unified governance and competent experience-based knowledge of the production conditions in the different country contexts. Since investments and connections are meant to generate synergies, they focus on mobilizing complementary capabilities in the home and host countries. The decisive knowledge component in organizing these networks is implicit, but this is, of course, coupled with important codified knowledge. The key knowledge bases are embodied in the person of the entrepreneur and, possibly, few close staff members who also share a bi-cultural experience (e.g., Williams and Baláz 2008).

(iii) *Trust and risks*. Typically, these networks rely on personal relationships and involve both very high personal and professional trust. Since few individuals around the entrepreneurs control strategic and day-to-day decision-making processes on all ends, the risks in interaction are relatively low. When the professional character of these networks becomes dominant, however, uncertainties may increase and risks become greater. If such relationship networks do not work well or generate frictions, exit from a partnership and exclusion of the respective partner can be the consequence.

6.3 Transnational Family Businesses

(i) *Framing*. Transnational family businesses create wider production and business networks based on family relations, by the way of sending family members off to establish and control affiliates in other countries (Yeung 1998). Such organization results in very rigid and closed forms of governing knowledge generation over distance, as discussed in empirical studies of Chinese family business networks (Tsang 2001) or transnational businesses of Indian families in the global diamond production and trade (Henn 2012). Because of close family ties, these businesses are under quasi-unified governance and, although they may be dispersed globally,

there might not be a need for frequent or extended face-to-face meetings.¹⁸ When problems arise, they can likely be solved through electronic or digital forms of communication. Occasional meetings might be aligned with family celebrations or get-togethers and thus simultaneously serve multiple professional and social purposes. Face-to-face meetings likely take place at the different family homes or at the sites of family events, and might not even include the production/sales locations (although this may be unavoidable).

The goals of transnational family business networks are derived from a combination of different professional and family-related agendas (Tsang 2001): On the one hand, it is aimed to arrange production, trade and corresponding knowledge circulation on a daily basis and to follow long-term goals, often imposed by the family hierarchy. On the other hand, the aim is to apply the advantages of the family knowledge pool to wider transnational production networks and to gain competitive advantages. Finally, an important incentive is also to contribute to the overall family goals (Henn 2012).

(ii) *Cognitive focus and learning.* The cognitive focus for interaction in these networks and for the stability in knowledge circulation is based on strong relational ties between the members of the wider family who share an actual or imagined common background in terms of origin, history and corresponding myths, religion and ethnicity (Light 2010). Family members create an ideal institutional basis for economic interaction in situations, in which uncertainties of global interaction are very high. One could say that the actual or perceived joint genetic pool establishes fundamental collective and mutual trust in these settings and becomes a precondition for learning and for establishing and maintaining transnational business linkages (Tsang 2001).

¹⁸ Similar structures characterize firms linked by strong ethnic ties, such as the trading Diasporas of the Jews or the Armenians (Light 2010).

(iii) *Trust and risks*. The risks of such settings for knowledge creation are minimal due to existing strong family ties. Such ties make it relatively easy to transfer all sorts of implicit and explicit, simple and complex, and public and secretive knowledge between globally dispersed firm sites (Henn 2013). Compliance is reinforced by family- and business-related codes of conduct and, in the case of misconduct, by the threat of being discharged from family and, by extension, business. Such punishment may be perceived by the respective individuals as being more severe than an economic sanction alone.

7. Conclusions

This paper argues that the contemporary globalizing knowledge economy is increasingly characterized by complex practices of knowledge creation over distance that integrate different combinations of virtual communication with various forms of temporary face-to-face interaction. As knowledge creation patterns are fundamentally structured by the nature and circumstances of the face-to-face contacts involved, a typology of knowledge creation configurations is developed based on three principal dimensions that structure interaction: (i) framing conditions, (ii) cognitive focus/learning and (iii) trust/risks involved. Using these dimensions and related indicators, the paper identifies and systematically characterizes key types of knowledge creation over distance: (1) occasional global community gatherings, such as trade fairs, conventions and conferences, (2) regular international business travel, i.e. intra-firm business coordination, producer-user meetings and inter-firm negotiations, as well as (3) ongoing transnational network relations found in transnational corporate networks, new transnational firms and transnational family businesses (Tables 1 through 3).

While these types of knowledge creation are not new, the multiple configurations distinguished in this paper and their widespread use throughout the economy suggest that these

practices are inherent features of contemporary capitalism. Although it is beyond the scope of this paper to provide an in-depth analysis of capitalist dynamics, our analysis suggests that the differentiation and intensification of knowledge creation practices over distance may have been both a precondition for and a consequence of the acceleration of modernity and its associated globalization processes, as powerfully described by Giddens (1984). Indeed, one could argue that the knowledge creation practices discussed in this paper have been at the core of enabling neoliberalism (e.g. Peck 2010) to prosper and expand in the developed world, while simultaneously supporting selective catch-up processes or cementing under-development in less developed parts of the world.

Currently, we are facing manifold challenges to capitalism, related to the effects of global climate change, peak oil and steeply increasing costs of mobility, possibly leading to a new scarcity economy in the future (Giddens 1984). These challenges not only point at massive future constraints in the transportation of goods and people that challenge the present state of globalization (Bridge 2010); these trends will also have important impacts on the global organization of economic processes, their reach and geographies, and the ways how global linkages are maintained and reproduced. The knowledge creation practices discussed in this paper can be regarded as parts of powerful experiments aiming to overcome these challenges towards a new period of capitalist accumulation (Hirsch 1990). Under these circumstances, related knowledge creation practices over distance become imperative to secure and sustain global linkages and will thus gain in importance in the future.

To date, the variety of such knowledge creation practices has been under-researched and has not been systematically addressed. The practices analyzed in this paper connect permanently separated, distant locations of economic activity through temporary and virtual co-presence to

the extent that these places appear ‘to move closer’ to one another. While different types of long-distance interaction and knowledge circulation have been studied separately in the literature, they are now being globally applied in economic practices and form efficient economic constellations for knowledge exchange that are not dependent on permanent co-location.

When synthesizing the central findings of our analysis, broader patterns emerge that take the shape of global practices of learning and knowledge generation. The above analysis suggests that regularities can be found when advancing from community gatherings through business travel towards network relations, as trust requirements between the agents increase and the types of knowledge at stake become more tacit in nature. While we reject a simplistic functionalist reasoning, our analysis has revealed interesting tendencies in terms of how the nature and circumstances of these temporary face-to-face constellations vary and play out differently. We find that with growing uncertainty of interaction and increasing integration and commitment of activities, smaller communities of agents tend to be involved in knowledge generation. These agents tend to communicate and meet more frequently. Along with this, the governance form of economic activities becomes more centralized, and more rigid mechanisms are put into place to reduce risks and sanction deviant behavior.

At closer investigation, we realize that the different learning settings are not separated but are used in combination with other settings – thus complementing each other. For instance, transnational networks use regular business travel to learn from their direct users while, at the same time, actively participating in international meetings to identify distant, yet complementary knowledge pockets. As a result, a variety of constellations of combined contexts of learning and knowledge creation is established. The identified types of knowledge creation over distance are thus not independent but build upon and support each other. For example, trade fair interaction

may lead to the establishment of new transactions or new inter-firm negotiations about strategic shifts in the future, while producer-user-related knowledge creation practices are being reconfirmed through periodical contacts during community gatherings.

At the same time, it needs to be emphasized that the geographies of knowledge creation over distance are not self-sufficient processes. They depend, in particular, on two conditions that are intrinsically bound to these practices: (i) The first condition is related to the importance of bodily travel, face-to-face interaction and high personal mobility. It is based on the need to understand and overcome institutional, technological or simply language differences and assigns a key role to air travel in enabling timely mobility (e.g., Aguilera 2008; Wickham and Vecchi 2008; McDonough et al. 1999; Light 2010). (ii) The second condition rests on the intensive use of sophisticated communication media that enable frequent, high-quality communication via digital networks and communities (e.g., De Meyer 1991; Jeppesen and Molin 2003; Grabher et al. 2008).

Empirical evidence points at a strong interdependence between face-to-face meetings and different forms of electronic communication: Occasional face-to-face contacts are sometimes important preconditions for virtual communication since they introduce and reinforce trust between the parties involved (De Meyer 1991). Face-to-face meetings also generate substantial costs and do not guarantee that complex knowledge is immediately understood (McDonough et al. 1999; Millar and Salt 2008). Virtual communication should thus be viewed as a complementary form of interaction that enables distant learning and knowledge creation. Since knowledge about the combination of temporary face-to-face contacts with ongoing virtual communication is limited at this point, an important avenue of future research will be to provide a better understanding of the integrative role of distant learning and knowledge creation practices.

Finally, it becomes clear from a regional policy perspective that regions have different potentials for learning through these settings. In high-technology regions, we might find that that global learning and knowledge creation practices fundamentally rest on new transnational firms (e.g., Hsu and Saxenian 2000) or field-creating conferences (e.g., Möllering 2010), while regions in traditional industries might organize external learning primarily through transnational family firms (e.g., Henn 2012) and general market-related fairs. Regions with heavy industries, in turn, may rely on transnational corporate networks, as in the automobile industry (e.g., Depner and Bathelt 2005), and participate in global technology fairs. Related to this, another avenue of future research needs to systematically engage with questions as to why different region types develop different global learning patterns and how this is influenced by regional structures of social and economic relations.

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Table 1: Circumstances of Occasional, Periodic Global Community Gatherings

Dimensions/indicators	Trade fairs	Conferences/conventions
<i>A. Framing</i>		
Actors involved	Many (e.g., executives, managers, technical specialists, sales managers of an entire industry)	Numerous (e.g., specialized managers, accepted experts, members of associations, politicians)
Duration/periodicity	Several days every year/every few years	Several days every year/every few years
Places of meetings	Convention/trade fair centers	Convention/conference centers/conference hotels
Expectations/goals of participation	Diffuse: presentation of products; search for partners; overview of markets; comparison with competitors; maintenance of networks	Conferences: exchange/discussion of state-of-the-art developments/experiences; search for solutions; collective sense-making on a specific theme Conventions: showcasing recent developments; achieving consensus regarding future developments
<i>B. Cognitive focus and learning</i>		
Common basis	Broad overlapping industry/technology-related communities	Specialized, related knowledge bases; common interests
Principal proximity dimensions	Cognitive	Cognitive/social
Knowledge circulated	Largely codified, but also systemic/architectural or design knowledge with tacit elements	Primarily codified knowledge
Principal learning mechanism	By interacting/observation	Through transferring experience (horizontal learning)
<i>C. Trust and risks</i>		
Stability in interaction	Initially short-term	Initially short-term
Risks of interaction	Low	Low
Role of trust	Not very important: swift trust	Not very important: institutional/professional trust
Potential sanctions	Control by/rules of organizers may lead to exclusion	End/avoid communication

Table 2: Circumstances of Regular International Business Travel

Dimensions/indicators	Intra-firm business coordination	Producer-user meetings	Inter-firm business negotiations
<i>A. Framing</i>			
Actors involved	Several (e.g., managers, technical specialists)	Several (e.g., managers, technical specialists)	Few (e.g., executives, leading managers, third parties)
Duration/periodicity	One day to few days several times per year	Several hours or few days once to few times per year	One day to few days several times per year
Places of meetings	Corporate branches	Client firms' sites	Luxurious hotels/ venues on neutral ground
Expectations/goals of participation	Assuring smooth and efficient collaboration/ division of labor/control	Strengthening/adjusting existing relations/ discussion of new collaborations	Strategic agreement over mergers/ acquisitions/ partnerships/potential collusion
<i>B. Cognitive focus and learning</i>			
Common basis	Unified governance; identical hyper-mobile knowledge base	Complementary value-chain-related knowledge base	Perceived identical goals/visions of the industry/firms
Principal proximity dimensions	Organizational	Cognitive/quasi-organizational	Cognitive/planned organizational
Knowledge circulated	Codified/complex tacit knowledge	Tacit in problem-solving, but also codified	Implementation of tacit/ codified knowledge
Principal learning mechanism	Through participation	By interaction	By trust-building; through due diligence
<i>C. Trust and risks</i>			
Stability in interaction	Open-ended/immanent	Several years or longer	Project-related: several/multiple months
Risks of interaction	Low: similar to one integrated location	Increase with growing transaction costs	High; potentially asymmetric knowledge
Role of trust	Regularity reduces need for trust, while creating personal trust	Professional trust; personal relations over time	Professional trust through regular meetings
Potential sanctions	Replacement/firing of key individuals	Contractual penalties; exit	Negotiable penalties; exit

Table 3: Circumstances of Ongoing Transnational Network Relations

Dimensions/indicators	Transnational corporate networks	New transnational firms	Transnational family firms
<i>A. Framing</i>			
Actors involved	Few (expatriates)	Few (transnational entrepreneurs/Argonauts)	Few (professional family members)
Duration/periodicity	Daily interaction with regular yearly meetings	Daily interaction with regular/irregular meetings	Frequent interaction; occasional meetings often within family context
Places of meetings	Foreign branches or headquarter site	Transnational network/firm sites	Private homes/firm sites
Expectations/goals of participation	Connecting different cultural/institutional knowledge pools; coordination	Establishment of durable production linkages; realization of cross-country competitive advantages	Long-term family/professional goals; close coordination of global production
<i>B. Cognitive focus and learning</i>			
Common basis	Joint governance through boundary-spanning	Joint governance; embodied experience; strong interdependence	Close family ties; shared history/values; joint family codes
Principal proximity dimensions	Organizational/relational	Cognitive/cultural/relational	Relational/cultural
Knowledge circulated	Tacit, but also codified	Tacit with codified components	Tacit/codified
Principal learning mechanism	Through translation	By exploiting inter-cultural knowledge	From a joint genetic pool
<i>C. Trust and risks</i>			
Stability in interaction	Medium-term (several years)	Open-ended	Quasi-permanent
Risks of interaction	Low, but conflicts may arise	Higher in professional than in personal networks	Minimal
Role of trust	High: professional trust; personal trust develops over time	Relatively high in professional/very high in personal networks	Extremely high: collective mutual trust without prior investments
Potential sanctions	Displacement/relocation	Exit/exclusion/contractual penalties	Discharge from family