Knowledge transfer in knowledge-intensive organizations: the crucial role of improvisation in transferring and protecting knowledge

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Abstract

Purpose – *This paper aims to answer the question: how do knowledge workers' improvisation processes promote both knowledge transfer and protection in knowledge-intensive organizations (KIOs)? A model is proposed identifying how effective improvisation can strengthen the effect of four specific knowledge transfer mechanisms – an experimental culture, minimal structures, the practice of storytelling and shared mental models – on knowledge transfer inside the organization and knowledge protection outside of it.*

Design/methodology/approach – *The paper builds on a knowledge translation perspective to position improvisation as intrinsically intertwined with knowledge transfer and knowledge protection.*

Findings – *Improvisation is proposed as the moderating factor enhancing the positive impact of an experimental culture, minimal structures, storytelling practice and shared mental models on knowledge transfer and knowledge protection.*

Practical implications – *The paper argues against a "plug-and-play" approach to knowledge transfer that seeks to replicate knowledge without considering how people relate to the routines and the context and highlights to leaders of KIOs the importance of developing awareness, understanding and motivation to improvise to internalize new knowledge being transferred and to create imitation barriers.*

Originality/value – *The paper proposes that KIOs' success in transferring and protecting knowledge emerges not directly from formal knowledge transfer mechanisms but from knowledge workers' improvisation processes.*

Keywords *Knowledge protection, Knowledge transfer, Improvisation, Barriers to imitation, Knowledge translation*

Paper type *Conceptual paper*

Knowledge imitation, knowledge transfer and knowledge protection are coexisting strategies implemented by the current leaders of knowledge-intensive organizations (KIOs). KIOs learn from other firms' failures and successes through vicarious learning while seeking to protect key knowledge from rivals (Rivkin, 2001). Inside the firm, knowledge transfer involves either actively communicating to others what one knows or actively consulting others to learn what they know (Van den Hoof and De Ridder, 2004). The ability to transfer knowledge across units has been linked to firm performance (Argote and Ingram, 2000; Darr *et al.*, 1995; Epple *et al.*, 1996). We adopt Kumar and Ganesh's (2009, p. 163) definition of knowledge transfer as "a process of exchange of explicit or tacit knowledge between two agents, during which one agent purposefully receives and uses the knowledge provided by another". A key question for leaders of KIOs is how to manage the tension between promoting knowledge transfer inside the firm and preventing knowledge imitation from outside the firm. The difficulty is that if something is hard to imitate, it may also be hard to transfer within the firm, and if something is easy to

> **"Knowledge imitation, knowledge transfer, and knowledge protection are coexisting strategies implemented by leaders of today's knowledge-intensive organizations."**

transfer within the firm, it may also be easy to imitate by rivals (Faria and Sofka, 2010; Jensen and Szulanski, 2007; Szulanski and Jensen, 2006; Van Wijk *et al.*, 2008).

In their morphology of knowledge transfer research, Kumar and Ganesh (2009) identified multiple mechanisms, including movement of people (Takii, 2004), movement of tools (Berry, 2003), movement of tasks (Winter and Szulanski, 2001), movement of networks (Argote and Ingram, 2000), codification (Watson and Hewett, 2006) and personalization (Borgatti and Cross, 2003). Similarly, in a recent review, Argote and Miron-Spektor (2011) examined the effectiveness of knowledge transfer mechanisms (Rosenkopf and Almeida, 2003), such as movement of personnel (Song *et al.*, 2003), alliances (Gulati, 1999), technology (Kane and Alavi, 2007), templates (Jensen and Szulanski, 2007), social networks (Reagans and McEvily, 2003) and routines (Darr *et al.*, 1995). Argote and Ingram (2000) propose that a solution to the tension between transferring and protecting knowledge is to embed knowledge in the networks involving members (e.g. social networks of individuals, division of tasks among individuals, tool expertise across individuals and links among individuals, tasks and tools). Their argument is that when knowledge is transferred, it needs to fit the new context, and given that selection, socialization, training and communication processes within firms make people more similar within than between firms, the networks involving people are more likely to be compatible with other networks internal to the organization than with external networks. Thus, transferring knowledge through "moving the networks involving people" is easier within than between firms.

Our point of departure from prior literature on knowledge transfer in KIOs is to focus on the underpinnings of *how* the implicit part of knowledge is transferred and, actually, translated through the transfer. Although prior research has been detailed about *what* makes the knowledge transfer process effective (e.g. templates and artifacts), we propose that understanding improvisation processes sheds light on *how* knowledge transfer and protection happen. The purpose of this paper is to propose that KIOs' success in both transferring and protecting knowledge emerges not primarily from the formal knowledge transfer mechanisms previously mentioned but from knowledge workers' improvisation processes.

Improvisation, defined as the "creative and spontaneous process of trying to achieve an objective in a new way" (Vera and Crossan, 2005, p. 205) and "the conception of action as it unfolds" (Cunha *et al.*, 1999, p. 302), is frequently associated with situations of ambiguity, uncertainty and the unexpected and is considered a time-bound phenomenon. Research on routines (Feldman and Pentland, 2003; Rerup and Feldman, 2011), however, has shown that improvisation is not limited to situations of time pressure; but, it is present in daily interactions in firms, irrespective of firm size or industry. Improvisation is not inherently good or bad (Vera and Crossan, 2004); depending on the skill of the improvisers, improvisation may be highly innovative or chaotic; improvisation may solve a problem or worsen it. Individuals and groups can, however, learn to improvise effectively, and research has shown that improvisation is a skill that can be trained and promoted by leaders in their firms (Crossan, 1998; Vera and Crossan, 2005). In the context of this paper, when we use the term improvisation, we are relying on the body of research on "quality/effective" improvisation in organizational settings, where effective improvisation is ingenious and resourceful and allows individuals to adapt to new circumstances (Eisenhardt and Brown, 1997; Hatch, 1997; Meyer, 1998; Weick, 1998). Bringing improvisation into the knowledge

transfer realm shifts our attention from more explicit knowledge management (KM) tools and strategies used by leaders of KIOs to processes of a more emergent nature that acts as a micro-foundation of knowledge transfer and protection.

The specific question we seek to answer is how do knowledge workers' improvisation processes promote both knowledge transfer and protection. In answering this question, we contribute to KM research in multiple ways. First, we position improvisation as a crucial mechanism for simultaneous knowledge transfer and protection by proposing that when knowledge transferred is effectively translated in a new context through improvisation, the idiosyncratic nature of knowledge transfer represents a barrier to knowledge imitation outside the firm. Rivals may reverse-engineer a product, but they cannot imitate the tacit and explicit knowledge being translated inside the firm through spontaneous and creative processes. Second, we propose a model identifying improvisation as a key moderating mechanism behind the effectiveness of four specific knowledge transfer mechanisms – an experimental culture, minimal structures, the practice of storytelling and shared mental models – on the transfer and protection of knowledge. Finally, our work has important managerial implications for leaders of KIOs by advising them against a "plug-and-play" approach to knowledge transfer that seeks to replicate knowledge without considering how people relate to the routines and the context.

Theoretical background

The idea that transferring knowledge while protecting it is paradoxical originated from the distinction between explicit and tacit knowledge (Nonaka and Takeuchi, 1995). Tacit knowledge is not easily visible and expressible, deeply embedded in personal beliefs, attitudes, values and experiences that give it its meaning and is not easily formalized and communicated to others. In contrast, explicit knowledge can be codified and documented, making it easily and cheaply available to large number of people at little or no marginal cost. These differences significantly influence the ways in which tacit and explicit knowledge can be shared (Hislop, 2002; Jasimuddin *et al.*, 2005). In addition, depending on the external context, the importance of transferring tacit or explicit knowledge shifts: tacit knowledge becomes more important to decision-making and strategic positioning in high velocity/turbulent environments (Jones and Mahon, 2012). A practice-based philosophy provides, however, an interpretivist view in which tacit and explicit knowledge are not two separate types of knowledge but, rather, knowing is enacted continuously in daily practice (Blackler, 1995; Boland *et al.*, 1994; Cook and Brown, 1999; Lam, 1997; Polanyi, 1967; Tsoukas, 1996).

Knowledge transfer and knowledge translation

Examples abound of KIOs' difficulties in transferring knowledge by relying heavily on the replication of explicit knowledge. Even when knowledge is codified in systems, manuals and procedures, difficulties in its transfer can emerge from the lack of contextual and situational factors, such as software, skills or training of the workforce (Rerup, 2004). Codified knowledge is insufficient to convey what the practice is about, why it works, what it can do and what it cannot do (Rerup, 2004). For instance, NASA faced difficulties in rebuilding Saturn rockets that were launched to carry out the Apollo Program, which helped the USA put astronauts on the moon during the late 1960s and early 1970s. Even though

"There is 'easy' and 'hard' to transfer knowledge, but also 'easiness' or 'hardness' of knowledge transfer based on the context of the transfer."

> **"Improvisation can help us to understand the different interpretations around routines, what individuals bring to the routines, and the type of context that allows knowledge transfer to be effective and costly to imitate."**

the blueprints and recorded material for Saturn design were available, NASA was not able to rebuild the rockets (Shariq, 1999). Similarly, multinationals seek to transfer best practices from headquarters to their subsidiaries (Kostova and Roth, 2002). Studies reveal that replicating the success of one subsidiary goes beyond the transfer of explicit knowledge of best practices from one subsidiary to the other.

Knowledge translation theory offers a key to understanding the effectiveness of knowledge transfer in firms. Holden and von Kortzfleisch (2004), in their support of the use of the translation analogy, mention Dixon's (2000) definition of KM as an activity when "knowledge is translated into a form usable by others' and Nonaka's (1991) understanding of KM as knowledge conversion for the purpose of creating 'common cognitive ground". Moreover, according to Holden and von Kortzfleisch (2004, p. 129), "translation in the sense of transposing a text in one language in terms of another is a notable form of converting tacit knowledge into explicit knowledge". Holden and von Kortzfleisch (2004) summarize:

> Knowledge transfer, like translation, is a sensemaking activity. Knowledge transfer, like translation, is literally concerned with personal cognition and the interlingual transfer of knowledge from head to head and into social networks. Knowledge transfer, like translation, is subject to constraints which affect not just transfer, but rather transferability: the extent to which knowledge can be transmitted to others (p. 133).

The translation analogy, as applied to knowledge transfer, brings up four different perspectives:

1. translation as a networking activity;
2. process and end-product quality;
3. levels of accuracy; and
4. constraints on the production of good translations (Holden and von Kortzfleisch, 2004; Liyanage *et al.*, 2009).

Similar to translation, knowledge transfer is not only transcoding the information from head to head but also involves the network of knowledge receivers – the firms' internal and external networks. Just as in translation, where the quality of final product and the actual process itself are of a crucial importance, knowledge transfer processes deal with the accuracy and impact of the process on the receiver along with the cognitive issues and the competencies of the sender of the information. Additionally, the levels of accuracy represent a challenge for knowledge transfer/translation – it is vital to convey accurate information to enable the receiver to make sense of it. Finally, translation theory provides an insight into three constraints that distort and constrain the convertibility of knowledge:

1. ambiguity (confusion at the source);
2. interference (errors from one's own background); and
3. lack of equivalence (absence of corresponding words or concepts) (Holden and von Kortzfleisch, 2004).

But how does the translation happen? What is the key mechanism for translating the information to a specific context and creating a shared meaning? We argue that the need

for interpretation and contextual embeddedness of knowledge demands the use of improvisation.

Improvisation in knowledge transfer and translation

Examples of how knowledge is transferred across individuals and units abound. Common methods, both in small and large organizations, include formal training, mentorship, guided experience, simulations, guided experimentation, work shadowing and paired work. Improvisation takes part in all these methods as organizational actors try to make sense of and act coherently with the new knowledge being transferred in the form of new processes, routines, systems and products or services. Training, for example, may be seen as an episodic event, where individuals lack the knowledge prior to the training and possess the knowledge after the training. However, the transfer of knowledge can be described as an ongoing process made up of opportunities and challenges not necessarily predictable at the start. As individuals leave the training with the intent of putting the new knowledge into practice in their jobs, they may start by engaging in trial-and-error to test the ideas they have learned and by improvising to close the gaps between the knowledge transferred and their job reality.

In the case of technology as a knowledge repository being transferred, Orlikowski (1996) engaged in a qualitative study of a software company adopting a new technological platform for tracking customer calls and requiring its employees to learn it and use it. The case study illustrates in detail how, as knowledge about the new technology was transferred, individuals:

> [. . .] experimented with local innovations, responded to unanticipated breakdowns and contingencies, initiated opportunistic shifts in structure and coordination mechanisms, and improvised various procedural, cognitive, and normative variations to accommodate their evolving use of the technology (Orlikowski, 1996, p. 63).

Similarly, Heeks (2002) discusses the difficulties of information systems (IS) implementation in developing countries, which applies, for example, for multinational companies transferring IS that have worked in developed companies to developing countries. Nevertheless, as the new systems are transferred from headquarters to subsidiaries in developing countries, users experience gaps between the design of the system and its actual use. Heeks (2002) describes actuality improvisation and design improvisation, where the former is about changing local actuality to make it closer to the IS design and the latter is about changing the "imported" IS design to make it closer to user actuality. In both cases, such changes often involve local improvisations, that is, actions by local stakeholders who are not so remote from the context of IS implementation and use.

Much of the empirical work on improvisation has been localized in the context of innovation. Prior research has found support for factors such as environmental turbulence, real-time information flows, organizational memory, team expertise, teamwork quality, experimental culture and semi-structures as moderators of the link between improvisation and various new product development and innovation outcomes (Eisenhardt and Brown, 1997; Kyriakopoulos, 2011; Moorman and Miner, 1998; Vera and Crossan, 2005; Vera *et al.*, 2014). We depart from the emphasis on innovation outcomes to examine the role of improvisation in a more proximal process, knowledge transfer, which contributes to multiple outcomes including innovation, organizational learning and change. Dehlin's (2012) work emphasizes on the presence of improvisation in everyday practice and describes improvisation as spontaneous and hermeneutical sense-making via external action. Dehlin (2012) highlights the practical and contextual nature of improvisation that finds its reflection in action: "improvisation [. . .] glues itself to all practical situations, even to some extent to routine-like conditions" (2012, p. 240). The sense-making part of improvisation (conscious processing) adds to the spontaneity and leads to recognizing improvisation as an "expected feature of everyday human activity that is never repeated exactly the same way"

(Dehlin, 2012, p. 241). This proposal is summarized in the idea that knowledge work is improvisation:

> The knowledge worker is more like "an improvising man (or woman)" than an administrative or economic man. [. . .] Knowledge work can only come to life as process as practical knowing performed by spontaneous innovators - and it is hard to see why managing such processes would be any less improvisatory. Even if the practice of knowledge workers varies immensely with respect to theoretical scope, their corporeal origin deems them as improvisers more than calculating machines. In any given situation a knowledge worker is more or less spontaneous and more or less innovative. (Dehlin, 2012, p. 243)

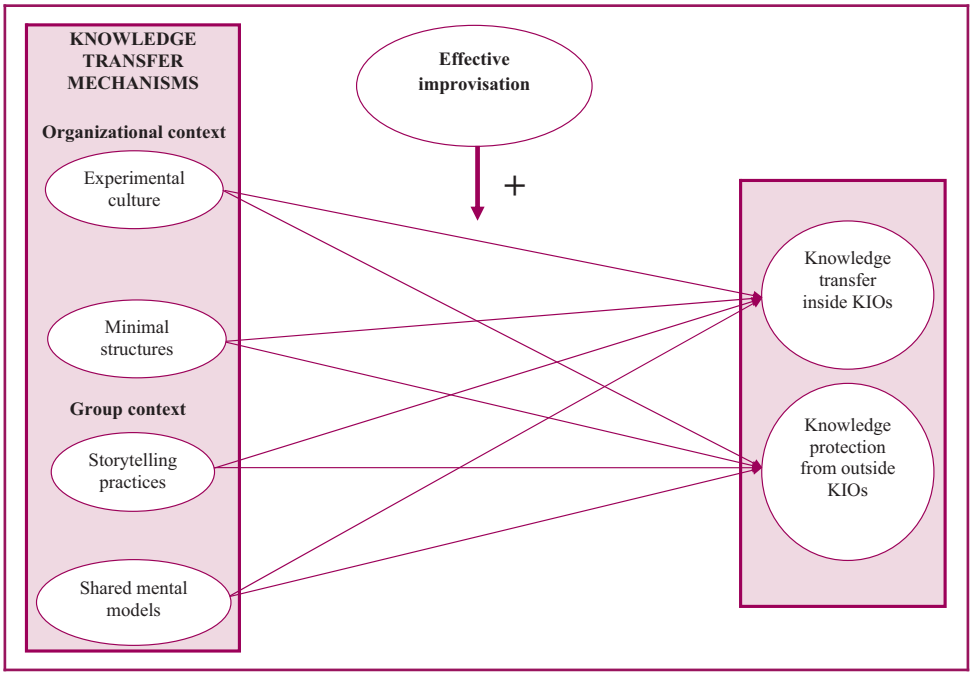
Multiple studies provide initial evidence of the role of improvisation in knowledge transfer/translation. King and Ranft (2001), in their study of the surgery field, were able to show how the ability of a medical professional (surgeon) to improvise contributes to the group-based tacit knowledge on surgery. They point out that knowledge is not separable from the actor performing the act. Such performances (thoracic surgery residency programs being one example) represent "choreographed experiences that provide for building on an existing body of knowledge and developing new knowledge through practice and improvisation" (p. 270). In another study of cement-laying workmen learning safety skills, Gherardi and Nicolini (2000) provide an example of knowledge translation as it involves improvisation and the negotiation of meaning. They used actor-network theory (ANT) (Latour, 1992) to examine how safety knowledge is "translated" at every point as it moves through a system. The ANT states that any changes we might describe as learning emerge through networks of actors. Both human and non-human entities become actors in the learning network by "translating another actor, mobilizing it to perform knowledge in a particular way" (Fenwick, 2006, p. 15). For instance, one workman would show another how to adapt a new safety procedure to make a task easier, or two together would adapt a particular tool to solve a problem. Finally, Biddle (2004) explored everyday learning at a fire-fighting school, where the group was faced with the challenge of integrating new technologies and adapting to new regulations. He used the ANT to examine micro-processes of knowledge translation in an environment where fire, with its risk and unpredictable nature often paralyzing newcomers, demands the combination of grounding and flying and shapes how people interact with one another to transfer knowledge.

Conceptual model

Figure 1 depicts our model. Although firms and groups rely on implementing experimental cultures and minimal structures and promoting the practice of storytelling and shared mental models to support knowledge transfer, we argue that improvisation processes will augment the positive effects of these factors on both knowledge transfer and protection.

First, improvisation enhances the value of knowledge transfer mechanisms because knowledge workers, who are better at improvising, are also better at translating knowledge and routines to new people, situations and contexts. Improvisation enables coordination and conflict management among members, where techniques such as "Yes-anding" (Crossan and Vera, 2005) – accepting and building on the ideas of others – allow individuals to make sense of the knowledge being transferred. Second, improvisation acts as a barrier to imitation from outside the firm by enhancing the idiosyncrasy of the knowledge rooted in practice and of the knowledge transfer process. As Kamoche and Cunha (2008) point out, the outcomes of improvisation will ultimately be visible, however, "the process of creating such contextual knowledge is not only difficult to discern [. . .], but it is also difficult to replicate" (p. 97). Barney (2002) proposes that inimitability of resources/capabilities comes from unique historical conditions, causal ambiguity and social complexity. Similarly, Argote and Ren (2012) suggest that path dependency, tacitness, social complexity and context dependency create imitation barriers. Although rivals can imitate end products through reverse engineering, it is costly to imitate the process of performing the routines and the practice of knowledge transfer, as they are alive and

Figure 1 The role of improvisation in knowledge transfer and protection



always changing. Knowledge workers' improvisation processes contribute to the idiosyncratic nature of the knowledge being transferred and of the transferring process, making them costly to imitate. Even if rivals, themselves, improvise, these processes are context-specific because improvisation is embedded not only in individuals and teams but also in the organization as we describe below. Thus, even when a team of knowledge workers is recruited away by a rival firm, their improvisation processes will be different when surrounded by a different context.

When establishing the boundary conditions of our model, an important factor to consider is that once the KIO grows to a certain size, improvisation becomes more difficult. When considering improvisation in relation to knowledge transfer in firms of different sizes, small and medium enterprises intuitively seem more suited for the existence of innovation, creativity and freedom that is frequently associated with improvisation. Nevertheless, past research has described the incidence of improvisation not only in the founding of entrepreneurial companies (Baker *et al.*, 2003) but also in municipal settings (Vera and Crossan, 2005), consumer product (Moorman and Miner, 1998) and technology firms (Eisenhardt and Brown, 1997) across different firm sizes, industries and life cycle stages. In pharmaceutical firms, for example, planning is necessary because of the large capital expenditures involved, but improvisation needs to occur because it is impossible to fully know ahead of time which approaches are dead ends and which ones will be fruitful (Vera *et al.*, 2014). The same scenario applies to software development, where it is extremely difficult, if not impossible, to get a big software project completely right the first time, and improvisation, in the form of workarounds, is always needed.

The link between firm size and the incidence and effectiveness of knowledge transfer has also been studied in the past; however, results are mixed. Some evidence exists that small firms have advantages (e.g. simple structures and organic cultures) over large firms in terms of the effects on knowledge transfer and learning outcomes (Simonin, 2004; Wong and Aspinwall, 2004; Dyba, 2000), but they also have several disadvantages (e.g. less formalization, standardization and formal procedures) that create difficulties in knowledge transfer execution (Wong and Aspinwall, 2004; Koskinen and Vanharanta, 2002). Other studies, including a meta-analysis by van Wijk *et al.* (2008), have identified positive effects

of size on knowledge transfer (Dhanaraj *et al.*, 2004; Gupta and Govindarajan, 2000; Laursen and Salter, 2006), whereas some authors have found non-significant (Tsang, 2002) or negative (Makino and Delios, 1996) effects.

Overall, we conclude that firm size has advantages and disadvantages for knowledge transfer, and that because improvisation is a common feature in the day-to-day life of firms of any size and industry, we expect our model of the role of improvisation in knowledge transfer and protection to apply to both small KIOs in the startup stage and mature KIOs of large size.

Propositions

Prior research by Szulanski (1996) suggests that four sets of factors are likely to influence the difficulty of knowledge transfer: the knowledge transferred; the source; the recipient; and the context in which the transfer takes place. We have discussed the perspective of knowledge as rooted in action and the translation theory views of the source and the recipients as knowledge workers improvising their way through knowledge transfer and protection. We center our attention in our model in Figure 1 in the context within which the transfer occurs and examine how improvisation enhances the effects of two organizational and two group contextual factors that leaders frequently implement in knowledge transfer initiatives.

Contextual factors have been considered in the past both in relationship to knowledge transfer and to improvisation, but these discussions have been frequently disconnected from each other. We focus on four prominent factors that bridge the improvisation and KM literatures and that can be influenced by leaders of KIOs. Specifically, we argue that when knowledge workers effectively improvise, the organizational context characterized by an experimental culture and minimal structures and the group context including the practice of storytelling and shared mental models among those involved in the knowledge transfer, will be particularly successful in facilitating new interpretations about the knowledge being transferred internally, and the knowledge transfer process will be idiosyncratic enough that it will create imitation barriers.

Research on the link between organizational culture and KM suggests that organizational values are important to facilitate knowledge practices among members, and that "good" cultural values (e.g. openness and trust) will lead to positive behaviors such as knowledge sharing, whereas "bad" cultural values (e.g. silo mentality and protectionism) will lead to dysfunctional behaviors such as information hoarding (Alavi *et al.*, 2006). We discuss a particular type of organizational culture – an experimental one – which has been largely absent in knowledge transfer – and how its value is amplified by the use of improvisation.

Network structures have been extensively studied in relation to knowledge transfer (Reagans and McEvily, 2003) with emphasis on factors such as the strength of ties, social cohesion, network range and centrality. Similarly, Tsai (2002) studied the effects of both formal and informal structures on knowledge transfer and found that formal centralization had a negative effect on knowledge sharing, whereas informal social interactions had a positive effect on knowledge sharing among units that compete with each other for market share, but not among units that compete with each other for internal resources. We discuss a novel type of structure called a "semi-structure" or "minimal structure", which has been largely overlooked in knowledge transfer, and propose that its value in providing the conditions of freedom combined with control within which knowledge transfer occurs is augmented by the use of improvisation.

Finally, Szulanski (1996) identified arduous relationships between the source and the recipient – described in terms of ease of communication and intimacy of the relationship – as one of the most important contextual barriers to knowledge transfer. We look at how improvisation enhances the value of the practice of storytelling and shared mental models

as two group factors that facilitate knowledge transfer. Each of these factors is discussed next.

Experimental culture. Experimental cultures provide room for experimentation and trial and error and are tolerant of "competent" mistakes – those resulting from novel ideas and not from flawed execution (Vera and Crossan, 2004, 2005). Experimental cultures are not associated with blind risk taking and lack of discipline but promote action as opposed to reflection as a way to understand and deal with reality (Cunha *et al.*, 1999) and define boundaries within which experimentation can occur. Experimentation provides grounds for people to deviate from their designated roles and established procedures to successfully transfer knowledge. In contrast, KIOs with highly hierarchical and standardized approaches to transfer knowledge constrain employees from bringing intuition into play; instead, these companies enforce analytical methods of operation, discourage the offering of ideas without facts to back them up and instill a culture where mistakes are not forgotten (Hall, 2001). Caldwell and O'Reilly (2003) found that support for risk taking and tolerance of mistakes were two cultural norms that promoted behaviors associated with emergence of new ideas and their transfer. When individuals perceive their environment as interpersonally non-threatening and tolerant, or even supportive, of taking risks and trying new approaches, higher levels of psychological safety and engagement in learning processes ensue (Edmondson, 1999; Gilson and Shalley, 2004).

The transfer of knowledge to newcomers depends on them improvising in their new roles and learning by doing. Research has identified guided experimentation and guided problem solving as ways of transferring deep tacit knowledge, or what Leonard and Swap (2005) call "deep smarts". Levine and Gilbert (1998) agree that the most important structural component that encourages creativity or idea generation is providing time to experiment and tinker, and Hall (2001) emphasizes that permission to experiment at the local level is important for the successful transfer of information. Work on learning has also built on Kolb's (1984) learning cycle model that proposes that for learning to be accomplished, an individual has to go through concrete experience, observational reflection, abstract conceptualization and, most importantly, active experimentation. Furthermore, in the context of socialization and learning of organization newcomers, Saks and Ashforth (1997) suggest that experimentation, alongside observation and involvement in work-related activities, is a major source of learning, and, consequently, knowledge transfer is a socialization-related outcome. Similarly, Ostroff and Kozlowski (1992) have found that through role models (supervisors and co-workers), newcomers acquire information about their task and role, and through observation and experimentation, they achieve a sense of mastery in their activities.

Experimental cultures have been discussed as promoting the incidence and effectiveness of improvisation (Vera and Crossan, 2004, 2005). Nevertheless, experimental cultures can also be implemented through planned experimentation, as in laboratory settings, with little room for spontaneity. We argue that when experimental cultures are combined with the freedom to improvise, this combination will be highly beneficial not only for knowledge transfer but also its protection. Leaders of KIOs, who promote experimental cultures and are explicit about providing knowledge workers with room to improvise, create a fruitful context for knowledge transfer by providing those involved in the transfer with the latitude to be spontaneous and to take risks and make mistakes as they translate the knowledge to a new context.

Furthermore, in addition to facilitating the experimentation encouraged by the culture, knowledge workers' improvising also enhances the improvisational and idiosyncratic nature of KIOs' knowledge being transferred and of the knowledge transfer process. Improvisation processes, in the context of experimental cultures, are socially complex and path-dependent. It takes time for a culture to develop within which individuals and teams can improvise inasmuch as it depends on shared values and beliefs, trust, effective communication and experience working together. Experimental cultures are, by

themselves, costly for rivals to imitate, and when improvisation is present, it enables and results in knowledge transfer processes that are also highly distinctive and hard to imitate by others. Hence:

P1. Improvisation positively moderates the relationships between an experimental culture and (a) knowledge transfer inside the firm and (b) barriers to external imitation such that when improvisation is high, the relationships are stronger.

Minimal structures. In an effort to foster consistency and efficiency, firms often attempt to systematically avoid changes and ambiguity by creating standard procedures, clear and rationalized goals and forms of centralized control. The notion of "minimal constraints" or "minimal structures" refers to the set of controls (e.g. a few sets of working rules or irrevocable goals and milestones) that leaders of KIOs can use to accomplish the synthesis of high levels of novelty and stability, autonomy and order (Eisenhardt and Brown, 1997; Kamoche and Cunha, 2001). Minimal structures provide autonomy while avoiding chaos; they allow freedom while ensuring that members are clear about the non-negotiable areas that bind the organization.

When KIOs' structures are too rigid or too loose, knowledge transfer will likely be too inflexible or too chaotic. Vertical structures raise barriers to knowledge transfers inside firms (Syed-Ikhsan and Fytton, 2004). In a traditional structure, large firms have many layers of managers where "formal reporting structures are more detailed at the top than at the bottom" (Davenport and Prusak, 2000, p. 73). Decision-making process and communication usually flow in the up-down direction; this communication process can significantly slow organizational processes (Syed-Ikhsan and Fytton, 2004). In a firm with a massive vertical structure, it takes too much time for information to filter down through organizational levels. Effective communication is very important in making existing knowledge profitable to the firm; however, bureaucracy can make knowledge very difficult to transfer because formal structures limit each division's access to knowledge accumulated by other divisions. In contrast, if a firm supports communication networks that operate freely within minimal rules and where knowledge providers and knowledge seekers can access knowledge through the shortest path, this infrastructure will enhance knowledge transfer inside the firm.

Minimal structures have been discussed as a fruitful context for improvisation to occur and to be effective (Kamoche and Cunha, 2001; Vera *et al.*, 2014). Nevertheless, minimal structures do not need to include improvisation and can be implemented through more formal mechanisms such as credos, myths, missions, visions, slogans and trademarks (Weick, 1990) that create a shared sense of orientation and help focus action on the things that really matter to the company. We argue that when minimal structures are combined with effective improvisation, this combination will be highly beneficial not only for knowledge transfer but also for its protection.

The reliance on improvisation and minimal structures for knowledge transfer is consistent with recent research proposing that the focus in KM has shifted from relying on KIOs' prescribed structure to relying on talented individuals and teams to move the firm forward through innovation, improvisation and change (Cunha and Cunha, 2006; Teece, 2000). When improvisation is encouraged and used, minimal structures are associated with the capacity of group members to be creative while improvising and translating knowledge from one context to another without running the risk of losing coordination. People can adaptively accomplish tasks even as the context is changing (Eisenhardt and Brown, 1997).

Furthermore, in addition to boosting the benefits of the autonomy provided by the context of minimal rules, knowledge workers' improvising also enhances the improvisational and idiosyncratic characteristics of KIO's knowledge being transferred and of the knowledge transfer process. Improvisation processes, in the context of minimal structures, are socially complex and path-dependent. It takes time to trust and embrace a system of a few rules

and objectives that grants autonomy, accepts improvisation and stimulates free communication of ideas and creativity among group members. The combination of improvisation with a simple infrastructure of rules facilitates the emergence of complex collective behaviors and intense interactions with levels of spontaneity, flexibility and adaptability that are less likely to be found in traditional, hierarchical and centralized forms (Cunha and Rego, 2010). The "nervous system" (Cunha and Rego, 2010, p. 92) of the processes shifts from managerial order to the real-time improvisational interactions that are spread throughout the organization. This socially complex phenomenon is idiosyncratic by itself, and when improvisation is present, it increases a KIOs' adaptability and self-organization and creates barriers to imitation of this distributed intelligence. Hence:

P2. Improvisation positively moderates the relationships between minimal structures and (a) knowledge transfer inside the firm and (b) barriers to external imitation such that when improvisation is high, the relationships are stronger.

Storytelling practices. Moving to the group contextual factors in our model, we propose storytelling as an informal practice that facilitates the transfer of tacit knowledge. Storytelling is the sharing of "war stories" in communities of practice and is an important part of action learning in KIOs (Connell *et al.*, 2004; Wensley, 1998; Denning, 2000). An organizational story is "a detailed narrative of past management actions, employee interactions, or other intra- or extra-organizational events that are communicated informally within the organization" (Swap *et al.*, 2001, p. 103). Such narratives usually include a plot, major characters and an outcome with a moral or an implicit or explicit implication of the story for action. These stories originate from within the organization and therefore reflect organizational norms, values and culture (Swap *et al.*, 2001). Developing narratives has been proposed as an enabler of organizational learning, particularly when dealing with new or unusual situations (Garud *et al.*, 2011). In fact, Sole and Wilson (2002) quote The Institute for Knowledge Management in offering a colorful definition of a story and its relation to knowledge transfer: a story is "a tiny fuse that detonates tacit understanding in the mind of the listener."

Nonaka and Takeuchi (1995) suggest storytelling as an informal process that facilitates the transfer of the tacit dimensions of critical knowledge through internalization and socialization. The psychodynamic theory of personality also describes the role of stories and narratives in interactions between individuals (Epstein, 1994; Mischel and Shoda, 1995). Narratives are assumed to appeal to the experiential system of personality because of their emotional engagement and representation of events in a manner similar to how they are experienced in real life (Epstein, 1994). Thus, stories are essentially more appealing than codified rules and procedures, technical documentation and lectures on abstract subjects. In the persuasion and communication literature, including stories in the message has been shown to increase the persuasiveness of the message (Kahneman and Tversky, 1973). Similarly, teaching wisdom through parables and stories is a reason why the Bible is still considered one of the most influential books in history (Epstein, 1994).

Improvisation amplifies the value of storytelling in knowledge transfer by highlighting the emergent nature of stories – stories are not manuals, but experiences that individuals can play with in real-time. Narratives combine both reflective and experiential approaches to learning (Garud *et al.*, 2011). Narratives trigger reflection about "what is going on here?" and, at the same time, serve as mechanisms for experimentation (Baker *et al.*, 2003; Weick, 1998) that can create new meanings and understanding through action. That is, memories of prior experiences, captured by narratives, guide rather than prescribe ongoing action (Garud *et al.*, 2011). Stories communicate who did what, when and why and act as thought machines through which individuals test out ideas and feelings about something and try to learn more about it (McLellan, 2006). For instance, at Xerox, stories are the real "expert systems" used by tech reps on the job; they are a tacit storehouse of past problems and diagnosis, a template for constructing a theory about the current problem and the basis for making an educated stab at a solution (Brown and Duguid, 1991). Stories may often not

coincide with standard procedures; they represent practice, how things are actually done. Stories, when combined with improvisation processes, allow people to recombine them in real time when facing a new situation or new context; simultaneously, successful improvisations are likely to result in new stories to be shared in the community of practice.

Furthermore, in addition to amplifying the benefits of storytelling, knowledge workers' improvising creates barriers to knowledge imitation. Improvisation, in the context of storytelling, is complex and socially embedded. Storytelling practices are defined by the history of social interactions, creating a link between members of groups and communities that cannot be understood by an outsider. These practices are by themselves costly for rivals to imitate, and when improvisation is used, it enhances the tacitness of the knowledge communicated from person to person and precludes rivals from disentangling knowledge rooted in action. Hence:

P3. Improvisation positively moderates the relationships between storytelling practices and (a) knowledge transfer inside the firm and (b) barriers to external imitation such that when improvisation is high, the relationships are stronger.

Shared mental models. Shared mental models are shared representations of tasks, equipment, working relationships and situations (Cannon-Bowers *et al*., 1993). They are developed through knowledge articulation, dialogue and collective discussions and are required for coherence, mutual adjustment and negotiated action in a team to take place.

Shared mental models have been described as antecedents of effective improvisation (Vera and Crossan, 2005; Vera *et al*., 2014; Weick, 1998). Nevertheless, shared mental models can also be associated with individuals' experiences in formal processes of planning. We argue that when shared mental models are combined with effective improvisation, this combination will be highly beneficial not only for knowledge transfer but also its protection. When improvising, groups with a shared mental model will require less time and fewer resources in developing a common understanding of a given phenomenon (Eisenhardt and Bourgeois, 1988; Smith *et al*., 1994). Similarly, knowledge transfer through socialization involves interpersonal interactions of individuals, where experiences can be shared via both verbal and non-verbal means (Nonaka and Takeuchi, 1995). Such socialization develops a community of practice necessary for the social construction of learning and facilitates the sharing of tacit knowledge among team members (Brown and Duguid, 1991). Social interactions are, therefore, associated with an increase in individual and aggregate tacit knowledge and with the development of shared mental models. Improvisation, in combination with the presence of shared mental models, is instrumental in enhancing teams' communication, collaboration, cooperation and coordination when transferring knowledge.

Furthermore, in addition to augmenting the benefits of shared mental models, knowledge workers' improvising contributes to barriers to knowledge imitation. Improvisation, in the context of shared mental models, emerges through interactions, experience working together, informal communication and social integration. Because of their path dependency and social complexity, shared mental models are by themselves costly to imitate, and when improvisation is present, it increases the tacitness of the knowledge being transferred by linking group members in a way that cannot be easily deciphered by an outsider. Hence:

P4. Improvisation positively moderates the relationships between shared mental models and (a) knowledge transfer inside the firm and (b) barriers to external imitation such that when improvisation is high, the relationships are stronger.

Implications

This paper addresses the role of knowledge workers' improvisation processes in enabling effective knowledge transfer inside KIOs while protecting knowledge from imitation from rivals. We argue that although there might be instances where direct

knowledge replication seems possible (e.g. highly standardized production and Six Sigma practices), effective knowledge transfer can only be achieved by translating the knowledge in action in the new context. Although previous research has looked into the material artifacts, such as technology and templates, that can facilitate the translation of knowledge within and across communities (Carlile, 2002; Jensen and Szulanski, 2007; Kane and Alavi, 2007), we delve into the question of how the translation of knowledge actually happens. Our answer is that effective improvisation processes are inherent in, and important for, successful knowledge translation within KIOs. The better knowledge workers are at improvising their way through knowledge transfer, the better they will be at translating and absorbing the transferred knowledge inside the firm and the harder it will be for external rivals to imitate the knowledge.

We contribute to the KM field in several ways. First, this paper explicitly links improvisation and knowledge transfer by highlighting the spontaneous nature of knowledge transfer and improvisation as an integral part of day-to-day knowledge work. By improvising, individuals bring knowledge to action and translate it to their context of work. Specifically, we describe how improvisation amplifies the benefits of experimental cultures, minimal structures, storytelling and shared mental models on knowledge transfer and protection. Furthermore, tacit aspects of improvisation such as spontaneity and creativity create its highly ambiguous character, which is hard to imitate by rivals. Effective improvisation is a skill that is not easy to develop, but once developed, it is hard to imitate by competitors. Even in the case of rivals who are good at improvising, those processes will be context-specific.

Second, an improvisation lens enables us to link cognitive and behavioral aspects of the knowledge transfer process. On the cognitive side, improvisation relies on past experience and intuition, whereas on the behavioral side, the spontaneous aspects of improvisation allow for real-time and creative action in the transfer of knowledge. In terms of context, when improvisation augments group and organizational factors, the context contributes to the causal ambiguity and social complexity of the knowledge transfer process. Examining improvisation in knowledge transfer enables a discussion about co-creation of knowledge while it is being transferred and about the multiple ways in which knowledge can be understood while it is translated.

This paper also offers important managerial insights for leaders of KIOs about the importance of developing awareness, understanding and motivation to improvise to internalize new knowledge being transferred. Despite its emergent nature, improvisation processes can be "led" (Vera and Rodriguez-Lopez, 2007). Leaders of KIOs can influence organizational and group contextual factors within which organizational members can engage in learning by doing when transferring knowledge. Our model provides specific guidance on group and organizational conditions that can be augmented by improvisation and that support the transfer and protection of knowledge. Implementing an experimental culture and minimal structures while providing room for improvisation within them requires firms to reconsider their reward systems so that they communicate a willingness to support creativity, spontaneity and flexibility as part of knowledge transfer and protection. Implementing storytelling practices and developing shared mental models while supporting improvisation require firms to foster opportunities for individuals in multiple units to gain experience working together and to offer open spaces for the informal and spontaneous sharing of experiences. Past research has also shown that improvisation skills can be developed through training programs; many times, this training builds on the practice of improvisational actors (Crossan, 1998; Vera and Crossan, 2004, 2005) and translates theatrical exercises to managers in organizations.

Future research directions

A logical next step is the development of testable hypotheses about the moderating effect of improvisation in the link between knowledge mechanisms and knowledge transfer and protection. Empirical studies on improvisation have become more frequent, and several

survey measures have been used to capture improvisation in teams (Moorman and Miner, 1998; Vera and Crossan, 2005). The combination of qualitative and quantitative methods can enable researchers to examine what makes the knowledge transfer process effective and the role of improvisation processes in it.

Our list of knowledge mechanisms that are augmented by the use of improvisation is not exhaustive. Future research could explore the role of improvisation in combination with individual expertise, individual power, real-time information and organizational memory and how they affect knowledge transfer and protection. Previous research has also mentioned the importance of learning culture in an organization as one of the factors to facilitate knowledge transfer (Aubrey and Cohen, 1995; Huber, 1991).

Future research could also further explore boundary conditions for the positive impact of improvisation in KIOs. What is the role of firm size, firm age or life cycle of the product or of the company? As mentioned before, research has indicated mixed results on the relationship between firm size and knowledge transfer and the relationship between improvisation and knowledge transfer in firms of different firm sizes, of different age and life cycles has not been explored at all. Therefore, the question of the effectiveness of improvisation in different organizational settings is yet to be answered empirically.

Finally, future work could also look at the interaction between knowledge characteristics and knowledge context and the conditions under which the tacitness of the knowledge or the context are more important for knowledge transfer. In no case will knowledge exist without context. However, the importance of the context will probably also depend on the degree of tacitness. For example, if we think of the extremely high-density tacit knowledge of a world-class expert in any field, such knowledge is certainly very difficult to transfer or imitate – regardless of the context. One factor that can help this transfer is the very high knowledge level of the receiving side – which also applies to the case of imitation. Thus, there is "easy" and "hard" to transfer knowledge and also "easiness" or "hardness" of knowledge transfer based on the context of the transfer. Looking at different scenarios of these characteristics can help develop a more nuanced picture of knowledge transfer and protection.

Conclusions

This paper proposes knowledge workers' improvisation processes as the underlying mechanism that enables effective knowledge transfer inside the firm while creating barriers to imitation from outside the firm. Improvisation can help us to understand the different interpretations around routines, what individuals bring to the routines and the type of context that allows knowledge transfer to be effective and costly to imitate. We hope to spark further debate and integrative work among KM researchers about improvisation as the process that helps to explain how newness comes out of oldness in knowledge transfer and protection through the translation that occurs every time knowledge is transferred to a new setting.

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