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## **Learning and Knowledge as Interrelations between CoPs and NoPs**

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# **Learning and Knowledge as Interrelations between CoPs and NoPs**

## **Abstract**

**Purpose** – The purpose of our study is to investigate the characteristics and interrelations between informal communities of practice and formal networks of practice and its consequences for learning and new knowledge at work.

**Methodology** – A case study was conducted in a Norwegian bank using qualitative explorative studies and in-depth interviews with financial advisers and their leaders.

**Findings** – Our findings demonstrate that in the absence of integration efforts via a network of practice, multiple communities of practice to ensure knowledge flow is not enough. By the same token, it is possible for new knowledge to be accepted where a community of practice functions cohesively in a singular form in close interrelation with network of practices, but only when both communities of practice and network of practices are supported by a participatory leader.

**Originality** – There are no studies to our knowledge that investigate the interrelations between informal communities of practice and formal network of practices.

**Research limitations** – The total of 30 in-depth interviews might call for further studies. Also, studying a Norway bank alliance does not account for cultural differences between countries.

**Keywords:** communities of practice, networks of practice, knowledge, leadership, learning

**Paper type** – Research paper

## **Introduction**

The communities of practice (CoP) literature focuses on knowing and practice as mutual know-how negotiated among its participants within this social practice (Newell et al., 2009; Brown and Duguid, 1991; Wenger, 2000). In addition, the literature emphasizes the situatedness and embeddedness of learning and knowing where the learning process is understood as collective mastery rather than as an individual achievement (Lave and Wenger, 1991; Gherardi and Nicolini, 2002). Hence, CoP has been found useful in exploring possible linkages between learning, identity, knowledge and motivation within working groups (Thompson, 2005), and the evidence for such informal but essential groups as critical for learning and knowing is fairly well established (Lave and Wenger, 1991; Brown and Duguid, 2001; Tallmann and Chacar, 2011). Since people find it easier to share knowledge with others engage in the same CoP (Newell et al, 2009), a CoP can pose problems for instance new knowledge or change, because they can limit or hinder knowledge flows across such communities (Blackler, 1995; Brown and Duguid, 2001; Swan et al., 2002). This poses a challenge for organizations' ability to strategically encourage (or hinder) the growth of such communities (Contu and Willmott, 2001; Wenger et al., 2002). Thompson (2005) sees this as related to the difficult-to-discern practice-related components of CoPs such as group identification and member interaction. The organic, spontaneous, and informal nature of CoPs, and their freedom from organizational constraints in frequent, social, face-to-face interactions (Agterberg et al., 2010), makes them resistant to supervision and interference (Swan et al., 2002).

Also, there are conflicts in designing for CoPs owing to efforts to formalise the informal (Plaskoff, 2003). There is also the perception of CoPs as more vital than formal management structures, as they constantly improvise and adapt their

behaviours to traverse the limitations of the formal organization (Wenger and Snyder, 2000; Swan et al., 2002).

The role of formal coordination structures—people interacting within a shared context and practice (Brown and Duguid, 2000, 2001), and their interplay and possible interrelations with CoPs—groups of people informally bound together by shared expertise, commitment, and identification in knowing and practice (ibid.)—is often overlooked (Thompson, 2005). These formal structures, as networks of practice (NoP), may serve as vehicles to integrate dispersed knowledge (Brown and Duguid, 2001; Tagliaventi and Mattarelli, 2006; Agterberg et al., 2010) but the question is whether these formal structures interplay with the informal CoPs, with what consequences?

Our concern is how formal coordination structures, in particular networks of practice (NoP), interact with CoPs in the implementation of new knowledge. We seek answers through a systematic comparison of several regional CoPs coordinated by a network organization relying on NoPs. Our interpretive case studies aim to answer the following research question: *How do CoPs in conjunction with NoPs consolidate the implementation of new knowledge?* It may well be that NoPs facilitate the flow of knowledge among multiple CoPs (van Baalen et al., 2005). This is, therefore, an attempt to address the central dilemma faced by knowledge scholars and practitioners: how does one balance between emergent self-organization on the one hand and some degree of formal influence on the other hand?

## **Theoretical Background**

### *Communities of Practice (CoP)*

CoP has achieved prominence in the wider debates of knowledge, learning, and innovation (Swan et al., 2002), as the concept of practice gains ground as a passage from learning as individual cognition to learning as situated in social practices (Lave and Wenger, 1991; Gherardi, 2009; Gherardi, 2010; Wenger et al., 2002; Elkjaer, 2004). CoPs have then been transferred to management domains by Brown and Duguid (2001), where most definitions of CoP focus on the importance of shared practice, common repertoires, interests, knowledge, face-to-face interactions, frequent and mutual engagement, and the informality and self-organizing character of CoPs (Van Baalen, 2005, Wenger, 1998; Agterberg et al., 2010; Mørk et al., 2008). CoPs represent a practice-focused perspective of organizational learning in which social structure and meaning are continually negotiated through participation (Lave and Wenger, 1991; Gherardi and Nicolini, 2002). In other words, there is a virtuous circle of participation where the more people participate, the more they learn, and the more they identify with a group (Thompson, 2005). Accordingly, CoPs refer to a group of people who spontaneously and informally are bounded through a shared concern, a set of problems, or a passion about a topic, and who depend on their knowledge, their thinking, sensemaking, experience and learning and their expertise in an area of ongoing social interaction (Wenger et al., 2000; Lesser and Everest, 2001). The defining characteristics of CoPs involve, in their combination, i) a sense of *joint enterprise* (bound together by collectively developed understanding of their community and how to hold each other accountable for this), ii) *mutual engagement* (interactions, established norms, and relationships of mutuality reflecting these interactions), and iii) a *shared repertoire* of communal resources including language, routines, artifacts and stories (Wenger, 1998; Hislop, 2004).

Given that CoPs represent a set of relations over time and *in relation* to other tangential and overlapping CoPs (Lave and Wenger, 1991: 98), a virtuous circle of participation cannot constitute a CoP unless it is supported by other forms of knowing in action or what Brown and Duguid (2001) call ‘networks of practice’ (NoP). These collaborative settings can provide the social forum that supports CoPs. The assumption here is that formal collaborative settings within organizations must be addressed in possible interrelations with CoPs to understand the acceptance of new knowledge and whether it results in changing established practice at work.

#### *Networks of Practice (NoP)*

Even in moderately complex organizations, the knowledge system includes multiple CoPs that are engaged in a variety of learning activities throughout the organization (Wenger, 1998). NoPs might serve to integrate disparate activities of CoPs by creating platforms for interactions and knowledge sharing. Their members serve as catalysts connecting people and ideas across boundaries (e.g. Wenger et al., 2002), hence promoting learning throughout the organization.

Brown and Duguid (2001) distinguish between CoPs and NoPs on the basis that people can have practice and knowledge in common despite being mostly unknown to each other. NoPs typically have weaker internal relations with less face-to-face interactions than CoPs (Tagliaventi and Matterelli, 2006). The links between the networks are mainly indirect, relying on explicit mechanisms such as databases, newsletters, and information bulletins (van Baalen et al., 2005). Unlike CoPs that are characterized by tightly-knit people who are engaged in frequent, social interactions, working side-by-side (Wenger, 1998), NoPs who share the same practice are geographically dispersed, show little reciprocity, and are largely supported by

information technology tools (Agterberg et al., 2010). NoPs tend to serve as boundary spanners that allow for the integration of distributed knowledge (Swan and Scarborough, 2005) such as by linking people who work in different professional groups (Bechky, 2003; Tagliaventi and Mattarelli, 2006), different organizations (Brown and Duguid, 2001), and different geographical contexts (Vaast, 2004), but they share a common practice. Serving as social networks, NoPs can encourage CoPs to emphasize the quality of relationships and to enact their participation in a community by linking knowledge across boundaries (Newell et al., 2009; Tallman and Chacar, 2011). They can ease the transmission of knowledge among embedded CoP members (e.g. Grandori, 2001) by establishing a common language and routines. They tend to be composed of closely affiliated CoPs from various organizations or units in a geographic region or cluster (e.g. Tallman et al., 2004).

NoPs, unlike CoPs, lack spontaneity in emergence given that they are characterized by fewer social and practical interactions across practices and geographies. Therefore, the emergence of NoPs requires management intervention (Tallman and Chacar, 2011). It is a real management challenge to draw on the benefits of CoPs while not disturbing their internal balance (Thompson, 2005). The role of leaders assumes particular significance in setting up NoPs for the stimulation of exchanges between rather isolated participating units. For instance, Hinds and Mortensen (2005) argue that shared identity and spontaneous communication can be effectively encouraged by top management to alleviate conflict in distributed teams. Extrapolating Wenger's (2000) argument for effective internal leaders in designing CoPs, we argue here that intense integration within an organization can be provided by participatory leaders who emphasize co-practice or joint development among

separated units as participative leadership includes consultation, joint decision making, decentralization and empowerment (Yukl, 2006).

The following section presents an empirical example of the key dynamics of the interaction between CoPs and the wider NoP to provide practical and theoretical insights for organizations seeking to foster CoPs. This is accomplished by demonstrating the different ways in which CoPs interact with an organization's NoP in their response to changing their way of working in accordance to a new knowledge vision.

## **Methodology**

### *Case Study Background*

The role and impact of NoPs and CoPs for new knowledge is illustrated here by a comparative case study conducted in one of the largest financial institutions, a bank alliance, in Norway. The bank alliance (BA) is a network organization with operations in five major regions in Norway, respectively BA North, BA West, BA Central, BA South-East and BA East. BA consists of approximately 350 local banks and 5,500 employees providing a geographical coverage for most of Norway within these regions. BA's five regions are organized through a joint ownership and co-operation of the holding company BA Group. The BA Group is a catalyst for and an initiator of alliances, visions, knowledge goals and co-operations within BA. However, it is each member within BA (in each of the five regions) that has the final say on decisions concerning strategies, visions and goals on behalf of their regions.

We selected three local banks (representing two regions) that were similar in size, employing around 30-45 highly-skilled employees who served the organization

on average for 15-25 years. The three sampled local banks are located in the South-East—SE1 and the central—C1 and C2—regions of Norway.

### *The change initiative*

BA decided to introduce a new knowledge vision in 2007, formulating this as “*BA should appear as an attractive learning organization with employees that have the capability of transforming and developing knowledge, skills and attitudes into behaviour, and thus, appear as skilled and business oriented towards customers*” (BA’s Strategy Document, 2007). The new knowledge vision aimed to a) increase the finance advisers’ knowledge in four business domains of i) loans, ii) savings and financial placements, iii) money transmissions, and iv) insurance, and b) change attitudes and work behaviour whereby the finance advisers increase their focus on sales within the four business domains.

An electronic learning tool (the ‘Learning House’) was established to support what BA refers to as *implementation* (meaning that the finance advisers accept to work as sellers and serve all four business domains) of a new knowledge vision. This tool consisted of learning activities such as role plays, training workshops and tests in an intranet platform. Additionally, a network of experts called the ‘resource people’ was organized. This network consisted of private finance advisers who were formally recognized as experts within one of the four business domains of BA and who could readily be called upon by the regional representatives, local bank leaders and local finance advisers for new knowledge. These experts were located in different local banks as experts within one of the four knowledge domains. Consequently, the number of resource people in each local bank varied from 0 to 4 depending on the size of the local office. The intention of the head office was to have both the Learning

House and the resource people used independently by the finance advisers if and when the need arose.

Our interest was in examining the extent to which the local banks implemented the new knowledge vision. The degree to which community members follow the formal rules implied by the new practice is therefore labelled here as the 'implementation' process (e.g. Kostova, 1999).

### *Data collection*

The case studies consisted of semi-structured interviews carried out between 2008 and 2009 with finance advisers and their leaders at each local bank. There were a total of 30 interviews finance advisers at each of the three local banks, interviews with their leaders at SE1, C1 and C2 each, and members responsible for training finance advisers within their region. The number of interviews at each site was about 13%-18% of the size of the given bank. There were 32, 35, and 45 people employed at SE1, C1, and C2 respectively. The interviews lasted, on average, one hour and were all tape recorded and transcribed. The interviews aided in collecting information on the role of various leaders in the implementation process, the effectiveness of resource people, and the extent to which new knowledge was implemented. These were complemented by observations in five knowledge meetings with HR managers that helped familiarize the investigator with the Learning House and capture the nature of—single or multiple—CoP and the extent of availability of the NoP.

### *Data analysis*

Our analysis started with within-case analysis followed by cross-case analysis. This involved, first, detailed and descriptive write-ups for each local bank, where

transcribed interviews were coded in NVIVO. Open and axial forms of coding were used to identify categories and related sub-categories (Strauss and Corbin, 1998) respectively for a given type of implementation. The degree of *implementation* was categorized as *high* where respondents fully infused new knowledge with value and changed practice of operating. This implied acceptance by employees of the acquired new knowledge with little resistance. By contrast, *low implementation* was captured by the absence of accepts of new knowledge and of an overall change in rules of operating owing to resistance (e.g. Ferner et al., 2005). Also, the responses to questions on ‘could you describe how you work with your leader?’ and ‘what is your experience with the Learning House and do you have any suggestions on how to improve it?’ revealed information on ‘leadership style’ and the ‘use of NoP’. As other respondents acknowledged these, theoretical saturation was reached and these were included as categories in the analysis. Sub-categories were identified on the basis of the categories’ properties and dimensions such as the ‘participatory nature of leadership’. *Participatory leadership* was categorized as a form of leadership that enabled influence over the leader’s decisions through employee involvement in decision making and being consulted and empowered (Glew et al., 1995; Yukl, 2006). *Non-participatory leadership* was defined as leadership that exclude employees from decisions without any consultation with their employees. Non-participatory was categorized as centralized leadership with no empowerment as opposed to participatory leadership (Yukl, 2006). The *use of NoP* was identified as *high* where CoP members participated fully in formal learning activities, seminars, role plays, training and tests on the intranet platform labelled as the ‘Learning House’, and tapped into the expertise of the resource people. Where there was very little participation, this was categorized as *low*. All of the three branches could benefit from

the widely-available learning-facilitating activities and the expertise of the resource people. There was no variation in the extent to which these were accessible to the branches. However, the use of NoP emerged as a significant condition during data collection. For instance, even though a network of resource people and the expertise that they offered was widely available, CoP members were not necessarily willing to employ their services. Furthermore, we identified CoPs as either *single* or *multiple* at each site. In acknowledging the characteristics of social relations and common practice among members of a single CoP, we argue that each local office, as in most organizations, often consists of several CoPs (Hislop, 2005; Boud and Muddleton, 2003 and Tallman and Chacar, 2011). We do not perceive a CoP simply as a matter of individual attributes: joint enterprise and common identity. Nor do we wish to reduce it to a relation between professionals as undifferentiated groups. Rather, a CoP is constructed in a complex array of social practices.

The second step consisted of the cross-case comparison, where the objective was to identify patterns of similarities and differences across cases (Eisenhardt, 1989). Following the 'pattern-matching logic' (Yin, 2003), we explored whether or not the differences in implementation could be attributed to particular CoPs and NoPs. This was carried out systematically following the methods of agreement and disagreement in case comparison (Mill, 1974). In other words, an instance of high implementation was compared with an instance of low implementation in order to identify 'bundles of conditions' that explained the variation in outcome. This is a method of elimination based on the successive exclusion of the conditions that are consistently absent in cases of high implementation (Mill, 1974; see Saka, 2007, for a recent application). An effort was made to identify associations that were deliberately not explicated in the theoretical framework.

## **Findings**

Our findings show variation in the finance advisers' implementation of the new knowledge vision. This tends to be shaped jointly by the presence of a single/multiple CoP and the high/low use of the resources offered by the NoP. Given that the NoP is available extensively across the three local banks, the NoP itself does not seem to explain for the variation. Rather, the use of the NoP assumes significance in the banks that accommodate multiple CoPs (cases C1 and C2), where a high use suggests a high level of implementation. Perhaps more interestingly, a low use of an NoP does not hinder implementation where there is a single CoP working to adopt alternative practices (as illustrated by SE1). Furthermore, leadership style tends not to play an important role in the implementation of the new knowledge vision in the presence of other conditions, i.e. CoP and the use of NoP.

### **High Implementation at Bank SE1**

SE1 adopted a sales-oriented approach to customers by presenting them with a broader range of services covering loans, savings and financial placements, money transmissions, and insurance. It was characterized by a single CoP that was marked by a sense of joint enterprise with interactions, norms and relationships related to a common understanding of what the members wanted the bank to be. There was no indication of the presence of several CoPs at the bank. The strength of the relations within the community was recognized in our studies.

The implementation of a knowledge vision was facilitated by a leader who took the initiative to organize his staff into teams and was readily available for feedback and consultation. This was expressed in his own words as *'I find leadership to be symbolic. The leader must be present and available, and it is extremely*

*important to me that I am that. I have to create trust and show that I trust my employees. Then we can manage everything together*'. He rotated team members every year to develop employee skills and to encourage collaborative relations across the formal teams. His participatory leadership style was well received in the bank.

In spite of the availability of the resource people and the learning activities of the intranet platform, i.e. the Learning House, the CoP did not make full use of these resources. For instance, even though the Learning House was recognized as an important learning tool, it did not fully meet the requirements of the local bank. The community developed its own learning activities to supplement the Learning House.

By contrast to the intention of the head office or the formal expectation, SE1 relied collectively on the resource people. They invited them to gatherings to provide input rather than contact them independently to solve a problem. Their approach reflected very much their working relations as a single CoP.

There was the acceptance of being a seller by the finance advisers, which rested on their participation as a single CoP in alternative ways of working. They did not see a value in using the NoP individually, as suggested by BA, as they were quite content in resolving issues collectively. Their interaction was encouraged by a participatory leader.

### **Low Implementation at Bank C1**

C1 was characterized by multiple CoPs consisting of either male or female advisers who identified more with advisers of their gender than with the wider branch. The work relations at the bank were marked by collegiality within several CoPs.

The female finance advisers identified with one another and worked together to address the challenging demands of being a seller. Their relations extended beyond

work to socializing outside of work. Their strong identity was reflected in their distrust of male colleagues.

The multiple CoPs were led by a leader who had been employed for six months and was perceived as hands-off in his management style. The female advisers, in particular, resented his non-participatory leadership. The female advisers' perception of their leader was different from the leader's self perception.

Similar to SE1, C1 could participate in various learning activities and benefit from the expertise of resource people. In addition to having a resource person in the office representing each of the four business domains, i.e. loans, savings and financial placements, money transmissions, and insurance, the CoPs could draw on the expertise of the resource people within the nearest district.

Although the members were cognizant of an NoP and had favourable experiences with it, this was restricted to certain CoPs. The extent to which learning activities and the expertise of resource people was used differed between the female and the male advisers.

There was resistance to being a seller, in particular, among the female advisers, which negatively affected their use of the NoP. The male finance advisers had a more favourable view than their female counterparts of the NoP. A non-participatory leader did not help address the segregation between male and female advisers to facilitate the implementation of the knowledge vision.

### **High Implementation at Bank C2**

Similar to C1, C2 nurtured multiple CoPs composed of either new recruits or more experienced advisers. The bank had experienced substantial turnover of staff over the last five of years, resulting in a rift between the newly recruited younger and the long-

standing older advisers. The shorter-serving advisers' desire for new challenges could not be matched by those of the longer-serving employees.

The exchange of ideas between the new recruits and the more experienced advisers was limited owing, not only to time pressures but, to differences in culture. The recent recruits identified more with BA as a sales organization and had mutual career goals. They perceived their more senior colleagues as traditional, resistant to change, and 'boring'.

The long-serving advisers were quite content with their accomplishments. They saw themselves as having "survived" the pressure. The new recruits, however, did not recognize their colleagues' achievements. Their stance was reinforced by the prevalence of the two strong CoPs representing each generation at the branch.

The leadership style at the bank did not support efforts to implement the new knowledge vision. The branch leader was perceived as weak in providing feedback and as detached from the everyday practices of the unit. This is perhaps explained by the results orientation of the leader.

Similar to the other two branches, C2 had learning activities and the expertise of resource people widely available for its use. However, the new recruits felt that the resource people could be consulted in meetings and seminars alone. They sought to compensate for the hands-off management style of the branch leader with the everyday involvement in practices of the resource people. The long-serving finance advisers, given the benefit of their accumulated experience, found it easier to draw on resource people and the learning house in their daily practice.

In spite of the segregation between the new recruits and the longer-serving advisers, the intranet-based learning activities were looked upon favourably by both the CoPs.

The sales orientation was taken on board without resistance in particular by the newly-recruited finance advisers. The implementation of the knowledge vision was supported by multiple CoPs employing the resources of the NoP fully. Table 1 summarizes our findings.

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Insert Table 1 about here

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## **Discussion**

Our study shows the interrelations between formal coordination structures, i.e. a NoP and how NoP interacts with a CoP in the implementation of a new knowledge vision. We find that providing employees with access to formalized learning activities and resource people (NoP) is not enough. The key to new knowledge and acceptance for changing practice is on how the members of a CoP use NoPs. We also find that participation in CoPs alone is not sufficient for new knowledge. Multiple CoPs create boundaries for knowledge flow between CoPs within organizations. These boundaries can, however, be managed or compensated by an extensive use of NoPs as shown in our study. Consequently, NoPs are important in encouraging CoPs to enact their participation by linking knowledge across multiple CoP boundaries. This finding is consistent with the arguments of CoP critics (Brown and Duguid, 2001; Contu and Willmott, 2001; Thompson, 2005; Newell et al., 2009; Fuller, 2009). As C2 demonstrates, the heavy reliance on the resources of NoPs helps overcome the barriers posed to knowledge flow by the presence of multiple CoPs. Whereas at C1, the limited use of NoPs leaves the unit less supported in bridging between multiple CoPs. In the absence of integration efforts by a network of resource people and formal learning activities, as seen at SE1, a single CoP alone can encourage knowledge to

flow effectively. This supports the conventional wisdom in the CoP literature (e.g. Lave and Wenger, 1991; Brown and Duguid, 2001). However, this finding needs to be considered in conjunction with the role of NoPs as demonstrated by C1 and C2.

SE1 also shows that a single CoP's approach to the resources on offer by NoPs is shaped by the very nature of the interactions within that CoP. The sense of joint enterprise, mutual engagement and a shared repertoire within the CoP is extended to the NoP to create a common understanding of how to use these formalized learning activities and the resource people. By contrast to the expectations of the head office, SE1 draws on the resources of the NoP collectively, which is a finding not addressed in the CoP literature. .

The supporting role of management can be observed in its efforts to make available learning resources through NoPs. However, participatory leadership has no salience in this process as it does not have a widespread reach or a mandate to integrate knowledge flow. Although we observe efforts by the leader at SE1 to sustain the prevalence of a single CoP through engagement, this condition is absent in the acceptance of new knowledge at C2. This suggests that an NoP tends to have a stronger influence than participatory leaders on new knowledge. This is, in part, aligned with the thinking in the CoP literature on the necessity of management intervention in the emergence of NoPs (e.g. Tallman and Chacar, 2011).

The study also points to access to CoPs. Full participation in a CoP is denied to recently-recruited finance advisers owing to a perceived threat of transforming the knowledge and practices of the extant community (e.g. Carlile, 2004). However, this constraint may be overcome by the dynamics between formal coordination structures and forms of participation that are critical to the ways in which individuals internalize, challenge or reject new practices. For instance, at C2, the new recruits

created their own CoP to overcome these barriers, and at C1, female and male finance advisers were part of separate CoPs.

## **Conclusion**

CoP studies are paying increasing attention to barriers to knowledge flow posed by geographically, professionally, or organizationally dispersed groups and how NoPs allow for the integration of distributed knowledge (e.g. Bechky, 2003; Tagliaventi and Matterelli, 2006). In this study, we have sought to add to this line of research by considering the interrelations of NoPs with multiple or single CoPs and leadership style to refine our understanding of the role of NoPs in new knowledge. To this end, we studied the introduction of a new knowledge vision at three branches of a large bank, and explored how differences in the use of formal mechanisms and leadership style to promote learning interacted to create differences in the implementation of new knowledge across the three sites.

The outcomes of our study make several contributions to the CoP literature. First, the CoP studies have, to a large extent, relied exclusively on CoPs as key to knowledge flow and as a critical vehicle for change (e.g. Swan et al., 2002, Lave and Wenger, 1991; Brown and Duguid, 2001; Tallmann and Chacar, 2011). Our case findings suggest that the exclusive dependence on CoPs flows might be misplaced, and that the interplay between a CoP and formal coordination structures and learning activities (NoPs) might be crucial to effective knowledge flows. This finding rests on the insight that disparate CoP activities create boundaries in organizations. A related issue is that of how cohesive or compartmentalized an organization's CoPs are and what implications this has on their participation patterns. Given that CoPs can exist as single or multiple entities within an organizational unit, formal structures can play an

enabling or a constraining role in new knowledge. This depends on the extent to which they connect or interfere with CoPs. Hence, we add to contributions emphasizing the significant role of NoPs for knowledge flows across epistemic divides (e.g. Brown and Duguid, 2001; Macpherson and Clark, 2009).

Second, although there is growing attention to multiple CoPs and their implications for knowledge flow (e.g. van Baalen et al., 2005; Tallman and Chacar, 2011), there is not a systematic investigation of what role NoPs play in such contexts. Our findings illustrate that CoPs which draw extensively on NoPs in settings of multiple CoPs define effective knowledge flows. NoPs act as devices that facilitate the transformation of knowing across organizational boundaries (Carlile, 2004), but not necessarily across CoP boundaries within an organizational unit, i.e. between males and females or novices and old-timers.

Third, the CoP literature has largely tended to celebrate the key characteristics of mutual engagement, joint enterprise and shared repertoire despite the recent upsurge in investigations concerning not getting access to CoPs. Our findings highlight the potential value of these investigations by illustrating the tensions within communities such as the struggle between the novices and the old timers. We show here that NoPs tend to form complementarity with CoPs for new knowledge adoption, in particular, in contexts that host multiple CoPs.

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**Table 1. Conditions associated with the implementation of a new knowledge vision**

Conditions	SE1	C1	C2
Size (number of employees)	32	35	45
Skill levels	Highly skilled employees with an average of 15 years of employment	Highly skilled employees with an average of 25 years of employment	Highly skilled employees with an average of 15 years of employment and 50 per cent newcomers
CoP	Single	Multiple, between females and males	Multiple, between the new recruits and longer-serving finance advisers
Leadership style	Participatory	Non-participatory	Non-participatory
Use of NoP	Low in terms of formal expectation	Low among the female advisers	High among the new recruits
<i>Implementation new knowledge</i>	<i>High</i>	<i>Low</i>	<i>High</i>