Lappeenranta
University of Technology

Anne Kallio

ENHANCING ABSORPTIVE CAPACITY IN A NON-RESEARCH AND DEVELOPMENT CONTEXT

An action research approach to converting individual observations into organisational awareness

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Supervisors   Professor Vesa Harmaakorpi
              Lappeenranta University of Technology,
              Lahti School of Innovation
              Finland

              Professor Tuomo Uotila
              Lappeenranta University of Technology,
              Lahti School of Innovation
              Finland

Reviewers   Professor John Ulhøi
              Aarhus University,
              School of Business
              Denmark

              Professor Ilkka Kauranen
              Aalto University,
              Department of Industrial Engineering and Management
              Finland

Opponent   Professor John Ulhøi
              Aarhus University,
              School of Business
              Denmark

ABSTRACT

The ability to recognize potential knowledge and convert it into business opportunities is one of the key factors of renewal in uncertain environments. This thesis examines absorptive capacity in the context of non-research and development innovation, with a primary focus on the social interaction that facilitates the absorption of knowledge. It proposes that everyone is and should be entitled to take part in the social interaction that shapes individual observations into innovations.

Both innovation and absorptive capacity have been traditionally related to research and development departments and institutions. These innovations need to be adopted and adapted by others. This so-called waterfall model of innovations is only one aspect of new knowledge generation and innovation. In addition to this Science–Technology–Innovation perspective, more attention has been recently paid to the Doing–Using–Interacting mode of generating new knowledge and innovations.

The amount of literature on absorptive capacity is vast, yet the concept is reified. The greater part of the literature links absorptive capacity to research and development departments. Some publications have focused on the nature of absorptive capacity in practice and the role of social interaction in enhancing it. Recent literature on absorptive capacity calls for studies that shed light on the relationship between individual absorptive capacity and organisational absorptive capacity. There has also been a call to examine absorptive capacity in non-research and development environments.

Drawing on the literature on employee-driven innovation and social capital, this thesis looks at how individual observations and ideas are converted into something that an organisation can use. The critical phases of absorptive capacity, during which the ideas of individuals are incorporated into a group context, are *assimilation* and *transformation*. These two phases are seen as complementary: whereas assimilation is the application of easy-to-accept knowledge, transformation challenges the current way of thinking. The two require distinct kinds of social interaction and practices.

The results of this study can been crystallised thus: *"Enhancing absorptive capacity in practice-based non-research and development context is to organise the optimal circumstances for social interaction. Every individual is a potential source of signals leading to innovations. The individual, thus, recognises opportunities and acquires signals. Through the social interaction processes of assimilation and transformation, these signals are processed into the organisation's reality and language. The conditions of creative social capital facilitate the interplay between assimilation and transformation. An organisation that strives for employee-driven innovation gains the benefits of a broader surface for opportunity recognition and faster absorption."*

If organisations and managers become more aware of the benefits of enhancing absorptive capacity in practice, they have reason to assign resources to those practices that facilitate the creation of absorptive capacity. By recognising the underlying social mechanisms and structural features that lead either to assimilation or transformation, it is easier to balance between renewal and effective operations.

TIIVISTELMÄ

Anne Kallio

ABSORPTIIVISEN KAPASITEETIN EDISTÄMINEN EI-TUTKIMUS JA
KEHITTÄMISKONTEKSTISSA
Toimintatutkimus lähestymistapana muuntaa yksilöiden havainnot organisaation tietoisuuteen

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Liiketoimintaympäristöjen lisääntyvä epävarmuus vaatii kykyä tunnistaa potentiaalisesti hyödyllistä
tietoa ja muuntaa tämä liiketoimintamahdollisuuksiksi. Tässä väitöskirjassa tarkastellaan
absorptiivisen kapasiteetin käsitettä sellaisen innovaatiotoiminnan kontekstissa, joka ei suoraan liity
tutkimus-ja kehittämistoimintaan. Ensisijaisesti huomio kiinnittyy sosiaaliseen vuorovaikutukseen,
joka edistää tiedon absorpoitumista. Väitöskirjassa ehdotetaan, että jokaisella pitäisi olla
mahdollisuus osallistua tähän vuorovaikutukseen joka muokkaa yksittäisistä huomioista
innovaatioita.

Molemmat käsitteet, absorptiivinen kapasiteetti ja innovaatio, ovat perinteisesti yhdistetty tutkimus-
ja kehittämisosastoihin; muiden roolina on omaksua siellä synnytetty tieto. Tämä niin kutsuttu
innovaatiotoiminnan vesiputousmalli on vain yksi näkökulma uuden tiedon tuottamiseen ja
innovaatioihin. Tiede-Teknologia-Innovaatio- näkökulman lisäksi viime aikoina on saanut
enemmän huomiota tiedon tuottaminen ja innovointi Tekemisen-Käyttämisen-Vuorovaikutuksen
kautta.

Absorptiivisesta kapasiteetista on paljon kirjallisuutta, vaikkakin käsitettä on käytetty myös paljon
ymmärtämättä sen syvempää olemusta. Suurin osa kirjallisuudesta yhdistää absorptiivisen
kapasiteetin tuotekehitysosastoihin. Jotkut julkaisut ovat keskittyneet absorptiivisen kapasiteetin
luonteeseen käytännössä, ja sosiaalisen vuorovaikutuksen rooliin sen kehittämisessä. Viimeaikaiset
tutkimukset pyytävät lisää valoa yksilön ja organisaation välisen suhteen kuvaamisen absorptiivisen
kapasiteetin viitekehyksessä. On myös pyydetty tutkimuksia jotka eivät liittyisi tutkimus-ja
kehittämisosastojen toimintaan.

Nojaten henkilöstölähtöisen innovaatiotoiminnan ja sosiaalisen pääoman teorioihin, tämä
väitöskirja tarkastelee sitä, kuinka yksilön havainnot ja ideat muokataan joksikin sellaiseksi, mitä
organisaatio voi käyttää. Absorptiivisen kapasiteetin merkityksellisimmät vaiheet ovat assimilaatio
ja transformaatio. Niiden aikana ideat siirtyvät yksilötasolta ryhmäkontekstiin. Assimilaatio ja
transformaatio nähdään vaihtoehtoisina vaiheina: assimilaatiossa sovelletaan helposti hyväksyttävää
tietoa, kun taas transformaatiossa haastetaan nykyinen tapa ajatella. Nämä kaksi edellyttävät
erilaisia sosiaalisia vuorovaikutuskäytänteitä.

Tutkimuksen tulokset on tiivistetty seuraaviin lauseisiin: *Jotta ruokittaisiin absorptiivista
kapasiteettia käytäntölähtöisissä, ei tuotekehitys-painotteisissa konteksteissa, täytyy järjestää
optimaaliset olosuhteet sosiaaliselle vuorovaikutukselle. Jokainen yksilö on potentiaalinen lähde
signaalille joka johtaa innovaatioon. Siispä, yksilö tunnistaa mahdollisuuksia ja havainnoi*

signaaleja. Sosiaalisten vuorovaikutusprosessien kautta, assimilaation ja transformaation, nämä signaalit prosessoidaan sisälle organisaation todellisuuteen ja kieleen. Luova sosiaalinen pääoma mahdollistaa assimilaation ja transformaation välisen siirtymän. Organisaatio joka käyttää henkilöstölähtöistä innovaatiotoimintaa, saa laajemman tarttumapinnan mahdollisuuksien havaitsemiselle ja nopeammalle tiedon absorboitumiselle.

Jos organisaatiot ja johtajat tulevat tietoisimmiksi absorptiivisen kapasiteetin hyödyistä käytännössä, heillä on syy kohdistaa resursseja käytäntöihin jotka helpottavat sen synnyttämistä. Kun tunnistetaan ne sosiaaliset mekanismit ja rakenteelliset piirteet jotka johtavat joko assimilaatioon tai transformaatioon, on helpompi tasapainoilla uudistamisen ja tehokkuuden välillä.

Avainsanat: innovaatio, käytäntölähtöinen innovaatio, absorptiivinen kapasiteetti, assimilaatio, transformaatio

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"In another moment went Alice after it, never once considering how in the world she was going to get out again"
- Lewis Carroll -

I never had a dream of becoming a PhD. And here we are. Even though the achievement feels good in this moment, I have to say that even more important to me has been the journey. During this exploration, I have encountered a lot of people that have impacted me in many ways. Next I want to thank those who made this happen.

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"...and she went on.
- Would you tell me, please, which way I ought to go from here?
- That depends a good deal on where you want to get to, said the cat.
- I don't much care where, said Alice.
- Then it doesn't matter which way you go, said the cat.
- So long as I get somewhere, Alice added as an explanation.
- Oh, you're sure to do that, said the cat, if you only walk long enough"
- Lewis Carroll -

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"At any rate I'll go there again!, said Alice as she picked her way through the wood. "It's the stupidest tea party I ever was in all my life!
Just as she said this, she noticed that one of the trees had a door leading right into it. "That's very curious!" she thought. "But everything is curious today. I think I may as well go in at once." And in she went.
- Lewis Carroll -

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Anne Kallio

Contents

1. INTRODUCTION

Finland has a long tradition of technological inventions. Finnish engineers are known around the world for their excellent expertise in technological advances. However, it has been acknowledged that focusing solely on the field of technological innovations means large amounts of potential will be missed. There is a wider shift of thinking underway, one that challenges traditional expertise-based thinking. The engagement economy is taking over (see for example McGonigal, 2008; 2011). No longer is the user simply a source of feedback; now the customer is involved in the actual innovation process. Educational programmes are being forced to rethink their methods and contents, as students are facing a more uncertain and complex world (*Financial Times,* December 19, 2011). Innovation is for everyone; it can even be driven by blue-collar workers (The Danish Confederation of Trade Unions, 2007; 2008).

"An innovation culture at the workplace implies that the individual employee not only focuses on performing his or her duties, but also considers whether the duties could be performed more appropriately and has the resources for changing the solution of tasks." (The Danish Confederation of Trade Unions, 2007, p. 21)

This thesis examines absorptive capacity in the context of non-research and development innovation. Absorptive capacity has most commonly been used in and associated with research and development functions. Many absorptive capacity studies also focus on transferring knowledge. This thesis concentrates primarily on the social interaction that facilitates the absorption of knowledge. This thesis suggests that, instead of restricting acquisition of new knowledge to certain gatekeepers, everyone is and should be entitled to take part in the social interaction that transforms signals into innovations.

1.1 On innovation

Innovation as a scientific field blurs the boundaries of traditional scientific fields (Fagerberg and Verspagen, 2009). As a concept, innovation has several meanings, and discussions on innovation sometimes occur even now in which the parties are not really talking about the same thing. The approach to innovation that is the focus of this thesis is the process of innovation and the culture of doing, of how things can be done in a way that is meaningful for stakeholders. The term *novel* is avoided, since things rarely are, but *value* is highlighted: innovation creates value and meaning. This thesis is grounded in the growing research stream on practice-based innovation (Melkas and Harmaakorpi, 2012). In this context, "…innovation is most often considered to be a result of co-operation in normal social and economic activities" (p. 2). Thus, innovation is something that is involved in everyday activities and not a privilege of, for example, research and development departments. Innovation is a process through which organisations interact with customers, suppliers and knowledge institutions (Jensen et al., 2007; Vinding, 2002).

Even though the process aspect of innovation is highlighted here, this approach nevertheless acknowledges that innovation is something that is used and useful, an outcome. "The values for the company can be both "hard" values such as a higher turnover, better bottom-line results, etc., and "soft" values, such as greater job satisfaction, reduced stress, etc. The concepts of implementation

and value creation thus play a very central part and are exactly what distinguishes innovative thinking or inventions from innovation." (The Danish Confederation of Trade Unions, 2007, p. 9)

Research on innovation has expanded from closed research and development innovation to open innovation environments (Chesbrough, 2003). According to Chesbrough et al. (2006), the antecedents of open innovation date from Schumpeter's 1934 research, in which he studied entrepreneurs in 42 research and development processes. At that time, it was believed that value was created in benefits of scale and scope for internal research and development. Nelson (1959) raised the issue of knowledge spillover. He claimed that benefits can be achieved through ideas that originate outside research and development departments. The use of external knowledge aroused strong objections in the form of the "not invented here" phenomenon (Katz and Allen, 1982). Cohen and Levinthal (1990) presented the two faces of research and development; the concept of absorptive capacity deals with acquiring knowledge from different sources and assimilating this knowledge into the organisation's existing stock of knowledge. As Cohen and Levinthal (1989) point out, absorptive capacity can offer an explanation for why certain firms invest in basic research even though the outcomes spill over from the firm into the public domain. It is not only basic research in which they are investing; it is also the capabilities of employees to exploit externally available information. Von Hippel (1988) investigated different sources for acquiring useful knowledge; customers were seen as one such significant source. Langlois (2003) noticed that innovations develop in a less hierarchical fashion. If a company does not possess sufficient absorptive capacity of its own, strategic alliances may be used to acquire knowledge.

Open innovation as such has set new kinds of demands for innovators, for example in the forms of collective knowledge production, innovation networks and expertise, as well as in skills needed (Pihkala and Harmaakorpi, 2011). Open innovation continues to seek its shape today. Pihkala and Harmaakorpi (2011, p. 2) conclude that organisations can be divided into four categories with respect to corporate culture and entrepreneurship: 1. Closed inside and outside, 2. Closed inside but open outside, 3. Open inside but closed outside and 4. Open inside and open outside. The focus in this thesis is on the *open inside* perspective.

Table 1 presents several modes of knowledge generation. Mode 1 comprises Science–Technology–Innovation knowledge generation (Jensen et al., 2007). Harmaakorpi (Harmaakorpi and Melkas, 2012) has classified the Doing–Using–Interacting mode of knowledge generation into two subcategories: Mode 2a and Mode 2b. Mode 2 knowledge generation focuses on practice-based innovation. In the literature on practice-based innovation (Melkas and Harmaakorpi, 2012; Ellström, 2010), employees, customers and networks are seen as important sources of innovations. Whereas Mode 1 stresses research and development as a context for innovation creation, Mode 2 also recognises the value of non-research and development innovations. And whereas Mode 1 focuses mainly on explicit knowledge, Mode 2 seeks out tacit and self-transcending types of knowledge. There is a tension between the Science–Technology–Innovation and Doing–Using–Interacting modes that generates a need to pay attention not only to research and development processes but also to learning from informal interaction and competence-building through tacit elements (Jensen et al., 2007). In order to gain a deep understanding of the differences in innovative performance, there is a need to develop indicators that are grounded in Doing–Using–Interacting (Jensen et al., 2007).

Table 1. Modes of knowledge generation (Harmaakorpi and Melkas, 2012, p. 447-448)

Point of view; Most typical…	Science-based innovation (Science–Technology–Innovation, Mode 1)	Practice-based innovation (Doing–Using–Interacting, Mode 2a)	Practice-based innovation (Doing–Using–Interacting, Mode 2b)
… innovation types	Radical, technological innovations and related concepts	Radical concept innovations – technological system innovations	Organisational innovations – social innovations – service innovations
… fuels of innovation	Proximity	Distance	"Near distance"
… logics	Agglomeration – clusters – economies of scale	Related variety – innovation platforms	Developing innovation capability – breaking down silos and preventing bottlenecks
… capital	Intellectual capital – financial capital	Social capital – institutional capital	Social capital – structural capital
… innovation processes	Analytical	Interpretative	Interpretative
… innovation methods	Scientific methods	Methods of intellectual cross-fertilisation	Problem-based learning (e.g., cultural methods)
… origins of innovations	Science and related expertise	Networks – serendipity – customers	"Normal" staff – customers
… fields of expertise	World-class scientific expertise in narrow fields	Brokering – general ability to build possible worlds	Brokering – general ability to build possible worlds
… types of knowledge	Explicit knowledge	Self-transcending knowledge	Tacit knowledge
… knowledge transfer mechanisms	Technology diffusion for the firms of cluster	Scanning and absorbing technology and market signals	Organisational learning

Whereas Mode 1 respects traditions and rewards those who have long-term experience in a certain field of science, in Mode 2 knowledge generation and innovations stem from an "ability to build possible worlds"; that is, divergent thinking (Robinson, 2010) is a good starting point for recognising opportunities. In this case, world experience and education can even be hindrances to spotting good signals, as they create path-dependencies and lock-ins (Saxenian, 1994; Robinson, 2010). Whereas Cohen and Levinthal (1994) state, referring to absorptive capacity, that "the capacity to exploit outside knowledge is comprised of the set of closely related abilities to evaluate the technological and commercial potential in a particular field..." (p. 227), in practice-based innovation and Mode 2 knowledge generation, the focus is on making connections between two or more fields.

The thesis is positioned in a non-research and development context. Table 2 presents key concepts from a research and development viewpoint versus a non-research and development approach. In the latter context, there are no official structures and assigned roles for scanning the environment in order to produce innovations, meaning a different kind of organising is needed.

Table 2. Key concepts and non-research and development innovation

	Research and development focused innovation	**Non-research and development innovation**
Knowledge generation	Science–Technology–Innovation	Doing–Using–Interacting
Knowledge absorption	Expert knowledge through research and development functions	Observations through anyone in an organisation
Open Innovation	Open outside	Open inside
Absorptive capacity	"By-product" of the research and development department	Ability of individuals facilitated by organisational elements. Realised through the actions of individuals
Social capital in the absorptive capacity context	Social structures that ensure access to knowledge	Social dynamics that facilitate the absorption of knowledge
Employee participation	Effective diffusion of innovation outcomes	Driving force of innovation

From the perspective of practice-based innovation, this thesis aims at increasing understanding of the concept of absorptive capacity and ways of enhancing it in practice. The following sections present the reasoning behind identifying the proper questions that need to be asked in order to fill in the theoretical gap. This Introduction closes with the presentation of the research questions.

1.2 Absorptive capacity

The concept of *absorption* originates from the field of chemistry; it refers to a situation in which "liquid or gas is taken into the interstices of a porous substance and held there" (Webster's, 1996, p. 6). Simply put, absorption is the process by which one who is ready to receive takes something that can be taken and keeps it. Webster's dictionary (1996) defines *absorption* (adj. *absorptive*) as "The act of absorbing or the condition of being absorbed" (p. 6) and *capacity* as "Ability to receive or contain" or "Adequate mental power to receive, understand" (p. 197).

So what, then, is absorptive capacity? Cohen and Levinthal (1990) say it is an organisation's ability to value, assimilate, and apply new knowledge. How come it has become a feature of research and development departments (Lane et al., 2006)? Is external knowledge a prerequisite for eggheads alone, who then try to sell their ideas to customers as well as other parts of the organisation? Even though Cohen and Levinthal (1989) do describe absorptive capacity as technological knowledge generated in research and development departments, they do not claim that research and development are the only processes that have an effect on learning and innovation. It is a near-universal organisational phenomenon that gaps exist between different parts of an organisation or between organisations. So in calling for social integration mechanisms, are Zahra and George (2002) actually calling for ways to enhance the knowledge flow from the research and development department to other parts of the organisation, i.e. production, sales and management?

As a construct, absorptive capacity is reified (Lane et al., 2006); in other words, scholars have taken it for granted without really examining its nature and antecedents. This is why the concept of absorptive capacity seems abstract and difficult to connect to real-world events. Reification is, it is true, a prerequisite for learning (Lane et al., 2006), but it also sets a threat to validity (Cronbach and Meehl, 1955). Cohen and Levinthal (1989) argue that "firms invest in research and development not only to pursue directly new process and product innovation, but also to develop and maintain their broader capabilities to assimilate and exploit externally available information" (p. 539). In addition, they state that absorptive capacity is usually a by-product of other activities, including research and

development (Cohen and Levinthal, 1994). Thus it must be noted that they do not claim that research and development are the equivalent of absorptive capacity, even though the latter stands at the centre of their examination.

The outcomes of absorptive capacity have gained plenty of attention, whereas its organisational antecedents have been ignored (Jansen et al., 2005). Little research has been done on the relationships between organisational structures, internal knowledge types and absorptive capacity (Lane et al. 2006). Lane et al. (2006) call for studies from the process and policy aspect: what firms should develop in order to manage absorptive capacity both in research and development and non-research and development contexts. Both the individual–organisation linkages and the social practices involved in the emergence of absorptive capacity have been discussed in recent literature (e.g. Hotho et al., 2011; Martinkenaite and Breunig, 2011).

1.3 The Doing–Using–Interacting mode of knowledge absorption

In researching absorptive capacity, relatively few scholars take into account the knowledge that is actually being transferred (Volberda et al., 2010). Lane et al. (2006) conclude that knowledge in absorptive capacity studies has been examined mainly from three viewpoints: content (e.g. Lane and Lubatkin, 1988), tacitness (e.g. Szulanski, 1996) and complexity (e.g. Garud and Nayyar, 1994). However, not many claim that an increase in tacitness or complexity would increase absorptive capacity; rather, the focus is on generating routines and practices to lessen them (Lane et al., 2006). In other words, the primary aim has been to reduce uncertainty and focus on knowledge that is easily codifiable. As Martinkenaite and Breunig (2011) point out, whereas the existing literature has highlighted the quantity of prior knowledge, more qualitative aspects should be considered.

Knowledge management literature considers several concepts from various traditions concerning knowledge, for example knowledge transfer (e.g. Szulanski, 1996), knowledge creation (e.g. Nonaka and Takeuchi, 1995), knowledge production (Gibbons, 1994) and knowledge generation (Jensen et al., 2007). Cheng et al. (2011) propose a shift from codifying, capturing and storing knowledge towards enabling the social interactions that enhance knowledge creation, transfer and application. The interaction type depends on the knowledge that is being absorbed. Explicit knowledge requires good routines to disseminate knowledge. Knowledge that is difficult to codify (e.g. *self-transcending knowledge*, according to Scharmer, 2001) demands greater absorption skills of the interacting partners. The process of absorption requires different structures, social skills of the interacting partners and managerial support, since it takes more time and may call for extra resources.

Cohen and Levinthal (1989) focus on explicit technological knowledge and see three sources for absorptive capacity: a company's internal research and development, its competitors' research and development spillovers and external technological knowledge from outside the industry. How about non-research and development innovations? As Jensen et al. (2007) indicate, great innovation potential lies in knowledge that is not technology-based. What is this Doing–Using–Interacting knowledge? Knowledge that is hidden in the practices, interactions and attitudes of employees? Table 3 presents the types of knowledge inherent in the Science–Technology–Innovation and Doing–Using–Interacting modes of knowledge generation.

The most innovative organisations successfully combine both Science–Technology–Innovation and Doing–Using–Interacting knowledge; for example, the new technology developed in the research

and development department requires the organisational competence of other departments to realise it as business opportunities (Jensen et al., 2007). Science–Technology–Innovation knowledge is something that can be codified in written form (as in know-what and know-why). Even though the absorption and interpretation of explicit knowledge also require some extent of tacit knowledge (Howells, 2002), absorption among people who share similar experiences is rather rapid. Problems of language do exist; a document written in scientific language is not necessarily readable by industry professionals, unless they possess a background within that science.

Table 3. Knowledge types (Jensen et al., 2007)

Science–Technology– Innovation mode	Doing–Using– Interacting mode
know-what	know-how
know-why	know-who

Knowledge generation and learning in the Science–Technology–Innovation model (Jensen et al., 2007) is based on expert knowledge production and dissemination of codified knowledge. As the driving force of innovation, a scientific push effect is the exception rather than the rule in innovation processes (Schienstock and Hämäläinen, 2001). Rather, innovations seem to presume factors like an ability to interact, learn collectively and build trusting relations between the innovating partners (Harmaakorpi, 2004). Doing–Using–Interacting processes are informal learning processes that entail experience-based know-how (Jensen et al., 2007).

Know-who is learnt through social practice (Jensen et al., 2007). Jensen et al. (2007) point out that Doing–Using–Interacting-mode knowledge enhances the abilities of employees to face (problem) situations they have not faced before. In these cases, it is not necessarily helpful to refer to a written manual to see how the issue should be dealt with. Jensen et al. (2007) refer to apprenticeship relationships in the acquisition of know-how.

1.4 From a privilege of gatekeepers to a company-wide duty

Volberda et al. (2010) state that absorptive capacity literature should acknowledge that knowledge acquisition can happen both externally and internally. In the general discussion contained in the literature, knowledge is usually understood as being acquired from external sources. Cohen and Levinthal (1990) specify that "organisational absorptive capacity is a function of absorptive capacity at the individual level" (Lane et al., 2006, p. 846). Thus, organisational absorptive capacity depends on the ability to transfer knowledge from the individual level to the organisational level. Zahra and George (2002) refer to this as the need for social integration mechanisms to move from potential to realised absorptive capacity. This brings us to the research gap presented by Volberda et al. (2010); more understanding should be gained regarding the relationship between individual absorptive capacity and organisational absorptive capacity. How is absorptive capacity actually generated in practice?

Cohen and Levinthal (1990) state that the absorptive capacity of an organisation is dependent on its gatekeepers – in other words, the people who represent the organisation in interaction with external stakeholders. Salespeople, for example, are in a position where they possess customer knowledge as an asset that affects knowledge acquisition. Todorova and Durisin (2007) propose that internal power relationships have an effect on the *transformation* and *assimilation* phases of new knowledge exploitation. This affects whether individuals are willing to share knowledge and eventually

participate in leveraging organisational absorptive capacity. Thus, more attention should be paid to motivating people to share knowledge rather than rewarding individual "superstar" ideas.

Cohen and Levinthal (1994) state that a firm has variety ways of developing its absorptive capacity; among other things, it may train its employees in advanced technical skills or encourage employees to monitor and read technical literature in their areas of expertise. It has been claimed that Cohen and Levinthal's approach is centred on technological innovations and the Science–Technology–Innovation mode of knowledge generation. However, they do state that absorptive capacity is created as an "accumulation of manufacturing experience" (Cohen and Levinthal, 1994, p. 229). In the Doing–Using–Interacting mode of knowledge generation, then, training employees is essential not only for technical skills but also for communication, interaction and innovation skills (Kallio et al., 2010; Pässilä et al., 2012). Employees should be engaged in observing or monitoring work processes and developing them.

Participation in decision-making increases acquisition of new external knowledge (Jansen et al., 2005). If all employees were legitimised to have interaction relationships in the name of organisational absorptive capacity, the problem of gatekeepers would decrease. If absorptive capacity is to be something for everyone within the organisation, everyone should be given a chance to make a difference. Employee-driven innovation follows in the footsteps of Japanese quality-oriented production logics such as *kaizen* (e.g. Imai, 1986), as well as continuous improvement (e.g. Boer et al., 2000) and high-involvement innovation (e.g. Bessant, 2003). All these approaches communicate that everyone in an organisation is capable of possessing the skills and abilities that underpin innovation (Tidd and Bessant, 2009). According to the theory of employee-driven innovation, innovations can emerge from any part of an organisation and from any employee group (Kesting and Ulhoi, 2010; Hoyrup, 2010). In employee-driven innovation, the stress is on non-research and development innovation (Hoyrup, 2010).

Many obstacles continue to exist for organisations trying to foster employee-driven innovation (The Danish Confederation of Trade Unions, 2007). The Danish Confederation of Trade Unions has listed following factors that may either enhance or hinder employee-driven innovation: management and strategy, work organisation, composition and development of skills, knowledge absorption, technology, values and culture (The Danish Confederation of Trade Unions, 2007, p. 12). In this thesis, the main focus is on knowledge absorption, although it is acknowledged that all these factors are interdependent.

In this thesis, employee-driven innovation is understood as engaging employees to be proactive and demonstrate initiative, and therefore acts as the basis for individual absorptive capacity. The organisations applying employee-driven innovation may be at different stages of development. Therefore, in one organisation, setting up a channel for employee suggestions is a step towards a bottom-up approach, whereas in another one, the employees get to design organisational processes with partial decision-making power.

1.5 Objective of the study

As indicated in the discussion above, the primary focus of this thesis is on the relationship between individual and organisational absorptive capacity (Volberda et al., 2010) as well as the actual social practices (Zahra and George, 2002; Lane et al., 2006; Hotho et al., 2010) that appear in the assimilation and transformation phases of absorptive capacity (Todorova and Durisin, 2007). The context is practice-based innovation (Melkas and Harmaakorpi, 2012), the Doing–Using–

Interacting mode of knowledge generation (Jensen et al., 2007) and non-research and development innovation (Hoyrup, 2010).

The objective of this study is to create actionable knowledge on absorptive capacity in practice-oriented contexts. In order to do so, following sub-objectives require examination. First, since absorptive capacity is looked at in a rather new context, it needs to be defined in that environment. Second, as the earlier research has focused either on individual level or organisational level, the interface of two levels of analysis calls for more attention. Thus, the study has to shed more light over the relationship of organisational and individual absorptive capacity. Third, to make this knowledge actionable the objective is to enhance understanding of the mechanisms that underlie in practice-based environments.

This thesis aims towards the objectives with following research questions:

How can organisational absorptive capacity be enhanced in a practice-based non-research and development context?

- *How* is absorptive capacity understood in the context of practice-based non-research and development innovation?
- *What* is the relationship between individual and organisational absorptive capacity?
    o *What* is the role of employees in enhancing organisational absorptive capacity?
- *How* can individual absorptive capacity be converted into organisational absorptive capacity?
    o *How* can employees be engaged in developing organisational absorptive capacity?
    o *What* is the role of social capital in this process?

2. RESEARCH DESIGN

The research focus of this thesis is on the examination of absorptive capacity in a practice-based setting. The aim is to include multiple levels of analysis. The problem is how to engage employees in enhancing organisational absorptive capacity. Since the research problem includes an intent to generate action in addition to scientific interest, action research is an appropriate method. Relying on action research, an intervention model called "innovation catcher" was developed in order to find answers to the research question.

This thesis is built predominantly on action research (Coughlan and Coghlan, 2002; Reason and Bradbury, 2008; Pasmore, 2008; Gustavsen, 2008) and makes use of a multi-case setting. The reasoning logic is founded on pragmatic reasoning. The thesis relies on mixed-method data collection: 2 surveys, 100 interviews and 8 action research processes were used to gather the data on which it is based. The survey and interviews provide a cross-sectional snapshot of the prevailing situation in the region under study, Lahti, at a given time, while the action research processes provide a more longitudinal picture and enhance understanding of change in organisations.

The overall research process is described in Table 4. During each phase of the research process, understanding accumulated for the next phases. The examination increased understanding of the nature of practice-based innovation activities in the region. The first interviews triggered the steering of attention towards absorptive capacity. Each of the action research processes was unique, although they shared the same basic structure (modified from Coughlan and Coghlan, 2002). The data was continuously fed back to the participants as the process proceeded and was reinterpreted by researchers during each phase (e.g. Miles and Huberman, 1994; Coughlan and Coghlan, 2002). Thus, the overall research process followed a hermeneutic circle, in which several interpretations of multiple researchers as well as practitioners affected the outcome (Davidson, 2001).

The qualitative research approach is vulnerable to researcher bias. Action researchers should therefore be self-reflective regarding which representations are valid and which are affected by the researcher's own presuppositions (Coughlan and Coghlan, 2002). The possibility of over-interpretation increases when a single person works alone and conducts all the phases of research him- or herself. (Miles and Huberman, 1994) Although several researchers participated in the action research processes involved in this thesis, the author was the responsible researcher in all cases. The cases were also monitored by a larger group of people. A weakness that frequently arises in confirming the findings of qualitative research is the tendency of researchers to describe the results alone, ignoring the process of how the results were achieved (Miles and Huberman, 1994). The quality of the research is discussed in more detail in Section 6.4.

Table 4. The research process

	2005	2006	2007	2008	2009	2010	2011
Literature	Absorptive capacity Social capital	Employee participation in innovation - Motivation - Channels - Places of idea collision - Absorptive capacity			Innovation capability in practice-based innovation Communities of practice	Social capital	Employee-driven innovation absorptive capacity
					Absorptive capacity: Assimilation and transformation during different phases Creative social capital in organisations		
Questions	Is this region innovative? How are the key actors networked? What is region's absorptive capacity?		How are ideas generated, enriched and evaluated in organisations (at the shop-floor level)? Why do people generate ideas? How are they rewarded?	How could innovativeness be cultivated among employees?	How could innovation opportunities be generated through exploring unexpressed customer knowledge?	What is the role of social capital in building an organisational absorptive capacity?	How do assimilation and transformation differ and how can we enhance the two?
Cases	10 interviews conducted in the regional innovation environment; Questionnaire directed to the main actors in the regional innovation environment		Developing the "innovation catcher" 8 action research processes 90 interviews: shop-floor employees, managers		Innovation capability questionnaire	Self-reflection in the cases as a whole for the thesis, Interpreting the results for this Introduction article	
Writing process (articles for thesis)			First conceptual conference paper on "innovation catcher" Article 1 conference paper	Article 3 conference paper	Articles 2 and 6 conference paper	Journal article 1 published Article 4 conference paper	Journal article 2 published (article 5 conference paper) Journal articles 3 and 6 accepted
					Maternity leave		Writing the Introduction

2.1 The articles

The research conducted within the framework of this thesis is documented in the form of this introductory article and the following journal articles:

1. Kallio, A., Harmaakorpi, V. and Pihkala, T. (2010). Absorptive Capacity and Social Capital in Regional Innovation Systems: The Case of the Lahti Region in Finland. *Urban Studies*, Vol. 47, No. 2, pp. 303-319. Print ISSN: 0043-0980.
2. Kallio, A. and Bergenholtz, C. (2011). Generating innovation opportunities - Exploring and absorbing customer knowledge. *International Journal of Technology Management* Vol. 56, Nos. 2/3/4, pp. 172-187. ISSN (Print): 0267-5730.
3. Kallio, A. and Bergenholtz, C. (forthcoming). Enhancing organisational absorptive capacity by reframing an outdated suggestion box: An action research study. Accepted by the *International Journal of Innovation and Learning.*
4. Kallio, A., Bergenholtz, C. and Korhonen, H. (submitted). The role of social capital in the creation of organisational absorptive capital: a two case study. Sent for a review process to *International Journal of Learning and Change.* (sent for first review April 11, 2012)
5. Kallio, A. and Konsti-Laakso, S. (2011). An employee-driven organisational innovation system - Experiences from Innovation Catcher. 11th International CINet Conference in Aarhus, Sep 11-13, 2011. (Invited for inclusion in the CINet special issue by *Creativity and Innovation Management,* sent for first review Dec 1, 2011)
6. Kallio, A., Kujansivu, P. and Parjanen, S. (2012). Locating the loopholes of innovation capability before launching a development project. *Interdisciplinary Journal of Information, Knowledge and Management,* vol. 7, pp. 21-38.

Detailed information about the articles is presented in Table 5. All the articles are joint papers, and the author of this thesis is the first author for each paper. Apart from paper 6, the author took part in the data collection, and for paper 6 the author participated in creating the questionnaire that was later modified for the actual data collection. Paper 4 dealt with two cases; the author conducted one case, and had no part in the other case. The role of the author in each paper is as following:

1. Collected the data, analysed the data together with co-authors, wrote the paper with co-authors
2. Collected and analysed the data. Wrote the paper with co-author
3. Collected and analysed the data. Wrote the paper with co-author
4. Collected and analysed the data of one of two cases. Wrote the paper with co-authors
5. Collected and analysed the data. Wrote the paper with co-author
6. Took part in creating the questionnaire, analysed the data. Wrote the paper with co-authors

Article 1 ("Absorptive Capacity and Social Capital in Regional Innovation Systems: The Case of the Lahti Region in Finland") enhances understanding of practice-based innovation activities. It also offers a preliminary understanding of how absorptive capacity is formed in this context and makes a connection to absorptive capacity and social capital.

Conference paper 5 ("An employee-driven organisational innovation system - Experiences from Innovation Catcher") presents an intervention model for how employees can be engaged to take part

in an organisation's innovation activities, and for the interaction that is ongoing within the organisation. Drawing on the literature of employee-driven innovation, the paper explores three cases in offering a clearly defined perspective on the context of the suggestion box as an organisational communication channel.

In developing the model, one case was seen as particularly interesting. There, the focus group was not on shop-floor employees but on sales managers. Papers 2 ("Generating innovation opportunities - Exploring and absorbing customer knowledge") and 4 ("The role of social capital in the creation of organisational absorptive capital: a two case study") both focus on the same organisation. Paper 2 presents a practice that enhances the absorption of acquired knowledge in a non-research and development environment. Paper 4 goes deeper, examining the mechanisms of assimilation and transformation and defining creative social capital as a concept that acts as a mediator between the two.

Paper 3 ("Enhancing organisational absorptive capacity by reframing an outdated suggestion box: An action research study") presents another experience. This paper is a good example of how an organisation brought shop-floor employees into organisational interaction in terms of innovation by assigning them the role of activators.

Paper 6 ("Locating the loopholes of innovation capability before launching a development project") promotes understanding that arose subsequent to the development of the "innovation catcher", as in some cases it became very clear that organisational culture, management involvement and history of employee engagement set boundaries for how large a step could be taken within one development project. Therefore, a diagnostic survey was developed in order to identify perceptions and attitudes before taking action. Here, absorptive capacity was seen as one part of innovation capability in the context of practice-based innovation and Doing-Using-Interacting mode of knowledge generation. Hence, innovation capability in practice-based environments is seen as mobilizing everyone to recognize and acquire knowledge across boundaries, and be able to turn this into innovation outcomes.

Table 5. The articles comprising this thesis

Title of publication	Research question (Objectives)	Keywords	Methodology and data	Empirical data from	Main contribution
1 Absorptive capacity and social capital in regional innovation systems: Case of Lahti Region in Finland	How is regional absorptive capacity reflected at the individual level in social capital?	Absorptive capacity, Social capital, Brokerage functions	Purposive sample survey - SPSS - Factor analysis - Cluster analysis - 234 responses	The individuals active in the Lahti region innovation system	Personal and organisational roles in the regional innovation system from the perspective of information brokerage, Social interaction
2 Generating innovation opportunities - Exploring and absorbing customer knowledge	How can a company generate innovation opportunities by exploring and absorbing customer knowledge?	Absorptive capacity, Communities of practice, Customer knowledge, Sales, Action research	Action research - Interviews ATLAS.ti - Observation - Written tasks	One case organisation: salespeople, managers	A social integration mechanism between potential absorptive capacity and realised absorptive capacity
3 Enhancing organisational absorptive capacity by reframing an outdated suggestion box: An action research study	How can an outdated suggestion box be re-framed in order to enhance organisational absorptive capacity?	Absorptive capacity, Shop-floor level, Innovation activity	Action research - Interviews - Observation - Researcher diary	An industrial company and its shop-floor employees	From individual absorptive capacity to organisational absorptive capacity, Role of innovation activator
4 The role of social capital in the creation of organisational absorptive capital: a two case study	What role does social capital play in the development of organisational absorptive capacity?	Social capital, Absorptive capacity, Social integrative mechanism, Low-tech organisation, Creative social capital	Two-case study with action research orientation	Two case organisations: experts, managers	Structure for knowledge absorption, Creative social capital as a mediator between assimilation and transformation
5. An employee-driven organisational innovation system: Experiences from innovation catcher	How can employees be engaged in a practice-based innovation environment?	Employee-driven innovation, Co-creation	Action research - Interviews - Observation - Researcher diary	Three case organisations: shop-floor employees	The study presents a process model of how to engage employees in the design of organisational innovation practices
6. Locating the loopholes of innovation capability before launching a development project	How should an innovation intervention be targeted in order to enhance organisational innovation capability?	Science–Technology–Innovation and Doing–Using–Interacting modes of knowledge generation, Practice-based innovation, Innovation capability	Survey 39 responses	One case organisation	A procedure to preliminarily evaluate where to target intervention

2.2 Methodology

Despite the many branches of literature on action research, Lewin is often considered to be its founding father. Lewin emphasised the methodology's normative aspect, i.e. that science ought to improve society, including organisations (Aguinis, 1993; Coughlan and Coghlan, 2002). Action research has drawn from, among other things, pragmatism (Greenwood and Levin, 1998; cited in Reason and Bradbury, 2008) and systems thinking (Pasmore, 2008). The 1940s experiments of the Tavistock Institute have had an effect on the application of action research in organisational change (Reason and Bradbury, 2008; Pasmore, 2008). The Scandinavian tradition of action research highlights creating relationships between actors and arenas for dialogue (Gustavsen, 2008).

The primary methodology of this thesis is action research, which is generally seen as a good method for answering "how" questions. Action research is a twofold methodological approach that consists of two projects: the action project, in which action is generated, and the research project aiming at creating knowledge about that action (Aguinis, 1993; Coughlan and Coghlan, 2002; Reason and Bradbury, 2008). In action research processes, practitioners talk about things and take actions, but what matters the most is how people talk in response to certain actions. Action research is situational, collaborative, participatory and self-evaluative.

In action research, the question "why" is asked, but the "how" is constructed during the action research process, because the result is dependent on all the participants as well as chance events. The role of researcher is significant, as he or she can, if not totally control, then at least guide the process in a certain direction. In every case, the researcher affects the result in one way or another. Action research is very much tied to contemporary events within real-life contexts. In some cases, it is more valuable to observe the actors' explicit actions than to acquire their cognitive intentions through, for example, interviews (Avison et al., 1999).

The roots of action research lie in the social sciences, but the methodology is increasingly used in the conducting and examining of organisational change processes. By using action research, we are able to introduce organisational changes in order to solve a given problem *and* simultaneously do research on the organisational change process. Furthermore, the action research approach focuses on *why* some organisational change processes succeed, while others do not (Coughlan and Coghlan, 2002; Reason and Bradbury, 2008).
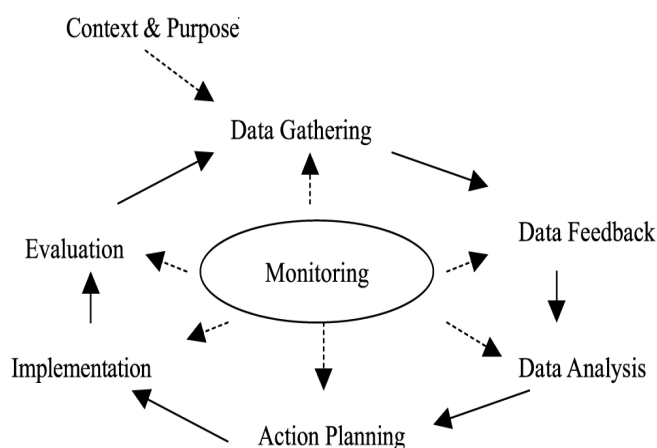
Figure 1. The phases of action research (Coughlan and Coghlan, 2002, p. 230)

Figure 1 presents the phases of action research as described in Coughlan and Coghlan (2002). The six main steps include data gathering, data feedback, data analysis, action planning, implementation and evaluation. In practice these steps overlap, as for example data analysis and feedback take place throughout the process.

2.3 Role of the researcher

According to McKay and Marshall (2001), the action research process consists of two interlinked cycles serving two different interests. First, there is the research interest, which has a research method and a research result. The second interest is bringing about change in business operations, which in turn has a change method and a change result. Cronholm and Goldkuhl (2004) further develop McKay and Marshall's (2001) ideas, emphasising the cohesion of the two cycles of research and business interests. The question of responsibility is raised by Avison et al. (2001), who examine "Who is really in charge of the project?" Since the two interests can be considered as being rather different, the division of responsibility must also be dual. As Cronholm and Goldkuhl (2004) state, the researcher is in charge of creating the research results, and the partner (for example, the participants from a company) makes the business change possible.

Wadsworth (2008) discusses the process of transformation from being a researcher to becoming a facilitator or co-creator. She identified six steps an action researcher must go through: 1) Knowing self, knowing others, 2) Realising inter-connectedness, 3) Identifying new growth and driving energies, 4) Resourcing the effort, 5) Shaping the inquiry and 6) Accompanying the transformative moments. Marshall and Reason (2007) see self-reflection as an important part of action research. The researcher's presence (Senge et al., 2005) makes it possible to adopt an attitude of inquiry that affects the validity of the research (Marshall and Reason, 2007).

With the "innovation catcher" tool, the researcher can eventually be described as a facilitator whose primary responsibility is not the production of new scientific knowledge, but the facilitation of the participants from the organisations to engage in the development process (see Kallio and Hyypiä, 2011; Wadsworth, 2008). In this scheme, the most important task of a facilitator is encouraging employees to take responsibility for their innovation activities (which can further lead to increased autonomy if allowed by management).

Three people participated actively in the action research processes involved in this thesis. Researcher 1 (the author of this thesis) kept in touch with clients and other researchers and developers. She kept abreast the current status of each of the projects. Researcher 2 was an expert in creative methods. Researcher 3 had an industry background and the appropriate contacts. He ensured access to organisations (Saunders et al., 2009). In addition, a fourth researcher worked closely with Researcher 1 in most of the cases, and a fifth researcher participated as a group facilitator in several cases. This group of researchers also conducted joint post-interview analysis of the cases without the participation of the organisation and helped to create an action plan for how to proceed.

In addition, the cases were monitored among a group of experts. The group included approximately 10–15 researchers and participants from a local science and business park, and they gathered together whenever there was a need for it, at least quarterly.

Table 6 presents the roles that were found to be important and necessary in order to achieve engagement. The various roles are important at different phases of the development process. Conceptually roles are a broad construct and have many definitions and meanings. For example, roles have been used in organisational development as indications of social structure (Mead, 1934), a way to understand employee behaviour (Katz and Kahn, 1987) and in the creation of team member roles that affect group performance (Chen, et al., 2002). "Role" refers here to researcher-instigated actions and behaviours to which practitioners respond, i.e. researcher intervention.

Table 6. Researcher roles (Kallio and Hyypiä, 2011)

Role	Actions/behaviour of researcher	Researcher quote (e.g.)	Counter-role of practitioners / purpose of using the role
Expert	Well-prepared presentation, high status	"In my experience…"	Passive, sit still and listen, low status
Facilitator	Ask questions, emergent process, low status	"Could you tell me more about…?"	Active, high status
Provocateur	Break taboos, discuss sensitive matters	"I have noticed controversies in your discussions…"	Practitioners may be annoyed or pleased that the taboo is revealed, but they are forced to talk about it.
Developer	Present a solution from the viewpoint of participants	"Could this be the way things are…"	It may help the participants to get out of a difficult situation.
Atmosphere creator	Inspire, use playful methods	"I will guide you to Wonderland…"	At its best, guides participants to a flow of ideas that are detached from reality
Reflector	Question what has been done, what the aim was and what actually has happened	"In the beginning we decided… have we done that…. Why not?"	Participants will learn something about their own behaviour as a group and as individuals.
Scientist	Interpret a situation through scientific language	"Translated into scientific language, your situation is exceptional. In fact… "	Participants listen to their story from a different perspective. Reminds them that the researcher is not a practitioner.
Listener	Make room for participants, speaking only through questions that help participants move through blocks	"How did that event make you feel…?"	Make room for thoughts and insights to emerge.
Guide	Show the direction in which the process is heading	"Our goal is there, but since life is uncertain, we don't know how to get there yet…"	Build participant trust towards researchers, a feeling of security that even though we don't know what will happen, that's just fine.
Broker	Bring together different perspectives	"I see similarities in A and B's viewpoints…"	More people are able to move their ideas forward through such a combination.

2.4 Data collection

The data collection used this thesis consists of three main elements. The first element includes the gaining of a preliminary understanding of practice-based innovation and absorptive capacity; the second element entails the development of an intervention model called *innovation catcher*. The third element includes a survey that increases understanding of where development actions should actually be targeted in employee-driven, practice-based contexts. The data from 2005 is reported in Kallio et al. (2010) in this thesis. The experiences resulting from the development of innovation catcher are reported in Kallio and Bergenholtz (2011; forthcoming), Kallio et al. (submitted) and Kallio and Hyypiä (conference paper 2011). The survey is reported in Kallio et al. (2012).

2005

The author of this thesis conducted interviews to increase understanding of innovativeness and knowledge flows in the region and, more specifically, later came to understand that these were related to the antecedents of practice-based innovation. The semi-structured interviews dealt with the following themes:

- The development atmosphere in the region. How are newcomers welcomed? Do their ideas get implemented?
- What are the elements of a working innovation environment?
- Networking and the motivations for it.
- The region's vision. How did you take part in defining it? Are there controversies about the vision?
- How does innovation policy support the generation of innovations among innovation actors?
- Who bring new knowledge into the region? How is that knowledge used?
- Weak signals for the region.
- How easy it is to get new ideas through in the region?
- How flexible is the region in adopting new ways of functioning?
- Does a common language exist among developers and between science and practice? How is that developed?

Table 7 presents the organisation to which each interviewee belonged and his or her position within the organisation.

Table 7. Table of interviewees

Organisation	Position
Employment and Business Development Centre in Häme	Chief of technology unit
Helsinki University of Technology / Lahti Center	Project manager
University of Applied Sciences	Project manager
County Administrative Board of Southern Finland	Superintendent (Education)
Regional Council of Päijät-Häme	Chairman of the Managing Board
Lahti Science and Business Park	CEO
Plastics cluster	Director
Lahti Science and Business Park	Director
OSKE centre of expertise programme	Director
Employment and Business Development Centre in Häme	Development manager
City of Lahti	Director
Lahti Chamber of Commerce	Industrial Agent

After the interviews were conducted, there was a desire to gain a broader picture of the region, so the decision was made to conduct a survey. The questions and themes that had been raised in the interviews served as the basis for designing the survey. These themes were reflected against theories. The targeted sample was directed at those actors (both persons and institutions) who were seen as significant for regional innovation activities (a total of 505 individuals). For the purposes of studying absorptive capacity, the individuals were selected according to position in the organisation. A measure of affective and cognitive attitudes towards innovative activities was formed. The respondents represent local companies, educational and research organisations, as well as public organisations within the Lahti region of Finland. The survey is described in more detail in Kallio et al. (2010).

2006-2009

A literature review phase took place in 2006. This was seen as critical to acquiring more information about what had been done previously in the field of employee participation and idea processes. All action research processes proceeded according to the same kind of structure. As a starting point, we conducted semi-structured interviews (Kvale, 1996) to get a comprehensive understanding of the company and the possible tensions and different viewpoints present within it that may have an effect on the (action) research process. In addition to the researcher diary that was

kept throughout the process, participative observation (e.g. Jorgensen, 1989) was used in all the meetings and workshops we organised. The role of participant observation was "participant as observer" (Saunders et al., 2009, p. 294-295; Robson, 2002), as the researcher did reveal her intents as a researcher. It was clear that the researcher was part of that group for only a limited time. Not being really one of the group, the researcher could ask obvious questions to enhance understanding among the group as a whole. Note also that the role of the researcher changed as the action research processes progressed (Kallio and Hyypiä, 2011).

Self-memos are the researcher's own ideas that are written down as they occur to the researcher. They do not have to be in formal format, although it is useful to date them and provide a cross-reference to transcript data (Saunders et al., 2009; Miles and Huberman, 1994). A researcher's diary is somewhat similar to self-memos, although it is kept in chronological order (Saunders et al., 2009).

Table 8 includes one unit in which only interviews were conducted. Organisation A had four units during the interviewing phase, but only three of them subsequently continued with the action research process. Five different units participated from Organisation B (reported as one organisation in Table 1).

Table 8. Data collection from 8 action research processes

Case organisation	Industry	Who participated	Data collection	Duration
A1	Packaging, 90 employees	10 people from every level of the organisation (including factory manager)	10 semi-structured interviews, participant observation, 3 workshops, written material participants produced during workshops, phone conversations	01/2007-12/2007
A2	Packaging board, 180 employees	Factory manager, suggestion board secretary, shop-floor employees	10 semi-structured interviews, participant observation, 3 workshops, written material participants produced during workshops, phone conversations	01/2007-11/2007
A3	Metal, 40 employees	10 people from every level of the organisation (including CEO)	10 semi-structured interviews, participant observation, 3 workshops, written material participants produced during workshops, phone conversations	03/2007-04/2008
A4	Forest	10 shop-floor employees	10 semi-structured interviews	02/2007
B	Forest	20 people from 5 units; management unit and 4 factories	20 semi-structured interviews, participant observation, 3 workshops, written material participants produced during workshops, phone conversations	04/2007-05/2008
C	Public utility, 230 employees	12 employees from various work locations	3 group interviews, participant observation, 3 workshops, written material participants produced during workshops, phone conversations	10/2007-12/2008
D	Forest, 750 employees	2 owner-leaders, 12 sales managers	14 semi-structured interviews, participant observation, 3 workshops, written material participants produced during workshops, phone conversations	04/2007-09/2008
E	Telecommunication 1000 employees	20 employees from expert level	20 semi-structured interviews, participant observation, 3 workshops, written material participants produced during workshops, phone conversations	09/2008-04/2009
F	Research, 20 employees	14 researchers, 3 professors	Questionnaire, 3 workshops, participant observation	01/2008-12/2010

Data collection, analysis and development of hypotheses are interactive and usually have an effect on each other (Saunders et al., 2009; Kvale, 1996). In other words, the phases are not purely linear; they are partly simultaneous.

2009-2010

After conducting and analysing the action research processes, the researchers pondered why some cases seemed to be successful and others did not. One reason that arose was that maybe the tool introduced ("innovation catcher") was not a suitable way of approaching the organisation. Maybe the organisation was not ready or did not see value in engaging employees in innovation activities. The group pondered how this could be avoided in the future, how could the need for development be recognised in advance and ensured?

A questionnaire was developed. It was designed to define innovation capability in the context of practice-based innovation. The aim was to recognize the readiness of the organisation for conducting Doing-Using-Interacting-based innovation. Further, this would facilitate the setting of targets as well as possible hindrances during the future development projects. The questionnaire was designed to cover the main aspects of innovation capability, according to the respondent's understanding of the prevailing situation. External knowledge absorption as well as internal potential was under inquiry. The author of this thesis designed the questionnaire with a colleague who had experience in the measurement of intellectual capital. They engaged the whole research unit in discussing and commenting on the statements, as well as the general principles of innovation capability.

At this point, the author of this thesis went on maternity leave and was not thus involved in the data collection of the case presented in Kallio et al. (2012, in this thesis). The data was collected from one organisation before action was taken on any development projects.

2.5 Data analysis

The following discussion of data analysis includes three levels: single event (e.g. one interview, workshop or meeting), single case and thesis as a whole. All required examination. We started with the interpretation of single events: what did that person mean when he said that, how can that group discussion be interpreted or what can be said about their group dynamics? And, eventually, how do all of these events and cases come together in a coherent thesis?

Prior to data analysis, the data had to be transcribed into a format that could be used (Saunders et al., 2009). All the interviews were recorded and transcribed into written form. The phone conversations were written in the researcher's diary and memos. Some of the researcher's field notes and self-memos were not transcribed. They were left as they were, in original form.

In data analysis, deduction means that a researcher first forms a theoretical framework and uses this to design and analyse data. Induction, on the other hand, is data-driven. This does not mean that a researcher would enter a project blindly; he or she would have to have prior knowledge of the research topic and some kind of preliminary understanding of the research themes (Saunders et al., 2009; Yin, 2003). This thesis includes elements of both deduction and induction, and could also been seen as abduction (Paavola and Hakkarainen, 2008; Pierce, 1903). Before investigation of the action research cases began, the researchers started off from the perspective that it would be beneficial for regular employees to be more involved in the innovation activities of organisations. It was stated that hidden innovation potential was contained within employees. The researchers had certain assumptions regarding theories related to the finding of this innovation potential. These were incorporated into the themes of semi-constructed interviews:
- Channels for ideas (Getz and Robinson, 2003; Kelly and Storey, 2000),
- Collision (meeting) places (Moultrie et al., 2007; Dodgson et al., 2006; Getz and Robinson, 2003; Tang, 1998; Kelley and Littman, 2005; Dodgson et al., 2006),
- Motivation (van Dijk and van den Ende, 2002; Amabile, 1998; Felberg and DeMarco, 1992),
- External knowledge (Burt, 1992; Granovetter, 1973; de Jong and Kemp, 2003; Chesbrough, 2003; Van de Ven, 1986; Hargadon, 1998; Kleysen and Street, 2001; Tushman and Scanlan, 1981)
- Absorptive capacity (Cohen and Levinthal, 1990; Zahra and George, 2002; Lane et al., 2006; Tsai, 2001; Kleysen and Street, 2001).

In order to analyse qualitative data, Saunders et al. (2009) categorise inductively based analytical processes as 1) data display and analysis, 2) template analysis, 3) analytic introduction, 4) grounded theory, 5) discourse analysis and 6) narrative analysis. This thesis may include some elements of the other four categories as well, but it is mainly based on data display and analysis (Miles and Huberman, 1994). According to Miles and Huberman (1994), data analysis includes three phases: data reduction, data display and drawing and verifying conclusions.

Data reduction can include all the elements of data sorting. Qualitative data analysis can be grouped into three main types of processes: summarising of meanings (condensation), categorisation of meanings (grouping) and structuring of meanings using narrative (ordering) (Saunders et al., 2009). Summarising of meanings was continuously practiced in the cases; in and after workshops and meetings, the researcher(s) wrote down the key points they thought were essential with regard to the meeting. In the next meeting of the very same group, this interpretation was fed back to the organisation as part of the research process: is this what we did last time? Also, while conducting the interviews, the researcher(s) wrote down the main points and possible development focuses. Afterwards they compared these to the material from the transcripts. In this way, they could rephrase long statements into usable form (Kvale, 1996).
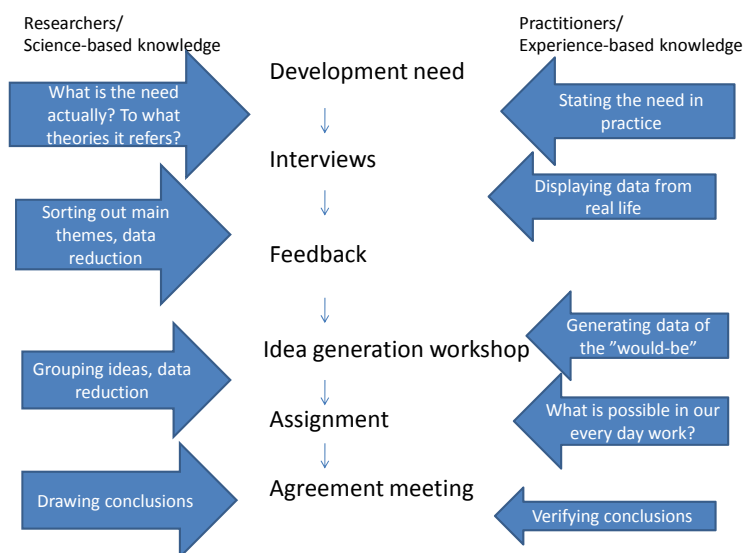

Figure 2. The data analysis process applied in a single action research process

Data categories were formed in each case as the process proceeded, as well as throughout the development of the whole thesis. As the single cases followed the cycle and principles of action research (Coughlan and Coghlan, 2002), the data analysis included a strong motivation for actual business development. The data was therefore grouped together with the practitioners during each workshop, and afterwards more closely by the researchers. As each case developed, the data was sorted and grouped. The cases were written into papers and articles, and as part of this process, certain categories of theories and assumptions emerged.

Data display involves the visual forms into which data can be organised and assembled, for example matrices and networks (Miles and Huberman, 1994). These were created at both the case level and the thesis level as well. In addition to matrices, visuals were presented via PowerPoint and flipchart.

At the thesis level, data display can be visualised in pictures that try to illustrate how the theories are intertwined and how data is linked to the theories. Visual tables that organise data are also part of data display. In some conference papers that were written based on the cases, ATLAS.ti and coding was used (Paalanen and Hyypiä, 2008). Even though these papers are not part of this thesis, their role in data analysis should not be neglected. They organised the data and facilitated the researcher in coming up with higher-level categories.

Data analysis: thesis level

The description above is focused on data analysis at the level of a single action research study. A general overview of the whole thesis is provided next. Figure 3 illustrates the data and theories used in various phases of the thesis. Writing this thesis was a process, and prior phases affected subsequent choices.
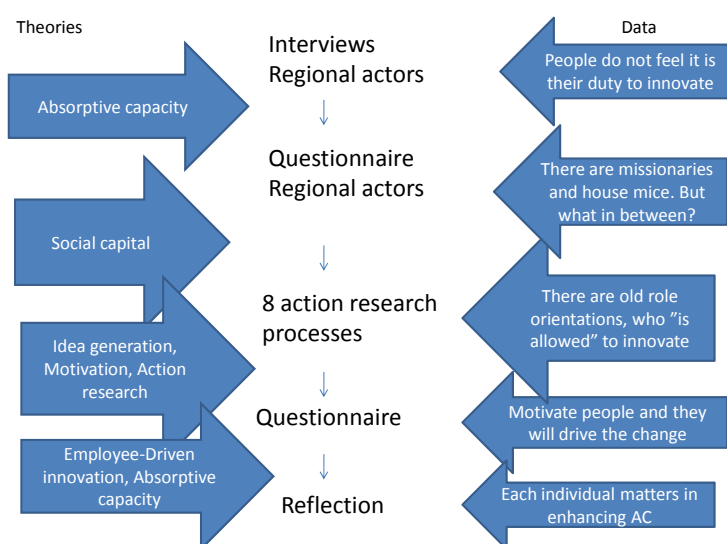

Figure 3. The data analysis process applied in the thesis as a whole

The initial focus was the innovativeness of a region. During the interviews, attention was drawn to the theory of absorptive capacity and the problematics of how new ideas could be adopted in the region. The first questionnaire indicated social capital as an important theory to bring into play. It was revealed that there were people in region, "missionaries", who acquired ideas outside the region. In addition, there were those who loved just "doing what they were supposed to do", "house mice". The problem was that, according to the survey, it looked like that there was no one in between to translate the visionary ideas to the house mice. In terms of absorptive capacity, something was missing between acquisition and exploitation; this was underlined by the notion that people from the institutions that were expected to work on the translation (i.e. assimilation and transformation) seemed not to feel like they were doing it. Thus the questionnaire also raised questions like who feels it is their duty to innovate/acquire signals, or to translate such signals into business opportunities?

This same problem was frequently repeated at the organisational level; in many interviews the employees stated that it was not their duty to generate innovations, and they did not see small

improvements as innovations. The continuous appearance of this theme in the data helped to form a more focused unit of analysis (Miles and Huberman, 1994, p. 69 and 246). Eventually the way the individual saw his or her position as a transferer of knowledge in innovation activities was recognised as important at both the regional and the organisational level.

Altogether eight action research processes were conducted that focused highly on idea generation systems, as this was both familiar and a common way for an organisation to acquire ideas from employees. It could be seen that in each organisation there were more or less visible boundaries regarding who was allowed to generate innovations and in what way this participation had been organised. Enormous innovation potential was unused, hiding in different parts of organisations. Employee-driven innovation takes employees into account in the organising of innovation activities, creating different roles and practices the adoption of which feels comfortable within the culture. In adopting them, organisations can leverage their abilities to absorb knowledge and innovate.

3. ABSORPTIVE CAPACITY

Absorptive capacity was originally defined by Cohen and Levinthal (1990) as an organisation's ability to value, assimilate, and apply new knowledge. Zahra and George (2002) developed the concept by distinguishing between two types of absorptive capacity (Figure 3): the potential absorptive capacity that is important in acquiring and assimilating external knowledge, and realised absorptive capacity, which refers to the transformation and exploitation of this knowledge.

Volberda et al. (2010) categorise the existing literature on absorptive capacity into six different streams: learning (e.g. Lane et al., 2006), innovation (e.g. Cockburn and Henderson, 1998), managerial cognition (e.g. Dijksterhuis et al., 1999), knowledge-based view of the firm (e.g. Kogut and Zander, 1992), dynamic capabilities (e.g. Jansen et al., 2005) and coevolution (e.g. Lewin et al., 1999). In addition, there is a growing stream of absorptive capacity that highlights social practices between individuals in the creation of organisational absorptive capacity (Hotho et al., 2011; Martinkenaite and Breunig, 2011; Kallio and Bergenholtz, 2011).

Most studies on absorptive capacity have focused on organisational characteristics, such as research and development intensity (Volberda et al., 2010; Zahra and George, 2002). Some authors have, hence, argued that the concept of absorptive capacity lacks a focus on the actual knowledge processes involved and the integrative social mechanisms that are needed to cross between potential and realised absorptive capacity (Lane et al., 2006). These social mechanisms could, for instance, be formed via a community of practice that can function as a cross-departmental system but that, via salespeople, is also able to reach outside the organisation in the search for new knowledge (Kallio and Bergenholtz, 2011). In studying organisational absorptive capacity, the learning behavior and knowledge sharing of individuals is, therefore, essential (Volberda et al., 2010).

Todorova and Durisin (2007) identify certain antecedents to organisational absorptive capacity: social integration, appropriability regimes, feedback loops and power relationships (see Figure 4).
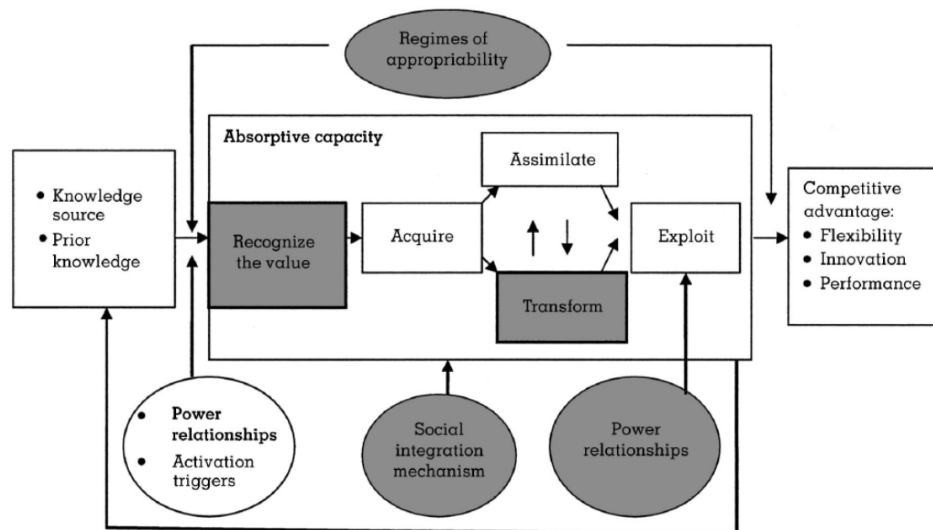

Figure 4. A refined model of absorptive capacity (Todorova and Durisin, 2007, p. 776)

Todorova and Durisin (2007) return to Cohen and Levinthal's recognition of the value of knowledge. They state: "The ability to learn—that is, to absorb external knowledge—depends to a great extent on the ability to value the new external knowledge" (p. 777). According to them, power relationships will have an effect on the ideas that will be absorbed and, on the other hand, exploited (see also Dougherty and Hardy 1996). Social integration mechanisms (Zahra and George, 2002) facilitate the assimilation of acquired ideas.

Zahra and George (2002) suggest that absorptive capacity is divided into four linear phases: *acquisition*, *assimilation*, *transformation* and *exploitation* of knowledge. Todorova and Durisin (2007) question Zahra and George's (2002) model in terms of whether assimilation and transformation are consequent phases, presenting them instead as sometimes-complementary phases. Cognitive structure defines whether a phase is assimilation or transformation: if the cognitive structure does not change, it is assimilation, and when the new knowledge cannot be fitted realistically to existing knowledge structures, it is transformation. This, in turn, brings us back to the exploration and exploitation of knowledge (March, 1991).

Expanding on Todorova and Durisin (2007), Uotila et al. (2012) further discuss the two learning paths of absorptive capacity: AAE (acquisition–assimilation–exploitation) and ATE (acquisition–transformation–exploitation). They propose that an AAE type of path leads to incremental innovations and exploitation, whereas the ATE path relates to explorative innovation processes (Uotila et al., 2012). It is to be noted that in a practice-based innovation context, there is the risk of overvaluing the AAE type of learning (Uotila et al., 2012). Uotila et al. (2012) stress that a balance between the assimilation and transformation paths is the ideal.

Cohen and Levinthal (1989) highlight the organisation's prior knowledge stock, whereas other scholars (Todorova and Durisin, 2007; Leonard-Barton, 1992: Minbaeva, 2003; Gavetti and Levinthal, 2000) note that path-dependent managerial cognitions and stickiness to the existing knowledge base hinder the capability to absorb new valuable knowledge. Later on, Cohen and Levinthal (1994) make the point that managers do not always see the value of absorptive capacity and do not invest in it. They note: "Under the more common circumstances where the firm faces prospective rivals, the consequence of waiting until the signals are obvious to all may be more drastic" (p. 245-246).

Van den Bosch et al. (1999) define three organisational capabilities that enhance knowledge absorption. *System capabilities* provide external knowledge on processes and routines. *Coordination capabilities* refer to the lateral transfer of knowledge inside the organisation. Engagement, natural relationships, training and job rotation enhance coordination capabilities. *Socialisation capabilities* result from the values of the organisation, as they define the current working culture. Jansen et al. (2005) develop these ideas further and discuss organisational mechanisms that enhance coordination as well as socialisation capabilities in line with the divisions laid out by Zahra and George (2002).

When more and more knowledge is continuously produced more and more rapidly (Foray 2004, 35), organisations are expected to exhibit a wider range of collaboration in order to solve common problems (Foray 2004, 69). So it is no longer a case of who possesses the knowledge, but who can use it the most effective way, or who has the best combination of knowledge. Those organisations that have a turbulent knowledge environment are more likely to invest in absorptive capacity than those with stable environment (van den Bosch ym. 1999). Stimulating chaos and turbulence in an organisation obliges employees to question the status quo (Nonaka and Takeuchi, 1995).

When considering the factors that enhance absorptive capacity, the factors that hinder it should also be taken into account. Earlier experience and cognitive schemas can prevent new knowledge from penetrating the organisation (Jantunen, 2005). Building on Ansoff's (1984) filter construction, Ilmola and Kuusi (2006) examined the filters that have effect on how and what signals get into the organisation.

It is necessary to take a deeper look into the phases of absorptive capacity (e.g. Lane et al., 2006), in order to provide a more holistic picture of the concept. The aim is to make a somewhat fuzzy concept more concrete: What exactly is absorptive capacity? What happens during its various phases?

3.1 The phases of absorptive capacity

3.1.1 Opportunity recognition

Todorova and Durisin (2007) state the importance of opportunity recognition: "The capability to recognize the value of new external knowledge represents an important component of absorptive capacity because the valuing is not automatic, it is biased, and it needs to be fostered to allow the absorption to begin at all" (p. 777). Some organisations pay too much attention to current stakeholder demands and do not invest in knowledge that may be valuable tomorrow (Todorova and Durisin, 2007; Christensen and Bower, 1996). So the ability to recognise opportunities is crucial. But what does recognising opportunities mean in practice?

Cohen and Levinthal (1990) propose that recognising value is the first component of absorptive capacity. They discuss cognitive structures and stress prior knowledge as an antecedent of absorptive capacity. When talking about opportunities, Cohen and Levinthal (1989) are referring specifically to technological opportunities. Martinkenaite and Breunig (2011) define recognition of value as the individual's cognitive ability and purposeful action directed at recognising the value of new information in daily work practices.

Lumpkin and Liechtenstein (2005) argue that organisational learning can strengthen the organisation's ability to recognise opportunities in a new venture context. Baron (2006) suggests pattern recognition as an important part of opportunity recognition among entrepreneurs. It is a kind of passionate sense of something as potential. In pattern recognition, a person interprets the events of the world, or knowledge, through his own cognitive frameworks and sees patterns that either have potential or not (Baron, 2006). Thus, opportunity recognition is asking the question of "what if"?

Opportunity recognition has two phases: discovery and formation (Lumpkin and Liechtenstein, 2005). The discovery phase is represented by preparation, incubation and insight. Evaluation and elaboration make up the formation phase (See Figure 5).
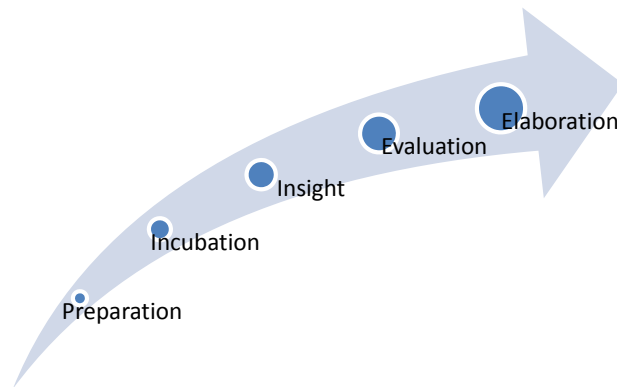
Figure 5. The process of opportunity recognition (Lumpkin and Liechtenstein, 2005)

Preparation is often conscious, affected by the earlier knowledge base and path-dependent learning. However, it can also involve unintentional discoveries. Incubation refers to contemplation of an idea of a specific problem. It is often guided by intuition, and it seeks to consider various possibilities or options. Insight refers to the eureka moment at which the connection to current knowledge or the value of new knowledge is recognised. If incubation is an ongoing process, insight is a moment (Csikszentmihalyi, 1996).

Evaluation is a phase of analysis where the actual value of knowledge is verified. In other words, ideas are put to test. If the idea passes, the elaboration phase follows. It may include uncertainties that are involved in the idea. The elaboration process reveals aspects of the business concept that need attention or more careful analysis and may thus result in further evaluation (Aldrich, 1999).

In order for the absorption to begin, the capability to recognise the value of external knowledge is essential (Todorova and Durisin, 2007). Mode 2 knowledge generation and innovations stem from the "ability to build possible worlds". That is, divergent thinking (Robinson, 2010) is a good starting point for recognising opportunities. A surveillance filter (Ansoff, 1984) determines where attention is steered, and which signals eventually have even the possibility of becoming noticed (Ilmola and Kuusi, 2006). This establishes the opportunity for management to guide the employees' attention in the direction of their visions. On the other hand, management should also cultivate those kinds of people who look in the opposite direction, in order to maintain diversity.

3.1.2 Acquisition

Todorova and Durisin (2007) do not really discuss *acquisition* as a term. This may be because they accept Zahra and George's (2002) definition, even though they think it is not suitable as a first phase of absorptive capacity, since it overlooks the seeing or understanding of new knowledge.

In practice, it is hard to define where opportunity recognition ends and acquisition starts. Basically the phases are overlapping. Is acquisition even conscious? If there is a eureka moment in opportunity recognition, is there such a thing in acquisition? In this thesis, the assimilation and transformation phases are seen as beginning when new knowledge is passed on to someone else. In the sense that opportunity recognition and acquisition can be acts of the individual, the following phases require interaction. And this eventually requires the sensitivity of actors with regard to whom they share knowledge with, and through which channels: At what moment do I share my observations? How do I justify my observations? The research stream of idea generation and

innovation within organisations deal with the challenges of selling ideas to others within an organisation. Mentality filters refer to the mental models that individuals and organisations have to affect which ideas are welcomed into the organisation (Ansoff, 1984; Ilmola and Kuusi, 2006).

3.1.3 Assimilation

Whereas Zahra and George (2002) see assimilation and transformation as subsequent phases, Todorova and Durisin (2007) state that they are consequent phases. Even though Cohen and Levinthal (1990; 1994) highlight the significance of prior knowledge and path-dependence, they distinguish two functions of absorptive capacity: the ability to interpret weak signals and the ability to direct assimilation of technological advances (1994). Todorova and Durisin describe the assimilation phase through cognitive schemas: *"When the new idea fits the existing cognitive schemas well, the new idea is only slightly altered to improve the fit and then incorporated into the existing cognitive structures. The existing cognitive structure does not change, and the knowledge is 'assimilated'"* (p. 778).

Martinkenaite and Breunig (2011) argue that assimilation includes the individual's capability to assimilate new information and participate in collective knowledge creation. They rely on the phases of *recognition of value–assimilation–application* to define absorptive capacity. As the organisational-level learning processes are more complex than individual processes (Cohen and Levinthal, 1990; Crossan et al., 1999), Todorova and Durisin (2007) propose that the relationships between assimilation and transformation are complex.

The process of assimilation can be seen as a process where the acquired knowledge is adopted as part of unofficial organisational routines. In the context of continuous improvement, Bessant et al. (2001) talk about the routines, or "the way we do things around here," that enhance incremental innovation. They mention, among other things, shared problem-solving and the learning organisation (Bessant et al., 2001).

Citing Andersson (1999), Ilmola and Kuusi (2006) talk about the interplay of chaos and stability. On the verge of chaos, there is a tendency towards self-organisation. Seeking certainty and security, systems aim at a static situation (Ilmola and Kuusi, 2006). The stable state is good for assimilation; it ensures the effective utilisation of knowledge that reinforces something that is already known to be good. However, in the long run, it leads to path-dependency and hinders the ability to transform.

3.1.4 Transformation

Transformation aids organisations in combatting the downsides of path-dependency and in learning from new knowledge that contradicts prior knowledge (Tushman and Anderson, 1986). Transformation is, thus, the key to radical innovation. It facilitates the leap from the incremental changes of the current generation of technology to the next generation.

When using the concept of transformation in absorptive capacity, it is good to bear in mind the different conceptions that exist in the literature. Some scholars (e.g. Zahra and George, 2002; Jansen et al., 2005) describe it as a phase that follows assimilation and refer to it as exploitation. Another school (e.g. Torodova and Durisin, 2007) sees transformation more like explorative capability. As a complementary phase to assimilation, Todorova and Durisin (2007) describe transformation thus:

"Accommodation through transformation as an alternative process to assimilation occurs in the case where new situations or ideas cannot realistically be altered to fit the existing knowledge structures.

New knowledge cannot be assimilated. In this case the cognitive structures of the individuals themselves must be transformed to adapt to an idea or a situation that they cannot assimilate" (p. 778).

Following weak signals leads to situations where assimilation is no longer enough and transformation is needed. "A weak signal represents potential discontinuity, something that the organisation has not interpreted before" (Ilmola and Kuusi, 2006, p. 911). In other words, the knowledge, or signal, that is acquired does not have to be new to the world or radical, but it has to make the organisation think. Transformation is, thus, collective interpretation of something that may be generally known, but has not been interpreted in this context before.

Organisations seeking transformation should embrace newcomers. As time goes by, the environment incorporates the new into itself (Ansoff, 1984), and thus the ideas as well as the scope of observation start to look similar to others within the organisation. One can also learn skills that enhance transformation, but whereas the skills necessary for assimilation are associated with trust and ways of working, i.e. bonding skills, transformation favors bridging skills, the ability to see good combinations.

3.1.5 Exploitation

In the end, which ideas get implemented? Is it always the best ideas, the right ideas at the right moment, or do social relationships matter? Todorova and Durisin (2007) add power relationships to the exploitation phase of absorptive capacity. In their model, power relationships comprise both the power relationships inside the organisation and the power relationships with customers and other external stakeholders. They state that there are both internal (resource allocation) and external power relationships (stakeholder preferences) that have an effect on which ideas get implemented. Ilmola and Kuusi (2006; see also Ansoff, 1984) refer to power filters in executing signals.

No matter how good or right an idea is, the idea itself is not enough. For example, funding may be neglected if the one with the power does not see the idea's value (Ilmola and Kuusi, 2006). In other words, know-what and know-why types of knowledge (Jensen et al., 2007) are only part of successful knowledge absorption. Know-who (Jensen et al., 2007) is also important in order to sell the ideas all the way to implementation. Todorova and Durisin (2007) point out a future research avenue in the link between internal power relationships and social integration mechanisms.

Ilmola and Kuusi (2006) mention that power filters represent, on the one hand, the mentality filters that are present, but also state that a power filter activates when a signal challenges the power structure or the organisation (p. 911). This partially explains why the newcomers may not be very active in presenting ideas, why it is difficult to start implementing employee-driven innovation or, in addition, why ideation activity is not high and the little that exists is in the hands of certain individuals. Power is a difficult thing. If you were to evaluate and make decisions regarding signals that may decrease your power, would you still give the go-ahead?

3.2 Individual and organisational absorptive capacity

Volberda et al. (2010) call for studies on the relationship between individual and organisational absorptive capacity. In earlier studies (Cohen and Levinthal, 1990; Lane et al., 2006), it has been indicated that individual absorptive capacity is needed in order to generate organisational absorptive capacity. Zahra and George (2002) call, on the other hand, for studies regarding which mechanisms

facilitate the transformation of potential absorptive capacity into realised absorptive capacity. This thesis claims that individual absorptive capacity is more likely to be of potential absorptive capacity, i.e. occurring during the first phases of absorptive capacity, whereas an organisation can assimilate or transform that into realised absorptive capacity.
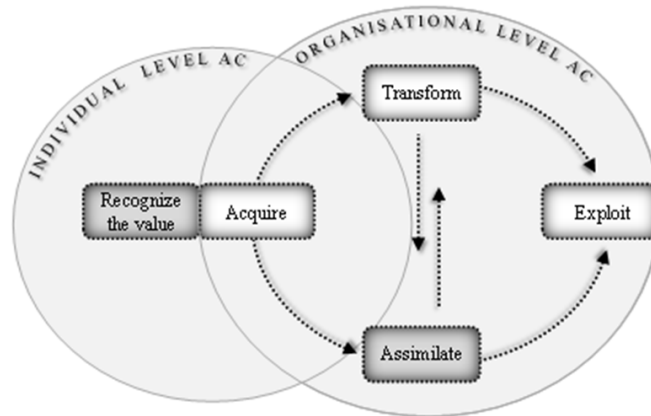

Figure 6. Organisational and individual absorptive capacity

Figure 6 positions the relationship of individual absorptive capacity and organisational absorptive capacity. It is up to individual characteristics to recognise opportunities and the value of (external) knowledge. Through good leadership, an organisation can communicate the vision of where to look and what to look for, but the actual action is performed by individual. In the acquisition phase, the organisation comes along. The organisation has to acquire the knowledge possessed by the individual. Acquirement depends on the individual as well: will the individual tell anyone about his or her knowledge? The organisation can facilitate by providing channels and arenas for sharing knowledge. Assimilation and transformation are more organisational than individual features. The interaction is carried out by individuals, but within an organisation. Exploitation includes decisions on, i.e., resources and strategy and is thus more of an organisational feature.

3.3 Knowledge and absorptive capacity

Philosopher Michael Polanyi (1962) was the first to divide knowledge into codified and tacit dimensions. Codified knowledge is something that can be written down and transferred to everyone in the same form. Tacit knowledge, on the other hand, is internal intelligence that cannot be transferred into codified form; it is knowledge that is hidden in unconscious cognitive processes.

The current perspective on knowledge is that instead of managing knowledge, we should instead manage the networks and actors that use the knowledge (Cheng et al., 2011). What kind of knowledge is absorbed in Doing–Using–Interacting processes? In the context of practice-based

innovation, the work process contains both research-based and practice-based knowledge (Nilsen and Ellström, 2012). Research-based knowledge is something that can be put into explicit form, for example a work process description. Practice-based knowledge includes experience, such as how the work process is actually done. The Science–Technology–Innovation mode of knowledge generation focuses mainly on science-based knowledge, whereas the Doing–Using–Interacting mode focuses on knowledge that is generated in contextual situations and is generated relying on the experience of work processes, i.e. know-how and know-who knowledge (Jensen et al., 2007).

Explicit knowledge is something that can be easily codified and transferred (Nonaka and Takeuchi, 1995). Tacit knowledge is, on the other hand, difficult to transfer (Nonaka and Takeuchi, 1995), and many times it is experience-based (Brown and Duguid, 1991; Nilsen and Ellström, 2012). Scharmer (2001) has introduced the concept of self-transcending knowledge. Uotila and Melkas (2008) further describe it as "the ability to sense the presence of potential, to see what does not yet exist (intuitions and hunches)" (p. 225), just like a sculptor sees the shape of a sculpture in his mind at the moment he sees the lump of clay.

More value can be found by relying on intuition; in sensing the presence of potential knowledge, or so-called self-transcending knowledge, which is even more difficult to express than tacit knowledge, because it is related to unknown and not just tacit needs (Scharmer, 2001; Uotila and Melkas, 2008). Kelley and Littman (2005) refer to people with these kinds of skills as anthropologists. They have the ability to understand the unspoken and seek inspiration for innovation in unusual places. Organisations can sense and actualise emerging business opportunities by tapping into knowledge that is not yet embodied, in other words, precognition that is difficult to codify or express to others (Scharmer, 2001).

If two persons share certain experiences, they understand each other in a way that cannot be fully explained to a third person that does not possess the same experience. Self-transcending knowledge requires generative dialogue in order to emerge in conversations (Scharmer, 2001). Have you ever had the feeling that you know exactly what someone is saying even though nothing at all is being said? Generative dialogue is based on reconnecting what we think, what we say and what we do with what we see. Generative dialogue may occur after days of shared work and be seen as intentional quietness or sacred silence (Scharmer, 2001; Isaacs, 1999).

Scharmer (2001) presents twelve types of knowledge in organisations (Table 9). This is in line with the division of knowledge types by Jensen et al. (2007) into Science–Technology–Innovation and Doing–Using–Interacting modes. They only use explicit knowledge (according to Scharmer), i.e. know-what and know-why as Science–Technology–Innovation modes of knowledge, and know-how and know-who as Doing–Using–Interacting modes of knowledge. The first column is explained as follows (Scharmer, 2001, p. 140):

(1) A1: delivering results that create customer-focused value (performing)
(2) A2: improving the process-based context of performing (redesigning)
(3) A3: improving the assumption-based context of performing (reframing)
(4) A4: improving the intention-based context of performing (regenerating)

Table 9. The twelve types of knowledge in organisations (Scharmer, 2001, p. 140)

Epistemological/action type	Explicit knowledge	Tacit knowledge	Self-trancending knowledge
A1: Performing	Know-what	Knowledge in use	Reflection-in-action
A2: Redesigning	Know-how	Theory in use	Imagination-in-action
A3: Reframing	Know-why	Metaphysics in use	Inspiration-in-action
A4: Regenerating	Know-who	Ethics/aesthetics in use	Intuition-in-action

The epistemological distinctions between three forms of knowledge are explicit knowledge (K1), tacit knowledge (K2) and self-transcending knowledge (K3). K1 includes the following: "balance sheet *(know-what),* accounting rules *(know-how),* reports based on activity-based costing *(know-why),* and the purpose statement of a company *(know-who)*" (Scharmer, 2001, p. 140). K2 is in line with Nonaka and Takeuchi (1995) and their knowledge spiral of the tension between tacit and explicit knowledge. Knowledge is living and embodied in situated practice (Orlikowski, 1996), as demonstrated by the examples that focus on surfacing provided by Scharmer (2001, p.140): "knowledge in use (Lave and Wenger, 1991); theories in use (Argyris and Schön, 1996); culture and metaphysics in use (Schein, 1992; von Krogh and Roos, 1995); and aesthetics in use (de Monthoux, 1993; Scharmer, 1991)*"*. In K3, the aim is to get to the forces that drive the knowledge spiral. This is largely based on the idea of intuition and not-yet-embodied knowledge and it is in simultaneous tension with K1 and K2 action types. In K1, the question is, can you observe it? K2 focuses on, can you produce it? And K3 asks, can you make it concrete?

In absorptive capacity, the K3 knowledge type is essential during the opportunity recognition phase. The individual's capability to recognise the value of new knowledge for current operations depends on his experiential practice-based knowledge. Intuition, the capability to see possible futures and comprehend different possible future patterns also affects the capability to recognise the value of something as-yet unknown. One can have some observations about it (K1), but it is not yet explicit to everyone. For example, you see someone dancing in the street. Everyone sees the dance, but people think you are mad if you claim this has something to do with, for instance, a semiconductor's product development. You can even try it out (K2), by for instance building parts that move as if they were dancing, but the economic benefits (Cohen and Levinthal, 1994) are not yet explicit to everyone, nor is the doing even necessarily observable.
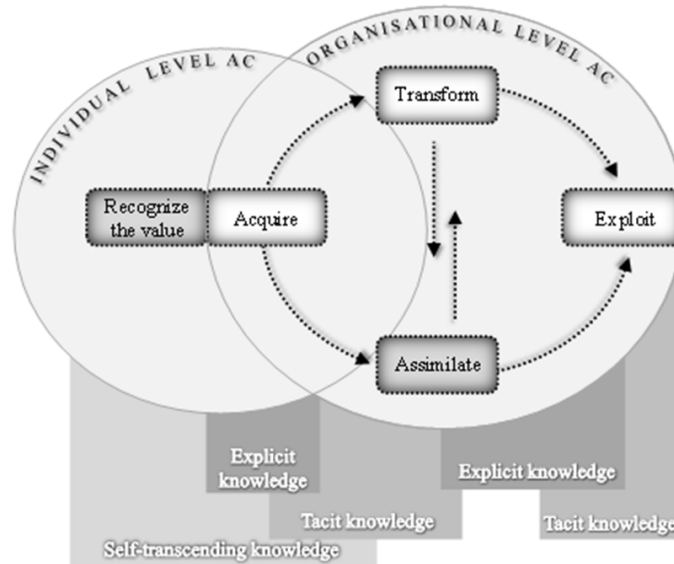
Figure 7. Knowledge types in the phases of absorptive capacity (The original absorptive capacity figure from Todorova and Durisin, 2007)

Figure 7 presents the types of knowledge that characterise the phases of absorptive capacity. In the acquisition phase, there has to be some kind of explicit knowledge, like the dance being observable to someone. In assimilating and transformation, the new knowledge, the tacit knowledge of how things are done enters into a dialogue with the explicit knowledge and the self-transcending knowledge that might be someone's vision or hunch in practice. When the knowledge starts to take shape within the organisation, it is codified once more to represent explicit knowledge. The semiconductor's work processes are modified, instructions are prepared. As time goes by, incremental learning and tacit knowledge increase understanding of how the gadget could be manufactured more efficiently.

4. SOCIAL CAPITAL

In order to arrive at a profound understanding of the underlying social mechanisms that enhance absorptive capacity, one further aspect needs to be considered. In this thesis, social capital is used as a mediator theory, and in particular the concept of creative social capital is seen as mediator between transformation and assimilation. First, we will discuss how absorptive capacity and social capital have been combined in the existing literature. Second, the basic theory of social capital and the concepts of bridging and bonding are presented. Third, the concept of creative social capital is discussed in the context of practice-based innovation, as are its contribution to absorptive capacity.

Jansen et al. (2005) refer to socialisation capabilities as an antecedent of absorptive capacity. They refer to codes of communication (Henderson and Cockburn 1994; Verona, 1999) and tacitly understood rules for appropriate action (Camerer and Vepsalainen, 1988; Volberda, 1998). According to the theory of social capital, the organisational mechanisms for socialisation capabilities include structural and cognitive aspects (Nahapiet and Ghoshal, 1998; Jansen et al., 2005).

Expanding on Zahra and George (2002), Upadhyayula and Kumar (2004) talk about the internal social capital that they suggest increases realised absorptive capacity and the external social capital that enhances potential absorptive capacity. They also refer to Nahapiet and Ghoshal (1998), citing three dimensions of social capital: structural, relational and cognitive. The structural dimension refers to the connections between people or organisations, i.e. "who knows who" (Burt 1992). The relational dimension refers to the personal relationships that people have developed on a dyadic basis, i.e. the strength of a tie (Granovetter, 1973). The cognitive dimension refers to the shared meanings and norms used in interaction.

The initial use of the concept of social capital referred to tight family ties. Coleman (1988) added the feature of privilege; with social capital, people can benefit from relations. According to Portes (1998), "whereas the economic capital is in people's bank accounts and human capital is in their heads, social capital inheres in the structure of their relationships". Tura and Harmaakorpi (2005) consider social capital to refer to an actor's resources, the sources of which are located in the actor's social relationships[1] (pp. 1116-1117). Lin's (2001) definition is "resources embedded in a social structure that are accessed and/or mobilized in purposive actions" (p. 29).

It has been noted in the literature that a dense network with strong ties is effective at transferring knowledge (Coleman, 1988). However, it should be remembered that a dense network favours the transfer of homogenous knowledge (Burt, 1992) and is thus path-dependent. In order to get fresh ideas and knowledge into, e.g., an organisation, weak links are needed (Granovetter, 1973; 2005). The greatest potential for innovation is to be found in the structural holes of various networks (Burt, 1992; 2004). The same phenomenon has been connected to the field of absorptive capacity. Tight connectedness enhances the transformation and exploitation of newly acquired knowledge, whereas socialisation tactics facilitate the ability to tap into new external knowledge sources and acquire and assimilate knowledge (Jansen et al., 2005).

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[1] In this instance, an actor can be collective as well as individual.

4.1 Bonding social capital vs. bridging social capital

Social capital can be divided into two dimensions: *bridging* and *bonding* (Putnam, 2000). Bonding describes internal cohesion within a group, whereas bridging represents linkages to the external environment. Bonding social capital is based on strong links (Burt, 2004). In other words, in bonding social capital, the network structure is dense. A group of people that has worked together for a long time know each other well. Cooperation is relatively smooth, because you know what the others will most likely say about your suggestions. On the other hand, you leave some things unsaid just because you "know" that they would be against it, and there is no use even trying.

Strong connectedness facilitates knowledge exchange and exploitation of knowledge (Jensen et al., 2005) and develops trust as well as commonality of knowledge (Rowley et al., 2000). Trust is a feature of bonding social capital (Putnam, 2000). Trust forms a platform for knowledge exchange between organisations (Foray, 2004).

Jansen et al. (2005) concluded that exploitation benefits from more dense and stable knowledge structures than transformation. Sparse networks are argued to be of use when searching for new knowledge (March, 1991; Hansen, 1999). There is certain eternal debate in this. How can organisations balance their resources between assimilating more familiar knowledge and searching for more radical renewal? In the end, both are needed. Strong connectedness seems to hinder the acquisition of new external knowledge (Jensen et al., 2005). It has also been claimed to lead to collective blindness (Nahapiet and Ghoshal, 1998). If an organisation is not open to new ideas, it is too path-dependent, which eventually harms its ability for self-renewal. The challenge for the future is the ability to master both.

Bridging social capital is based on weak links in sparse networks (Burt, 2004), meaning you know people who know things, but you really do not know the people you know. Zaheer and Bell (2005) claim that those actors who have the widest networks can also take advantage of their own internal capabilities.

People who are situated near the structural holes of networks have the advantage in getting their hands on new knowledge (Burt, 2004). Foray (2004) talks about these people as *intelligent agents*; Zahra and George (2002) use the term *activation triggers* and Burt (2004) refers to *brokers*. They are in a key position to recognise good ideas and valuable knowledge. As these people are often referred also as "gatekeepers", they also have a negative effect. If these people are the only ones who have a social mandate to bring new knowledge into the organisation, others start feeling that they do not have to do it, or that they are not capable of doing it. In order to keep the absorption surface as wide as possible, it should be communicated that the whole personnel is able and allowed to do it.

4.2 Creative social capital

The concept of creative social capital has been introduced by Harmaakorpi (2004) as a field-specific resource that combines the bridging and bonding elements of social capital. It has been used by Tura and Harmaakorpi (2005), Cooke (2007) and Kallio et al. (2010). Tura and Harmaakorpi (2005) further stress that creative social capital is needed in regional innovation systems. They add that creative social capital includes creative tension (Sotarauta and Mustikkamäki, 2001) and that it supports evident socio-institutional change. Kallio et al. (2010) use the concept of personal creative social capital as a brokering ability in the immediate working environment. Personal creative social capital can be used and is useful in all phases of absorptive capacity (Kallio et al., 2010, p. 316).

Tura and Harmaakorpi state that creative social capital is the most important capital in the innovation process (2005, p. 1122). However, it is still a bit blurry what creative social capital is in practice. Kallio et al. (submitted, in this thesis) tie the concept into an organisational context and aim to take a step towards examining its practical manifestations. They state that creative social capital includes structural and action-oriented features (Kallio et al., submitted). They talk about creating a safe space (Isaascs, 1996) for dialogue (Gustavsen, 1992; Schein, 1993) with emotional intelligence (Goleman, 2006).

Individual antecedents that enhance creative social capital include, for example, a capacity for self-reflection (e.g. Marshall and Reason, 2007; Pässilä et al., forthcoming) and social intelligence (Goleman, 2006). It is hard to predict when you will achieve creative social capital. Prerequisites for it can be established, but there are always factors that may prevent it. But you can certainly tell when the group has achieved it. It feels like a kind of group flow.

4.3 Social capital in enhancing organisational absorptive capacity

In this thesis, social capital is understood as a mediating theory that facilitates the understanding of the nature of absorptive capacity (see also Kallio et al., submitted). In addition, it sheds light on a research gap proposed by Todorova and Durisin (2007) that the differences between assimilation and transformation should be examined in greater depth. Figure 8 shows social capital in enhancing absorptive capacity.
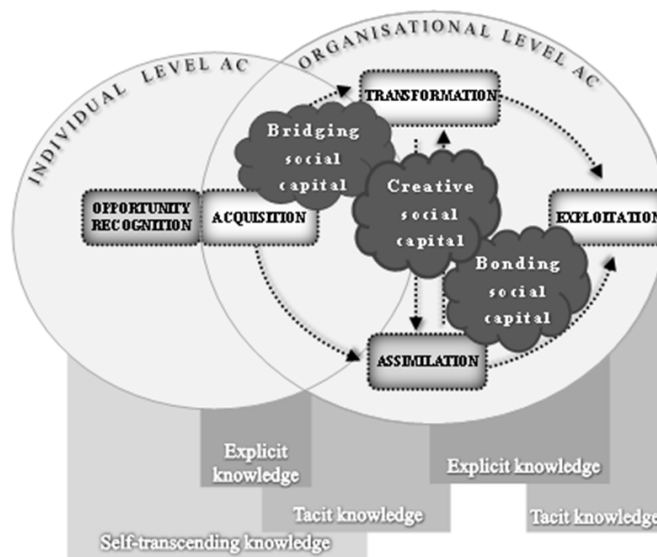

Figure 8. Social capital in enhancing absorptive capacity.

In the transformation phase (Todorova and Durisin, 2007), bridging social capital across sparse networks is essential, since transformation requires the making of new knowledge combinations.

Those actors with a lot of weak links can more easily make connections to knowledge that they have seen someplace else. Bonding social capital exhibiting strong links and trust is useful in assimilation. On a structural level, a centralised network with well-defined rules governs the use of explicit knowledge (Smedlund, 2008). Strong connectedness enhances the exploitation of knowledge (Zahra and George, 2002; Jansen et al., 2005) in dense networks. If something needs to be implemented right away, a strong, cohesive group is effective.

Creative social capital (Harmaakorpi, 2004; Tura and Harmaakorpi, 2005; Kallio et al., submitted) balances between assimilation and transformation (Todorova and Durisin, 2007). It is situated and can be generated in single incidents of social interaction. It is joint flow in which the group takes part in the moment. From a structural point of view, creative social capital is a combination of both sparse and dense networks. Whereas Upadhyayula and Kumar (2004) propose that the cognitive dimension of social capital contributes to potential absorptive capacity, in creative social capital, the cognitive dimension facilitates the combination of bridging and bonding features.

Todorova and Durisin (2007) propose that during absorptive capacity processes, an organisation may move back and forth between assimilation and transformation processes before new knowledge is solidly incorporated into the organisation's knowledge structures and ready for exploitation. As Kallio et al. (submitted) conclude, creative social capital allows assimilators to try transformation in a safe environment without losing face. And vice versa: creative social capital facilitates the creation of a feeling of situational bonding in groups where practitioners seem to be from different worlds.

5. EMPLOYEE-DRIVEN INNOVATION

The concept of employee-driven innovation is originated from research streams of continuous innovation (Bessant et al., 2001; Jorgensen et al., 2004) and high-involvement innovation (Bessant, 2003). In practice, the concept has been launched by the confederation of trade unions in Denmark (The Danish Confederation of Trade Unions, 2007). Employee-driven innovation is driven by globalisation; trade unions in Denmark wanted to maintain the country's high employment rate despite the trend of relocation to low-cost countries (The Danish Confederation of Trade Unions, 2007). Along with a well-functioning employment benefit system, an active employment policy combined with workforce mobility and adaptability help combat the global movement of jobs (The Danish Confederation of Trade Unions, 2007).

"Employee-driven innovation means that the employees generally contribute **actively** *and* **systematically** *to the innovation process."* (The Danish Confederation of Trade Unions, 2007, p. 9)

Hoyrup (2010) refers to the Science–Technology–Innovation mode of knowledge generation as research and development-driven innovation, whereas the Doing–Using–Interacting mode represents employee-driven innovation. According to the principles of employee-driven innovation, innovations can emerge from any part of an organisation and any employee group (Kesting and Ulhoi, 2010; Hoyrup, 2010). Hoyrup (2010) connects employee-driven innovation to non-research and development and non-technological innovations, high-involvement innovation (Bessant, 2003; Tidd and Bessant, 2009), direct participation in organisational change (Geary and Sisson, 1994) and workplace learning (Jensen et al., 2007; Ellström, 2001). Ellström (2010) states that practice-based innovation (i.e. employee-driven innovation, Hoyrup, 2010) is a balancing act between two organisational logics: production and development, where the previous is controlled by reproduction and reduction of variance and latter dominated by variation and transformation (Ellström, 2010). A similar notion had been proposed earlier by Ashby (1960), Hannan and Freeman (1987) and March (1991), who stated that organisations balance between variation and selection. Effective selection of routines and practices is essential for short-term survival, but the ever-changing environment forces organisations to seek new variations for the long run (March, 1991).

Even though the concepts of employee-driven innovation and practice-based innovation have been referred to as similar (Ellström, 2010; Hoyrup, 2010; Harmaakorpi and Melkas, 2012), there are some differences that should be noted. Practice-based innovation is as an umbrella concept, of which employee-driven innovation is but one aspect. As noted in Noteboom (2012) and Harmaakorpi and Melkas (2012), the arguments for practice-based innovation are both practical and philosophical.
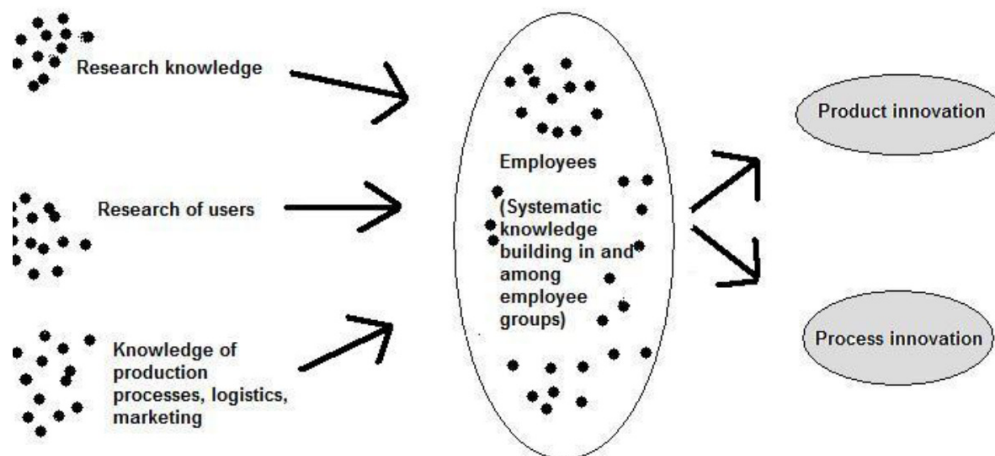
Figure 9: Employees as a key element in the conversion of knowledge into innovation (The Danish Confederation of Trade Unions, 2007, p. 10)

Innovation ideas initiating bottom-up from small everyday observations of one's surroundings can create a competitive advantage for the company; they are not visible to competitors, because they are hard to replicate in another context and eventually remain proprietary without licensing (Leonard-Barton, 1992; Zien and Bucker, 1997; Nijhof et al., 2002; Forssen, 2002). Employees may combine different kinds of knowledge: for example, scientific knowledge, market-based knowledge and user knowledge (The Danish Confederation of Trade Unions, 2007). This processing of knowledge produces new innovation outcomes, such as products and processes. As stated in the report of Danish Confederation of Trade Unions, the role of employees in research-based innovation is minimal, but they can make significant contributions to both user-driven innovation and price-driven innovation (The Danish Confederation of Trade Unions, 2007). In practice-based innovation (Melkas and Harmaakorpi, 2012), employees also have a role in research-based innovation in the form of networking and combining different knowledge bases.

In Ellström's article (2010), practice-based innovation and employee-driven innovation are very closely related concepts. In Melkas and Harmaakorpi (2012), employee-driven innovation is seen as a sub-concept of practice-based innovation. According to Ellström (2010), an explicit work process is formally described and consists of procedures that can be codified, whereas an implicit work process contains an individual's interpretation of how work can actually be executed on the basis of tacit knowledge. The explicit dimension enhances adaptive learning, while the tacit dimension and personal variations create a platform for innovation and reproductive learning (Ellström, 2001). These two organisational logics form the basis for practice-based innovation: the balance between reproduction and reduction of variance on the one hand and variation and transformation on the other (Ellström, 2010).

Tacit knowledge of a work process is complex and difficult to codify (e.g. Ellström, 2010). That knowledge cannot, therefore, simply be absorbed and reused. It requires a social process that engages those who possess knowledge as practice (Elkjaer, 2003; Gherardi, 2006). Employees are an unused resource in terms of absorptive capacity. The literature on quality management (e.g. Imai, 1986; Liker, 2011) and lean production (Liker, 2011) indicates that employees do observe deficiencies in the production process. In addition, most activities regarding continuous improvement are initiated, planned and directed top-down (Jorgensen et al. 2004). Similarly, Cohen

and Levinthal (1994) conclude that manager actions, such as investments, affect employee beliefs regarding what is valued, which has an effect on their ability to exploit new technologies. However, this is reactive, top-down activity. The managers set the targets that employees should look for. Employees are involved in the models that the management has already defined; they are not brought along in the initial phases of designing new organisational models (Telljohann, 2010). The potential hidden in the employees remains unrealised.

Kesting and Ulhoi (2010) discuss drivers that enhance employee participation: management support, the creation of environment for idea generation, decision structure, incentives and corporate culture and climate. According to Kesting and Ulhoi (2010), management support in employee-driven innovation can be divided into two modes of acting: first, all employee participation requires a license to step out of their everyday roles. Second, management support can also mean a mentoring process to guide the employees in their idea-generation processes. Intra-organisational support affects employee-driven innovation: how many resources exist to support idea generation and what kind of relationship exists between autonomy and control (Kesting and Ulhoi, 2010).

The literature on empirical studies on employee-driven innovation is not vast, and the existing examples are widely dispersed. In other words, employee-driven innovation can mean different things in different organisations (Teglborg-Lefèvre, 2010). For example, Evans and Waite (2010) see the process of enhancing employee-driven innovation as leveraging the skills of employees in lower-grade jobs, whereas Teglborg-Lefèvre (2010) presents one case that involves consultants who help others in creating innovations. In an example from Italy, Telljohann (2010) describes a case of public hospital workers who reconfigured their actual work process. This research process included discussion groups, in-depth interviews, search conferences and project groups, and the duration of the project was five years (Telljohann, 2010).

Tools that enhance employee-driven innovation are in principle very simple, such as an observation exercise (observing a work process in a different way), lean tables (structuring of employee ideas and management of the development process), future-oriented discussion groups (joint development of ideas and consensus on objectives, values), suggestion boxes (accumulation of ideas and their allocation to the right individuals), interdisciplinary project groups (ideas from all employee groups), experimental workshops (during which ideas are made implementable) and self-sustaining teams (employees manage to work by themselves, create new ideas) (The Danish Confederation of Trade Unions, 2007).

A typical hindrance to employees' innovativeness is that individual employees do not see it as part of their job. The attitude of feeling responsible for idea generation may increase activity among some employees, while others may feel like "it is someone else's job" (Farr and Ford 1990; Morrison and Phelps 1999; Axtell et al. 2000). Although not everyone wants to be active in development and this desire to focus on routines should be respected (Kesting and Ulhoi, 2010), some change in mindset is needed before employee-driven innovation can be effective. It is not only the management that needs to create possibilities for participation, but also employees need to realise that they can participate.

According to employee-driven innovation, employees should be involved in innovation-related decisions regarding daily processes (Kesting and Ulhoi, 2010). In practice-based innovation, employees are acknowledged in idea evaluation systems by using the collective intelligence existing in employees (Salminen and Harmaakorpi, 2012). Onarheim and Christensen (2011) also refer to "the wisdom of the crowd" in the context of employee-driven innovation. This approach not only challenges traditional "the expert evaluates" ideas but also liberates resources within the

organisation for other functions. When employees receive more power to decide which ideas are to be implemented, activity levels rise.

Research on employee-driven innovation has to focus on planning and decision-making procedures (Kesting and Ulhoi, 2010). In order to mobilise employees to perform tasks, they must have a certain degree of capacity to put their autonomy to use. This can affected by, for example, experience, knowledge and understanding of the task itself, self-confidence and occupational identity (Ellström, 2001).

Even though many write about the antecedents of employee-driven innovation, the research stream focusing on the concept of employee-driven innovation is just now expanding. In the following table, this emergent literature is organised. There are earlier references to employee-driven innovation in the reports of The Danish Confederation of Trade Unions (The Danish Confederation of Trade Unions, 2007; 2008) as well as references to non-research and development innovation in the Aho report (2005). Many references from 2010 can be found (See Table 10). A special issue of *Transfer: European Review of Labour and Research* presents Hoyrup (2010) as a theoretical starting point and many empirical examples. Many papers cite Kesting and Ulhoi (2010) and/or Hoyrup (2010) as their central references to employee-driven innovation. Ellström (2010) and work processes are also frequently mentioned. Denmark is the homeland of employee-driven innovation, although use of the concept is increasing in other Scandinavian countries as well.

Table 10. The growing stream of research on employee-driven innovation

Source	Employee-driven innovation seen as....	Background	Empirical evidence	Contribution to the concept
Aho 2006	Not mentioned as a concept	Aims to create innovative Europe via paradigm shift	-	Presents non-research and development innovation
The Danish Confederation of Trade Unions 2007	Employees generally contribute **actively** and **systematically** to the innovation process.	Trade union background	Questionnaire sent to 500 organisations. Pairing up of manager and shop steward	Factors that affect employee-driven innovation and tools that enhance employee-driven innovation
The Danish Confederation of Trade Unions 2008	Employees systematically and actively contribute to the generation of new ideas which create value when they are implemented.	Trade union	3 in-depth case studies	Innovation toolbox for organisations, factors that benefit employee-driven innovation
Kesting and Ulhøi 2010	Employees taking part in innovation decisions	Literature on organisational routines	-	Presents a model and propositions based on theory
Hoyrup 2010	Comparing the concepts non-research and development innovation, non-technological innovation, high-involvement innovation	Workplace learning and participation in knowledge generation	-	Combines various pieces of literature to argue for employee-driven innovation
Ellström 2010	Equals practice-based innovation	Literature on learning work processes	-	Employee-driven innovation as balancing between two organisational logics: reproduction and transformation
Kristiansen and Bloch-Poulsen 2010	Employee-driven innovation in teams as a jointly created, shared routine	Literature on communication and dialogue	Observation of team meetings in Denmark	Dialogue and dissensus in communication
Telljohann 2010	Employee-driven innovation as employee participation	Direct and negotiated participation	Case study from an Italian hospital	Employee-driven innovation enhances efficiency, quality of services, improvement of working conditions and job satisfaction
Teglborg-Lefèvre 2010	Aims to make employee-driven innovation an organisational routine	Structured approach to employee-driven innovation	6-case study from France	Employee-driven innovation means different things in different organisations
So Rocha 2010	Continuous attempts to improve production and processes	Shop stewards' role in coordinating employee-driven innovation	Qualitative 7-case study from Denmark	Practice-based example: highlighting the role of shop stewards
Evans and White 2010	Workplace learning as a precondition, stimulus and essential ingredient of	Learning and skill development base for	Longitudinal studies in the UK among lower-	Interplay between formal and informal workplace learning can help create the

participation in employee-driven innovation	employee-driven innovation	grade jobs	environments for employees to use and expand their skills.

Kristiansen and Bloch-Poulsen (2010) talk about employee-driven innovation in the context of communication and dialogue. They state that in order to facilitate employee-driven innovation, it is important to create dissensus in communication. Dissensus, the opposite of consensus, means *"that team conversations must be organized in ways where silent or unspoken, critical voices speak up"* (p. 156). Organisations can thus develop skills in a "dissensus sensibility to open up for more voices, for indirect criticism, and for more democracy in the decision process trying to balance dialogues in multidimensional tensions between consensus and dissensus" (p. 156).

What the literature review reveals is an emphasis on routines. Routines in innovation are good, in that they make the creative side possible. Routines save planning effort; one does not have to learn the same things over and over again (Cohendet and Llerena, 2003; Kesting and Ulhoi, 2010). For example, an organisation that tries to establish routines for bureaucracy can save its experts' time and direct it to generating ideas for innovation. Otherwise, the experts' time might be exhausted by the need to spend it all filling out papers. Unfortunately this phenomenon is also known in the research field.

Employee participation has been researched before, although the employee-driven innovation angle is a bit different. Employees are currently involved in models that the management has already defined; they are not involved in the initial phases of designing new organisational models (Telljohann, 2010). Employee involvement programmes have been widely used to increase effectiveness and productivity. Involvement enables employees to take action at work within their authority, to respond in order to solve problems and to suggest feasible alternatives (Pun et al. 2001). Employee participation can contribute significantly to increases in employee expertise, creative thinking and motivation and ultimately to the level of organisational innovation (Dooley and Sullivan 2000). Employee participation can be divided into weak employee participation and strong employee participation, determined by whether the participation has an influence on managerial prerogatives (Baglioni, 2000 cited in Telljohann, 2010).

Why should organisations foster employee-driven innovation? Based on several empirical examinations, the report of The Danish Confederation of Trade Unions (The Danish Confederation of Trade Unions, 2008) concludes that employee-driven innovation results in the following five benefits:
1. Increases bottom-line competitiveness and improves results
2. Increases job satisfaction and makes the organisation more attractive to employees
3. Decreases the amount of sick leave
4. Reduces negative stress
5. Lowers staff turnover

These factors have been backed up by research, for instance that of Telljohann (2010).

Employee-driven innovation – just another term for continuous improvement?

Continuous improvement and employee-driven innovation share some basic principles. They are both directed at seeking developed and motivated people and involving all employees in the organisation's development activities. There is a strong literature stream of user-driven innovation that is supported by both employee-driven innovation and continuous innovation.

Continuous improvement originated from Japanese *kaizen* and was adapted to Western culture. Lean production was created in the footsteps of industrialisation and mass production. The basic idea for creating more value is reducing all extraneous waste, for example time, steps, and material

waste. Employee-driven innovation, on the other hand, originated from the trade union objective of retaining jobs during waves of globalisation. The concept stresses the well-being of employees and creating value for the organisation through employees who are happy at work.

What differentiates employee participation in continuous improvement from employee-driven innovation is perspective; most continuous improvement activities are initiated, planned and directed top-down (Jorgensen et al. 2004). In employee-driven innovation, the approach is bottom-up (The Danish Confederation of Trade Unions, 2007) and more power is given to the employees themselves (see Table 11).

Table 11. The main differences between continuous improvement and employee-driven innovation

	Continuous improvement	Employee-driven innovation
Practices	Designed by management	Designed by employees
Value creation	Reduce waste	Employee well-being
Ideas	Routines	Emergence
Innovations	Problem-oriented	Opportunity-oriented

Knowledge absorption is one factor that may hinder or enhance employee-driven innovation (The Danish Confederation of Trade Unions, 2007). In fact, the relationship is not one-way, as the high level of employee-driven innovation in turn increases absorptive capacity. Employees learn to observe their surroundings with curious minds and question existing working procedures. Kesting and Ulhoi (2010) posit that "employee-driven innovation is embedded in everyday critical and reflective experiences and work practices, which in turn are often triggered by social interaction and exchange" (p. 66).

Work is no longer solely just something that we do to earn money for a living. Employees engage in working life activities for reasons of self-identification, to be recognised by others and to gain the satisfaction of completion (Cairns and Malloch, 2006; 2011). These changes in workplace and individual behaviours should be recognised and exploited.

6. DISCUSSION AND IMPLICATIONS

In this chapter, the implications of the thesis are discussed. First, the theoretical contributions of the study are reviewed, followed by the implications for managers. This chapter closes with a discussion of possible future avenues of research and an assessment of the study.

6.1 Theoretical implications

The thesis examines absorptive capacity in a non-research and development context (Cohen and Levinthal, 1990; Lane et al., 2006) by underlining that all employees in an organisation are important actors in enhancing organisational absorptive capacity; in other words, all employees are responsible for leveraging organisational absorptive capacity. The thesis suggests an organisation can shift from individual to organisational absorptive capacity (Lane et al., 2006; Volberda et al., 2010) via
- roles that enhance opportunity recognition
- structures that facilitate acquisition and transformation
- facilitating the engagement of employees
- paying attention to the composition of social capital in social interaction mechanisms

Roles and structures present social integration mechanisms (Zahra and George, 2002; Lane et al., 2006) that enable interaction between different people. The right combination of social capital has an effect on social integration mechanisms; creative social capital (Harmaakorpi, 2004; Tura and Harmaakorpi, 2005) creates a link between assimilation and transformation. The roles of innovation activators on the shop-floor level of an organisation (Kallio and Bergenholtz, forthcoming) are critical in spotting practice-based knowledge that may be hidden in daily work processes (Ellström, 2010) and bringing this knowledge to organisational consciousness. This in turn supports the creation of a more "open inside" organisation (Pihkala and Harmaakorpi, 2011).

As for employee engagement, the approach of employee-driven innovation (Hoyrup, 2010; Kesting and Ulhoi, 2010) is proposed. The "innovation catcher" intervention model presents an option for how external intervention can help employees develop organisational innovation practices that they feel motivated to use. The process model further develops Coughlan and Coghlan's action research model (2002).

Figure 10 draws together the main implications of the thesis. The phases of opportunity recognition and acquisition focus primarily on individual absorptive capacity. However, the organisation does support individuals in acting upon their knowledge; during the acquisition phase, the individual takes the initiative in sharing his or her ideas with others in either codified or tacit form. Absorptive capacity is a social process during the assimilation and transformation phases through which the individual enters into a discussion with the organisation as to whether the knowledge he or she has is of any value to the organisation. This discussion can occur in different contexts: at the shop-floor level during coffee breaks, during sales meetings or through feedback retrieved from a suggestion system. Exploitation is affected by the routines the organisation has established to execute ideas that there has been a decision to implement.

Social capital is used as an intermediating theory related to dealing with multilevel absorptive capacity (Kallio et al., 2010). Expanding on the work of Harmaakorpi (2004) and Tura and

Harmaakorpi (2005), Kallio et al. (submitted) in this thesis present a concept of creative social capital in organisational contexts. It brings group dynamics within the structures that enhance development from individual-level absorptive capacity to organisational-level absorptive capacity. Social capital facilitates understandings of how assimilation and transformation differ (Todorova and Durisin, 2007). Bridging social capital supports transformation, whereas bonding social capital seems to favour assimilation. Creative social capital (Harmaakorpi, 2004; Tura and Harmaakorpi,
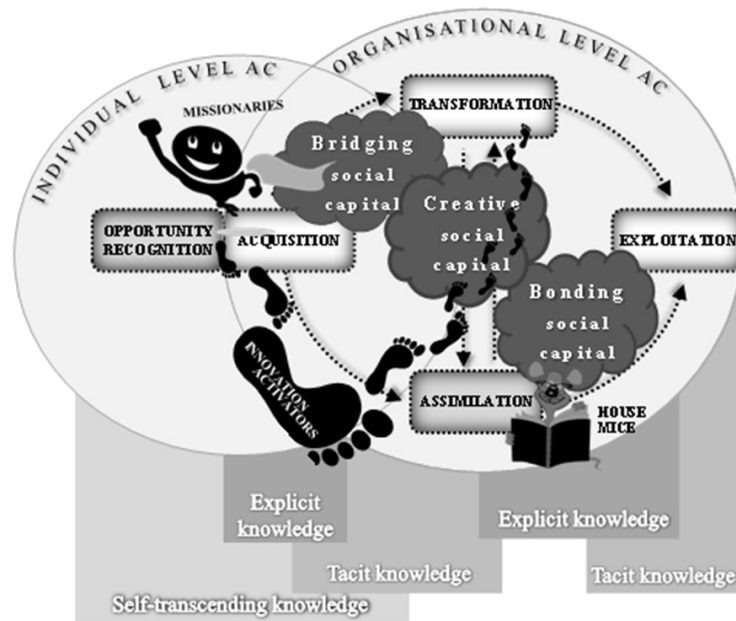
2005; Kallio et al., submitted) appears to enhance social interaction in favor of the tension that exists between transformation and assimilation.

Figure 10. Implications of this thesis

Martinkenaite and Breunig (2011) conclude that in order to leverage knowledge absorption, it is essential to identify who brings valuable knowledge into the organisation and how internal resources are mobilised and knowledge boundaries managed for knowledge to become organisational. This thesis identifies three groups of people who function in knowledge absorption. *Missionaries* seek external signals and observations that might be valuable. This activity is not, however, effective unless there are practices for incorporating their observations. *Innovation activators* function as brokers inside the organisation and have in-depth knowledge of internal processes; they channel any observations through the right procedures and practices. *House mice* are effective at assimilation; they make connections and quickly see the value of incremental observations in terms of current processes.

In this thesis, self-transcending knowledge (by Scharmer, 2001) is seen as governing the opportunity-recognition phase. First, the individual has a hunch about something. In order to be able to acquire knowledge, an explicit element of it has to be involved in order for everyone to be able to

see it, even if its value is not obvious. When the observation is presented to others, more tacit knowledge enters the picture. Everyone brings their experiences, probably from different viewpoints, that enrich the observation. In the processes of assimilation or transformation, more explicit elements are formed of its potential value, and exploitation brings more tacit knowledge in the form of experience of working in a new way.

When examining Todorova's and Durisin's (2007) model of absorptive capacity (originally from Cohen and Levinthal, 1990), we see that the same box of opportunity recognition leads to two different ways of handling acquired knowledge. The question is, can opportunity recognition and acquisition be the same if assimilation differs from transformation? Do people recognise and acquire knowledge that challenges their current thinking and knowledge that does not challenge it in the same way? In March's article on exploration and exploitation (1991), these two knowledge-search strategies are wholly different in nature. In exploration, uncertainty reigns and returns on investment involve high risks. In transformation, the knowledge that is absorbed does not fit current ways of thinking (Todorova and Durisin, 2007), and decisions require the same kind of courage as in exploration. Can transformation exist without an explorative search strategy?

The findings of this thesis indicate that opportunity recognition and acquisition seem to be absorptive capacity on the individual level (and assimilation and transformation would bring this to the organisational level). This has been examined in the context of salespeople as well as shop-floor employees (Kallio and Bergenholtz, 2011; forthcoming). Opportunity recognition is based on individuals. Through their recruitment policies, organisations can to some extend adjust the amount of internal explorative and exploitative knowledge acquisition. For example, an engineering company can enhance its exploration capabilities by hiring an artist. Natural transformation increases as a result, since there is no common language, experience or history. In other words, there is no need to create turbulence in the knowledge environment (See Nonaka and Takeuchi, 1995), as the combination of people generates it emergently.

The effect described above is only temporary; the artist turns knowledge acquisition into transformation for a only certain time. As March (1991) states, while the organisation is learning from its members, the individuals are also being socialised into organisational beliefs. Thus organisations should ensure this kind of change in personnel; recruitment is a continuous process and each instance requires not only employees but also the evaluation of the environment.

6.2 Implications for managers

"Reason inhibits foolishness, learning and imitation inhibit experimentation" (March, 1991, p. 73)

The practical implications of this thesis show how organisations can reveal the hidden innovation potential possessed by employees. Organisational absorptive capacity cannot be built without caring for those individuals who deal with knowledge. It is their skills, motivation level and possibilities for human interaction that leverage absorptive capacity.

March (1991) states that many times organisations do not tend to explore, since exploitation is faster, its returns can be seen right away and it is more certain. The value of absorptive capacity will not be acquired if managers do not see it, perhaps because absorptive capacity is intangible in nature or because it is usually a by-product of other activities (Cohen and Levinthal, 1994). Absorptive capacity has been linked to learning. Foray presents three prerequisites to maximise the learning potential of an organisation (2004, p. 64-65): 1) People in the organisation must accept that

learning takes time and its results are not seen right away, 2) The organisational culture must support the learning of individuals, and 3) Organisational structures have to support learning and encourage employees to express their ideas orally and in writing.

The cognitive ability of an individual to recognise valuable information and his or her purposive action directed at this goal is embedded in the organisation's search practices (Martinkenaite and Breunig, 2011). The search strategy of an organisation can be oriented in two ways: exploration or exploitation. In order to stay competitive in the long run, both should be in use. As Cohen and Levinthal (1994) state, a company should invest in its absorptive capacity even if it is already the market leader and the only one capable of exploiting a new technology. The thesis suggests an organisation can leverage its ability to use knowledge more effectively by
- Executing employee-driven innovation
- Creating structures that facilitate natural knowledge flows
- Making room for social interaction and facilitating the emergence of creative social capital
- Resourcing roles to reveal hidden innovation potential

The trade union perspective in Denmark could be a good benchmarking target for Finnish authorities as well. With the help of employee-driven innovation, they have turned relocation and globalisation into creating more employment from within (The Danish Confederation of Trade Unions, 2007). Organisations that engage employees to develop their work will also succeed in future change processes better than strictly top-down managed units.

People need to have places where they can share and develop the ideas. This does not take place during meetings; officially organised meetings are rarely the birthplace of radical innovation. It is coffee breaks and self-organised, ad hoc meetings that create and spur inspiration, and inspired people take things forward. Different roles can also be invented to enhance innovation and knowledge flows. Forget the change agents that are sweating, trying to figure out how to get people involved. Find the natural roles people feel comfortable with. Like in a case of three innovation activators (Kallio and Bergenholtz, forthcoming); each acquired the resource they needed (time, in this case), but all three activated their people in a different manner.

What is absorptive capacity in practice? It has been widely acknowledged in the literature on the topic that learning and absorptive capacity have a positive correlation (e.g. Lane et al., 2006). What are the competences needed in the different phases of absorptive capacity? What skills does an individual need? What is the role of the organisation during each phase? Table 12 suggests the features of each phase of absorptive capacity that organisations and managers should embrace.

Table 12. Various stages of enhancing organisational absorptive capacity

	Individual	Organisational	How to enhance
Opportunity recognition	Curiosity, critical examination, wonders, sees different things	Atmosphere that allows crazy ideas and supports critical thinking	Hire different people; hire people who are odd, who question your way of thinking Foster the idea that anyone can bring new ideas to organisation Invest in individual learning
Acquisition	Active behaviour, saying things aloud	Structures (places to bring forward ideas)	Encourage crazy ideas Build channels for ideas Create meeting places for ideas to collide Ask employees, not system providers, which tools they would use
Assimilation	Analyse, process, interpret and understand	Efficiency, bonding, choice, execution	Give away power to make decisions on small improvements
Transformation	Ability to see "possible worlds", broker	Discovery, flexibility, slack, bridging	Make reflection an organisational practice Give resources for experiments
Exploitation	Expertise	Effective short-term routines and long-term goals	Design effective routines Adopt lean production Develop long-term evaluation for learning and innovativeness

6.3 Future studies

While writing this introduction to this thesis and reading numerous studies on absorptive capacity, the author asked herself one question over and over again: What exactly is absorptive capacity, in the end of all? There is much absorptive capacity literature that refers to the concept without examining it (Lane et al., 2006). In an effort to understand the profound nature of the concept as well as its links to other concepts, some propositions regarding possible future research avenues are presented below.

What kind of knowledge is being absorbed?

The question presented by Volberda et al. (2010) should be taken into closer examination.

Cohen and Levinthal (1989) focus mainly on technological knowledge and see three sources for absorptive, i.e. learning, capacity: the company's internal research and development, competitor research and development spillovers and external technological knowledge from outside the industry. Many scholars subscribe to Cohen and Levinthal's view and refer to technological knowledge. How about absorptive capacity in non-research and development environments? How about absorption of knowledge that is associated with, e.g., the customer's behavior or future trends among the young?

Jansen et al. (2005) call for absorptive capacity studies that address the role of knowledge attributes. As tacit knowledge requires richer processing mechanisms (Subramanian and Venkatraman, 2001) than explicit knowledge, what is the case with self-transcending knowledge? Perhaps the answers could be found in the field of intuition, mindfulness and self-awareness. In order to recognise opportunities and self-transcending knowledge, individuals could enhance awareness though mindfulness practices. And in order to absorb and share this kind of knowledge, mindful connections and practices for creating those should be examined.

In absorptive capacity studies, more attention should be awarded to the field of study and its influence on knowledge that is being absorbed. For example, Jansen et al. (2005) study financial services, and their data is from general managers. There are two points here: 1) the knowledge within the field of financial services and 2) the knowledge of the general managers. In examining the actual processes of absorption and exploitation, the employee level should be taken into consideration. General managers present one viewpoint to produce knowledge. How about the absorption of tacit, let alone self-transcending, dimensions of knowledge?

In terms of explicit knowledge, i.e. information, alternative representational practices should be acknowledged (Elkjaer, 2003; Gherardi, 2006; Pässilä and Oikarinen, forthcoming). When this is put into an organisational context, it is seldom simply knowledge or a new idea that needs to be executed. The new knowledge abounds with different meanings for various individuals and groups (Pässilä and Oikarinen, forthcoming). To one person, the idea or piece of knowledge may mean a promotion, while another assumes she will lose her job after implementation of that same idea. A third person feels that it facilitates his job, whereas a fourth person just knows that now he has to do something twice. A fifth person would like it if nothing changed. All these five individuals will react and act upon the knowledge or idea proposed according to their background and interests. We cannot simply transfer knowledge without taking a closer look at who is there to transfer it and what their incentives are. And even with content and incentives, nothing is transferred without action, i.e. interaction.

How can absorptive capacity be researched using qualitative methods?

In order to answer the question of what happens in the process of knowledge absorption, more qualitative studies should be conducted. The bulk of absorptive capacity literature contains quantitative studies where the data from an organisation has been provided by a single individual. They measure the outcomes of absorptive capacity, but from a process perspective, the myth of the concept of absorptive capacity remains.

More qualitative studies on absorptive capacity and its organisational antecedents should be conducted. What is absorptive capacity in individual processes and interactions? What is it that cannot be written down but can be sensed in situations? For example, knowledge itself may not be bad or not useful for an organisation; it may be the individuals within the organisation who do not know how to interact and create a mutual understanding.

Broker theories would offer fresh insight into absorptive capacity literature. What actually is taking place when knowledge is transferred? This thesis examined the concept of social capital. What about social intelligence or playfulness? Also, in-depth studies on management in environments that are good for leveraging absorptive capacity could be examined.

How can absorptive capacity be measured in practice-based Doing–Using–Interacting environments?

As noted in the work of Cohen and Levinthal (1989), the current measures of absorptive capacity usually comprise research and development expenses. Cohen and Levinthal (1989) argue that "incentives to learn should influence research and development spending" (p. 570), which most likely has had a great influence in the determination of research and development expenses as measure for absorptive capacity. However, as Lane et al. (2006) conclude, the research stream focusing on empirical examples of the impact on research and development incentives on

absorptive capacity is questionable. The number of patents is used in the literature as both a dependent and an independent variable; Lane et al. (2006) question whether the research can be reliable if the same measure is used in both input and output. Research and development spending offers only a partial view of innovation (Jensen et al., 2007). Furthermore, the amount of external knowledge has also been used to measure absorptive capacity. A better measure would be, for example, the capacity to disseminate and apply acquired knowledge (Lane et al., 2001). Lane et al. (2006) also question the use of Ricardian rents to evaluate absorptive capacity, such as how much difficult-to-imitate knowledge a firm possesses (e.g. Barney, 1991).

When Cohen and Levinthal (1994) talk about investments in absorptive capacity, they do not solely mean research and development expenses, although that was their initial proposition in a 1989 paper. They talk about first- and second-mover advantages and state that even if a firm thinks it is the only one that can exploit new technology, they have to invest in absorptive capacity. This entails also the acting upon the technology, not just developing it. So, what do research and development expenses really tell us? Cohen and Levinthal (1989) state that absorptive capacity is assumed to be generated when firms invest in research and development.

In examining the concept of absorptive capacity, Lane et al. (2006) claim that absorptive capacity studies should at least employ absorptive capacity as a capability. As a word, capability signifies potential absorptive capacity (Zahra and George, 2002). Webster's dictionary (1996) confirms the concern: the word capability means "the state or quality of being capable" (p. 197). It says nothing about performance. In other words, we know that we could do it, but it is not stated whether we would actually do it. This fact can partially explain why scholars evaluate absorptive capacity with measures that actually describe potential, such as research and development expenses. Hence, in this examination the realisation of the potential should be acknowledged in studies of absorptive capacity.

Most absorptive capacity studies to date are quantitative. Perhaps a more profound examination of the nature of the phenomenon would facilitate the generation of new measures as well. A measurement model for absorptive capacity should be developed that follows the principles of Doing–Using–Interacting and Mode 2 knowledge generation. How about non-research and development innovations? As Jensen et al. (2007) note, great innovation potential lies in knowledge that is not technology-based. What is this Doing–Using–Interacting knowledge and how could the absorptive capacity in that be measured? "Doing–Using–Interacting mode relies on informal processes of learning and experience-based know-how" (Jensen et al., 2007, p. 680).

Absorptive capacity has been measured in the incremental sense through the speed of learning and frequency. Absorptive capacity in the context of radical innovation has not been examined to any great extent. What would be the measures for doing so, considering that an organisation's absorptive capacity depends on its ability to share knowledge and communicate internally (Cohen and Levinthal, 1990)? Communication platforms, opportunities that are arranged for people with different backgrounds to meet each other? The group's creative social capital? Its capacity for critical thinking and critical reflection?

How do different levels of absorptive capacity correlate?

Literature on the different levels of analysis in absorptive capacity exists regarding the regional (Uotila, et al., 2006), organisational (Cohen and Levinthal, 1990), unit (Jansen et al., 2005) and individual (Pedrosa et al., 2010) levels. However, the comparison and the relationships between these levels of analysis have to some degree been ignored. Research comparing regions and

organisations exists. This research avenue is also consistent with Volberda et al.'s (2010) suggestions for future research.

Yet deeper examination is needed. What kinds of regions favor interaction? What is the role of regional agencies in facilitating interaction, not just transferring information or technology signals? How about the national level? Finns are good at research and development; how good are they at interaction?

What kinds of antecedents for absorptive capacity govern practice-based Doing–Using–Interacting environments?

The focus of this thesis is on the mechanisms that enhance the transfer of absorptive capacity from the individual level to the organisational level. Of particular interest is the interplay between transformation and assimilation. How should resources be divided between effective routines and playful experimentation and exploration? What are the things that make organisations take big risks and pursue crazy ideas? What are the factors that affect absorptive capacity?

Reflection has been noted as an important part of creative learning (Nilsen and Ellström, 2012). At the individual level, reflection starts from self-awareness; from seeing oneself. The concept of presence (For example Senge et al. 2005) is also interesting in the context of absorptive capacity, and especially in transformation. People in possession of deeper presence see better opportunities. Is this assumption correct? How does presence relate to prior knowledge? Opportunity recognition is also affected by the ability to see possible worlds. Only a free mind sees clearly. How could organisations use this in order to enhance absorptive capacity?

Play is a term related to exploration (March, 1991). Playfulness questions habitual beliefs and enables a shift in viewpoints, allowing the making of new distinctions (Barry and Meisiek, 2010). Anderson (1994) claims that play can be a significant motivator and energiser of the employees. Dodgson, Gann and Salter (2005) use play to mediate the move from ideas to action by exploring the possible outcomes during the early stages of the innovation process. What role could play take in organisational culture and in the interaction between people? How about games? Gamification can be considered a trend. How do organisations use this trend? Is it conscious?

Work is no longer solely just something that we do to earn money for a living. Employees engage in work activities as means of self-identification as well as to gain recognition from others and the satisfaction of completion (Cairns and Malloch, 2011). What are the future incentives of employee participation? Could a suggestion box be a virtual factory where the problems of reality are solved (see McGonical, 2011)?

6.4 Assessing the study

In this section, the quality of the study is discussed from three viewpoints: validity, reliability and applicability. Bradbury and Reason (2008) discuss these questions from an action research point of view. Citing Kvale (1989), they raise the issue of whether the traditional discourses relied on by non-action researchers to address research quality can be used when evaluating action research. This notion regarding action research is taken into consideration in the discussion below.

6.4.1 Validity

Validity has been defined as an answer to questions such as "Are the results really what they appear to be?" (Saunders et al., 2009) or "Do the findings make sense?" (Miles and Huberman, 1994). Marshall and Reason (2007) present a different type of approach to validity. Drawing their implications from longitudinal action research, they conclude that validity takes an attitude of inquiry, i.e. a curiosity, a willingness to articulate and explore purposes, humility, participation and radical empiricism.

In action research, there is a tension between the intensions of researchers and practitioners. Whereas research needs time for analysing the data and interpretation, practice needs the answers now. As in many cases the first meeting was about trying to convince how the research process would be beneficial for the organisation. The situation naturally created pressures for the researchers to think about the practical implications, even though the role of the researcher is more on facilitating the practitioners with good research process.

The thesis combines both qualitative and quantitative data for data-type triangulation (Miles and Huberman, 1994). Quantitative methods made it possible to engage more people, and the data set could be taken from a larger group, achieving more generalisable results. However, qualitative methods revealed the essence of what appeared in quantitative form. In other words, qualitative methods were used to discover the questions it was necessary to ask. In addition, the research question "how" could be examined with qualitative methods.

In analysing why the two particular action research processes were chosen to produce data for journal articles, a couple of issues played a role. Firstly, case results generated the practices that were seen as useful in terms of practice (Reason and Bradbury, 2008). Second, the researcher was trusted by the members of the organisations studied, which makes the data stronger (Miles and Huberman, 1994, p. 268). In one case, this was interpreted as meaning that most of the participants spoke openly about the company and interpersonal relations within it. In addition, one particular meeting confirmed this. In a meeting where an external consultant came to present something to the organisation, the researcher was not introduced as external to the company, but she was "one of them". In another case, the trust was interpreted from how the practitioners interacted with researcher after the actual action research process. The researcher went to the factory to generate ideas for a future research project with the innovation activators, who were chosen subsequent to the action research process. Upon her arrival at the factory, the manager walked up to the researcher, shook her hand and said he was sorry he could not take part in the idea generation, as he was giving other visitors a factory tour.

Robson (2002) has categorised threats to validity: history, testing, instrumentation, mortality, maturation and ambiguity about causal direction. Each of these threats are discussed below.

History. Events that have happened in the past have an effect on research results. Some of these can be included in the study and analysis. However, there might be some personal or organisational cultural issues that are so deep that it is difficult if not impossible for an outsider observer to note. In engaging employees, many of these issues were mentioned explicitly: people had been disappointed by earlier development projects, so they were not eager to give their all to this one. Some had been rewarded for their ideation contributions, so they were willing to provide more ideas.

Testing. If a participant thinks that answering a certain way will harm their current status, they will avoid doing so. In surveys, this is always difficult to control. People have different interpretations of statements. In action research processes and interviews, a kind of universal contradiction was sensed: "Since change is generally comprehended as a good thing, I am favor of it. But I don't want anything concerning my work to change." Actually, this participating without really engaging into it may harm the process the most. In addition, it may not be visible to the researcher for quite some time. The action research processes had this element. The meetings were nice and smooth, but nothing seemed to happen. Probably no one was passionate enough to work more for the matter. Or maybe they just did not have enough power to decide?

Instrumentation. Do the targets contradict something that the participants have been told to do? For example, in the case of pursuit of employee-driven innovation, is the management willing to give them the resources to do it? This is an important point. Most of the organisations had a culture of participating employees with suggestion box, but rarely were the employees entitled to make decisions on the ideas. As the researcher was keen on employee-driven innovation, it took some time for her to recognize this issue. Also the steps on practice would very much depend on how ready the management was to adopt employee-driven innovation. This again, posed another tension of expectations between the results of research process and the possibilities to achieve those. Every manager wants, that his/her employees are innovative. But on what terms?

Mortality. Participants drop out of the study. During our action research process, some participants did drop out. It was noted that this correlated with the culture of the organisation. In small, idyllic organisations, all the participants stayed; in large ones, drop-outs were more likely.

Maturation. Other events have an effect, not just the research. This was more than probable in one case study, where a recently promoted manager implemented ideas produced during the action research process. To be honest, the results of that process would have been very different if it were not for that promotion. Also the economic situation affected. At the time when there was a shortage of raw-material, the employees had time to sit down and generate ideas.

Ambiguity about causal direction. There always is a path we take. For example, in action research studies, the researcher's choices in presenting interview results were crucial. If the process is genuinely emergent – that is, the outcome is not decided beforehand – the previous phase leads to the next phase. In conducting many action research processes with similar structure, the researcher observed from her own thinking, that more and more path-dependent assumptions were made. It could also be called learning, however, it does has an effect on how alert the researcher is to observe the small things that could the process to another direction.

6.4.2 Reliability

Reliability refers to the possibility to replicate results in a similar environment. However, in a qualitative, induction-focused case study, there is less need to generalise results (Saunders et al., 2009, p. 127). The value of a case study actually lies more in understanding the phenomenon involved than in generalisation (Stake 1994, 238).

The research process of this thesis can be seen to be unique and hermeneutic. Time and context do create circumstances that would be hard to replicate. For example, many of the case companies were from the forest industry, and the situation in Finland at the time was unique. The old powerhouse industry has faced difficulties that have heavily thinned the companies. However,

during the research process, some hermeneutic circles have been repeated, and the same kinds of observations arose from different levels. For example, a similar problematic of whose duty it is to acquire signals and new knowledge emerged in the regional-level and organisational-level analyses. Thus the results were similar at two different levels, which strengthens the reliability of the study (Miles and Huberman, 1994).

Easterby-Smith et al. (2008, p.109) provide three questions for assessing the reliability of a study:
1. Will the measures yield the same results on other occasions?
2. Will similar observations be reached by other observers?
3. Is there transparency in how sense was made from the raw data?

In this thesis, reliability was put to test as the research proceeded at the case level. There were other researchers involved in the research processes. In addition, a group of experts monitored the action research processes (Coughlan and Coghlan, 2002). However, some threats to reliability did exist of which the researcher should be aware. Using action research as a method always includes the danger of focusing too much on business interests and neglecting research. In this case, there was an attempt to make the role of the researcher conscious by stating that the purpose was to engage employees to take responsibility for business interests (Kallio and Hyypiä, 2011).

Robson (2002) describes four threats to reliability: participant error, participant bias, observer error and observer bias (Table 13).

Table 13. Threats to reliability (Robson, 2002)

	Observer	Participant
Error	One observer sees things only from one point of view	Background factors influence participant enthusiasm
Bias	One observer makes interpretations through his/her own cognitive lenses	Participants are saying what they believe they are expected to say

There was an effort to avoid observer error by engaging several researchers in the processes. Furthermore, two researchers were present at most of the interviews, which is reflected in the data. These interviews provide much richer data than those that were conducted alone. Small talk was used to try to avoid participant error. The interviewee was always asked how he or she was doing and engaged in other chitchat prior to the interview to observe his or her emotional state. Although, it is to be noted that for example disappointment with earlier projects had an effect on the motivation to engage, as discussed in earlier chapter on validity. There were some interviews that clearly did not result in relevant data, since the participant was full of negative emotions. Also, recent promotions had an influence in that some participants seemed to view work through rose-coloured glasses.

There was an attempt to avoid observer bias by involving different researchers in research processes. Researchers of different ages and backgrounds offered totally different interpretations of the same situations. Open questions were used to try and minimise participant bias during interviews; for example, "How is the atmosphere in this organisation?" was asked instead of "Is the atmosphere good in this organisation?" The presence of this bias was noted in jointly organised workshops; opinion leaders were present and not everyone was willing to question their views.

6.4.3 Application

In addition being valid and transferable to other contexts, the effect of the study on its participants is also an important assessment measure (Miles and Huberman, 1994, p. 280). In action research, *participants* means both the researchers and those who have taken part in the research processes. Kvale (1989) talks about pragmatic validity: Do the results have value in practice?

In action research processes, the arenas for dialogue have been organised (Gustavsen, 2008). Not all of them were seen as useful by the practitioners, but in most cases the oral and written feedback that was gathered was positive. The practitioners were grateful for the time they had to discuss things together. And, in one case (presented in Kallio and Bergenholtz, 2011), the explicit results of the action research process was based on arranging time to discuss small signals regarding customer knowledge. In the same case, the practitioners realised that the meetings have a more diverse focus when someone external to the organisation is present. They thus had strong bonding group, and more creative ideas were born when they had bridging links (Kallio et al., submitted). In this case, the initial problem-setting was that the managers did not receive informal knowledge about customers. The actions thus helped in solving a practical problem (Miles and Huberman, 1994).

The article "Locating the loopholes before launching a development project" takes a step towards the problematic of application. The employee-driven approach that governs the implications of this thesis are not for every organisation. The survey aims to understand attitudes towards Doing–Using–Interacting knowledge generation. A preliminary understanding of the organisation also helps set targets for development.

The findings of the thesis have stimulated several avenues for future research (Miles and Huberman, 1994). Some of those support earlier calls for studies and some expose less-examined areas. Many of the proposals for future studies revolve around the interface of practice and theory.

7. CONCLUSION

This chapter concludes the thesis by answering the research questions. The main research question was to find out how organisational absorptive capacity can be enhanced in a practice-based non-research and development context.

"Enhancing absorptive capacity in practice-based non-research and development context is to organise the optimal circumstances for social interaction. Every individual is a potential source of signals leading to innovations. The individual, thus, recognises opportunities and acquires signals. Through the social interaction processes of assimilation and transformation, these signals are processed into the organisation's reality and language. The conditions of creative social capital facilitate the interplay between assimilation and transformation. An organisation that strives for employee-driven innovation gains the benefits of a broader surface for opportunity recognition and faster absorption."

The articles increase understanding of the research questions in the manner presented in Table 14.

Table 14. Contributions of thesis articles in terms of the research questions

	Article	Proposed contribution
How can organisational absorptive capacity be enhanced in a practice-based non-research and development context?		
How is absorptive capacity understood in the context of practice-based non-research and development innovation?	1,2,3,5, 6	**Absorptive capacity** can be generated in every function of an organisation, everyone has an affect. **Shop-floor** employees are important in recognising opportunities. **Knowledge** that is possessed by individuals, but is not used by the organisation, is *external* to the organisation. **Assimilation** and transformation require different kinds of social interaction mechanisms. **Absorptive capacity** is one element of innovation capability.
• *What* is the relationship between individual and organisational absorptive capacity?	1, 3, 4	**Individuals** recognise an opportunity and acquire knowledge of it. Through the processes of assimilation and transformation, this is incorporated into social mechanisms that are highly dependent on organisational characteristics.
• *What* is the role of employees in enhancing organisational absorptive capacity?	2, 3, 4	**Employees** are active in stating their observations out loud. **The roles** of innovation activators enhance knowledge absorption.
How can individual absorptive capacity be converted into organisational absorptive capacity?	4,5	**Employee-driven innovation** facilitates the achievement of greater engagement. **The right** kinds of social integration mechanisms facilitate interaction.
• *How* can employees be engaged in developing organisational absorptive capacity?	2,3,5, 6	**Employee-driven** innovation **External** intervention facilitates the steps towards employee-driven innovation. **Motivation** to take action and seeing value in this work
• *What* is the role of social capital in this process?	4	**Bonding** social capital particularly reinforces assimilation and exploitation, bridging social capital especially enhances acquisition and creative social capital facilitates the balancing between transformation and assimilation.

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Article 1:

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Absorptive Capacity and Social Capital in Regional Innovation Systems: The Case of the Lahti Region in Finland

Anne Kallio, Vesa Harmaakorpi and Timo Pihkala

Abstract

The recent theories of innovation suggest that there is great potential for innovation in the structural holes and weak links of the innovation system. Higher absorptive capacity enables an easier crossing over of structural holes in the innovation system, aided by social capital that is located in the social relationships of actors. However, the level of human and social interaction in regional innovation systems has been largely neglected as a research topic. Empirical research on a sample in the Lahti region in Finland suggested three forms of social capital: organisational bonding social capital, regional bridging social capital and personal creative social capital. Further analysis revealed three groups of actors' interaction behaviour: Missionaries, House Mice and the Passive Resistance.

Introduction

There is great potential for innovation in the somewhat empirically unexplored structural holes and weak links of the regional innovation system. Innovations are increasingly taking place in networks, in which actors with different backgrounds are involved. This places new demands on innovativeness. Innovations seem to presume factors like the ability to interact collectively and build trusting relationships between the innovating partners in order to solve collective problems (Harmaakorpi, 2006; Foray, 2004, p. 69; Saxenian, 1994). In a regional context, innovation is seen as a process embedded in a regional innovation system (for example, Cooke *et al.*, 1997; Storper, 1997; Braczyk *et al.*, 1998; de la Mothe and Paquet, 1998; Doloreux, 2002). A regional innovation system is understood as a system of innovation networks located within a certain geographical area, in which firms and other organisations are systematically engaged in interactive and

Anne Kallio, Vesa Harmaakorpi and **Timo Pihkala** are in the LUT Lahti School of Innovation, Saimaankatu 11, Lahti, 15140, Finland.
E-mails: anne.kallio@lut.fi, vesa.harmaakorpi@lut.fi and timo.pihkala@lut.fi.

collective learning through an institutional milieu characterised by social embeddedness (see Cooke and Morgan,1998; Kostiainen, 2002).

A regional innovation system consists of human interaction networks with various social relationships. Social structure, especially in the form of social networks, affects economic outcomes, since networks affect the flow and quality of information (Granovetter, 2005). Granovetter (1973) introduced the concepts of strong ties and weak ties in social networks. The strength of a tie is a combination of the amount of time, the emotional intensity, the intimacy and the reciprocal services that characterise the tie (Granovetter, 1973). Both strong ties and weak ties are important to innovation. Strong ties include a common language and high level of trust, whereas weak ties enable the flow of novel information to the system. Innovations are most likely to be found in the structural holes between dense network structures (Burt, 1992, 2004; Granovetter, 1973, 2005).

The network structure and the role of structural holes appear differently in different kinds of regional innovation systems. However, new innovation policy conclusions are too often drawn from success story regions and policy models are used in an undifferentiated manner for every region. Despite many attempts to define one efficient innovation model for regional innovation systems (RIS), it is impossible to create a model that suits every region (Tödtling and Trippl, 2005). A special interest in this present article is to assess networks and the actors in less successful or dysfunctional regions (see Cooke and Piccaluga, 2005). These regions are forced to seek new innovation potential in structural holes of the innovation system. The article emphasises the human, social and interactive capacity of regional innovation systems. Therefore, we suggest that the absorptive capacity and social capital of actors in an innovation system are crucial in increasing the innovative capability in these kinds of regions.

The term absorptive capacity was originally coined by Cohen and Levinthal (1990) to describe an organisation's ability to value, assimilate and apply new knowledge. Potential absorptive capacity enables the exploration of knowledge (often) over the weak ties of the innovation system; and realised absorptive capacity secures the exploitation (often) in the strong ties of the networks. (Cohen and Levinthal, 1990; Zahra and George, 2002). Zahra and George (2002) suggest that there is a special need for a social interaction mechanism between exploration and exploitation processes. Particularly for the less favoured regions, how social interaction evolves in structural holes becomes a crucial question (Tödling and Trippl, 2005). Absorptive capacity can play a significant role as a capability that aids knowledge transfer in the regional innovation system. Fontes and Coombs (2000) suggest that new technology-based firms (NTFBs) have the ability to absorb externally generated technology and adapt it to a region's needs. In order for a NTFB as a single organisation to do this, at least some knowledge needs to be generated indigenously and the region must possess sufficiently absorptive capacity to benefit from the knowledge.

While the concepts of innovation system, structural holes and absorptive capacity refer to a collective unit of analysis, the concept of social capital is closely related to an individual actor's perspective. Early use of the term social capital referred to resources inherent to family relations. Later, Coleman (1988) suggested that social ties bring certain privilege to a group. They can provide one with individual access to important knowledge and, at the same time, limit the access of others to this knowledge. The role of social capital in regional development seems to be two-edged. On the one hand, it has a positive effect on regional development and renewal processes,

the key elements for socio-institutional adaptation. On the other hand, Florida *et al.* (2002) argue that places with high social capital are the worst places for innovation and creative processes. In the light of these arguments, the concepts of bonding social capital and bridging social capital become very useful tools for describing the different types of social capital needed in regional innovation systems. Bridging social capital creates bonds of connectedness formed across diverse horizontal groups (weak ties), whereas bonding social capital connects only the members of homogeneous groups (strong ties) (Granovetter, 1985; Putnam, 1995).

In this study, we focus on the role of social capital in the regional innovation system. We suggest that from the perspective of social capital, the level of human and social interaction in RIS has been largely neglected as a research topic. Should the functioning of the regional innovation system depend on the bridging of the structural holes, it is relevant to focus on the individual actors' role in this behaviour. The research question of this study can thus be phrased as

> How is regional absorptive capacity reflected at the individual level of social capital?

To explore the premises of social interaction and knowledge transfer in the innovation activity of a regional innovation system, we study the theoretical background regarding the characteristics of social capital. The concepts of absorptive capacity and social capital and their role in the regional innovation system are discussed and propositions are drawn from the theory. Next, we present the special features of our case study region as well as the methodology of the study. We explore the issue by measuring the respondents' affective and cognitive attitudes towards innovative activities following the theory of social capital and absorptive capacity. The results of the purposive sample study are introduced

through principal components analysis and cluster analysis. Finally, we discuss the study results, especially from the perspective of the individual's importance in terms of regional absorptive capacity and innovation.

Absorptive Capacity and Social Capital in Regional Innovation Systems

Absorptive capacity is an organisation's ability to value, assimilate and apply new knowledge (Cohen and Levinthal, 1990). Kim (1998) argued that absorptive capacity requires learning capability and develops problem-solving skills; learning capability, again, is the capacity to assimilate the knowledge for imitation and problem-solving skills to create new knowledge for innovation. Moreover, Zahra and George (2002) define two different types of absorptive capacity: potential absorptive capacity is important in acquiring and assimilating external knowledge, whereas realised absorptive capacity refers to the functions of transformation and exploitation of the acquired knowledge.

This paper is largely based on the idea that social capital is a decisive factor in determining the absorptive capacity and, through this, the innovativeness of a region. Assuming that social capital is inherent in both intrafirm and interfirm relationships, Upadhyayula and Kumar (2004) talk about internal social capital and external social capital. They suggest that external social capital increases potential absorptive capacity and internal social capital increases realised absorptive capacity. Both are, naturally, important in regional innovation processes. Potential absorptive capacity enables the exploration of knowledge over the weak ties of the innovation system and realised absorptive capacity secures the exploitation in the strong ties of the networks. Absorptive capacity is crucial when considering questions of

future-oriented knowledge adaptation in regional innovation networks; that is, higher absorptive capacity enables the easier crossing of structural holes in the innovation system (Uotila et al., 2006).

To reach a better understanding of the characteristics of absorptive capacity, we must take a closer look at its different parts: acquisition, assimilation, transformation and exploitation. Acquisition refers to an actor's capability to identify and acquire externally generated knowledge critical to his/her operations. Assimilation refers to an actor's routines and processes that allow him/her to analyse, process, interpret and understand the information obtained from external sources. Transformation denotes an actor's capability to develop and refine routines that facilitate combining existing knowledge and newly acquired and assimilated knowledge. Exploitation as a capability is based on routines that allow actors to refine, extend and leverage existing competencies or create new ones by incorporating acquired and transformed knowledge into their operations (Zahra and George, 2002).

The importance of social capital in creating regional competitiveness lies in its regional specificity. It is inherent to the character of social capital that it cannot be copied or transferred from one regional innovation system to another. However, it can easily be destroyed as a result of bottlenecks and problems existing in the network. According to Portes

> whereas the economic capital is in people's bank accounts and human capital is in their heads, social capital inheres in the structure of their relationships (Portes, 1998, p. 7).

Social capital cannot be traded, but is in practice created only through constant co-operation. It could be argued that social capital is a central factor promoting innovativeness in regional innovation systems (Tura and Harmaakorpi, 2005; on different views on

social capital, see, for example, Nahapiet and Ghoshal, 1998; Adler and Kwon, 2000).

Tura and Harmaakorpi present a resource-based view of social capital: they consider social capital to refer to an actor's resources, the sources of which are located in the social relationships of the actor (Tura and Harmaakorpi, 2005, pp. 1116–1117).[1] These resources constituting social capital enable certain actions or make obtainable certain objectives that would have been impossible or unattainable without those resources (see Nahapiet and Ghoshal, 1998, p. 244). This view comes close to Lin's (2001, p. 29) definition of social capital as "resources embedded in a social structure that are accessed and/or mobilized in purposive actions". This means that social capital is a capability-like resource: it is closely connected to the things we *can do*, while, for example, physical capital is more about things we *have*. It is also dispositional: it can exist even if it is not exercised, or even recognised, at a given moment.

When moving from the individual level to the innovative capability of a community, an organisation or a network, the role of social capital changes significantly. It is not only one resource among others, but it is also located at the centre of the whole innovative capability. Social capital is a resource which gives an organisation or network the capacity to utilise the material, economic and intellectual resources of the whole collective and social resources reaching outside the collective (Tura and Harmaakorpi, 2005, p. 1119).

The division of social capital into bridging and bonding types becomes crucial in assessing regional innovativeness, since it is essential both to build an atmosphere of trust in each innovation network and to keep them open in order to allow the necessary flows of information to take place. Although bonding social capital can be seen as partly fruitful for the functioning of one innovation network, the regional innovation system, formed

characteristically of networks of strong bonding social capital, might lead to unwanted results. The dominance of bonding strong ties could lead to the introspectiveness of the innovation network, which would harm both the network itself and the entire innovation system. Closed networks may act against the interests of other networks, leading to rent-seeking behaviour reducing the aggregate economic performance (Olson, 1982). On the other hand, bridging social capital is seen as positive because it brings individual innovation networks into trustworthy interaction. This interaction enables, for example, the increase of absorptive capacity benefits of the structural holes of these networks. Burt's (2004) definition of the 'social capital of brokerage' is very similar to bridging social capital.

'Creative social capital' describes the third form of social capital needed in the regional development environment. Creative social capital in regional development networks is a field-specific resource. It includes the elements of creative tension (Sotarauta and Lakso, 2000) and supports the necessary socio-institutional change caused by techno-economic development. It is also a balanced amalgam of bridging and bonding social capital (see Putnam, 2000, pp. 22–24). Bridging social capital creates bonds of connectedness formed across diverse horizontal groups, whereas bonding social capital connects only the members of homogeneous groups (Granovetter, 1985; Putnam, 2000). Tura and Harmaakorpi (2005, p. 1121) argue that a network including only bonding social capital might lead to unwanted results due to a decrease in potential absorptive capacity. Such social capital can lead to the closure of the network and collective blindness. Closure refers to the way a network separates itself from its environment: members have close relationships within the network, but only a few or loose relationships with actors outside the network. By collective blindness, Tura

and Harmaakorpi (2005) refer to the way a network may collectively focus erroneously.

A well-known example of the importance of weak links and bridging of structural holes is Silicon Valley. Saxenian (1994) studied why Silicon Valley was such a success and why Route 128 failed in becoming the leading region. In both cases, geographical proximity increased the mutual trust needed to sustain collaboration and interaction (Saxenian, 1994, p. 161). In order to avoid the negative effects of such proximity, like overopportunism, lack of flexibility or different lock-ins (see, for example, Boschma, 2004; Tura and Harmaakorpi, 2005, p. 1120; Adler and Kwon, 2000, pp. 106–107), structural holes had to be crossed with weak links or network brokers. One of the main problems for Route 128 was the absence of outer-regional ideas. The business model of technology firms on Route 128 was inherited from the previous industrial era. Silicon Valley overcame this model with a more efficient innovation policy (Saxenian, 1994, pp. 162–168).

Brokers in Structural Holes: The Development of Research Propositions

One big challenge in transferring knowledge between different networks or actors is the lack of common rules for communication. A common language inside an organisation and linkages to regional decision-makers affect the ability of an organisation to transfer knowledge (Lawson and Lorenz, 1999, p. 308). From an individual's point of view, the skills and experiences of learning, communicating and working together can be even more important than specified skills in a substance. These characteristics enable an individual to understand change and act proactively (Foray, 2004, pp. 46–47). In terms of innovativeness, the personal characteristics of individuals faced with the challenge

of transferring knowledge seem to play a central role. To focus on this point, we suggest the following propositions

– *Proposition 1a*. Social capital is basically a personal characteristic and can be observed as such also in terms of regional innovativeness.
– *Proposition 1b*. Individual preferences/capacity in terms of social interaction determine the formation of personal social capital, which then leads to specific identifiable patterns (roles) of social capital.

In the position of structural holes, activation triggers (Zahra and George, 2002), brokers (Burt, 2004) or intelligent agents (Foray, 2004, p. 111) meet increasing challenges. They are presumed to possess pre-existing knowledge and experience from their own network. They also must be well aware of present issues and hold a strong view of the future. Finally, they must have enough weak links to other fields and business areas. Thus, personally held social capital is path-dependent: that is, it is uniquely built up and, thereby, necessarily person-specific by nature. The consistent bridging behaviour of a person leads to increased bridging social capital and, in a similar vein, consistent bonding behaviour leads to a build-up of bonding social capital. However, bonding behaviour is not likely to increase bridging social capital directly, or vice versa. Therefore, we suggest the following proposition

– *Proposition 2*. In terms of patterns of individual capacity, bridging and bonding social capital are characteristically separate and therefore a combination of bonding and bridging social capital necessarily means a combination of such people.

Mediator organisations' role is to function as activation triggers in structural holes. They are to have practical experience and knowledge of the current state of the region,

but it is also their task actively to seek weak links. Outer-area links are important especially for less favoured regions. For example, a region without its own university is likely to retain outdated technologies and paradigms if it is not able to create requisite methods of renewal from the outer regions. In this sense, mediator organisations face the challenge of compensating for the region's lack of own knowledge creation functions with knowledge bridging functions. While otherwise difficult to obtain inside an area, new knowledge can be generated with the help of outer-area links (de la Mothe and Paquet, 1998). Here, the mediator organisations' role in transferring knowledge is essential (Niinikoski and Valovirta, 2005; Smedlund *et al.*, 2005, p. 28; Cooke and Morgan, 1998, p. 33), but it is also very challenging, since they need to understand the processed substance knowledge as well as have the social abilities to work in very diverse groups. The mediators need to be able, for example: to make the people on both sides of the structural hole aware of the interests and difficulties of the other group; to transfer best practices between the groups; to draw analogies between groups ostensibly irrelevant to one another; and, to synthesise knowledge interests (Burt, 2004). Thus, to increase the absorptive capacity of the regional innovation system, the information brokerage function is crucial. However, the actual innovating partners should also be able to broker information. Based on the theoretical discussion, we form the following propositions

– *Proposition 3*. Because individual capacity for social interaction is created within the organisational and social context, individual social capital is organisation-dependent and can be associated with the type of organisation.
– *Proposition 4*. Efficient knowledge transfer for innovation in RIS can be aided by the equal dispersion of roles within participating organisations in a region.

Case Study: The Lahti Region, Finland

Description of the Region

The Lahti region is the fifth-largest urban region in Finland. It is by far the largest urban district without a university, resulting in a lower level of research compared with other large urban regions. Comparative data for the largest urban regions are presented in Table 1. Having a university is seen as one basis for innovation and a low level of research is a poor foundation for the image of the Lahti region as an innovative milieu. The region has, however, decided to build an innovative milieu through the concept of a 'network-facilitating innovation policy'.

Although lacking its own scientific research, the Lahti region has a favourable logistic situation: it lies only 100 km from two notable research centres, Helsinki and Tampere, enabling a relatively easy transfer of scientific knowledge to practice-based innovation processes. The annual research input per person in 2004 was 1800 euros in the Helsinki region

and 2530 euros in the Tampere region, whereas in the Lahti region it was only 255 euros. The situation in the Lahti region has forced it to develop new tools to trigger innovation processes. One aim of the network-facilitating innovation policy is to search for structural holes between the regional knowledge-base and the scientific knowledge-base found in the surrounding research centres.

The special task of the network-facilitating innovation policy is to produce practice-based ways to remove the obstacles to innovativeness and bring the knowledge needed to support the innovation processes. According to the Lahti region innovation environment development strategy (2005), the network-facilitating innovation policy should, in particular

- create practice-based innovation processes;
- create multiactor and multidisciplinary innovation networks to support the objectives set in other regional strategies;
- bring knowledge located outside the region to the use of local actors by means of interregional networking;

Table 1. Descriptive statistics of Finland's largest urban regions

Urban regions	Population in the region (number)	In polytechnics, share of people over 15 years (percentage)	In universities, share of people over 15 years (percentage)	Degrees in polytechnics or universities, share of people over 15 years percentage	R&D (million euros)	R&D (€/resident)	R&D index (whole country = 100)
Greater Helsinki	1 224 257	3.2	6.1	33.3	2 212.1	1 806.9	181.7
Tampere	313 748	2.9	9.9	28.2	793.8	2 530.1	248.1
Turku	290 524	3.3	8.8	26.8	315.0	1 084.2	107.1
Oulu	202 898	3.9	9.2	29.7	663.0	3 267.7	226.4
Lahti	**169 386**	**3.5**	**0.1**	**21.5**	**43.3**	**255.6**	**23.2**
Jyväskylä	163 390	4.7	10.3	27.4	180.8	1 106.6	124.0
Kuopio	118 050	5.6	6.2	27.3	101.2	875.3	82.6
Imatra-Lappeen-ranta	109 791	3.1	6.0	21.2	77.8	708.6	
Vaasa	88 798	6.9	9.3	27.4	88.3	994.4	94.3

– promote the generation of creative social capital and creative collective eruptions in the networks;
– promote collective learning, including managing future knowledge, tacit knowledge and explicit knowledge;
– eliminate bottlenecks and problems in the networks hindering networking,
– prevent the development of the regional lock-ins by actively searching for new development paths; and
– create chances and interfaces for coincidences.

The goal of the Lahti urban region innovation environment development strategy (2005) is to turn Lahti into a region with the best practice-based innovation activities in Finland and the best developer of public-sector innovativeness and productivity in Finland. The goals of the network-facilitating innovation policy place special demands on the entire regional system and particularly on its absorptive capacity, information brokerage and forms of social capital.

Method and Data

The study presents an analysis of a survey targeted at the personnel of local key organisations taking part in the regional innovation system. We measure the respondents' affective and cognitive attitudes towards innovative activities following the theory of social capital and absorptive capacity. After an explorative factor analysis, we conduct a cluster analysis and identify respondent groups characterised by their stance towards innovative activities.

Due to the nature of the group studied, we did not follow the traditional random sample procedure; instead, we applied purposeful sampling methods with predetermined criteria (Patton, 1990, pp. 176–177). The decisive criteria for inclusion in the sample were that the person

(1) operates within a local organisation known to be involved in developing the region's innovation activity;
(2) works on the management level or as an expert;
(3) is a knowledge producer, knowledge mediator or knowledge user; and
(4) could be contacted by e-mail.

After the formation of the sample list, the survey was sent to 505 individuals and, after one reminder, 234 acceptable questionnaires were returned. The response rate was 46.5 per cent, which can be considered satisfactory. The survey was conducted in the autumn of 2005.

As the background information presented in Table 2 shows, over one-third of the respondents were in the oldest age class. The next largest representation was the group from 41 to 50-years old (35 per cent). Men had a slight majority (58 per cent) over women. Nearly half of the respondents work in research or educational organisations

Table 2. Descriptive statistics of the sample population (*N* = 234)

	Number	Percentage
Age (years)		
≤30	15	6.4
31–40	51	21.8
41–50	82	35.0
≥51	85	36.3
No response	1	0.8
Sex		
Male	137	58.5
Female	96	41.0
No response	1	0.4
Organisation type		
Companies	35	15.0
Research and education	109	46.6
Public organisation	64	27.4
Mediator organisation	22	9.4
No response	4	1.7

(46 per cent). Public organisations had the next largest representation (27 per cent).

Research Items² and an Exploratory Factor Analysis

Following the theoretical underpinnings presented earlier in this paper, we formed a measure of affective and cognitive attitudes towards innovative activities. The measured items followed a 5-point Likert scale (1 = strongly disagree … 5 = strongly agree) (see Table 3.)

A shared and common language is needed in an organisation to transfer knowledge in an efficient manner to increase cognitive social capital (Nahapiet and Ghoshal, 1998; Weber and Camerer, 2003) and to make it easier to combine science-based knowledge with practice-based activities. The first item was "In my organisation, everyone speaks a common language". An open and flexible work environment is not so vulnerable to the phenomenon of the 'Not-Invented-Here'

syndrome (Katz and Allen, 1982), which eventually would lead to a stagnant environment blocking all new outer-organisational ideas. The level of acceptance was "My immediate work environment easily accepts new work methods". The item indicates whether the organisation is open and flexible to new ideas. Openness creates trust among the actors in the workplace or inside a region and trust as a relational dimension of social capital facilitates the transfer of knowledge (Levin and Cross, 2004; Fukuyama, 1995; Nahapiet and Ghoshal, 1998). The third item, "The atmosphere in my immediate work environment is open", indicates that the organisational culture is open and helps to generate bonding social capital.

The fourth item, "I feel that one of my main tasks is to bring new ideas to the region", indicates the structural dimension of social capital (Nahapiet and Ghoshal, 1998), intra-regional bridging (Harmaakorpi et al., 2006). The person feels responsible for transferring

Table 3. The research items

Item	Source
In my organisation, everyone speaks a common language	Nahapiet and Ghoshal, 1998; Weber and Camerer, 2003
My immediate work environment easily accepts new work methods	Levin and Cross, 2004; Fukuyama, 1995; Nahapiet and Ghoshal, 1998
The atmosphere in my immediate work environment is open	van deVen et al., 2000; Chen, 2004
I feel that one of my main tasks is to bring new ideas to the region	Nahapiet and Ghoshal, 1998; Harmaakorpi et al., 2006
I am well aware of what different organisations do for this region	Harmaakorpi et al., 2006
I transfer knowledge between different people and organisations	Tushman and Scanlan, 1981; Hargadon, 1998; Burt, 2004
If I fail I will work out why afterwards	Arrow, 1962; Frohman, 1999; Smith et al., 1999
I make an effort to get others to understand what I want to say	Howells, 2002
I dare tell my closest colleagues even my craziest ideas	Kelley and Littman, 2005; Foray, 2004

knowledge, whether or not it is agreed upon in the contract. Variable V5, "I am well aware of what different organisations do for this region", is somewhat static but describes a strong cognitive brokerage position. Inter-regional bridging (Harmaakorpi *et al.*, 2006) in variable V6, "I transfer knowledge between different people and organisations", is active brokerage.

Variable V7 emphasises learning-by-doing (Arrow, 1962): "If I fail I will work out why afterwards". The person is eager to learn things properly and be persistent, and if at first he/she does not succeed, he/she will do so next time. Certain initiative brokerage helps when selling creative ideas to the decision-makers of a firm or at the regional level (Frohman, 1999; Smith *et al.*, 1999; Vandermerwe, 1987; van de Ven, 2000). Variable V8 was "I make an effort to get others to understand what I want to say", which makes a strong comment on a person's attitude towards interpretation (Howells, 2002). Finally, variable V9, "I dare

tell my closest colleagues even my craziest ideas", tests the self-efficacy of the respondents. Personally experienced self-efficacy (Bandura, 1993) and innovative behaviour are needed to recognise the innovative potential of new knowledge and, thereby, enable the development of radical innovations.

Factor Analysis

On a scale of 1–5, item V9, "I dare tell my closest colleagues even my craziest ideas", had the highest mean (4.28) (see Table 4). Items V7, "If I fail I will work out why afterwards", (4.12), and V8, "I make an effort to get the others to understand what I want to say", (4.07) had means over 4.0. Reading between the lines, we might conclude that item V3 ("The atmosphere in my immediate work environment is open"; mean 3.97) corresponds to the respondents. Together with item V2 ("My immediate work environment easily accepts new working methods"; mean 3.02), we could speculate that these variables describe an

Table 4. Factor analysis results

Variable	Mean	S.D.	Factor 1	Factor 2	Factor 3	Communalities
V1	2.93	1.218	0.793			0.636
V2	3.02	1.145	0.741			0.583
V3	3.97	1.115	0.725			0.567
V4	3.71	1.165		0.758		0.581
V5	2.86	1.260		0.728		0.554
V6	4.03	0.922		0.713		0.539
V7	4.12	0.844			0.789	0.626
V8	4.07	0.831			0.758	0.585
V9	4.28	1.022			0.576	0.466
Cronbach's Alpha			0.656	0.602	0.539	
Eigenvalue			2.474	1.403	1.261	
Percentage of variance explained			27.484	15.594	14.006	
Cumulative			27.484	43.078	57.084	

Notes: Principal component analysis. Varimax rotation. Loadings above 0.40 are shown. KMO measure of sampling adequacy 0.688.

environment with a high bonding element of social capital.

Item V6, "I transfer knowledge between different people and organisations", (4.03) and item V4, "I feel that one of my main tasks is to bring new ideas to the region", (3.71) could indicate that most of the respondents feel they are mediators of knowledge. Items V1, "In my organisation, everyone speaks a common language", (2.93) and V5, "I am well aware of what different organisations do for this region", (2.86) received less than average means (3.00). We could conclude that the ingredients for a high level of absorptive capacity are largely missing in this region.

To group the data and find possible hidden variables behind it, we conducted a principal component analysis. An exploratory analysis with Varimax rotation produced three factors with an eigenvalue of over 1.00. The model explains 57 per cent of the variance (see Table 4). The value of the Kaiser–Meyer–Olkin measure of sampling adequacy was 0.688, which can be considered good. Communalities range from 0.466 to 0.636, the highest being variable V1 and the poorest variable V9.

Factor 1. The first factor represents 27.5 per cent of the total variance of the data. It received three loadings ranging from 0.725 to 0.793. "In my organisation, everyone speaks a common language" had the strongest loading (0.793). Also "My immediate work environment easily accepts new work methods" (0.741) and "The atmosphere in my immediate work environment is open" (0.725) describe the respondents' view of their immediate work environment and how the environment encourages individuals to transfer knowledge within their own organisation. Altogether, these features represent the first factor: *organisational bonding social capital.*

Factor 2. The second factor represents 15.6 per cent of the total variance of the data. Three items loaded to this factor range from

0.713 to 0.758. The strongest loading was on the item "I feel that one of my main tasks is to bring new ideas to the region" (0.758). The others were "I am well aware of what different organisations do for this region" (0.728) and "I transfer knowledge between different people and organisations" (0.713). Altogether, the three items describing the ability to see oneself in a position between different networks represent the second factor: *regional bridging social capital.*

Factor 3. The third factor represents 14.0 per cent of the total variance of the data. "If I fail I will work out why afterwards" had the strongest loading (0.789). "I make an effort to get others to understand what I want to say" (0.758) and "I dare tell my closest colleagues even my craziest ideas" (0.576) are part of the third factor. The items describe the way an individual handles failure and has the courage to share ideas even at the risk of being laughed at. The lack of excessive guardedness represents the third factor: *personal creative social capital.*

Cluster Analysis

The analysis was continued with a cluster analysis, in which we used the computed factor scores. The cluster analysis led to a three-cluster model (see Table 5).

The first cluster consists of 65 people. Factors 2 and 3 got positive values (cluster centres 0.60 and 0.62), while factor 1 was clearly negative. Therefore, the respondents in this cluster can be characterised by personal creative social capital combined with regional bridging social capital. They would not place much importance on an organisation's inner bonding. This attitude could refer to an independent person who spreads a message he or she strongly believes in between different organisations. Therefore, we named this cluster 'the Missionaries'.

In the second cluster, organisational bonding social capital got the highest score (cluster centre 0.69), while both regional bridging

Table 5. Cluster analysis results

Cluster	Individuals	Factor 1	Factor 2	Factor 3
1	65	−0.82745	0.59784	0.62399
2	119	0.69019	0.05458	−0.07506
3	37	−0.76618	−1.22579	−0.85479

Factor 1: Organisational bonding absorptive capacity (F 89.802; prob 0.000)
Factor 2: Regional bridging absorptive capacity (F 99.332; prob 0.000)
Factor 3: Personal initiating absorptive capacity (F 4.418; prob 0.013)

social capital and personal creative social capital were close to nil. The respondents in the second cluster (119 persons) have characteristically a strong feeling of intraorganisational solidarity and feel that their organisation's absorptive capacity is high. On the other hand, they are not apt to engage in operations that require capacity in regional social capital or personal social capital. We named this group 'the House Mice'.

In the third cluster, the values in all the factors were negative. The strongest factor was regional bridging social capital (cluster centre −1.23). It can be suggested that the respondents of this cluster (37 persons) see none of these types of social capital as characterising their way of operating. On the contrary, they might even be reluctant to participate in innovative processes that seek to develop new ideas and change the local *status quo*. However, it is likely that these people do not actively promote their perspectives in the development processes due to their low social capital. We named this cluster the 'Passive Resistance'.

Finally, we analysed the distribution of the cluster membership with the background measures of the respondents (see Table 6). As shown in Table 6, the largest group of respondents is aged 41–50 in the Missionary and Resistant groups. In the House Mice cluster, the majority was in the older group, aged over 51. Of the House Mice, two-thirds were men, while more than 50 per cent of the Missionaries were women. Considering organisation types, research organisations were

well represented in the Missionaries' group; over half of the cluster were from research organisations. Public organisations were well represented in the House Mice, cluster, and there were relatively many mediator organisations in the Passive Resistance cluster (note the rather small data).

Even if some tendencies can be identified in the analysis, no statistically significant differences were found in comparing the clusters. This suggests that participation in the regional innovation system is not organisationally dependent; rather, it originates from the people themselves. While this study focuses on the personnel of organisations known to be involved in developing the region's innovation activity, it is comforting to see that there are no homogeneous patterns to be identified, but instead the organisations comprise a rich combination of people taking a different stance with regard to innovative activities.

Discussion

Innovation policy should not be just about providing physical capital, but it should also deal with enhancing human and social capital (Nauwelaers, 2001; Tödtling and Trippl, 2005). This study set out to analyse the role of personal social capital in the creation of regional absorptive capacity and, thus, the innovativeness of the region. The research question was phrased as "How is regional absorptive capacity reflected at the individual level of social capital?". On the basis of a theoretical

Table 6. Respondent characteristics and cluster membership

	All clusters (n = 234)		Cluster 1 (n = 65)		Cluster 2 (n = 119)		Cluster 3 (n = 37)	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Age (years)								
≤30	15	6.4	4	6.2	6	5.0	4	10.8
31–40	51	21.8	15	23.1	22	18.5	9	24.3
41–50	82	35.0	28	43.1	39	32.8	15	40.5
≥51	85	36.3	17	26.2	52	42.0	9	24.3
No response	1	0.4	1	1.5	0		0	
Sex								
Male	137	58.5	29	44.6	76	63.9	22	59.5
Female	96	41.0	36	55.4	42	35.3	15	40.5
No response	1	0.4	0		1	0.8	0	
Organisation type								
Companies	35	15.0	8	12.3	18	15.1	6	16.2
Research and education	109	46.6	37	56.3	54	45.4	14	37.8
Public organisation	64	27.4	14	21.5	36	30.3	11	29.7
Mediator organisation	22	9.4	4	6.2	9	7.6	6	16.2
No response	4	1.7	2	3.1	2	1.7	0	

framework, we formulated a set of propositions on the phenomenon.

In Proposition 1a, we suggested that social capital is basically a personal characteristic and can be observed as such also in terms of regional innovativeness. Further, Proposition 1b emphasised the individual perspective by claiming that the individual preferences/capacity in terms of social interaction determines the formation of personal social capital, which then leads to specific identifiable patterns (roles) of social capital. Based on our empirical findings, three forms of social capital were found in the regional innovation system: organisational bonding social capital; regional bridging social capital; and personal creative social capital. Organisational bonding social capital is favourable in assimilating and transforming knowledge in innovation processes. Such social capital enables the information brokerage of acquired knowledge to the exploitation in realised innovation processes. Regional bridging social capital is favourable in acquiring diverse knowledge in the innovation processes. Such social capital enables information to be brokered over structural holes, facilitates potential absorptive capacity and secures the diversification of the regional knowledge-base. Personal creative social capital is favourable in all forms of absorptive capacity. It describes the personal will to take risks and continue positively after mistakes. Therefore, it can be described as including features of a master-class information broker in the immediate work environment. Whilst these patterns can be interpreted as characteristics of the regional innovation system, they were identified at the individual-person level. Our analysis supports this proposition—the respondents seemed to cluster in a way that could be labelled as patterns of social capital of these persons.

In Proposition 2, we suggested that, in terms of patterns of individual capacity, bridging and bonding social capital are characteristically separate and therefore the combination of bonding and bridging social capital necessarily means a combination of such people. Our cluster analysis revealed three groups: Missionaries ($n = 65$), House Mice ($n = 119$) and the Passive Resistance ($n = 37$). These groups of respondents represented clearly different combinations of social capital, strongly supporting our proposition. On the other hand, the different types of social capital are all important elements in creating the absorptive capacity of the region.

In the third proposition, we suggested that, because individual capacity for social interaction is created within the organisational and social context, the individual social capital is organisation-dependent and can be associated with the type of organisation. Our analysis suggested that personal social capital was fairly independent of the organisational context of the person. In essence, it could be seen that there was an above-average share of House Mice in the mediator organisations, which are supposed to act as regional information brokers. According to Cohen and Levinthal (1990), an organisation's absorptive capacity depends on its gatekeepers. Individuals interacting to and from the organisation can either advance or delay the absorption of knowledge, so they should have the right amount of all the earlier-mentioned forms of social capital. At a regional level, mediator organisations can be considered the gatekeepers of a region. They are in a position to strengthen the transfer of knowledge between organisations inside the region and absorb new outer-area knowledge and bring it to other companies. An analogy can be seen in the work of Fontes and Coombs (2000) on new technology-based firms: a single organisation can play a role in technology acquisition, transformation and dissemination in the innovation system, but in order fully to exploit this technological dynamism, other actors in the innovation system need to be involved. According to our analysis, whilst mediator organisations seem

to be malfunctioning, active persons with bridging social capital are able to operate in the region.

Finally, Proposition 4 suggests that efficient knowledge transfer for innovation in RIS can be aided by the equal dispersion of roles within participating organisations in the region. The Missionaries might be considered the most important group in innovation processes. However, processing innovations is not just spanning structural holes and getting new ideas. It is mostly a hard, long-term process, including work in quite closed environments. Therefore, at least the House Mice are essential for the realised absorptive capacity. The absorptive capacity of a regional innovation system requires the right amalgam of different actors. 'The right people in the right places' is a relevant factor also in developing the innovation environment. If the House Mice group were left to absorb outer-area knowledge, the result would hardly be very innovative. And vice versa, brokers bring much potential absorptive capacity, but they rarely excel in realised absorptive capacity.

The results of this paper lead to the following implications. First of all, significant differences among respondent types and background organisations of the respondents were not found. For further studies, it would be interesting to find out the position of the mediator organisations, under the presumption that they should have more brokers than an average organisation. Should it be the case that mediator organisations are expected to play the role of the broker without requisite capacity, the region is likely to meet difficulties in the implementation of its innovation policy.

The emphasis of this paper is on brokerage roles. On the basis of our analysis, it seems rather clear that information brokerage is basically a very personal role instead of merely an organisational task to accomplish. While this has grown evident, the other roles within the innovation system need to be examined as well. First and foremost, the role of passive resistance has received only limited attention. A fruitful topic of further research would be the critical side of the regional innovation system. For instance, could passive resistance be regarded as a positive influence on innovation due to its representatives' demands for better argumentation on the innovation policy?

We believe that the results of this paper are important for researchers and policy-makers of regions that have problems with the institutional side of their local innovation system. For example, in order to implement practice-based innovation activities and exploit the hidden potential in the innovation system, the Lahti region and its actors should possess certain abilities. Regions are not isolated islands, although that is how they are usually treated. The effects of interrelationships with other regions could be taken more into consideration, as could the importance of extra-regional contacts in providing new knowledge, technology and ideas (Tödtling and Trippl, 2005). There should be individuals with an excessive number of weak links and some structural holes in networks in order to increase the chance of getting in touch with new knowledge. Actors should have high absorptive capacity and enough creativity to process knowledge and social capital to benefit from the tacit knowledge possessed by different people.

Notes

1. An actor can here be a collective entity or an individual.
2. Variable names have been freely translated from the original questionnaire in Finnish.

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Article 2:

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Generating innovation opportunities: how to explore and absorb customer knowledge

Anne Kallio*

Lahti School of Innovation,
Lappeenranta University of Technology,
Saimaankatu 11, FI-15140 Lahti, Finland
Fax: +358 3 876 9133
E-mail: anne.kallio@lut.fi
*Corresponding author

Carsten Bergenholtz

CORE, Department of Management,
Aarhus School of Business, Aarhus University,
Haslegaardsvej 10, 8210 Aarhus V, Denmark
E-mail: cabe@asb.dk

Abstract: This study examines how a company can generate innovation opportunities by exploring and absorbing customer knowledge. The exploration can be performed via an in-depth or broad search for resources beyond organisational boundaries. Salespeople are an essential channel for an in-depth search in relation to customers, since salespeople possess rich knowledge of the customers. In order to be useful, such knowledge has to be absorbed in the company. Most of the literature on absorptive capacity has focused on R&D, while less focus has been placed on studying the role of individuals in the development of integrative practices. This paper demonstrates how a community of practice can enable organisations to move from potential absorptive capacity to realised absorptive capacity.

Keywords: exploration; absorptive capacity; communities of practice; customer knowledge; sales; action research; actionable knowledge; innovation.

1   Introduction

This study focuses on how a company can generate innovation opportunities by exploring and absorbing customer knowledge. This is examined in an action research (AR) process that targets salespeople in a low-technology business environment.

March (1991) identifies the critical trade-off between exploiting current knowledge and exploring new opportunities. Laursen and Salter (2006) distinguish between two kinds of explorative search strategies, breadth and depth. Following up on a stream of patent-based research on search strategies (Katila and Ahuja, 2002; Rosenkopf and Nerkar, 2001), they present a survey-based study where different search strategies are compared with innovation performance. In reference to future studies, Laursen and Salter (2006) call for qualitative case studies and observational research into what processes are at stake when applying such search strategies.

Customers have long been considered an important source for an in-depth search process (Griffin and Hauser, 1993; von Hippel, 1988). While a number of studies have focused on the overall relationship between a focal organisation and its customers (e.g., Carbonell et al., 2009), the present study focuses on the role of a specific intermediary group of people with substantial proactive linkages to customers: salespeople.

The literature on absorptive capacity has emphasised that without intra-organisational transformation and assimilation of knowledge, interorganisational exploration risks being in vain (Cohen and Levinthal, 1990; Jansen et al., 2005; Zahra and George, 2002). In order to not just get a partial view of the role of salespeople, this paper will rely on the terminology of absorptive capacity, and not just exploration.

Zahra and George (2002) identify two different types of absorptive capacity. Potential absorptive capacity is important in acquiring and assimilating external knowledge, whereas realised absorptive capacity refers to the functions of transforming and exploiting the knowledge. However, according to a systematic literature review by Lane et al. (2006), research on absorptive capacity has mainly focused on R&D departments and studies on patents, analogous to the mentioned stream of research on search strategies. Lane et al. (2006) highlight that absorptive capacity is not just about corporate and departmental characteristics, but should focus on the absorptive capacity of individuals and the structures and processes in play within the organisation. Spithoven et al. (2010) add that few studies in the field have focused on low-tech areas, and organisations without formal R&D departments have been excluded.

Communities of practice are social structures where members can share their observations in order to enhance knowledge sharing, learning and innovation (Brown and Duguid, 1991, 2001; Lave and Wenger, 1991). Communities of practice can thus facilitate the individual mechanisms that can be important for the development of an organisation's absorptive capacity.

Therefore, this paper presents an explorative qualitative study of exploration and absorptive processes that involve individuals and their interactions within and across departments and organisations. By combining the fields of exploration, absorptive capacity and communities of practice, and relating this theoretical framework to the empirical context of salespeople in a low-tech organisation, the following research question is examined: How can a company generate innovation opportunities by exploring and absorbing customer knowledge? We argue that a community of practice can be particularly important for the flow of knowledge in a low-tech context, where no

formal R&D departments exist. We propose that a community of practice that involves a number of departments can be an integrative mechanism in the transformation from potential absorptive capacity to realised absorptive capacity. The explorative study is based on an AR process conducted in one organisation and thus focuses on developing actionable knowledge.

In Section 2, the relevant theoretical framework is presented. Section 3 focuses on the methodology, presenting the theory of AR, as well as details of the case company. Section 4 presents the community of practice that is generated in order to search for and share customer knowledge. Discussion and implications of the study are presented in Section 5, and Section 6 concludes the study.

2   Explore and absorb

March (1991) distinguishes between exploration and exploitation, where exploration involves search and innovation, while exploitation involves the refinement of existing ideas. In the framework of exploration, Laursen and Salter (2006) furthermore distinguish between search breadth and search depth, where search breadth refers to the number of external sources, while search depth relates to the intensity of the search related to a given source. They note that such an organisational search strategy is often path-dependent and it can be difficult to implement a new search strategy (Laursen and Salter, 2006). In this context, where the search for new opportunities in relation to existing customers is at the centre of attention, search depth is the relevant framework.

The exploration vs. exploitation distinction has been criticised for being too simple (Zahra and George, 2002), and hence focusing on absorptive capacity has been suggested. Absorptive capacity was originally defined by Cohen and Levinthal (1990) as an organisation's ability to value, assimilate, and apply new knowledge. Zahra and George (2002) further developed the concept into potential and realised absorptive capacity. Potential absorptive capacity is essential in acquiring and assimilating external knowledge, whereas realised absorptive capacity refers to the functions of transforming and exploiting the knowledge. Jansen et al. (2005) have studied the role of organisational mechanisms in relation to both potential and realised absorptive capacity. They show how participation and cross-functional interfaces can enhance potential absorptive capacity, whereas connectedness and socialisation strengthen realised absorptive capacity (Jansen et al., 2005).

While the concept of absorptive capacity is an attempt to understand how organisations search for and develop knowledge, a systematic literature review of 289 papers by Lane et al. (2006) illustrates that most studies based on the absorptive capacity framework have focused on absorptive capacity as a function of industry and corporate characteristics. Additionally, most studies have examined formal R&D departments, preferably with R&D intensity and patents as the primary variables. The individuals and the interaction between organisational departments have thus been overlooked (Lane et al., 2006). Furthermore, Spithoven et al. (2010) point out that traditional low-tech sectors have received little attention. Middle-sized organisations in the low-tech sector might not involve a formal R&D department, which entails different challenges compared to the high-tech sector. Spithoven et al. (2010) illustrate how intermediary research centres can play a significant role in enhancing an organisation's absorptive capacity.

Lane et al. (2006) argue that an understanding of individuals, departments and the interplay between individuals from different departments will illuminate how organisations actually develop and utilise absorptive capacity. There is thus a need for research on the micro-level and the social integration mechanisms that can facilitate the realisation of potential absorptive capacity (Lane et al., 2006; Soosay and Hyland, 2008; Zahra and George, 2002), especially in the low-tech sector (Spithoven et al., 2010).

Within an in-depth search framework, a significant stream of research has examined how the organisation can integrate customers into the new product development process (Carbonell et al., 2009; Griffin and Hauser, 1993; von Hippel, 1988). Different strategies have been employed. Griffin and Hauser (1993) propose a very systematic search concept, where customers respond to in-depth interviews and questionnaires, while von Hippel (1988) focuses specifically on lead users. Sawhney and Pradelli (2000) relate the field of customer knowledge to absorptive capacity by emphasising that an organisation needs to develop its overall ability to absorb, share and deploy the knowledge. Although in the present study we also look at the involvement of customer knowledge, we focus specifically on the intermediary role of salespeople. The salespeople, rather than the customers, are thus at the centre of attention.

2.1 Exploring the knowledge via salespeople

Salespeople have an ongoing and direct connection to the customers, which can potentially be a vital part of an organisational in-depth search process. The salespeople can either be part of an explicit and systematic search process (cf. the *Voice of the Customer*, Griffin and Hauser, 1993) or they can enhance their ability to search and share relevant knowledge while they perform their primary job: selling. It is the latter process that is at the centre of attention in the present paper. Salespeople can function as activation triggers (Zahra and George, 2002) in generating potential absorptive capacity.

An exploration involves the processing of new and unknown knowledge, and therefore Jansen et al. (2005) emphasise the role of knowledge attributes. They argue that absorbing knowledge from an in-depth exploration involves the processing of tacit knowledge that requires integrative mechanisms such as cross-functional teams, frequent communication and experienced members. This focus is thus in line with the focus of Lane et al. (2006) on the micro-level and integrative mechanisms that involve individuals, departments and their interrelations.

Micro-level studies have shown that by applying the ideal of an anthropological perspective,[1] a company can enhance their exploration and integration of external, rich knowledge. Kelley and Littman (2005) state that an anthropologist brings new insights to the organisation by observing human behaviour and developing deep understanding how people interact physically and emotionally. Anthropologists listen to their intuition and consider the emotional underpinnings of the human behaviour they observe. Anthropologists observe their surroundings, and are aware of their pre-dispositions. Furthermore, anthropologists create an atmosphere where it is safe to talk (Kelley and Littman, 2005). Intuition is also emphasised in the organisational learning perspective by Crossan et al. (1999). In a similar vein, Bonney and Williams (2009) rely on the concept of 'awareness' in a study of salespeople's ability to recognise sales opportunities. Awareness refers to the ability to perceive, comprehend and project elements in the environments. To be aware in this sense thus involves the ability to recognise significant

elements, even if the consequences are not yet revealed. It is argued that these skills can be developed within an organisational context (Kelley and Littman, 2005; Bonney and Williams, 2009).

2.2   Absorbing the knowledge into focal organisation

If salespeople are to change their awareness and perform an in-depth search of customers, a number of challenges arise. Organisational change in general is difficult (see, e.g., Lewin, 1951), and Cho and Chang (2008) demonstrate this point in relation to an attempt to change the organisational routines of salespeople in particular. Furthermore, the salespeople need to be able to search for and have the opportunity to share the gained customer knowledge. The literature on communities of practice relates to both challenges. A community of practice relies on a bottom-up framework and incentive, which could be an advantage when trying to overcome resistance to change. Simultaneously, the aim of the community of practice is to provide individuals an opportunity to share knowledge and experiences.

Seminal studies on communities of practice by Brown and Duguid (1991, 2001) refer to several ethnographic studies (e.g., Orr, 1990) and there is thus a direct link between the ideal of salespeople as anthropologists and communities of practice. The work of cognitive anthropologists Rogoff and Lave (1984) describes how learning can take place in different situations, and Lave and Wenger (1991) present the concept of legitimate peripheral participation as a way of learning. It involves a process where a newcomer becomes a part of the community of practice.

> "A person's intentions to learn are engaged and meaning of learning is configured through the process of becoming a full participant in a socio-cultural practice" [Lave and Wenger, (1991), p.29].

People who participate in a community of practice share a concern, problem, or passion about a topic. They gather together because they feel they get value from interaction in the community, which means that a community would not function as a community of practice if the members were not motivated to share their knowledge. Over time, the community develops a common body of knowledge, and the members may form a common sense of identity. Although participation can also be assigned, the actual incentive to participate is at the personal level (Brown and Duguid, 1991; Duguid, 2005; Wenger et al., 2002).

According to Wenger et al. (2002), three key issues need to be taken into consideration when planning and launching a community of practice: domain, community, and practice. The domain issue is about how to define the scope of the domain in a way so that it intrigues individuals and is aligned with organisational targets. The community issue concerns how to find people who are already networked on the topic and help them see the value of increased knowledge sharing. The practice issue concerns how to identify the common need for knowledge. In relation to this study, it is furthermore relevant that communities of practice are seen as significant sites for innovation (Brown and Duguid, 1991).

The customer knowledge can be turned into profit only if all the business processes of an organisation are focused on customer value. This requires the attitude that the best knowledge may come from somewhere else than the R&D department (Sawhney and Pradelli, 2000). To make the decision to mobilise the customer knowledge in its

operations, a company needs knowledge on what is possible in production. The management also needs to be present in order to be able to make the right decisions (see Cohen et al., 1972).

3 Methodology

This paper is based on a case study where the focal company needed input from outside experts in order to develop their exploration and absorption of customer knowledge. The AR design seemed particularly useful in this case, since AR makes it possible to introduce organisational changes in order to solve a given problem and simultaneously do research on the organisational change process. AR is thus a two-fold methodological approach that consists of two projects; the action project where action is generated, and the research project that intends to create knowledge about that action (Coughlan and Coghlan, 2002; Reason and Bradbury, 2008). A case-study approach is furthermore in line with Laursen and Salter's (2006) call for qualitative research on the actual processes of exploration, Holmqvist's (2004) call for actionable research on the transition between exploration and exploitation and the call of Lane et al. (2006) for research that has individuals and interactions between departments as the unit of analysis.

3.1 Case organisation

The participants of the AR process are from a company in the forest industry. The company has approximately 740 employees located at eight plants in Finland and one in Estonia. Their main products are sawn timber, gluelam, wooden packages, and land and road building products. The focal company does not have a formal R&D department. The forest industry in Finland has been going through major structural changes during the first decade of the 21st century. A lot of jobs will be lost and organisational renewal is deemed necessary.

Twelve salespeople, two managers, and four researchers participated in the AR project. One of the researchers has had previous contact with the company, in part on the need to focus more on customer-based knowledge. The participants do not all work in the same place geographically, so the significance of face-to-face interaction plays an important role in the process. When the AR process unfolded, it became clear that the company does not use an excessive number of outsider consultants to support their development activities. The involvement of external experts is thus a strong indicator of the importance of the project, which enhanced the motivation of the salespeople.

3.2 Data

Altogether 14 semi-structured interviews (Kvale, 1996), with a duration of 1 hour to 1.5 hours, were conducted during the summer of 2007. The themes of the interviews were the salespeople's exploration of customers, the channels through which salespeople's ideas were disseminated in the organisation, their motivation for their work, and the structure of the company. The data on how salespeople observed customers is based on the interviews of salespeople, i.e., their evaluation of their own behaviour. Observational

data is organised in the form of diaries. Literal material produced by the participants during organised sessions is also used as data.

3.3   Intervention process

Figure 1 presents the phases of the AR process, which are in accordance with the overall framework provided by Coughlan and Coghlan (2002):

- a pre-step to understand the context and purpose

- six main steps: to gather, feedback and analyse the data, and to plan, implement and evaluate the action

- a meta step to monitor.

Figure 1   Phases of the AR process (see online version for colours)
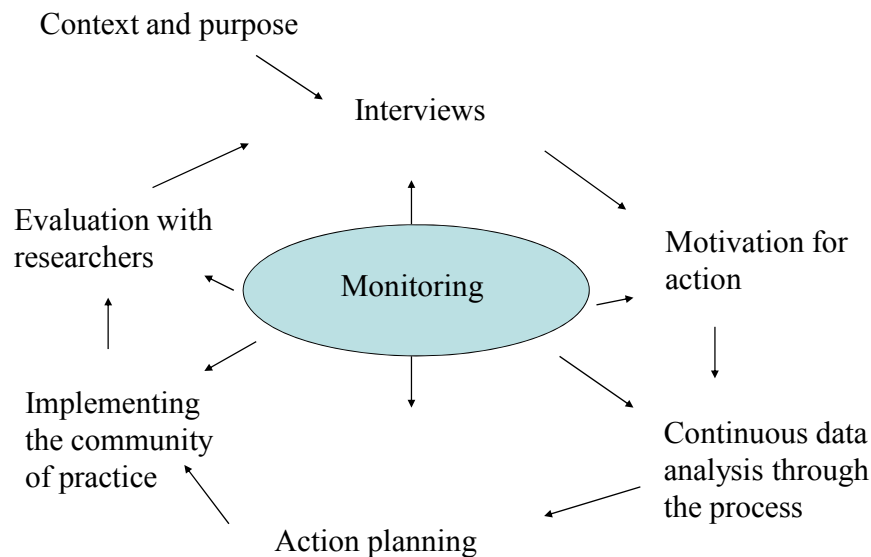
Source: Elaborated from Coughlan and Coghlan (2002)

3.3.1   Initial need and interviews – data gathering

The initial idea for the project came from one of the managers. Just a few years earlier, the previous manager had retired and let his two sons take over the managing of the company. They were hoping to improve the use of customer knowledge. The managers continuously receive the required figures relating to customers and current needs, but weak signals of possible near future needs could not be deduced from these figures. When the salespeople returned after a visit to a customer, they might inform their manager about important observations, but this was not done in any systematic way, and potentially relevant information got lost.

> "In our sales meetings, I have been a little disappointed since they are rather shallow. We exchange price information. But what these projects are about is impossible to convey." (CEO)[2]

The decision to focus on customer knowledge was introduced to the salespeople, and they were interviewed to get a more profound picture of the salespeople's interaction with customers. In the interviews, the salespeople were interviewed about their views on their everyday work, the motivation to share customer-related knowledge, and the different ways they can observe customer needs. Interestingly, it appeared that salespeople with more experience in different companies, countries and departments were more aware in observing and interpreting the needs that customers were not able to express explicitly.

3.3.2 Motivation for action – data feedback

Since the initiative for the project had originated among managers, the significance of the process was discussed intensively. The aim was to make sure that the salespeople do not feel like passive objects, but become active participants. The young managers knew that they would not be able to force the experienced salespeople to do anything they were not motivated to do.

The data from the interviews was fed back into the process (see Coughlan and Coghlan, 2002) through conversations. The researchers briefly described their observations and roundup from the interviews according to their perspective. Thereafter, a collective discussion on the topics from the individual interviews took place. This gave the researchers the opportunity to observe which topics the salespeople brought up collectively as compared to the individual interviews. The salespeople discussed the knowledge flows and resources in their company in general, and more specific knowledge related to the products and customers. Interestingly, they also started to talk about the identity of salespeople, what it used to be, and what kind of identity was desirable. After this, the salespeople were asked to think about their motivation: why should they share their knowledge related to customers? The researchers picked up points from this discussion and then made a summary of the things that had been stated collectively.

When asked what would motivate the salespeople in their work and particularly in sharing the customer knowledge, the following stood out: the success of the company, personal success, challenges, independence, and the opportunity to work with customers (Paalanen and Hyypiä, 2008). 'Challenges' is an interesting concept, as it includes learning and future possibilities. How the salespeople perceive their assets was also discussed, as customer-related knowledge has traditionally been a vital asset for the internal competition among salespeople.

3.3.3 Idea generation and agreements – action planning

At this stage, the research group did not know that a community of practice would be created. Together with the two managers, the salespeople started generating ideas about how they wanted to organise the knowledge sharing. An idea generation session based on four themes was organised: shared vision, ways to acquire customer-related knowledge, motivation, and practices for sharing the knowledge. Afterwards, a group of volunteers agreed to work the ideas into an action plan. The managers were also part of this group.

After the small group had met an IT-consultant and worked on the ideas at a few meetings, they presented the solution to the others. Their solution was termed 'social arenas for making thoughts collide'. They agreed that meetings would be held monthly, every first Tuesday, with the salespeople, in addition to the regular sales meetings.

Meetings on a bigger scale would be held four times a year. These would take place at different locations and each meeting would thus involve the opportunity to tour different plants and meet members from the production.

Although the solution is very similar to the logic of communities of practice, the actual term did not come up at this phase. The researchers did consider the potential, but it was decided that the salespeople should design a practice that would suit them, solely involving terms familiar to them.

3.3.4   The community starts to form – implementation

During the process, it was discussed that all the salespeople did not even know about all the products the company actually offered, not to mention the potential products that the company could produce. For instance, when producing low-refined saw-mill products, a certain amount of wood got lost and it could be (re)used by refining it according to the customers' needs. Something that was a simple loss could be turned into a profit. To identify and take advantage of such opportunities, production needs to be part of the community.

> "Customers want more refined products. ... It requires that the salesperson has professional skills related to the production. So that he/she sees right away whether it is something we could manufacture and this would suit it."
> (Salesperson)

The salespeople already had a working practice of sales meetings, although in these meetings they did not have the opportunity to talk about observations and potential innovations. The change thus focused on changing the perspective of already existing meetings. During the first spring, they held four meetings at different plants. The researchers were invited to the first meeting in the following September to see the meeting in action.

4   A community of practice in the case company

Salespeople are already good at talking and interacting with people in a real-life situation. To be a good salesperson, you have to take an interest in the customer, and, among other things, get information about the customer's personal preferences and life. It has not been possible to share this kind of information in a customer relationship management (CRM) system, for legal reasons, and because it has not been an organisational practice to do so. Since salespeople are particularly good at talking, the obvious way to organise the community of practice was to focus on establishing a face-to-face community, in order to share the customer needs.

> ".. I don't like e-mail, it is somehow faceless. I rather talk on the phone and tell how things are. With e-mail, the information that is transferred is limited."
> (Salesperson)

The community of practice created in this case is intentional and institutionalised. The institutionalisation and the inclusion of the managers are essential parts of creating the credibility of the community. The community is intentional in the sense that the meetings

are planned ahead. The meetings also have a loose agenda where everyone may put a topic on the agenda, but the meetings are not tied to them.

> "It is good that we have scheduled meetings ahead. People hold on to those meetings and they will come." (Salesperson)

> "It is good that in the meetings nothing is forced. This is a good way to do things." (Salesperson)

During the AR process, the salespeople and managers considered using computer software to support the community, but eventually the idea was discarded. First, it would have required overall investments in IT. Second, it was not seen proper for the company's organisational culture. In other words, it would have required investments in skills and also a change of attitudes towards using IT (following Wenger et al., 2002; see also Cho and Chang, 2008).

When analysing the process, the motivation of the salespeople to share customer-related knowledge is strongly emphasised. This is relevant because the actual level of engagement defines whether the community of practice will have the potential to work or not (Wenger et al., 2002; Duguid, 2005). The domain of knowledge for this community of practice is customer needs. The initiative for this community came from the management, but was refined in the discussion with the salespeople. The salespeople were already a community of people who cared about this domain.

During the AR process, the researchers noticed that the more experienced salespeople talked about customer interaction with a certain kind of curiosity and empathy, also reflecting their own behaviour. This intrigued the researchers and they wondered if this kind of attitude could be taught to the whole group. If they just became aware of their behaviour, they could practise the anthropologist's (Kelley and Littman, 2005) view of seeing customers.

> "There is no systematic approach, no concept. Just talk to people, meet people and see what they actually do. Then you either get ideas or not. But there is no template, and I don't think that would be good, because all the cases are different and all the needs are different..." (Salesperson)

When visiting customers, salespeople observe the environment and individuals, and note things that seem interesting. These observations may not make any difference individually, but if many salespeople make the same observation, it can constitute something important. For example, at one of these meetings, a saleswoman started to talk about an observation she had made at a customer location. She was responsible for selling sawn-timber components to the customer. She had observed that the customer stored their own final products inefficiently and the dialogue at the meeting revealed that several salesmen observed similar problems elsewhere, but never said anything. One salesman who had experience in product design and production knew that they could manufacture a packaging solution with low costs that could remedy this problem. As a result, the organisation designed a new refined product with a simple solution, which satisfied many customers.

> "Some of the salespeople know the production processes of the sawmill and know the opportunities that the existing wood and sawmill products provide. Salespeople should begin to think about what we have in the storage and what we can do with it." (Salesperson)

Figure 2   Community of practice to generate innovation opportunities by using customer knowledge
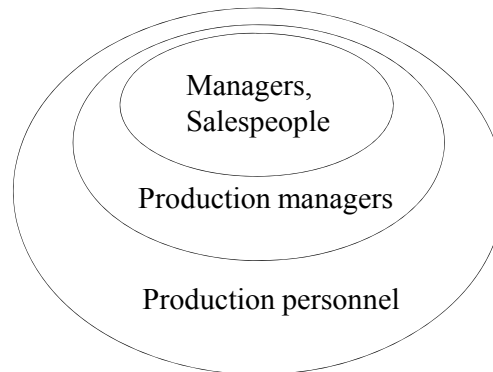
Source: Adapted from Wenger et al. (2002)

The understanding acquired from the customers is shared in the community of practice (Figure 2) involving managers and salespeople in the core group, production managers in the active group, and production personnel from the plants in the peripheral group. As the meetings will be held at every plant, the salesman in charge will plan the meeting with the production manager of that plant. The production manager will choose some participants among the personnel and give a tour of the shopfloor to the salespeople.

"The best salespeople simply have experience from production." (CEO)

5   Discussion and implications

The study follows calls in the literature that emphasise the need for more research on how to perform an in-depth search (Laursen and Salter, 2006), how the gap between exploration and exploitation can be bridged in an inter-organisational framework (Holmqvist, 2004), and what kind of integrative mechanism can assist individuals and departments in the realisation of potential absorptive capacity (Jansen et al., 2005; Lane et al., 2006; Zahra and George, 2002). In this way, the literature on interorganisational exploration (Laursen and Salter, 2006; March, 1991), absorptive capacity (Cohen and Levinthal, 1990; Zahra and George, 2002), and communities of practice (Brown and Duguid, 1991; Wenger et al., 2002) is combined into actionable knowledge in one single study. The paper answers the following question: How can a company generate innovation opportunities by exploring and absorbing customer knowledge?

Figure 3 provides an overview of how the individual and different organisational levels are combined, in order to describe how the pool of organisational knowledge is aided by the community of practice in the case organisation. The customer knowledge acquisition takes place through individual salespeople, whereas the assimilation and transformation take place in the community of practice. Customer knowledge becomes part of the organisational pool of knowledge only through the organisational exploitation of that knowledge (March, 1991; Zahra and George, 2002).

Figure 3 How the customer knowledge becomes part of an organisational pool of knowledge
(see online version for colours)
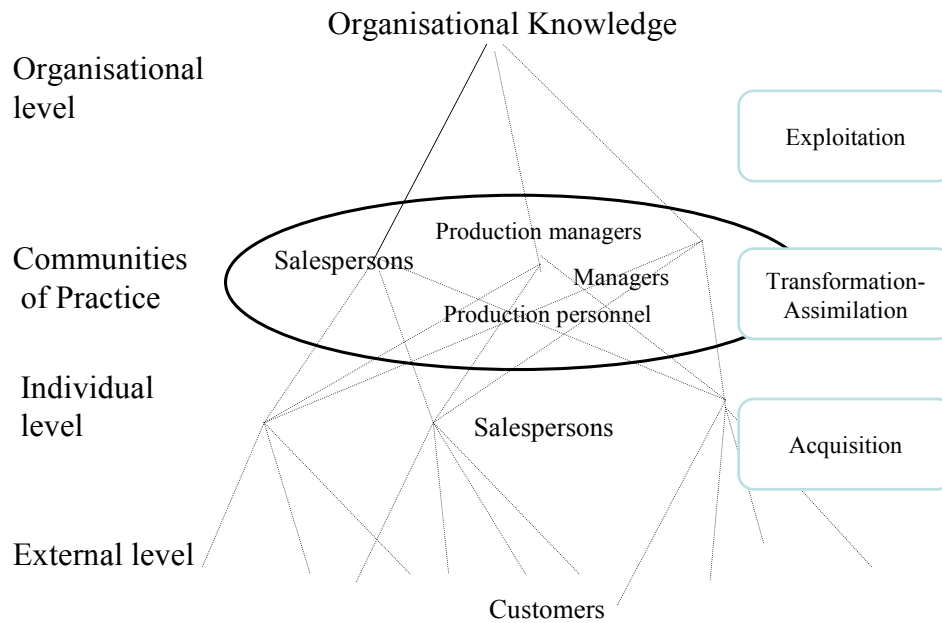
5.1 How do salespeople explore the customer knowledge?

In the eyes of the provider organisation, single customers possess knowledge of their buying history and current demands. This information can be easily codified and transferred and is a form of inter-organisational exploration. However, by using intuition and awareness (Bonney and Williams, 2009; Crossan et al., 1999; Kelley and Littman, 2005), salespeople can enhance the in-depth exploration of customers. Furthermore; different salespeople interact with different customers. By interacting in a community of practice with other salespeople and production, the skills of exploration can be significantly enhanced. This kind of knowledge is tacit in nature and therefore hard to codify, but via the community of practice it is possible to integrate the individual and organisational knowledge on how to search. Enhancing the organisation's ability to search enhances the organisation's potential absorptive capacity, but the knowledge still needs to be transformed and exploited.

5.2 How is the knowledge absorbed within the focal organisation?

Organisations in the low-tech sector can be argued to face particular challenges compared to the high-tech sector, since low-tech organisations, like the focal organisation in the present case, often have no formal R&D departments (Spithoven et al., 2010). Since R&D departments usually play a significant role in the absorptive process (Duguid, 2005; Holmqvist, 2004), other kinds of integrative mechanisms between exploration and exploitation need to be established.

We propose that a community of practice can be particularly useful for the assimilation and transformation of knowledge in a low-tech environment involving salespeople. Knowledge on the potential future needs of customers is not easily codified, and the salespeople in question clearly consider themselves to be far better at talking than communicating in writing, e.g., via an IT-based system. Integrative mechanisms based on social interaction can be argued to be of significant importance in such circumstances (Duguid, 2005). A community of practice is a social practice that can cross boundaries between departments and individuals (Brown and Duguid, 2001; Jansen et al., 2005). In the present case, production personnel and management are involved in peripheral and active roles, cf. Figures 2 and 3. The newly acquired knowledge on potential future opportunities can thereby interact with existing organisational knowledge. The community of practice thus facilitates understanding and interpreting the knowledge obtained from external sources (Brown and Duguid, 2001). Links between different functions are strengthened and the abilities to search and share are simultaneously enhanced, even without a formal R&D department as the focal point. In a low-tech environment, a community of practice can thus be considered a fruitful facilitator of the realisation of the potential absorptive capacity in the organisation.

In the present case, an AR process was part of the creation of the community of practice, but is the involvement of a research centre necessary? Spithoven et al. (2010) argue that research centres can be expected to be useful in low-tech fields, since the organisation might not be capable of developing the relevant knowledge and capacities alone. In this case, a research centre was involved, not as a provider of technological knowledge (cf. Spithoven et al., 2010) but in a facilitating role.

Wenger et al. (2002) state, that in planning a community, it is more important to find the triggers, than create a full design. Cf. Cho and Chang's (2008) study on salespeople and resistance, it certainly seems necessary to be very aware of the motivational barriers that are to be overcome. As mentioned above, it was not obvious in the beginning that the form of exploring and absorbing customer knowledge would be a community of practice. Previously, the competitive asset of salespeople was related to the possession of customer-related knowledge and the value relied on it being individual and not organisational. In the new business environment, their competitive asset will be how well they recognise potential customer knowledge and share this knowledge with the organisation. Such a change of the definition of how to handle their competitive assets required an acceptance of a new identity as a salesperson (cf. Duguid, 2005). The community of practice is hence established on the basis of a bottom-up motivation and is in that sense non-hierarchical while still supported by the managers.

An institutionalised community of practice can risk becoming over-managed or living beyond its usefulness (Wenger et al., 2002). Continuous development of the practice is hence needed and a focus on the fact that it is a community of practice and learning, and not short-term exploitation (cf. March, 1991) should be kept intact.

The implications are based on an explorative AR study of social relations and mechanisms in a specific low-tech industry and country. The conclusions of the paper should therefore be developed and tested in future multi-case studies involving other low-tech sectors and different constellations of salespeople. Studies that are not based on an AR process should also be performed, in order to further develop and test the propositions on the possible role of communities of practice in the realisation of potential absorptive capacity.

6 Conclusions

This explorative study examines how an organisation can generate innovation opportunities and develop their absorptive capacity. The aim is to generate actionable knowledge. While most of the literature on absorptive capacity has focused on R&D departments and organisational characteristics, the present study focuses on individuals and integrative inter-departmental mechanisms. The study contributes to the literature on absorptive capacity by demonstrating how communities of practice can enable organisations to move from potential absorptive capacity to realised absorptive capacity. The creation of a community of practice in a focal organisation located in a low-tech environment was studied via an AR process. Salespeople constitute the core group of the community and perform the in-depth search of customers. The community of practice both facilitates the salespeople's ability to search for and share customer knowledge. It is argued that a community of practice is particularly relevant in a low-tech environment where no formal R&D departments exist. Therefore, production personnel and management are included in the community in order to generate cross-departmental linkages and to be able to absorb the customer knowledge and generate organisational knowledge based on the individual's exploration.

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Notes

1   It is considered an ideal and an attitude, rather than a specific profession.

2   All the quotes are translated from Finnish by the authors.

Article 3:

Kallio, A. and Bergenholtz, C. (forthcoming) Enhancing organisational absorptive capacity by reframing an outdated suggestion box: An action research study.

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Enhancing organisational absorptive capacity by reframing an outdated suggestion box: an action research study

Anne Kallio*

Lahti School of Innovation,
Lappeenranta University of Technology,
Saimaankatu 11, FI-15140 Lahti, Finland
Fax: +358-3-876-9133
E-mail: anne.kallio@lut.fi
*Corresponding author

Carsten Bergenholtz

Department of Business Administration,
Business and Social Sciences,
Aarhus University,
Haslegaardsvej 10, 8210 Aarhus V, Denmark
E-mail: cabe@asb.dk

Abstract: The study explores the connection between the organisational and individual level absorptive capacity in the context of shopfloor employees. Most literature on absorptive capacity focuses on the organisational level, while there has been less focus on the social integration mechanisms between the individual and organisational level of absorptive capacity. Via an action research study on shopfloor employees in a low-tech industry, it is shown how innovation activators can facilitate social integration mechanisms and identify the potential of the individual level ideas and assist the transformation of these to an organisational level.

innovation. He has previously published in the *International Journal of Strategic Business Alliances*, the *International Journal of Technology Management* and *European Innovation Management*.

1   Introduction

This study is about enhancing the organisational level absorptive capacity (AC) of an organisation. In an action research study focused on shopfloor level employees, a reframing of an outdated suggestion box is proposed in order to generate social integrative mechanisms between the organisational and individual level AC.

The literature shows that shopfloor level employees have direct contact with the problem sources and they have the required knowledge of the production processes (Axtell et al., 2000; Imai, 1986; Nijhof et al., 2002; Van de Ven, 1980). The suggestion box is perceived as a channel for ideas that are related to these production processes. However, idea generation for innovative purposes is not seen as a function for the shopfloor level and therefore it is not supported, in contrast to ideas about efficiency (Coates et al., 1996; Dougherty and Hardy, 1996). Different social mechanisms hence need to be in play, if managers want to learn to develop the internal knowledge environment in order for organisations to absorb external knowledge more effectively (Paiva and Goncalo, 2008) and enhance organisational learning (Wickramasinghe, 2008).

Cohen and Levinthal (1990) define AC as an organisation's ability to evaluate, assimilate, and apply new knowledge. Continuing this line of research, Zahra and George (2002) distinguish between two different types of AC: potential AC and realised AC. Acknowledging that most literature has focused on the organisational level, R&D characteristics and tangible outcomes, Lane et al. (2006) and Volberda et al. (2010) argue that individual level antecedents and organisational design issues have been relatively neglected in AC studies.

Within this framework, Hotho et al. (2010) state that social interaction patterns and organisational conditions enhance AC. Paiva and Goncalo (2008) furthermore conclude that knowledge integration depends on how companies access information and use it in their processes. In line with this perspective, Spithoven et al. (2010) in a study of organisations without formal R&D departments highlight the significance of social mechanisms. It is thus argued that although AC is an organisational level construct, it is not just about the corporate and departmental characteristics, but basically founded in an understanding of individual cognition, motivation and interaction (Volberda et al., 2010). Hence, AC should focus on the individuals and the social integration mechanisms in play within the organisation (Lane et al., 2006).

Based on this gap, the aim of the present study is to interrelate the organisational and individual level AC, and introduce a practice-based focus on shopfloor level employees. Hence, the research question is: "How can an outdated suggestion box be re-framed in order to enhance the organisational absorptive capacity?" This is examined in an action research (AR) process in one industrial organisation (Coughlan and Coghlan, 2002; Reason and Bradbury, 2008). The traditional suggestion box is some sort of integrative mechanism between the organisational and individual level, but it is argued to be inapplicable for generating innovation ideas. The study shows how three individuals were trained to be 'innovation activators' who actively ask their peers about ideas and

encourage idea generation. In this way, innovation activators enhance the collective incentive (Adler and Obstfeld, 2007) to bring ideas forward. The objective of the study is hence to illustrate how a bottom-up approach to create new active roles to harvest innovation ideas on the shopfloor level can enhance the ideation activity among employees. In this way, the study presents an empirical example of how social integration mechanisms can facilitate the transformation of individual level AC to organisational level AC (Volberda et al., 2010), mediated by the function of an innovation activator.

First, we look at relevant AC literature. Then, we discuss the role of shopfloor employees in recognising and acquiring knowledge, i.e., potential AC. The research design is presented next, whereafter the case is presented and analysed, followed by the discussions and implications.

2 Absorptive capacity

Volberda et al. (2010) categorise the existing literature of AC into six different streams; learning (e.g., Lane et al., 2006), innovation (e.g., Cockburn and Henderson, 1998), managerial cognition (e.g., Dijksterhuis et al., 1999), a knowledge-based view of the firm (e.g., Kogut and Zander, 1992), dynamic capabilities (e.g., Jansen et al., 2005) and coevolution (e.g,. Lewin et al., 1999). Based on Volberda et al.'s (2010) categories of AC research streams, the authors position the current paper within learning theories, rather than the innovation stream of AC (Volberda et al., 2010), since the present study focuses on the processes of learning on the individual and organisational level. In contrast, innovation streams target the innovation outcome, i.e. the product, service or process. In line with this, the measures of AC within the present perspectives are not outcome-oriented (e.g., number of new products, turnover, R&D-expenses), but rather more focused on e.g., the strength and persistence of social interaction (Hotho et al., 2010). AC in this paper is therefore seen as practices for interaction that facilitate knowledge flows (see e.g., Hotho et al., 2010).

Even though there are different streams of AC literature, Cohen and Levinthal's (1990) work is generally held as the founding paper of the concept. They define AC as an organisation's ability to value, assimilate, and apply new knowledge. Zahra and George (2002) develop the concept by distinguishing between two different types of AC: potential AC that is important in acquiring and assimilating external knowledge, whereas realised AC refers to the functions of transformation and exploitation of the knowledge. Todorova and Durisin (2007) further develop the concept and present the steps of recognition, acquisition, assimilation or transformation, and exploitation.

Most studies on AC have focused on organisational characteristics, e.g., the R&D intensity (Volberda et al., 2010; Zahra and George, 2002). Some authors have hence argued that the concept of AC is lacking a focus on the actual knowledge processes involved and the integrative social mechanisms that are needed to build a bridge between potential and realised AC (Lane et al., 2006). These social mechanisms could for instance be formed via a community or practice, which can both function as a cross-departmental system, and is also able to reach outside the organisation via salespeople in a search for new knowledge (Kallio and Bergenholtz, forthcoming). Therefore, in studying organisational AC, the learning behaviour and knowledge sharing of individuals is essential (Volberda et al., 2010).

Todorova and Durisin (2007) identify certain antecedents to organisational AC; social integration, appropriability regimes, feedback loops and power relationships (see Figure 1).

Figure 1   ACAP
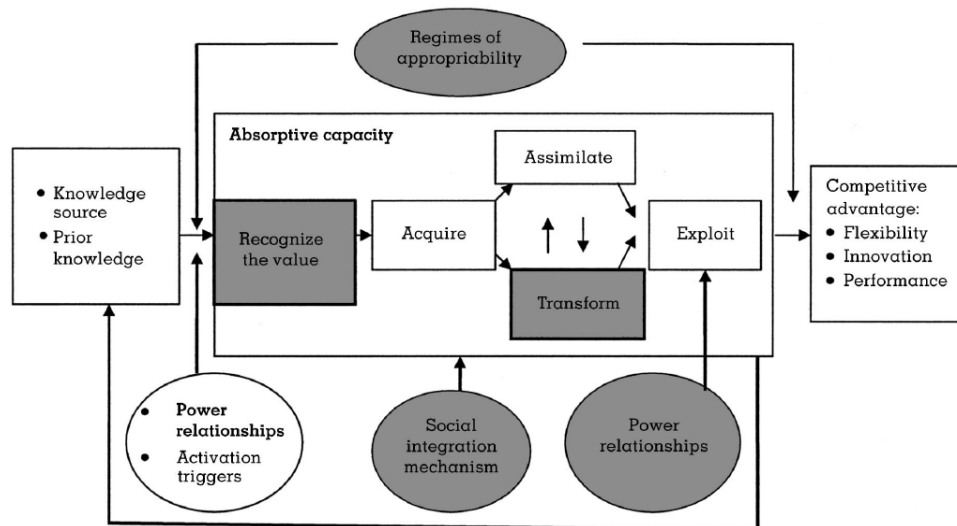
Source: Todorova and Durisin (2007, p.776)

Todorova and Durisin (2007) bring back Cohen and Levinthal's recognition of the value of the knowledge. They state:

> "The ability to learn – that is, to absorb external knowledge – depends to a great extent on the ability to value the new external knowledge." Todorova and Durisin (2007, p.777)

According to them, power relationships will have effect on the ideas that will be absorbed and, on the other hand, exploited [see also Dougherty and Hardy (1996)]. Social integration mechanisms (Zahra and George, 2002) help the assimilation of acquired ideas. Finally, Todorova and Durisin (2007) question Zahra and George's (2002) categorisation of assimilation and transformation as constituting different phases, and instead present assimilation and transformation as complementary phases depending on the situation. The familiarity of the new knowledge will define whether it is assimilation or transformation. If the existing way of thinking is not challenged, it is assimilation, and when the new knowledge cannot be fitted realistically to the existing knowledge structures, it is transformation.

3   Shopfloor employees recognising and acquiring knowledge

Shopfloor employees are in a key role in recognising valuable knowledge related to working processes and practices. They possess prior knowledge on the practices and can then make valuable connections and observations also outside the factory in their free time as well as during company visits. However, shopfloor employees are not generally

acknowledged as a channel of external knowledge and therefore not seen as a source of AC.

A typical hindrance to shopfloor employees' innovativeness is that individual employees do not see it as part of their job. The attitude of feeling responsible for idea generation enhances the activity, in contrast to 'it is someone else's job'. (Axtell et al., 2000; Farr and Ford, 1990; Morrison and Phelps, 1999) This is in part due the organisational setting and culture which often does not encourage this shopfloor level innovative activity. However, innovation ideas initiated bottom-up from small everyday observations on one's surroundings can create a competitive advantage for the company, since they are not visible to competitors, they are hard to replicate in another context, and eventually remain proprietary without a license (Forssén, 2002; Leonard-Barton, 1992; Nijhof et al., 2002).

Entrepreneurial individuals can function as enablers and can boost ideation activity by their example. On the shopfloor level, these individuals have been referred to as champions (Forssén, 2002; Van de Ven, 1986), and they can function as mediators who see opportunities. They absorb knowledge from different sources and are both interested and able to make new combinations out of it. In the general literature on innovation, these mediators have also been called activation triggers (Zahra and George, 2002), brokers (Burt, 2004; Parjanen, forthcoming) and intelligent agents (Foray, 2004).

The suggestion box is an old invention, with roots in lean production and Kaizen (Imai, 1986). It has been successfully used to collect the ideas from shopfloor employees in large industrial companies. Recent discussions of the role of a suggestion box focus on, for example, how to channel creativity (van Dijk and van den Ende, 2002). van Dijk and van den Ende (2002) illustrate success factors of environments where the suggestion box is successful: alignment with top management, the accessibility of the system, the intensity of evaluation, the use of rewards and processing of ideas.

The suggestion box is seen as an efficient way to collect shopfloor initiatives. However, the usefulness of the suggestion box depends on the kind of knowledge in question. According to Ellstrøm (2010) explicit work processes can be formally described and the procedures can be easily codified whereas descriptions of implicit work processes rely on interpretations of tacit knowledge. This knowledge is difficult to codify and contribute to a suggestion box. Furthermore, the incentives to give ideas have been mainly individual-oriented. If the suggestion box is to function as an integrative mechanism from the individual level to organisational level AC, it needs to be reframed in order to take collective incentives and individual motivations into account. The study hereby follows Adler and Obstfeld's (2007) general conceptualisation of motivation, and how collectivity and emotions influence collective creativity. In the AC literature (Volberda et al., 2010), it is stated that only few studies examine the two levels of analysis, both organisational and individual AC. Hence, the following case aims to reframe the suggestion box as an integrative mechanism, which in turn illuminates the relationship between individual level AC and organisation level AC.

4   Case innovation activators

The case company is in the forest industry. Five different units participated in the AR process; four factories and one administrative unit. All four factories are situated in different locations.

Generally speaking, the ideation culture for the shopfloor level employees has been almost solely based on a suggestion box. Once a year the company had an idea competition, but the management did not see it as a significant motivator for the shopfloor level. The suggestion box is available online and everyone has access to a computer. If the implementation of an idea creates profit, the originator will be rewarded according to a certain formula. A good idea can be rewarded with a small sum of money even if the idea is not implemented.

The management of the company wanted to get involved with this process because they thought that there was an unused innovation potential on the shopfloor level. Although idea competitions can function as a good way to combine different skills and units (Schepers et al., 1999) the management recognised that idea competitions produce great ideas but involve ideas that are too well prepared: some prepare their suggestions for years until they submit it. The same thing was also revealed in the interviews; the employees felt that idea competitions required very well-prepared ideas. Idea competitions in this organisation hence tended to capture codifiable and well-developed ideas, and not the more tacit knowledge concerning complex processes. The management wanted to find the ideas that were hidden in everyday activities.

> "We should have continuous ideation; not a separate idea competition. For example reward the best from all suggestions over two year's period... ... to make the threshold lower. Now people think it is some kind of trick..." (Interview of chief of security, member in innovation group in the upper management level in 2007)

4.1   Methodology

AR is a twofold methodological approach that consists of two projects; the *action* project where action is generated, and the *research* project that intends to create knowledge about that action (Coughlan and Coghlan, 2002; Susman and Evered, 1978; Reason and Bradbury, 2008). AR makes it possible for the shopfloor level employees to take part in creating an organisational practice for innovation (e.g., Haga, 2005; Coughlan and Coghlan, 2002).

Seen from a pragmatic point of view, the present context involves a real-life setting, where a company was interested in creating a new action and in finding ways to facilitate and activate innovative ideas on the shopfloor level. The company needed insight into how to start and facilitate this. Thus, the competences and involvement of the research unit in question were needed; otherwise the innovation activators would never have started, at least not in present form.

4.2   Data

The collected data consists of interviews, observations, workshop data and the interaction in the AR process. Documents and memos acquired from the company are also used as data. Initially, 20 semi-structured interviews were conducted in five units. Sixteen of the interviewees were from the shopfloor and four from management. For this paper, four interviews from the unit that implemented ideas are at the centre of attention, while the rest have had an effect on the whole AR process and the understanding of the process. The interviews included open questions about the individuals' facilities and motivation to give ideas, their awareness of the idea management system and their perception of the

atmosphere in general. The willingness to take part in the process was also an object for open inquiry. The interviews were recorded and the length varied from 60 to 90 minutes. The analysis of the interview material was facilitated by the ATLAS.ti software.

4.3 Intervention process

Figure 2 presents the AR process of the study. The preliminary aim of the AR process was to create a positive routine in creating innovation ideas and sharing the best practices in a network of different units in an organisation. As the AR process proceeded, it became clear that this goal was difficult to attain according to the preliminary plans, mainly because the idea generation culture was not ready to accept new practices in all the units. Only one of the units (later referred to as the pilot unit) did implement the ideas. This constitutes the first cycle of an AR process, where a solution was generated and tested.

Figure 2 The AR process
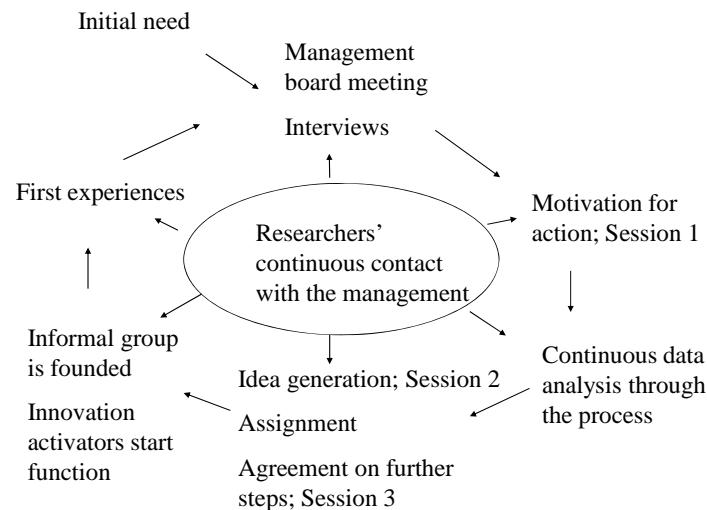
Source: Adapted from Coughlan and Coghlan (2002)

The research group of three individuals with different backgrounds continuously discussed the project on a meta-level in order to monitor the action and the research process. In addition to the core group, the know-how of a cross-discipline group of ten researchers and developers was used during the project. The core researcher group met each other almost every day, and shared their ideas for the case immediately; if not face-to-face, then by phone. Researcher one continuously kept in touch with the client. Researcher two was an expert on methods and creativity. Researcher three had an industry background and the right contacts. In addition, a fourth researcher did the interviews with researcher one, and altogether four extra researchers mentored the participants with their assignments. They mentored the participants on the phone, exchanged e-mails and the mentors paid a personal visit to the unit. This group of researchers also analysed the case together without the client after the interviews and helped to create an action plan for proceeding.

4.3.1 Initial need and motivation for action

First the process plan was introduced to the management board, which had managers from different units present. Four volunteer units decided to take part in the process, in addition to the 'management unit'. The managers chose four individuals from each unit to be interviewed.

The ideation activity in the pilot unit was made possible with a suggestion box and a suggestion board secretary took care of the system. In addition, there were small meetings in the factory where ideas could also be said out loud. This way the management had secure channels to express ideas.

> ".. but how could we encourage the fellows to bring out these matters more? We hear too much of those kind of things after fixing a problem; that this problem has been acknowledged for many years and the solution has been known for a long time. It just has not reached anyone." (Interview of the chairman of the suggestion board in 2007)

For this company, the suggestion system is a very useful channel to get ideas from employees. Over time, the organisation also changed, and there is always room for initiative as the processes and factories have evolved.

> "When young, unprejudiced fellows come, even more unexpected things come out. And also the fact that these factories have evolved into a more automated direction during these years." (Interview of the chairman of the suggestion board in 2007)

In the first collective session, the researchers presented the results of the interviews. To ensure anonymity, the researchers focused on the things mentioned the most in the interviews while giving feedback. After the feedback, the participants discussed their hopes and fears regarding this initial phase. This was considered important because it could establish a mutual understanding of why ideas are important and why the ideation activity should be emphasised.

Participants discussed whose duty it was to acquire ideas and how this activity could be enhanced. It was stated that the lack of feedback had reduced activity, so what would be the means to get ideas from everyone, even those who usually stayed silent?

> ".. but when you think that you have had a really good idea, you are very critical yourself and think about it a long time before you take the idea forward... many of the guys out there, they seek for approval for the idea from their peers before taking it forward." (Interview of foreman, maintenance in 2007)

The processing of ideas was also discussed. People who are responsible for evaluating and deciding on the ideas often do not have enough time or patience to understand an initiative that is written in an unclear way. This also entails that employees think they need to hand in very elaborated ideas, which in part does not enhance the incentive, and in part might delay a suggestion.

> "... If you just put something on the paper, they won't bother to even ask, really. Or then they come and ask that what on earth does this mean, then this (initiative) receiver has the kind of... attitude towards you that he does not have a clue of what you mean... have you even thought about it [the initiative]..." (Interview of an employee with a long history in the company and different positions, in 2007)

Eventually, it all came down to providing the proper incentives for employees. What makes people write down initiatives? Why should they share their ideas anyway?

At the end of the session, the participants were given an assignment to do before the next session. They had researchers to mentor them with this assignment. Assignment 1: Every unit had to write about two things with the help of mentors. First, they had to write about a successful innovative idea that was implemented in their unit. Second, they had to report a case where a good idea was not implemented in order to show the bottlenecks of idea management in their unit.

4.3.2 Idea generation (producing the solution)

The idea generation consisted of two sessions. Session 2 was about generating ideas and session 3 was for decision making on the ideas.

The second session consisted of two parts. First all the groups presented their assignments followed by feedback from their mentors. The idea was to make it easier for the participants to think about the idea generation practices in their own unit, and understand each other's realities and experiences. Simultaneously, this was an opportunity to share the work-related problems that the different units experienced.

The second part consisted of idea generation on four themes:

1   informal group to collect ideas

2   benchmarking visits between units

3   processing the absorbed ideas

4   motivating people.

These four themes were derived from the participants' ideas and questions in the previous session. The ideas had been modified by the researchers to serve as an actionable plan. The researchers did not provide answers to the questions; they converted the questions so that it would be easier for the participants to start answering them.

At the end of that session, the participants were given another task. This time they had no mentors, nor did they have to give a report. However, the researchers were available in the case of questions. Assignment 2: How do ideas absorbed from other units diffuse in their unit? Are there existing channels that could support idea diffusion?

The next collective session focused on making decisions. The researchers had organised the material from session two and suggested those things that the company could start to implement. The managers sat around the same table as the shopfloor employees. The suggestions included suggestions to let an informal group collect ideas, inter-unit benchmarking visits and boosting the ideation activity by encouraging an innovative climate.

Initially, there seemed to be some reluctance to decide anything during the session. Eventually one of the participants took the lead and said that they could try some of the things agreed in their unit. He had a couple of key individuals who were also participants. It was decided that they would act as a pilot unit.

Later on, the manager from the pilot unit reported that they had decided to found an informal group that consists of three innovation activators and a suggestion board secretary. The activators are active individuals from the shopfloor. They have a mandate to walk around the factory and facilitate and encourage ideation as part of their job; they

go and talk to people. They evaluate the ideas and guide those to the different channels that the company has.

4.3.3 Innovation activators in action

A month after session three, a researcher called the unit that had agreed on creating the informal idea gathering group. The manager of the pioneer unit said that they had chosen three persons to be innovation activators and who would implement the plan. Two months later, the researcher received a memo of the first activator experiences. It was already stated that they could facilitate the shopfloor employees' ideation and that their peers were willing to share ideas with them. The manager confirmed a couple of months later that activity in terms of the number of suggestions was increasing.

> "Especially the difficulties in making suggestions have been brought up and actions have been taken upon this" (Memo from the suggestion board secretary, 2008)

> "Many employees experience discussion as an easier way to express ideas than the suggestion system. I already have written one suggestion this year to the system on behalf of an employee. All channels to give ideas are held open to ensure equality as innovators to every employee." (Memo from the suggestion board secretary, 2008)

Two researchers visited the unit after five months of activity. The innovation activators seemed to be very content with their new positions. They had been chosen by the ideation committee because they offered many ideas and were active. The idea benchmarking network between the different units of the company was mentioned by the activators. They were proud of their group, which had thought of an idea that could be shared with one of the participating units. Every one of them had started to activate their peers in their own way. Even their brochures they had posted on the information boards were very different. They had drawn the brochures by themselves.

> "Innovation activators are active persons in suggestions and initiative, who seek to find the problematic spots from the everyday work. You can talk to activators about things that bother you or your work team. They will help you in generating ideas and finding the right channel to forward the idea. Also sensitive matters can be brought up via an activator." (Material from the company, how the function of an innovation activator was described to the organisation, 2008)

Table 1 presents the key roles of the shopfloor employees, innovation activators and the managers in the phases of AC. In the opportunity recognition phase activators have a key position to observe and ask for things that need to be fixed. They have to be active in asking people about their ideas and making sure good ideas are codified. In assimilation phase the ideas do not challenge the current vision of the company and it is necessary to ask how to implement. However, in the transformation phase the ideas do challenge the current ways of thinking, so the why questions need to be asked. The activator has a demanding role as he interprets and helps employees to ground their ideas.

Table 1 Key roles in enhancing organisational AC through the renewed suggestion system

Phases of AC	Quote from the interviews	The role of shopfloor employees in the phase	The role of innovation activator in the phase	The role of management in the phase
Opportunity recognition	".. when new guys arrive, there is a new wave of initiative.. " (employee with a long history in the company)	To spot things that are bothering people, creating new combinations	To spot entrepreneurial behaviour in the shopfloor	Show and communicate vision Encourage
Acquisition	".. someone starts to talk, or has read somewhere, that there are problems in the productions process.." (employee with a long history in the company)	To say ideas aloud at work, or make a suggestion	Asks employees to make a suggestion, or encourage to present the idea to the managers	Provide channels and incentives Give feedback
Assimilation	".. those have been small improvements in practice in the small groups. They all have advanced just by discussing" (employee with a long experience, a trustee)	To be active in implementing ideas	To actively support the implementation of ideas	Provide freedom and resources to implement
Transformation	"... it takes the most time to investigate the suggestions properly..." (the chairman of suggestion board)	To be persistent and willing to modify ideas	Act as a broker to help the management understand what the idea is about	Be open to new ways of thinking, make decisions

The role of an innovation activator in fact makes the job of the management easier concerning idea generation, as they try to help the management to understand what a current idea is about and also to ask the shopfloor employees for more information.

> "For starters, we found four ideas that had previously been in a small meeting but for some reason or another never got put to use. One activator wrote these ideas down and the ideas were handled again in a small meeting. All the ideas are now being utilised. One of the ideas was big enough so we will make an official suggestion to the system so that the idea owner will have the compensation that he deserves." (Memo from the suggestion board secretary, 2008)

The researchers received another memo from the pioneer unit after six months of activity. It stated that the function of an activator was to be open and easy to approach. However, the activators do not think that they should work as go-betweens between their

peers and the management. In other words, they do not want to become another hierarchical layer. When activators hold meetings, they do not have a particular agenda, but the discussion guides the meetings. The activator group had decided to develop an alternative channel for small ideas that do not meet the requirements for the official channel. It was also said that the next three activators were going to be hired in the near future. The activators had visited their subcontractor to discuss the innovation activities in the two companies. They consider this a reward for their activator function.

> "Innovators have definitely been useful in developing the suggestion system. Myself, I would not have contacted the operational level employees to get anything done. All activators have also learned something from each other on the way." (Memo from suggestion board secretary, 2008)

5   Discussion and implications

The study explores the interrelation between organisational AC and individuals (Volberda et al., 2010) in the context of a suggestion system on the shopfloor level. The authors suggest that shopfloor employees are an important channel for an organisation to facilitate the absorption of knowledge in improving working practices. Individuals on the shopfloor have important prior knowledge of the processes and practices and are therefore able to recognise and absorb 'the right knowledge' (Cohen and Levinthal, 1990; Todorova and Durisin, 2007; Volberda et al., 2010), but they often lack the incentives and the organisational design to put ideas forward. An integrative role of innovation activators is suggested to facilitate the communication (Opt, 1998) between employees and managers. Innovation activators observe work processes on the shopfloor level and can capture ideas, even from implicit work processes (Ellström, 2010).

While shopfloor employees can recognise knowledge that would facilitate the production process, the knowledge may remain the intellectual property of this particular employee if he does not share it with the organisation. Three different barriers to share were identified. First of all, employees were reluctant to hand in suggestions until they were very well-prepared, and actually too well prepared. This affects the speed of learning (Zahra and George, 2002). Secondly, tacit knowledge on complex processes was difficult to hand in, without assistance. Finally, a traditional suggestion box only facilitated an extrinsic incentive, but not a proper collective incentive (Adler and Obstfeld, 2007). By introduction innovation activators, the understanding of what and how ideas might be relevant was thus significantly enhanced, and both the quality and speed of learning is affected.

The traditional suggestion box is thus reframed into a suggestion system that acts as a link between the shopfloor employee and management. As part of this suggestion system, innovation activators play a key role as mediators between the individual and organisational level AC. The activators encourage the employees to submit their ideas to the suggestion box so that the organisation would acquire the ideas.

Figure 3 From individual level AC to organisational level AC mediated by the function of an innovation activator (see online version for colours)
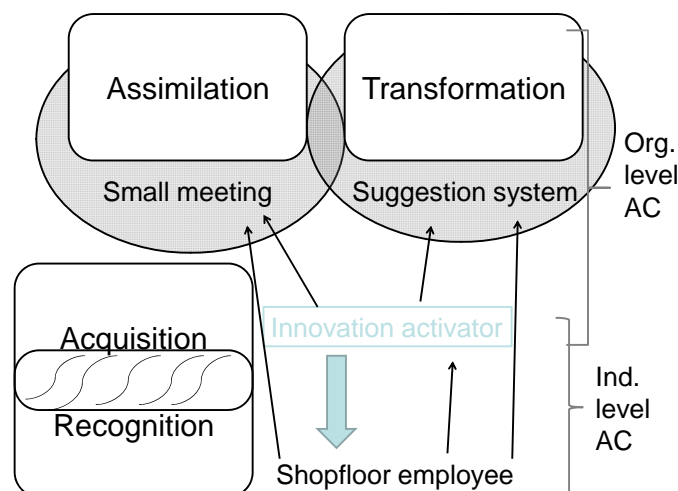

Figure 3 presents the relations between individual AC and organisational AC. These relations are quite complex, since the original definition of AC includes the presupposition that knowledge is being absorbed from outside the organisation into the organisation.

The kind of social interaction mechanism (Hotho et al., 2010; Opt, 1998) initiated by the innovation activators depends on the AC phase, as we illustrated in Table 1. In the assimilation phase, the activator's role is supportive and an idea can be fitted to existing culture. Assimilation can, e.g., be recognising implicit work process (Ellström, 2010). Organisational learning would leverage if these practices of implicit work processes are brought up in small meetings (Figure 3), since eventually they could change the codified explicit work processes (Ellström, 2010). Transformation, on the other hand, requires new ways of looking at the world (Wickramasinghe, 2008). Therefore, the innovation activator acts as a broker in this social context. He might have to translate the idea from the shopfloor level and help management to understand the value of the idea to the production.

In all the AC phases, the activators try not to constitute another organisational level, since the ideas are submitted via a suggestion system, and not through these innovation activators. Instead, based on their general knowledge of the shopfloor level and the overall organisational context, their aim is to assist in the identification of relevant ideas, how to frame the ideas and in general to encourage and facilitate ideation. They walk and talk to people while spreading a knowledge-seeking behaviour on the shopfloor (Borgatti and Cross, 2003). In this particular study, their role is fairly autonomous, and constituted in a bottom-up manner, encouraged by the management level. Via these social interactions, the innovation activators activate the already existing ideation potential. Such facilitation can enhance the motivation of the shopfloor employee and establish a collective incentive to contribute to the organisational pool of knowledge. In this way, the owner of the idea becomes responsible for the further idea transformation, and the shopfloor employee sense of duty might increase (Axtell et al., 2000; Farr and Ford, 1990; Morrison and Phelps, 1999).

Hence, innovation activators can enhance the collective motivation and related creativity (cf. Adler and Obstfeld, 2007) and the organisational design for how to transform individual level AC to the organisational level. Since the innovation activator function is a social process, they constitute a form of social integration mechanisms between the individual and organisational level AC, as called for in the literature on AC.

The limitations and possibilities for future research point to a more profound examination of the relation between individual and organisational level AC. The implications here are based on an explorative case study in a single organisation. The conclusions of the paper should therefore be developed and tested in multi-case studies.

In the future studies, a measurement instrument for enhancing the social integration mechanisms should be created. How can one measure the interaction that leads to enhanced knowledge flows? A holistic discussion on what kind of social interactions lead to enhanced knowledge flows in different environments should be provided. Another possible avenue for future research relates to the suggestion box and the associated speed of learning. Multi-case studies could test the results of the present case, where a relation between the the reframing of the suggestion box and quality and speed of learning was identified. In particular, the different roles of the innovation activators in the different phases of AC should undergo further testing. More generally, the role of the suggestion box for organisational learning should be examined more in-depth.

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Article 4:

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The role of social capital in the creation of organisational absorptive capacity: A two case study

Abstract: Based on a two case study, this paper discusses the role of social capital in the creation of organisational absorptive capacity. More specifically attention is on the phases where newly acquired knowledge is processed, either via assimilation or transformation. Previous studies have shown how bridging social capital makes it possible to acquire diverse knowledge for transformation, while bonding social capital facilitates the assimilation of more familiar knowledge. This paper introduces a concept of creative social capital into an organisational context and shows how creative social capital can facilitate a balance between assimilation and transformation.

Keywords: social capital, absorptive capacity, transformation, assimilation, low-tech organisation, creative social capital, innovation, knowledge transfer, social mechanisms

1 Introduction

This study examines the role of social capital in balancing the different processes of absorptive capacity (AC). It introduces creative social capital as a group level construct. It is suggested that creative social capital plays an important role in moving from assimilation to transformation and vice versa. In-depth case studies from two organisations constitute the empirical basis of the paper.

The concept of absorptive capacity was introduced two decades ago by Cohen and Levinthal (1990). They coined the term as an organisation's ability to value, assimilate and apply new knowledge. In the same era March (1991) introduced the distinction between exploration and exploitation, where exploration involves the search for new ideas and exploitation involves the refinement of existing ideas. A decade later, Zahra and George (2002) further developed the concept of absorptive capacity, by defining it as a set of four complementary capabilities and by emphasizing the distinction between potential AC and realised AC.

Social capital has been defined in numerous ways. Bourdieu (1986) focused on actual and potential resources of the actor, while Coleman (1988) defined social capital by its function, thereby combining a focus on social structure and the actions of the individuals involved. A decade later, Nahapiet and Ghoshal (1998) introduced three dimensions of social capital; structural, relational and cognitive. Tsai and Ghoshal (1998) highlighted the social interaction to blur the traditional boundaries of different business units and indicated its effect on product innovations. The recent surge of social network analysis also emphasizes the significance of social relations in organizational contexts (Bergenholtz and Waldstrøm, 2011).

Yli-Renko et al. (2001) combined the concepts of absorptive capacity and social capital. They discovered how social capital is positively associated with facilitating external knowledge acquisition. In the mean time Burt (2001), in contrast to Coleman

(1988), argued that better ideas are acquired through structural holes. Bridging social capital grants access to unfamiliar knowledge so crucial for explorative outcomes.

Based on the distinction between potential and realised AC by Zahra and George (2002), Jansen et al. (2005) showed how bridging social capital can enhance potential AC (assimilation) whereas bonding social capital strengthens the realized AC (transformation). Following up on this study, Todorova and Durisin (2007) argued that the assimilation and transformation phases of AC should not be considered distinctive and consecutive but complementary and alternative, since different new ideas require different AC phases. This indicates that, depending on the cognitive fit of new ideas, different absorption processes and hence different kinds of social capital are required. This implies a need to be able to intermingle bonding and brokering social capital. Therefore Harmaakorpi (2004) introduced creative social capital on a regional level as something that includes both bonding and bridging elements, where the creative tension allows something new to emerge in uncertain environments.

Kallio et al. (2010) examined absorptive capacity through social interaction and social capital. They see personal creative social capital as a way to handle failures and the courage to try new things. Hotho et al. (2011) stated that via social interaction the newly acquired knowledge can be transformed into local context. They highlight that absorptive capacity is strongly linked to different social interaction patterns such as social cohesion, scale of interaction and scope of interacting employees. Overall, a lot of attention has been paid to how to tap into external knowledge, but less is focused on what happens in practice when these ideas are brought into the organisation. This is related to the fact that most studies on AC have focused on organisational characteristics, e.g. R&D intensity (Zahra and George, 2002; Spithoven et al., 2010). Therefore, this study sets out to investigate organisational AC processes on a micro-level, in order to generate applicable knowledge on social capital and absorption processes The following research question is addressed: "How can social capital facilitate the balance between transformation and assimilation phases of absorptive capacity?" We rely on and extend Nahapiet and Ghoshal's (1998) conceptualization of social capital. The different phases of absorptive capacity turn out to rely on different social processes, and creative social capital facilitates an intermingling of transformation and assimilation processes.

2 Social capital in the creation of organisational absorptive capacity
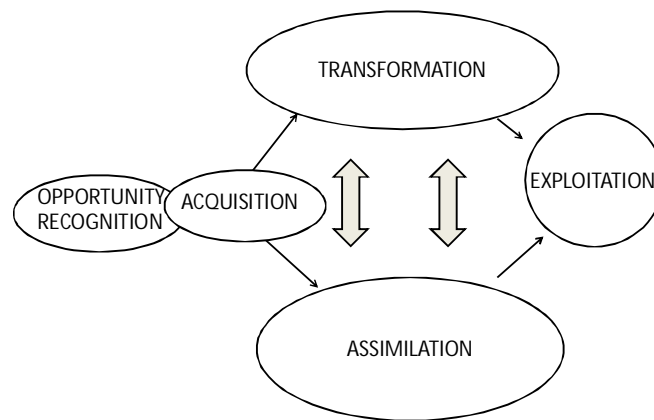
2.1 Absorptive capacity

In an organisational learning perspective, absorptive capacity is originally defined by Cohen and Levinthal (1990) as an organisation's ability to value, assimilate, and apply new knowledge. They suggested that this ability is path dependent: prior knowledge permits the absorption of new knowledge. The concept created wide discussion as it is seen fundamentally important for the renewal and competitiveness of organizations. Zahra and George (2002) further developed the concept by recognizing it as a dynamic capability that influences the firm's ability to create and deploy the knowledge necessary to build other organizational capabilities. They defined AC as a set of four complementary capabilities and distinguished between two different types of absorptive capacity: potential absorptive capacity that is important in acquiring and assimilating external knowledge, whereas realised absorptive capacity refers to the functions of the

transformation and exploitation of the knowledge. The cognitive structure will determine whether it is assimilation or transformation. If the cognitive structure does not change, it is assimilation, and if the new knowledge cannot be fitted realistically to the existing knowledge structures, it is transformation. Todorova and Durisin (2007) criticized the sharp distinction between potential and realised AC and argued that the assimilation and transformation phases of AC should not be considered distinctive and consecutive but complementary and alternative. They emphasized the interactional relationship between the different phases and called for more studies on this dynamism. Figure 1 presents the transformation and assimilation phases of absorptive capacity as complementary processes, following Todorova and Durisin (2007).

Most studies on absorptive capacity have focused on organisational characteristics, e.g. R&D intensity (Zahra and George, 2002; Daghfous, 2004; Spithoven et al., 2010). Some authors have hence argued that the concept of absorptive capacity is lacking a focus on the actual knowledge processes involved on the individual level, and the integrative social processes that an organisation needs in order to facilitate the cross between potential and realized absorptive capacity (Lane et al., 2006). These social processes could for instance be shaped via a community of practice, which can both function as a cross-departmental system and also reach beyond organisational boundaries via salespeople in a search for new knowledge (Kallio and Bergenholtz, 2011).

Figure 1 Phases of AC (Following Todorova and Durisin, 2007)

Yli-Renko et al. (2001) conclude that social interaction and network ties dimension of social capital is associated with knowledge acquisition. Upadhyayula and Kumar (2004) combine the theories of social capital and absorptive capacity stating that social capital is a prerequisite for organisational absorptive capacity. Assuming that social capital is inherent in both intra-firm and inter-firm relationships, they suggest that inter-firm social capital increases the potential absorptive capacity and that intra-firm social capital increases the realized absorptive capacity. However, they are not addressing what kind of social processes can balance the assimilation and transformation phases of absorptive capacity (cf. Todorova and Durisin, 2007).

2.2 Social capital

Unlike other forms of capital, social capital is of a relational nature, which means no one has exclusive ownership of a given social capital (Burt, 1992). While most authors agree on social capital being of a social nature, different definitions have been provided, ranging from a focus on the micro level to the macro level. Bourdieu's (1986) seminal definition focuses on actual and potential resources, while Coleman (1988) defines social capital by its function, combining social structure and the actions of individuals involved. As Bourdieu, Putnam (1993) also includes a reference to the institutional setting, and talks specifically about "networks, norms, and trust that facilitate co-ordination and co-operation for mutual benefit" (1993, p. 35). In this way, Putnam not only emphasises that social capital is a concept that is related to network structure, but also puts the 'norms' of interaction at the centre of attention. Thus, social networks relate not only to who knows who, but also to how they know each other and what norms they can and can't interact with.

Nahapiet and Ghoshal (1998) also refer to norms via their identification of three dimensions of social capital; structural, relational and cognitive. The structural dimension refers to the connections between people or organisations, i.e. 'who knows who' (Burt, 1992). The relational dimension refers to the personal relationships that people have developed on a dyadic basis, i.e. it refers to the strength of a tie (Granovetter, 1973). The cognitive dimension refers to the shared meanings and norms used in interaction. It is embodied for example in shared paradigm of code which enhances common understanding (Tsai and Ghoshal, 1998).

There is an ongoing debate about what kind of network structure is the most efficient for searching and transferring knowledge. Coleman (1988) argues that a dense network structure consisting of strong ties provides the basis for trust and a shared language which will enhance the exchange of knowledge. Bonding social capital is thus argued to be the most fruitful. On the other hand, Burt (1992) argues that dense networks imply homogeneous and redundant knowledge. In order to get access to non-redundant knowledge, an actor needs to move across a structural hole, which is defined as a gap between two different networks. He thus argues that bridging social capital is needed in order to get access to new and heterogeneous knowledge, which can enhance the individual and organisational pool of knowledge.

Later studies have argued that different kinds of social capital are valuable for different kinds of tasks. "Brokerage across structural holes is the source of value added, but closure can be critical to realizing the value buried in structural holes" (Burt 2001, p. 398). Sparse networks are thus argued to be of use for exploring for new knowledge, and dense networks for exploiting the gained knowledge. On a related note, Smedlund (2010) states that different tasks require different network structures of knowledge flow. Routine tasks require hierarchy, development tasks require core-peripheral structures and idea generation requires ego-centric structures. In a routine network, employees share their ideas only with those who they have a relationship with in routine tasks. In development and idea generation tasks, communication is based more on the informal and non-routine (Smedlund, 2010). These studies on how different kinds of social capital are valuable for different tasks still do not explain how to create the transition between bonding and bridging within a firm, and thereby facilitate the AC phases of assimilation and transformation.

2.3 Creative social capital between transformation and assimilation

Todorova and Durisin (2007) describe an assimilation phase with cognitive schemas:

> "When the new idea fits the existing cognitive schemas well, the new idea is only slightly altered to improve the fit and then incorporated into the existing cognitive structures. The existing cognitive structure does not change, and the knowledge is "assimilated." (p. 778)

As previously argued, social capital is related to knowledge-searching behaviour. Reusing this cognitive argument within a broader social capital setting, it is interesting to note that bonding social capital consist of people who know each other well, and new knowledge is not easily fitted into such a tightly bonded network (Putnam, 2000; Burt, 2001). Bonding social capital can in this way be related to assimilation.

Todorova and Durisin (2007) describe transformation as:

> "Accommodation through transformation as an alternative process to assimilation occurs in the case where new situations or ideas cannot realistically be altered to fit the existing knowledge structures. New knowledge cannot be assimilated. In this case the cognitive structures of the individuals themselves must be transformed to adapt to an idea or a situation that they cannot assimilate." (p. 778).

Transformation is thus associated to a different search-behavior and different social networks. It seems that transformation is nourished by bridging social capital. Bridging social capital is based on weak links and structural holes, and actors located in such positions have faster access to other networks and hence new knowledge (Burt, 2001). Foray (2004) talks about these people as intelligent agents, Zahra and George (2002) mention activation triggers and Burt (2001) refers to brokers. They are in a key position to recognize good ideas and valuable knowledge, although this will depend on their capabilities to observe and recognize the valuable knowledge. Todorova and Durisin's (2007) paper is conceptual though, and does not empirically identify relevant social absorption processes.

In the present study, the authors introduce the concept of creative social capital in an organisational context as a group-level construct. The proposal follows the definition of Nahapiet and Ghoshal (1998) who distinguished between structural, relational and cognitive features. Originally the concept of creative social capital has been introduced on a regional level by Harmaakorpi (2004), and it has been further discussed by Tura and Harmaakorpi (2005), Cooke (2007) and Kallio, Harmaakorpi and Pihkala (2010). Within the context of regional innovativeness, Harmaakorpi (2004) describes the creative social capital to be a balanced amalgam of bridging and bonding social capital with elements of creative tension. By combining bridging and bonding, the concept is similar to Burt's (2001) proposal. In the present study the concept is transferred from a regional to an organisational context and in the following some of the main elements are presented.

Due to structural features, creative social capital is transitory. When a group has co-existed for a certain period of times, strong bonding elements will form, and creative social capital can therefore by definition not be permanent. It can occur in groups that meet each other for the first time, which means a strong or particular dyadic relation is not necessary. In order to establish creative social capital, it is important to have a combination of bonding and bridging, but also specific norms and "rules" (Putnam, 1993;

Nahapiet and Ghoshal, 1998) for dialogue (Gustavsen, 1992; Schein, 1993) in order to generate creative safe spaces (Isaacs, 1996) where it is possible to move between transformation and assimilation.

In this study, dialogue is examined in an organisational context. Following the studies of Isaacs (1996), Gustavsen (1992) and Schein (1993), the authors emphasize the importance of dialogue in the construct of creative social capital. Schein (e.g. 1993) states that dialogue helps groups to reach a higher level of consciousness, thus leading to a higher level of creativeness and productiveness. Isaacs (1996) suggests that in order to reach a genuine dialogue, a safe place is needed. If this safe place is reached, it is possible to practice "skilled incompetence" (Argyris, 1990) in order to create dialogue. Schein (1993) states that dialogue between engineers and operator increases the mutual understanding between the two subgroups. This would also enhance cross-functionality, which is a key mechanism for AC (Lane et al., 2006).

Although creative safe spaces are a target, the group should not be too homogeneous, since this will not create adequate creative tensions (Senge, 2006). The lack of trust that a heterogeneous group entails is supposed to be generated via trust in the safeness of the situation at hand. Social intelligence (Goleman, 2006) also plays a role in creative social capital. Interaction is seen as an emergent process, which is taken forward by statements, reactions and group dynamics.

Figure 2 Social capital in absorptive capacity (elaborated from Todorova and Durisin, 2007)
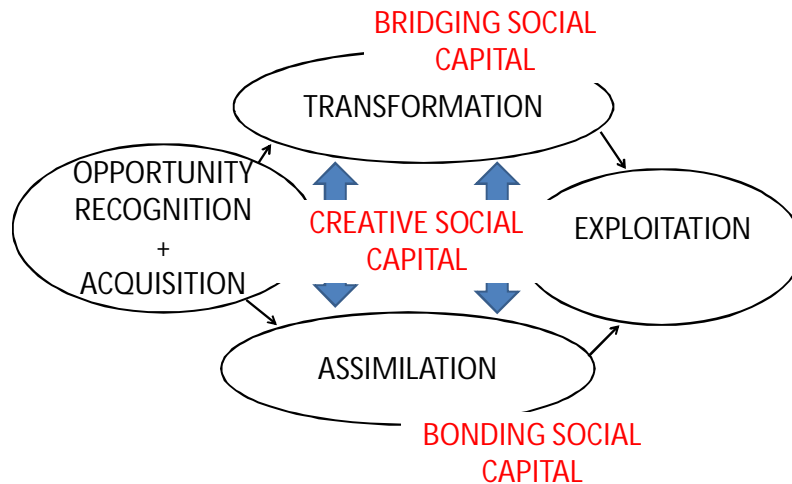

Figure 2 positions different social capital types into the framework of absorptive capacity. Bonding social capital aids in the exploitation of current knowledge, thus in assimilation. Bridging social capital is essential in acquiring new radical ideas, since the diversity of backgrounds and the level of internal communication have a positive effect on the transformation (e.g. Cohen and Levinthal, 1990; Daghfous, 2004). Creative social capital makes it possible to move from transformation to assimilation and vice versa.

3 Research design

3.1 Methodology

The paper relies on a two case study setup. Case studies are particularly useful for enhancing the understanding of topics not previously investigated (Gummesson, 2000) and for theory building (Eisenhardt, 1989). Both cases deal with social integration processes within two absorptive capacity phases, but since one case focuses on how to add bridging elements to bonding and the other on how to add bonding elements to bridging, the cases constitute two different angles, and hence complementary exemplar cases (Flyvbjerg, 2006). In this way the context is an ideal choice for the given research question.

The data is collected during two different action research processes. Action research (AR) makes it possible to introduce organisational changes in order to solve a given problem and to research the organisational change process simultaneously. It is a twofold methodological approach that consists of two projects; the action project where action is generated, and the research project that intends to create knowledge about that action (Coughlan and Coghlan, 2002; Reason and Bradbury, 2008).

Table 1 presents the key information of the two cases. The cases have a somewhat similar aim for change. The salespeople are recognizing and acquiring customer knowledge. Even the research processes have certain similarities: they combine research and business change interest, involve salespeople and management and they also partly have the same methods. However, the outcomes differ from each other.

Case	A	B
Industry	Forest Industry	Electrical Industry
Researchers involved	5; Main facilitator, observer, group facilitators	3; Case leader, two other researchers
Data collection	14 semi- structured interviews of leaders and salespeople, project steering meetings, 5 workshops, participative observation, literal workshop material, telephone conversations, feedback questionnaire	10 in-depth interviews of key personnel, project steering meetings, 2 workshops, participative observation, questionnaires, telephone conversations, e-mail, site visits, company internal material
Duration of project	01/2007- 09/2008	10/2006-08/2008
Development aim	Better use of customer knowledge	New business creation and organisational ability of renewal

Table 1. Key information of the cases

3.2 Case descriptions

3.2.1 Case A

The participants of the action research process in case A are from a company in the forest industry. The company has approximately 740 employees located at nine plants, with no formal R&D department. The managers were hoping to improve the use of

customer knowledge. They continuously receive the required figures relating to customers and current needs, but the possible near future needs could not be deduced from these figures. When the salespeople returned after a visit to a customer, they might inform their manager about important observations, but this was not done in any systematic way, and potentially relevant information got lost. Eventually, they were not able to exploit the information signals that the individual salespeople acquired through their networks.

> "Disseminating knowledge in an organisation of this size is not simple. I don't know whether it is due to the culture or the tools". (A salesperson)

Starting point

Some of the salespeople talk to each other daily and they know each other well, so there is a strong bonding between the salespeople. Some of the salespeople have experience from production as well. However, more bridging is needed since the production department is not very familiar to all of the salespeople. In fact, some feel that it is rather difficult to contact the people from the production, even if they had an idea for a product or a process.

> "I don't know if the salespeople can locate the right person in production department. And I am not sure either how the workers from the production react to suggestions from the sales people…. "(CEO)

The group of salespeople is rather homogeneous and possesses bonding social capital. The same salespeople have worked together for years, even decades. In order to obtain creative social capital, more diversity is needed.

Forming a social practice

Following an action research process, a new meeting practice was created. A community of practice (e.g. Lave and Wenger, 1990) reinforces the strong connectedness of salespeople, but also allows legitimated peripheral participation from the production.

Figure 3 presents the structure of interaction in the communities of practice. The understanding acquired from the customers is shared in the community of practice involving managers and salespeople in the core group, the production managers in the active group, and the production personnel from the plants in the peripheral group. Previously the interaction between the salespeople and the production has been somewhat random. The communities of practice arrange a safe place where the salespeople and the production can enter into dialogue.

Figure 3. The structure of communication in the communities of practice
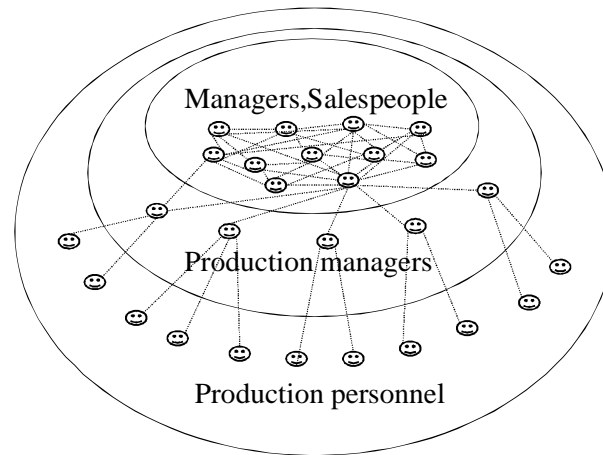
For the core group of salespeople and managers, their aim was mutual decision-making. After a series of meetings arranged by the researchers, it was time to decide how to continue. This was facilitated by one researcher, while the other researchers made observations. It was observed that when it comes to making decisions, they do it jointly. The managers did not tell the salespeople what to do, but instead they all discussed the decision as a group.

> "...talking and discussing. Are they in fact just starting to ideate and making the decisions now?! Many of them are based on statements made by others. Ask questions. They ponder different options. Most of them give statements vocally, some of them smile." (From a researcher's observation diary)

Using the social practice

The researchers asked the salespeople about their opinions after two of the COP meetings, this was done by phone, and after four other meetings they used a questionnaire. As a standard for the meetings, it was agreed to have no official agenda, but allow everyone to start a topic for conversation. The overall experiences of the meetings were mainly positive. People felt that they had learned something individually. However, in the future the meetings could have more spice in them.

> "I wish the meetings had more wildness in them. Some of the meetings should be formal, but some should be more detached from the everyday stuff." (Salesperson after four meetings)

> "I received important knowledge on other people's ways of doing things. And additionally, how we could do things another way here as well" (A salesperson on the question "what did you learn during this process")

The team spirit may reinforce the bonding social capital and the feeling of belonging to a group. However, the participants also felt that the meetings did help in bringing up different opinions. In their meetings, they aimed for dialogue, and decisions were made as a result of conversation, even though two managers were present. As was the case

during the researcher intervention, the managers kept a low profile during the conversation and presented their views on things only after having listened to their employees.

> "The meetings have brought a positive change in the sense that we used to work hard all on our own. In these meetings, we have worked together and brought out different views on things." (A salesperson after two COP meetings)

And then, were the meetings purely about the joy of discussing with others? It seems that this kind of interaction can have effects on both changing the consciousness of the work identity in the long term and on the performance in the short-term. In the following is an example showing that the meetings resulted in expanding the business to a new country.

> "The two meetings we have had have been good; we have discussed the right topics. And of course, we would not just sit there for the joy of being in meetings. Ideas have been implemented. Among other things, we chose a new country as a new market area. This has already been beneficial." (A salesperson after two meetings)

3.2.2 Case B

Case B is about a company operating as a supplier in the manufacturing of electrical products. It is a growth oriented, privately owned Finnish SME (around 500 employees) with manufacturing and service centres on several continents. When the empirical data was collected, the world was experiencing a period of wealth and growth. Our case company was also experiencing high-speed market growth. Yet the experienced CEO and owner of the company anticipated that the easy and lucrative market growth would not last forever. There would come a time when the market would be more crowded and the competition fierce. That is why the CEO wanted to create new, uncontested business areas and to develop the organisation's ability to renew itself.

Starting point

Before any changes were made, the company had a very flat hierarchy, yet it was siloed. *"Everything goes through one channel"*, as a key person described it. The organisational norm was that all members of the key personnel had their own separate area of responsibility as an individual and that they were directly responsible to the CEO. Anyone in the company could contact the CEO on any issue. People felt that this was a very clear and easy way of operating, but they also saw that there was very limited cross-borders, i.e. bridging, communication within the company. The highly centred pattern of the company was a potential hindrance to its fast growth. It was realized that a change was needed towards a structure and culture in which people could interact. The heterogeneity of people was sufficient for the transformation, but the people did not realize the existing potential because they did not have natural connections to each other. Bridging social capital was needed to put together the different parts of the organisation with different cognitive backgrounds. The change is depicted in Figure 4.

Title

Figure 4 Simplified organisational structures, "centre" and "doing together".

Starting point
"CENTER"

Direction of change
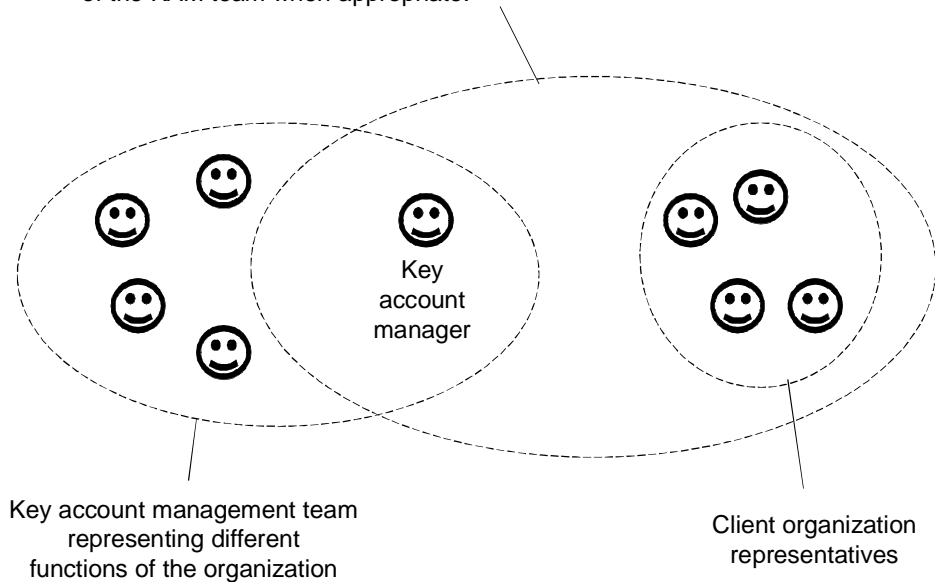"DOING TOGETHER"
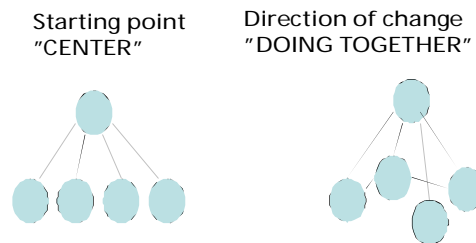
Forming a social network

As development action, the company decided to adopt the key account management (KAM). This enabled the start-up of cross-functional KAM teams that were responsible for the development of new business areas. The teams had a dual mission. First of all, they were to practice KAM and to develop new businesses. Secondly, they were to develop their own ways of practicing KAM and of developing new businesses.

The KAM teams were based on the idea of co-development between the company and its clients. The role of the KAM teams was to ensure the efficient creation and utilization of customer knowledge, i.e. AC. The key account managers were managing and mediating the co-development between the clients and the KAM teams. They created bridging connections to the customers on one hand and to the different functions within the company on the other hand, thus bridging structural holes. This is seen in Figure 5. The members of the KAM teams were chosen cross-functionally so that each team included all the necessary expertise needed for the development of the customer account in question. In practice, this meant including e.g. project managers and representatives of the production, procurement and product development. Hereby the network structure of interaction was changed.

Figure 5 The key account manager mediates and runs the co-development between the organisation and its client company.

Author

Key account manager is the main responsible for co-development negotiations
between the company and its client, but he/she involves other members
of the KAM team when appropriate.

Key
account
manager

Key account management team
representing different
functions of the organization

Client organization
representatives

Refining social practices

It was difficult for production and sales to find agreement in a situation where the salespeople were expected to create new businesses, while the production people had the dual responsibility not only of increasing sales but also of running the production in an efficient manner. It was hard to join these different interests that were equally important from the company's point of view. Yet, it was the diversity of views and interests that created the necessary creative tension in this case. The parties had to struggle to find the answers and they were forced to engage in meaningful discussions before they could reach their goals.

In the beginning, the KAM team meetings did not have much structure. The busy people started to doubt the whole idea of meetings as it didn't seem productive enough. Structure and practical goal-oriented problem solving was seen to bring efficiency and results. *"We need the team, but we need clear rules and we need to work together in practice"* said a representative of production in one of the workshops arranged for reflection. Different norms hence had to be set up. The teams decided to have short, structured meetings once a week with a standard agenda. Some issues needed to be discussed regularly even though it would only mean mentioning them shortly. The problem of finding mutually beneficial agreements between production and sales was alleviated to a great extent through the development of structured, joint working practices and tools for assessing the financial impact of new businesses. These new rules, structures, agendas and tools were used to overcome the problems of the company's traditional norms of highly central communication and decision culture.

Creativity was the result of the team members' commitment and willingness to find mutual goals and work towards them. This commitment would not have been possible

without the goal-oriented and structured way of working. The regular meetings with agreed working practices and tools created a safe arena where different interests could be joined together in a productive manner.

The high frequency of the meetings (once a week), which was needed in order to enhance bonding elements, constituted a problem since the members of the teams came from different countries and locations. Therefore, the weekly meetings of the teams were organized as teleconferences. There was a lot of scepticism about whether the teleconferences would work, but the option of less frequent interaction between the teams was even worse. The decision to use teleconferences seemed right, and one of the key account managers stated that *"The teleconferences are working very well despite our low expectations."* A social integration communication mechanism is in play, albeit not face to face.

Outcomes of the implemented practices

The result of the changes was that bridging connections between functions of different cognitive backgrounds and different operational aims were established through the KAM teams. Additional bridging linkages were established with the customers. The distress caused by the diversity of people and contradictory aims was relieved by bonding type elements: stable structure, frequent and regular meetings and the jointly agreed practices and tools. These new mutually accepted norms created a safe situation in which creativity could take place.

The practical usefulness is the primary criterion when evaluating this type of research and development work. Even though the teams did not become fully "ready" within the time-frame of the research project, both the project owner and the team members saw clear improvements and were happy with the development. The use of the KAM teams and the new working methods were continued after the project. Therefore, the development work passed the weak market test. The strong market test requires that implementing the change systematically leads to better results than not implementing the change. We do not have data on similar KAM change processes, but we do know that the KAM team model did lead to very good results in this case. The KAM teams were able to create organisational renewal and new businesses that wouldn't have been developed otherwise. The developed new businesses were also very successful, leading to a substantial and profitable increase in sales.

4 Summing up the cases

The two cases have similarities but different starting points. In case A, the salespeople group is well-bonded and can effectively exploit knowledge that is familiar to everyone. The strong bonding social capital hence leads to assimilation. Their weakness lies in the limited number of new and different ideas that could penetrate the organisation and constitute transformation. In case B, the people are scattered and the knowledge flows go mainly through one channel, the CEO. The people do have a lot of diverse knowledge and potential for transformation, however, they do not possess enough bridging and bonding social capital to turn this potential into transformative, new business.

Transformation is achieved in both cases via the intermingling of bonding and bridging, i.e. creative social capital. In case A, there was initially a strong bonding social capital, since the community of practice is built on the premises of a well-bonded group of salespeople. The bridging element is added by legitimizing the peripheral participation of production managers and employees. This structural change entails new cognitive dimensions, since differing opinions are added to the discussions via the involvement of production in the active and peripheral group. These opinions are facilitated in safe contexts.

On the other hand, case B emphasizes diversity and bridging social capital. The KAM teams aim to add bridging social capital i) between different functions of the organisation and ii) between the organisation and its clients. This bridging was not sufficient though, since further bonding was needed in order to lessen the cognitive distance and reduce frustration. Introducing regular goal-oriented practices for co-operation facilitated the needed bonding. These practices consisted of elements like regularity of meetings, common rules, structures, agendas and tools. In the end, it all comes to organising the possibilities for discussion. The managers and organisations can facilitate the leverage of organisational absorptive capacity through social capital by appreciating and cherishing the human encounters.

5 Discussion and conclusion

The authors follow up on the work of Todorova and Durisin (2007) who state that assimilation and transformation are complementary phases of AC and suggest that different kinds of social capital can facilitate different kinds of processes. They propose that while the different AC (assimilation and transformation) phases seem to call for different (bridging vs. bonding) social capital, a third element is needed in order to be able to balance different kinds of organisational outcomes. Creative social capital is suggested to facilitate the moving from assimilation to transformation and vice versa and thus achieve balance between the two phases.

This paper builds on the study of Kallio and Bergenholtz (2011) on how to transfer individual level absorptive capacity to the organisational level. Hereby the authors focus on the micro level of concrete social processes by presenting creative social capital as a group-level concept (Harmaakorpi, 2004; Kallio et al., 2010; Tura and Harmaakorpi, 2005) that includes both a perspective on structure and an emergent social interaction process to balance the assimilation and transformation processes.

Figure 6 shows the role of social capital when facilitating the transformation-assimilation of knowledge.

Figure 6 Social capital in the transformation-assimilation dilemma of AC
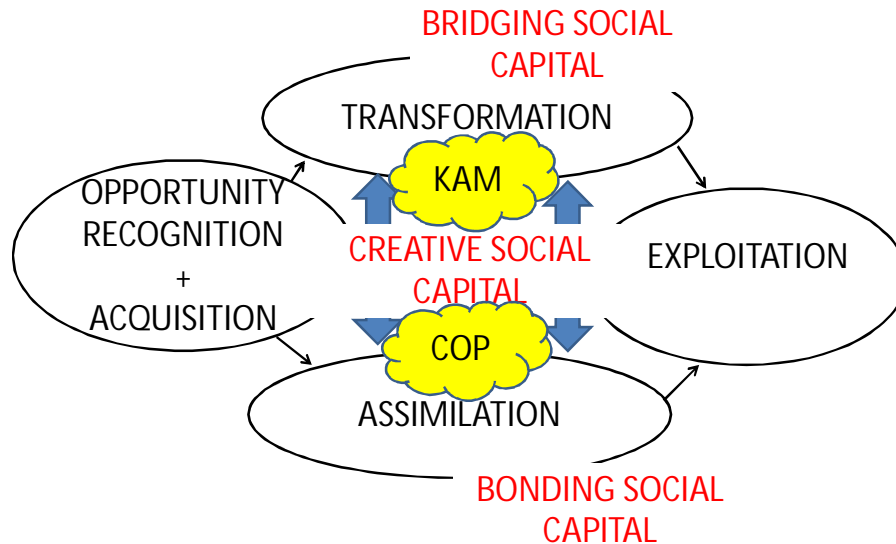
As Todorova and Durisin (2007) argue, some absorption processes rely more on transformation than assimilation, and vice versa, depending on how easily the new idea fits existing cognitive schemas. In case A it is demonstrated how the social capital originally relied on bonding elements, which entails that especially transformation absorption processes will be difficult to facilitate. On the other hand, case B illustrated that bridging social capital was not sufficient to achieve transformative goals, since the cognitive distances were too significant and created confusion. A certain level of bonding is needed for the commitment and willingness to find mutual goals and work towards them. In both cases bonding and bridging elements thus complemented each other in order to achieve transformation. Transformation thus requires different kinds of social capital (both structurally and cognitively speaking) than assimilation.

In order to establish creative social capital, it is important to generate a safe space (Isaacs, 1996) where it is possible to reach dialogue (Gustavsen, 1992; Schein, 1993) between different viewpoints. Network structures create part of the safeness and thus assist in the establishment of creative social capital. However, the creation of creative social capital requires the interacting partners to practice social and emotional intelligence (Goleman, 2006) in the emergent process of interaction. Hereby creative social capital is a concept that both relies on structural and action oriented features (e.g. norms for interaction), as Nahapiet and Ghoshal's (1998) social capital concept.

Whether an organisation and its members depend more on assimilation than on transformation, depends on the search strategy (March, 1991). Creative social capital can balance the two options by creating a safe space (Isaacs, 1996) for assimilators to try transformation (e.g. communities of practices). Or, creative social capital can create situational bonding in groups of high diversity (e.g. KAM). Different tools or social integration processes will facilitate these moments of innovation.

Author

The implications are based on AR studies of social integration processes and absorption processes in a specific low-tech industry (no R&D department) and country. The contribution of the paper should be further tested in other settings and involve different constellations of individuals. More systematic projects could also test some of the implications via survey-based studies.

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Article 5:

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AN EMPLOYEE-DRIVEN ORGANISATIONAL INNOVATION SYSTEM – EXPERIENCES FROM INNOVATION CATCHER

Anne Kallio*
Lahti School of Innovation,
Lappeenranta University of Technology,
Saimaankatu 11, FI-15140 Lahti, Finland
Fax: +358 3 876 9133
E-mail: anne.kallio@lut.fi
*Corresponding author

Suvi Konsti-Laakso
Lahti School of Innovation,
Lappeenranta University of Technology,
Saimaankatu 11, FI-15140 Lahti, Finland
Fax: +358 3 876 9133

ABSTRACT

Employee participation is a widely researched area in the field of innovation studies. The movements of continuous improvement and Kaizen as basis of lean production highlight the value of employee observation. However, these models are top-down oriented and focus on reducing variety rather than exploring new possibilities.

Building on the literature of employee-driven innovation, this paper focuses on how employees can be engaged in designing organisational innovation practices. An intervention model to build an employee-driven organisational innovation system, Innovation Catcher, is presented. Employees are involved in designing and making decisions on the practices in co-creation with management and researchers. Three action research processes are examined in this paper, all focusing on improving the traditional suggestion box.

Keywords: Employee-driven innovation, shop floor innovation, co-creation, practice-based innovation, Innovation Catcher

INTRODUCTION

Employee-driven innovation (EDI) follows in the footsteps of Japanese quality-oriented production logics, such as Kaizen (e.g. Imai, 1986), continuous Improvement (e.g. Boer et al., 2000), as well as high-involvement innovation (e.g. Bessant, 2003). All these approaches relay that everyone in an organisation is capable of possessing the skills and abilities underlying innovation (Tidd & Bessant, 2009). According to EDI, innovations can emerge from any part of organisations and from any employee group (Kesting & Ulhoi, 2010; Hoyrup, 2010). Hoyrup (2010) writes that EDI is often connected to non-R&D innovation as well as non-technological innovations. EDI is also related to direct

participation in organisational change (Sisson et al., 1994) and workplace learning (Jensen et al., 2007; Ellström, 2001).

EDI is emerging into the current discussion about the sources of innovation. The current mainstream of innovation research is mainly based on the research stream of STI (Science-Technology-Innovation) (Jensen et al., 2007). Knowledge generation and learning in STI is based on expert knowledge production and dissemination of codified knowledge. DUI processes are informal processes of learning that entail experience-based know-how. In DUI processes, knowledge producers and users are intertwined (Jensen et al., 2007). Hoyrup (2010) refers to the STI mode of knowledge generation as R&D-driven innovation, whereas the DUI mode represents employee-driven innovation (EDI). Ellström (2010) discusses EDI and practice-based innovation as similar concepts, whereas Melkas and Harmaakorpi (2011) see EDI as a subcategory of practice-based innovation. This paper follows the definition of Melkas and Harmaakorpi (2011).

According to Ellström (2010), an explicit work process is formally described and the procedures can be codified, whereas an implicit work process contains the interpretation of an individual of how the work is actually executed on the basis of tacit knowledge. The explicit dimension enhances adaptive learning, whereas the tacit dimension and personal variations create a platform for innovation and reproductive learning (Ellström, 2001). These two organisational logics form the basis for practice-based innovation: the balance between reproduction, reduction of variance and variation, transformation (Ellström, 2010). Thus, every employee has two tasks: to carry out their work and to think about how they could develop their work.

This study aims to understand how employees can at the same time do their routine work and engage in development work (in a way that is meaningful to them). The research question is: How to engage employees in a practice-based innovation environment? This is examined in three action research studies that focus on an employee-driven suggestion box.

First we shed some light on the literature on employee-driven innovation, following the idea of the co-creative approach in implementing EDI. The Innovation Catcher

experiences described here include a description of the research process and cases as well as the outcomes of these cases.

EMPLOYEE-DRIVEN INNOVATION (EDI)

Kesting and Ulhoi (2010) define EDI as "*the generation and implementation of significant new ideas, products, and processes originating from a single employee or the joint efforts of two or more employees who are not assigned to this task*" (p. 66). Thus, EDI can be understood as a process of engaging employees in the innovation process, not just the outcome.

The fact that shop floor level employees are valuable for development is widely recognized in literature, especially concerning quality improvement movements. Shop floor level employees are key persons to engage in innovation activities of organisations since they have direct contact with the problem sources and the required knowledge of production processes (Axtell et al., 2000; Nijhof et al., 2002; Van de Ven, 1980; Imai, 1986). What differentiates continuous improvement and EDI is the perspective; most of the activities in continuous improvement are initiated, planned and directed top-down (Jorgensen et al., 2004). Employees are involved in models that the management has already defined; they are not taken along in the initial phases of designing new organisational models (Telljohann, 2010). In EDI, the approach is bottom-up, and more power concerning the whole innovation process is given to the employees.

There are some inhibitors that affect the innovative behaviour of employees. A typical disabler of innovative activity on the shop floor level is that the organisational setting and culture does not encourage this activity (Rawaswamy & Gouillart, 2010). Another typical hindrance is attitude: individual employees do not see it as part of their job. The attitude of feeling responsible for idea generation increases the activity in contrast to the attitude of "it is someone else's job" (Farr & Ford, 1990; Morrison & Phelps, 1999; Axtell et al., 2000). However, not everyone desires to be active in development but prefers to focus on their routines, and this should be appreciated (Kesting & Ulhoi, 2010).

The literature on empirical studies on employee-driven innovation (as a concept) is not vast, and the existing studies are dispersed. In other words, EDI can mean different

things in different organisations (Teglborg-Lefèvre, 2010). For example, Evans and Waite (2010) see the process of enhancing EDI as leveraging the skills of employees in lower grade jobs, whereas Teglborg-Lefèvre (2010) presents one case that involves consultants who help others in creating innovations. Telljohann (2010) describes a case where public hospital workers redesigned their work in a five-year development project.

According to EDI, employees should be taken along in the innovation related decisions regarding daily processes (Kesting & Ulhoi, 2010). In practice-based innovation, employees are acknowledged in idea evaluation systems by using the collective intelligence existing in employees (Salminen & Harmaakorpi, 2011). This approach not only challenges the traditional view of an expert evaluating ideas but also liberates resources in the organisation to other functions. When employees get more power to decide which ideas are to be implemented, the activity level rises.

EDI research has to focus on the planning and decision-making procedures (Kesting & Ulhoi, 2010). Kesting and Ulhoi (2010) discuss drivers that enhance employee participation: management support, the creation of an environment for idea generation, a decision structure, incentives, and the corporate culture and climate. In order to mobilise employees to perform a task, they must have a certain degree of capacity to use the autonomy given to them. This is affected by, for example, experience, knowledge and understanding of the task itself, self-confidence, and occupational identity (Ellström, 2001).

A CO-CREATION APPROACH TO ORGANISING EDI

A top-down culture still governs in the innovation activities of organisations. However, it is not only the management who needs to change the way they see organisations. Employees also need to adopt a new attitude of realizing that they do have power in innovation activities, and they should take responsibility in the development.

In order for EDI to take place, the employees can be supported, for example, by inviting them to participate in innovation processes and high-involvement innovation (Hoyrup, 2010). Another term linked to this matter is co-creation, presented by Ramaswamy and Gouillart (2010). Co-creation was introduced by Prahalad and Ramanswamy (2004) as a way to create value with customers. It was recognized that customers should be

4

included in the value creation process, not just to create value *for* them but create the value *with* them.

Co-creation can be understood as a participatory or democratic approach to innovation. A co-creation approach builds on the ideas that a) the individual is part of the creativity process and it is in the employees' self-interest to participate, and b) the starting point of the co-creative process is the experience of an individual, not the organisation's process. It can be said that co-creation relies on emergence rather than strict management. Co-creative processes have both a top-down and a bottom-up component. The management creates the grand vision of what must be achieved and then facilitates (not manages!) the transformation. The bottom-up component designs and mobilizes the transformation (Rawaswamy & Gouillart, 2010).

In order to successfully apply EDI, the structures are needed so that the ideas could be harvested from among the employees. Therefore, we suggest that co-creative approaches are needed in order to implement ways of working or structures such as an organizational innovation system which could be successful and which the employees could actually adopt.

INNOVATION CATCHER

In this paper, we present experiences from an intervention process called "Innovation Catcher". The cases for this paper have been chosen from nine case studies that were conducted during the years 2006-2009. All three cases included companies that considered the suggestion box as a good channel for acquiring employee ideas. However, it was stated that something could be done to enhance the activity in the suggestion system.

RESEARCH DESIGN

The authors of this paper belong to a multidisciplinary research group. It is believed that in creating innovation, the ability of the participants, representing various competences, to co-operate, learn collectively and build a trusting and creative atmosphere is crucial. A core research group with different expertise was involved: one with EDI, one with creative methods and one with a strong industrial background. In addition, the cases were monitored by a group of experts. The group included circa 10-15 researchers and

participants from a local science and business Park and they gathered together whenever there was a need for it, at least quarterly.

METHODOLOGY

The methodology is action research (AR). An AR approach helps to explain why some organisational change processes succeed and others do not. It makes it possible to introduce organisational changes to address a practical need and to simultaneously do research on the change process. This kind of approach also stresses the joint learning where the researcher does not solve the problem for the organisation, but they solve it together (Coughlan & Coghlan, 2002; Reason & Bradbury, 2008). AR supports the co-creative approach to organising EDI. The practitioners have to take responsibility of the business change as the researchers facilitate the analysis and reflection (Avison et al., 2001).

Table 1 presents the phases of the AR process, i.e. phases of Innovation Catcher. A lot of effort is being put into locating the development need, that is, what in the organisation's innovation system is seen as non-functioning. Both the management and the employees are asked about their views and the final development focus is decided in a workshop. The actual content of what kind of practice will be generated is decided in phase two. That includes two workshops and assignments in the everyday work environment. Finally in phase three, the resources and commitment to the new practice are ensured.

Phase	Content	Working method	Output of the phase
1. Diagnosis: locating the development need			
1.1 Meeting the management	Need and resources for the process	Meeting	What does the management think is the current state of things?
1.2 Interviews, questionnaire	Presupposition of where to target the actions Awareness of the state of the innovation capability of the organisation	Semi-structured interviews, web-based questionnaire	What do employees think is the current state of things?
1.3 Workshop 1	The actual development focus and individual motivation	Creative working methods	Shared view of the development focus; Motivation to continue
2. Creating content			
2.1 Workshop 2	Idea generation	Creative working methods	Ideas for practices, roles, models that enhance EDI
2.2 Work	Testing the ideas	Observation, notes,	What is possible to implement

		researcher mentoring	in everyday work?
2.3 Workshop 3	The questions that need to be solved	Creative working methods	A solution that will be implemented
3. Agreement			
3.1 Agreement	Resources and commitment	Meeting table with roles	To ensure different viewpoints
3.2 Reflection	Evaluation	Reflective discourse, questionnaire	To evaluate the process and innovation capability

Table 1. The phases of the Innovation Catcher intervention process (inspired by the AR process of Coughlan and Coghlan, 2002)

In our processes, the researcher is seen as a facilitator whose responsibility is not to mainly produce new scientific knowledge but to facilitate the participants from the organisations to engage in the development process (see Kallio & Hyypiä, 2011; Wadsworth, 2008). It is seen that the most important tasks of a facilitator is to empower employees to take responsibility of their innovation activities (which can further lead to increased autonomy if allowed by the management).

Interventions were made to facilitate the participants to make their practices visible and thus discussable and changeable. The interventions were organized in close co-operation with the personnel and the leaders of the case organisations.

CASE ORGANISATIONS

Organisation A is a packaging board manufacturer in one factory location. Organisation B is in the forest industry and it had five different units participating in the action research process, four factories and one administrative unit. It was tested whether Innovation Catcher would work on a network level. In the end, only one unit implemented their joined ideas.

Organisation C is a public utility operating in the field of municipal engineering. It has approximately 240 permanent employees and about a dozen temporary employees during the peak seasons. The organisation itself is quite new; it started operations in the beginning of 2005 as a result of a merger of five different municipal service production units. It was the first public utility in Finland to operate in this field (Linna et al., 2010).

Case organisation	Industry	Who participated	Data collection	Duration

	A	Packaging board, 180 employees	Factory manager, suggestion board secretary, shop floor employees	10 semi-structured interviews, participant observation, 3 workshops, written material the participants produced during workshops, phone conversations	01/2007-11/2007
	B	Forest	20 people from 5 units (management unit and 4 factories)	20 semi-structured interviews, participant observation, 3 workshops, written material the participants produced during workshops, phone conversations	04/2007-05/2008
	C	Public utility, 240 employees	12 employees from dispersed work locations	3 group interviews, participant observation, 3 workshops, written material the participants produced during workshops, phone conversations	10/2007-12/2008

Table 3. The case organisations and data

DATA

Semi-structured interviews were conducted and carried out by one or two researchers. The interviews included open questions about idea management systems and possibilities to participate in the innovation activities, the working atmosphere, and motivation towards work and idea generation. In other words, the interviews were about the activity of the individual and how the organisation supports initiatives. Willingness to take part in the process was also an object of open inquiry. In case C, the interviews were carried out for three groups.

In action research, one of the underlying assumptions is that researchers are themselves instruments in the generation of the data. When they ask questions, at the same time they actually present hypotheses and present a certain field of thinking (Coughlan & Coghlan, 2002). Table 2 presents the key questions that took the action research processes forward.

Case	Interviews	workshop 1	W2	W3	Other
A	Idea generation, Idea management, Motivation and arenas for generating ideas together, feedback and rewarding, absorption of external knowledge Willingness to be	Idea generation: how could we get more employee suggestions?	Clarifying communication: how could we inform the personnel about the suggestion system?	Rewards: what motivates to make suggestions? What else than money?	Assignment: tell your peers about the suggestion system and encourage them to submit ideas
B		Why are employee suggestions important?	Idea generation: how could the units benchmark each other's	Agreement: How is this going to be implemented?	Assignment after W1: tell the success story of an idea from your

C	involved in the process		ideas?		unit
		Meeting with the CEO Feedback from the interviews, discussion of idea management in general and solutions that are used in other places	Feedback from the interviews, how ideas should be: - generated - processed - rewarded	Agreement: discussion of the idea management system and deciding what to implement	Assignment after W2: how would this model work in your work environment?

Table 2. The key questions in the phases of the action research processes

The interviews had the same semi-structured interview form. The workshops also had a certain structure to follow: the first one was about motivation, the second about idea generation and the third about decision making. However, the topics of the workshops were modified according to each organization and their interview results.

The data was analysed using content analysis techniques. We were comparing our data to the EDI factors described in the literature: Management support (Kesting & Ulhoi, 2010) and Intra-organisational support and culture (Kesting & Ulhoi, 2010; Teglborg-Lefèvre's, 2010; Rawaswamy & Gouillart, 2010). In addition, the role of the (action) researcher was reflected (Hallgren, 2009; Kallio & Hyypiä, 2011).

CASE DESCRIPTIONS

CASE A
Case A was one of the first cases in the development of Innovation Catcher. Previously, the company had a suggestion system on paper. At the same time as this process took place, the company launched an online suggestion system that could be used from every computer in the factory.

> *"I have made many suggestions, yeah. Some suggestions have vanished, so to speak; I have received no feedback on whether they were accepted or not. The one I made about one blower, that suggestion disappeared, no one has seen it. And no one came to me and asked if it was poorly written. I must have written it badly so that they did not understand it. They did not even come and ask. And maybe they just ripped it if it was not accepted. It is rough. And it was not the first one that disappeared."* (Interviews, shop floor employee on the suggestion system on paper)

The factory manager was an active part of the process, as well as the suggestion board secretary, as this was his area of responsibility. In addition, eight shop floor employees took part.

> *"The role of the suggestion board secretary seems to be significant. He acts as a gatekeeper. So being, the form of the practices generated here is grounded on his persona."* (Researcher's diary)

The first workshop focused on how the organization could get more ideas from the shop floor. The shop floor employees generated ideas and presented their opinions on the topic. Things that were hindering suggestion activity were also brought up. Among other things, it was mentioned that it took too long to implement ideas even if the idea was related only to a small improvement in the process. A maintenance guy was assigned to prioritize the tasks coming from the suggestion system. That way he could fix the little things in a short time.

> *"I have been a suggestion board secretary for two years. The employees are not very active in making suggestions. I don't know why. …. The reason can be that it takes too long to implement the suggestions….. and how the experts give their statements, it may not be prioritized… "* (Interviews, suggestion board secretary)

The second workshop was about the topic of communication. The participants wondered how they would inform the employees about the suggestion system and get them to constantly remember that it does exist. It was stated that "generating ideas" is a quite vast area, and perhaps needed some clarification. Eventually it was decided to launch an idea campaign on how to reduce raw-material waste in the production process. As the suggestion system was new to the company, those who participated in the intervention process agreed to help their peers on the shop floor in the actual submission of ideas.

The company had launched teamwork some years earlier. However, it was criticized in the interviews for the lack of leadership in teams. Here the teams were used to talking about current problems and unsolved questions in the everyday work. The third workshop dealt with motivation. What motivates the employees to submit suggestions? Feedback from this process was also asked in a written form.

> *"The shop floor employees did not talk aloud a lot in this session. However, they did write a lot in the feedback form."* (Researcher's diary)

Another interesting thing was observed in the third workshop. In all workshops, the factory manager and shop floor employees were there. No foremen were present. The leader asked from the researchers that were sitting around the same table: *"Sounds good, I wonder what they (shop floor employees) think about this*? After pausing for a second, the researcher looked at the shop floor employees and asked, *"What is your perception on this?"* The manager had not intended to be rude or disregard the employees on purpose; he probably just did not know how to act in that situation. The researcher observed in the third workshop that after a while, the same manager started asking the employees themselves about their opinion. As a researcher's interpretation of the situation, it just might be that the most valuable result of that research process happened in the mind of that manager. He realized something that opened a discursive channel between the shop floor and the management.

CASE B
Company B has a suggestion box online and every year an idea competition is held. The suggestion box is perceived as a good channel, but the management does not see that idea competition would be a significant motivator for shop floor level ideation.

The most active members of each unit were chosen for the interviews, since it was assumed that they would have the most insightful knowledge on the idea generation practices. After that, they had altogether three workshops. In the first workshop the researchers presented the results of the interviews. After the feedback, the participants discussed the feedback, aiming to form a mutual understanding of why ideas are important and why the ideation activity should be emphasised. After the first workshop the participants were given an assignment. They were to write about two experiences from their unit: an innovation success story and an example of a bottleneck in the idea management system of their unit. They were given mentors in their assignment.

The second workshop was two-fold: the participants presented their assignments and generated ideas on inter-unit practices to benchmark ideas. The mentors were present to give feedback on the assignments. The participants learned about each other's realities and practices. The idea generation part produced practices that enhanced idea generation inside each unit and between units.

In the third workshop, the researchers had organised the material from session two and suggested those things that the company could start to implement. The suggestions included ideas of a more informal group to collect ideas, inter-unit benchmarking visits, and boosting the ideation activity by encouraging an innovative climate. Eventually one of the participants took the lead and said that they could try some of the things agreed in their unit. He was just promoted to factory manager. It was decided that they would implement the informal group idea in their unit.

A month later, the researchers called the pioneer unit and heard that they had chosen three persons to be innovation activators. Activators were to take their new position at the beginning of the following year. Together they were an informal idea-gathering group.

Six months later the researchers received a memo from a meeting that the innovation activators had held. It shared the very first experiences of the activators. An activator was to be open and easy to approach. Even though activators considered themselves an alternative channel to submit small ideas, they did not want to tell the official feedback to their peers. In other words, they did not want to be another hierarchical layer between peers and management. The company had arranged a visit to their subcontractor for the activators, who saw this as a reward for their work in their new position.

Ten months after the innovation activators had started, the amount of suggestions had increased. The role of an innovation activator in fact makes the job of the management easier concerning idea generation, as they try to help the management to understand what a current idea is about and also to ask the shop floor employees for more information.

> *"Many employees experience discussion as an easier way to express ideas than the suggestion system. I have already written one suggestion this year in the system on behalf of an employee. All channels for giving ideas are held open to ensure equality as innovators for every employee."* (Memo from suggestion board secretary)
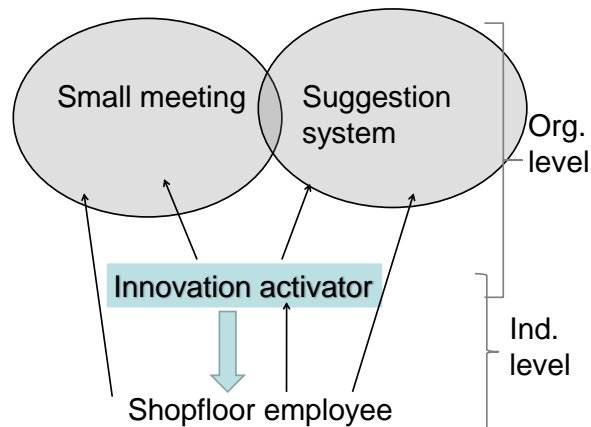
Figure 1. Innovation activator supporting idea submission (modified from Kallio and Bergenholtz, forthcoming)

Figure 1 presents the role of the Innovation activator. The arrows illustrate the knowledge (or idea) flows. The innovation activator is active in listening and observing shop floor employees in their work and encourages them to present good ideas in small meetings or to the suggestion system. If an employee feels uncomfortable doing so, the innovation activators offer their assistance. Incremental improvements are steered to the small meeting and implementation, whereas ideas that require investments or somehow challenge the status quo are submitted to the suggestion system. The function of the innovation activator facilitates the individuals' ideas to become part of the organisation's knowledge.

> *"Innovation activators are active persons in suggestions and initiatives who seek to find the problematic spots in the everyday work. You can talk to activators about things that bother you or your work team. They will help you in generating ideas and finding the right channel to forward an idea. Sensitive matters can also be brought up via an activator."* (Material from the company, how the function of the innovation activator was described to the organisation)

CASE C

The first Innovation Catcher in the public sector was launched in autumn 2007. The employees work in dispersed locations, for example, taking care of the city gardens, and seldom encounter each other. Previously they had no channel to express their ideas, except through occasional contacts with supervisors.

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In this case, the interviews were conducted in three small groups. The purpose of using group interviews is not to replace individual interviews but to reveal another perspective on the research problem that could not be achieved through individual interviews (Fontana & Frey 1994). In fact, the interview sessions were not very formal: they were more like learning and discussion events. Not only did the researchers acquire information, but also the employees learnt how things are done in different units in their organisation.

> *"... in one municipality they may be doing some assembling with a tool that they have made themselves, but other municipalities have no knowledge that this kind of tool even exists.."* (Interviews, manager of city gardening)

After analysing the interviews, the researchers met the manager. The research team presented some suggestions concerning the main challenges that the organisation is facing concerning innovativeness.

The action-planning step with the shop floor employees included two collective sessions and an individual assignment. In the first collective session, employees generated ideas on how the idea management system should be formed. As an assignment, they introduced their ideas to colleagues who did not take part in the process in order to get their reactions. The second collective session was held to prioritize the ideas and make an agreement on how to implement ideas.

The purpose of workshop three was to make decisions on how to proceed, and the CEO was expected to be present. However, he was not present and the aim was not achieved. Even though the CEO was not present in the workshops, he implemented the solution very efficiently and was content with the process. A year later in a small conference held in the city, he stood up and praised the work of the researchers on the suggestion system.

Figure 2 presents the suggestion system the employees had created. The process included the phases of idea generation, idea evaluation and rewarding. Idea submission was derived through two channels: the suggestion box (continuously) or an idea competition once a year. Idea evaluation included feedback, implementation and rewards. The suggestion boxes are emptied once a month and the evaluation board

evaluates them and gives personal feedback. The feedback form included the following details:

- Basic description of the idea
- When has it been considered (and when is it going to be considered the next time, if further consideration is needed)?
- When has it been implemented?
- Who can give more information?
- Is it suggested that the employee should be rewarded for the idea and how are they to be rewarded? (Linna et al., 2010, p. 297-298)
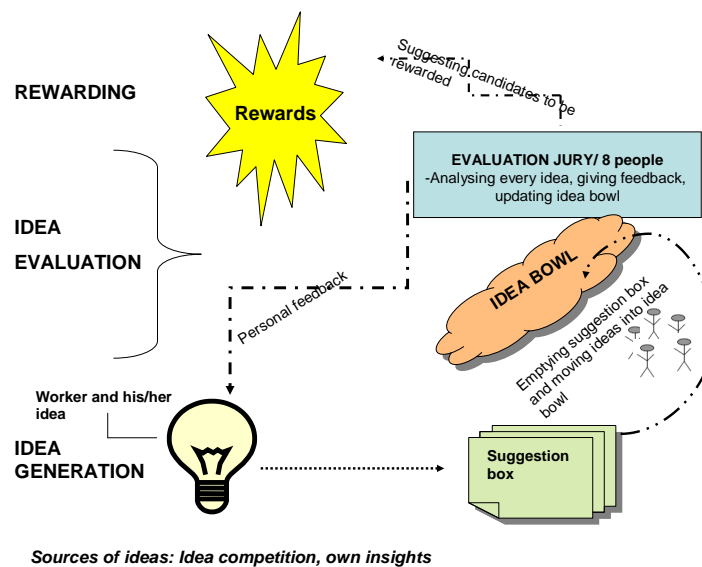
Figure 2. The Innovation Catcher of the case organisation: a model of process innovation (Linna et al. 2010, p. 297)

The first experiences of the implementation of the agreement were acquired in an evaluation meeting. At this stage, 8 months had passed from the agreement session with the shop floor employees and 7 months from the meeting with the manager. The members of the evaluation board were very committed and enthusiastic about the issue. The board had held its first couple of meetings. Still, the actual innovation process is in a pilot stage and some minor changes might be done. Both of the representatives present in the evaluation meeting of the organisation were realistic and pointed out that it takes

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a lot of time and patience to make this innovation process a part of the daily routines of each employee.

The discussion is organised according to factors that are seen to affect the engaging of employees in designing an intra-organisational innovation system: the power relationships of the researcher/participants (Wadsworth, 2008; Kallio & Hyypiä, 2011), management support (Kesting & Ulhoi, 2010), and intra-organisational support (Teglborg-Lefèvre's, 2010; Rawaswamy & Gouillart, 2010).

In case A, the factory manager gave the researchers a lot of room to work, although the trust was achieved as the process went on. He used his power to give resources, although the hierarchical status was present in the workshops even if he did not actively use it. In the idea generation workshop, where he was not present, the employees had the courage to be playful and express their views on things. In the other two workshops, it was rather difficult for the researchers to get the employees to be fully involved and active.

Case B was researcher-oriented, monitored by upper management. Only in the third workshop the factory manager saw a possibility in the created practice, selected it and implemented it with success. In case C, the CEO wanted to keep the power. He had a strong influence in the meetings before workshops, did not come to the workshops, and again after the workshops he implemented the created practice. Thus, it can be argued whether the role of the researcher was just to facilitate the idea generation. It can be questioned whether the process was truly co-creative (Rawaswamy & Gouillart, 2010) and genuinely employee-driven.

Case	Practice that was generated	Power-relationships	Management support	Intra-organisational support
A	Idea generation campaign	Factory manager present and active in 2/3 workshops	Allowed to use time on the process	Resources: a maintenance person alert for implementing suggestions
B	New roles to enhance innovation activity	Researchers led the process; Factory manager active participant in the workshops; took an	Organisational support for idea generation, new job descriptions	Resources: Innovation activators on the shop floor, activator meetings with suggestion board

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		initiative to implement a practice		secretary
C	Suggestion box	CEO not present in the workshops, mainly in meetings. Implemented the created practice.	Allowed to use time on the process	A channel to present ideas was provided to dispersed workers

Table 3. Comparing the EDI practices in the cases

According to Kesting and Ulhoi (2010), management support in EDI can be divided into two ways of acting: First, all employee participation requires a license for the employees to step out of their everyday roles. Second, management support can also be a mentoring process to the employees in their idea generation processes. In cases A and C, the management support appears in the form of time allocation, so that employees were allowed to use working time to come to the workshops, but after the process they were expected to give ideas and return to business as usual. It can be stated that the employees did not receive more authority after the process, although they were involved in building the practice and later on had better opportunities to have influence on innovations in their organizations.

In case B, new roles for shop floor employees were created. This case had probably the most remarkable increase in employee authority, even though it was only for certain individuals who volunteered and were active. They got to create part of their own job description, what an activator is and how it works. And all three activators did the job in their own ways according to their personalities.

It seems that EDI is affected by intra-organisational support, the amount of resources there are to support idea generation and what the relations of autonomy and control are (Kesting & Ulhoi, 2010). Case B with innovation activators is a very good example of organisation-supported idea generation and ideas elicited from the shop floor. Combined with a traditional suggestion box, this offered a good way for the organisation to absorb the ideas that the employees had (Kallio & Bergenholtz, forthcoming). The activators also had peer support; they met each other and discussed the difficulties and the ways of being an innovation activator.

In case B, the researchers had agreed on the project on the top management level. However, the foreman level was not aware of it or did not see as important. One of the

groups had not returned their assignment, and when asked, they replied with the question of whether all the supervisors knew about this project. One of the participants said he would have liked to do the assignment during working hours but had no chance to do it. He told the researcher that they even had to sneak out to our previous meeting. Their foremen either did not know about this project or like it. The researcher informed the also amazed contact person about the situation. The participants did not come to the meetings anymore.

In case A, a maintenance person was assigned to prioritize tasks coming from the suggestion system. This had a direct effect on the idea implementation time.

CONCLUSIONS

This paper contributes to the literature on employee participation (Axtell et al. 2000; Bessant, 2003) and the discussion of employee-driven innovation (Hoyrup, 2010; Kesting & Ulhoi, 2010) with the co-creative approach (Rawaswamy & Gouillart, 2010) to organizing EDI. It presents three cases where an action research-based intervention, Innovation Catcher, was conducted. The Innovation Catcher engages employees in designing an innovation system inside the organisation in a co-creative process with managers and researchers.

From the co-creative viewpoint, the employees were given the possibility to participate and contribute to the formation of an organisational innovation system. From a process perspective, the most co-creative process took place in case B. The manager was part of the whole process as an active participant, and stood out only in the phase where decisions needed to be taken. In the other two cases, the managers did not want to participate in idea generation.

The manager in case B was part of the whole process as an active participant, and stood out only in the phase where decisions needed to be taken. Then in case A, the manager was active and crossed some lines of communication but felt that he did not want to be in the idea generation workshop. And finally in case C, where the manager did not want to take part in the idea generation, he communicated very little with researchers. However, the picture is not so black-and white. As an example of the practices that were generated in these processes, case B produced a continuous practice for the shop floor

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level. The role of innovation activators does actually engage employees simultaneously in the development work and in routine work (See Ellström, 2010; Melkas & Harmaakorpi, 2011). In case C, the suggestion box was also a considerable change since the employees got a channel for their ideas. In case A, the idea generation campaign was temporary and the long-term benefits are questionable.

Our experiences show that the role of the manager should be active throughout the process, also in the idea generation phase. At least in organisations that are not used to EDI, researcher intervention can function as brokerage between employees and managers. Further on, the need for external intervention decreases. Well-established companies cannot take too big steps toward EDI at once. Thus, a potential future research avenue is to define the levels of EDI, including contingency factors such as industry, company size, culture and history. After these are recognised, scholars and practitioners can set better targets together and spread EDI.

The limitations of the study include the focus of the research being strongly attached to the suggestion box. Employee-driven innovation is more than a suggestion box and its modifications. Further studies should focus on the intervention and its effect on employee-driven innovation. Does an external intervention speed up the process in which organisations adapt to non-R&D innovation? Can the intervention be generated in-house?

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Locating the Weak Points of Innovation Capability before Launching a Development Project

Anne Kallio
Lappeenranta University of Technology,
Lahti School of Innovation,
Lahti, Finland

anne.kallio@lut.fi

Paula Kujansivu
Tampere University of Technology, Department of Industrial Management, Tampere, Finland

paula.kujansivu@tut.fi

Satu Parjanen
Lappeenranta University of Technology,
Lahti School of Innovation, Lahti, Finland

satu.parjanen@lut.fi

Abstract

Before launching a development project to enhance innovation capability, it is essential to know how innovation capability is comprehended. This paper suggests a procedure to locate the development targets of organizational innovation capability before making decisions on projects. First, from the viewpoint of practice-based innovation, an understanding of the concept of innovation capability is provided. Further, the suggested classification for innovation capability provides a basis for developing the measurement instrument. Finally, to answer the research question of how an innovation intervention should be targeted, this paper uses practical experiences of implementing the procedure in the setting of a single case company.

Keywords: development project, practice-based innovation, innovation capability, measurement, questionnaire, survey

Introduction

Innovation capability has been recognised as a future success factor. Companies are interested in developing their innovation capability, and the research community has developed various methods to assist managers in their development work. There are reported experiences of applying these methods successfully in practice (Kallio & Bergenholtz, 2011; Parjanen, Harmaakorpi, & Frantsi, 2010).

The literature on development projects defines two major phases: project planning and project execution (Khurana & Rosenthal, 1997). Project planning of development projects includes choosing the project to work on, setting product and project targets, and putting in place the key resources and mechanisms to accomplish the development effort. The

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project execution phase involves actually carrying the project through to completion (Tatikonda & Rosenthal, 2000).

However, the success of development projects is not always guaranteed. A lot of projects are carried out that neither lead anywhere nor leave visible traces in the organization. In addition, these projects are rarely reported and published. Why do these projects fail? Are the researchers incompetent? Is the company not skillful enough to implement the results? Development projects are somewhat obligatory in today's business environment. One must keep developing to achieve success. But on what premises are the decisions made on what should be developed? How often does an external researcher present a product, after which a manager makes a go/no go decision based on his/her individual knowledge? This is often the case. Managers make decisions and may lack knowledge of what is the reality in the actual work processes (M. Cohen, March, & Olsen, 1972).

The concept of innovation capability as such is complex. No existing theory of business or innovation completely explains innovation capability (Koivisto, 2005). However, there is no one truth about what innovation capability actually is. It is essential to understand the viewpoint and comprehension of innovation and the capability to produce innovations in a given company before development projects to enhance innovation capability can be fully designed.

Our approach to innovation as well as innovation capability is practice-based innovation (Ellström, 2010; Melkas & Harmaakorpi, 2012). Harmaakorpi and Melkas (2012) have used a division where Mode 1 knowledge generation is based on a STI (science-technology–innovation) model and Mode 2 knowledge generation is based on the processes of doing-using-interacting (DUI) (for the definitions of STI and DUI, see Jensen, Johnson, Lorenz, & Lundvall, 2007). Innovation capability in the context of practice-based innovation is further based on the customer- and employee-driven innovations that are born (also) in non-R&D environments.

The research question of this paper is: How should an innovation intervention be targeted in order to enhance organizational innovation capability? This paper suggests a procedure to locate the development targets of organizational innovation capability before making decisions on projects. Before the development of a measurement procedure, a more profound understanding of the phenomenon to be measured is needed. Thus, in light of the literature, an understanding of the concept of innovation capability in the context of practice-based innovation is accumulated. This paper will present a classification of the elements of innovation capability which provides a basis for the measurement instrument. Furthermore, we report on our practical experiences of implementing the procedure in a survey study in one organization.

What is Innovation Capability in Practice-Based Innovation?

Knowledge generation and learning in STI (Science-Technology-Innovation) (Jensen et al., 2007) is based on expert knowledge production and dissemination of codified knowledge. The science push effect as the driving force of innovations is an exception rather than a rule in innovation processes (Schienstock & Hämäläinen, 2001). Rather, innovations seem to presume that companies possess the ability to interact, learn collectively, and build trusting relations between the innovating partners (Harmaakorpi, 2004). DUI (Doing-Using-Interacting) processes are informal processes of learning that entail experience-based know-how (Jensen et al., 2007). There is a tension between the STI and DUI modes which generates a need to pay attention not only to R&D processes but also to learning from informal interaction and competence building with tacit elements (Jensen et al., 2007). In order to deeply understand the differences in innovative performance, there is a need to develop indicators that are DUI-based (Jensen et al., 2007).

A significant body of innovation literature has its roots in the science-technology-innovation (STI) research stream (Jensen et al., 2007). In examining innovation capability from that viewpoint, it is usually seen as (R&D) expenses spent on innovation generation as well as the amount of products or services or the revenue stream derived from these actions. Innovation processes are often studied as linear and analytical processes, including rational decision-making and problem solving (e.g. Tidd, Bessant, & Pavitt, 2001).

The Doing-Using-Interacting (DUI) viewpoint examines the informal processes of learning and experience-based knowhow (Jensen et al., 2007). In the context of practice-based innovation in Mode 2b knowledge generation on the organizational level, some aspects are examined more closely: developing innovation capability through breaking organizational silos, interpretative innovation processes, customers and employees as sources of innovations, tacit and symbolic knowledge, and organizational learning as a base for innovation capability (Harmaakorpi & Melkas, 2012).

Table 1: Doing-Using-Interacting in practice-based innovation activities
(An excerpt from Harmaakorpi & Melkas, 2012)

Point of view; Most typical…	Practice-based innovation (DUI, Mode 2a)	Practice-based innovation (DUI, Mode 2b)
… innovation types	Radical concept innovations – Technological system innovations	Organizational innovations – social innovations – service innovations
… fuels of innovation	Distance	"Near distance"
… logics	Related variety – innovation platforms	Developing innovation capability – breaking 'silos' and preventing bottle-necks
… capital	Social capital – institutional capital	Social capital – structural capital
… innovation methods	Methods of intellectual cross-fertilisation	Problem-based learning (e.g., culture-based methods)
… origins of innovations	Networks – serendipity – customers	'Normal' staff – customers
… types of knowledge	Self-transcending knowledge	Tacit knowledge
… knowledge transfer mechanisms	Scanning and absorbing technology and market signals	Organizational learning

Table 1 describes innovation and knowledge generation in Mode 2 practice-based innovation activities. Common to both Mode 2a and 2b is interpretative innovation (Lester & Piore, 2004) and brokerage as an ability to build possible worlds as a field of expertise (Harmaakorpi & Melkas, 2012).

A rough division between Mode 2a and Mode 2b is on the level of analysis; Mode 2a is more characteristic of inter-organizational innovation activities, whereas Mode 2b is more common on the organizational level. In this paper the focus is more on the organizational level, i.e., on Mode 2b. However, an organization is not an island; it is connected in many ways, for example, to its customers, partners, and suppliers. Therefore, we have to take both perspectives into consideration when thinking about practice-based innovation capability. Thus, the division is not black-and-white.

Mode 2a Knowledge Generation and Innovation

In the networked age, innovations are increasingly accomplishments of many people. Thus, fostering innovation means nurturing networks, exchanging ideas, and sharing knowledge not only within the organization but also outside of the organization. Innovation networks, such as links to

customers, suppliers and technical institutes, are increasingly important to organizational innovation efforts.

The relations between actors in networks can be described as strong ties and weak ties. The strength of a tie is a combination of the amount of time, the emotional intensity, the intimacy and the reciprocal services that characterise the tie (Granovetter, 1973). Both strong and weak ties are important to innovation. Strong ties include a common language and a high level of trust, and weak ties enable the flow of new information to an organization. Weak ties allow for the diversity that is needed in innovations. Burt (1992, 2004) argues that innovations are most likely found in structural holes. Structural holes are often weak connections between clusters of densely connected individuals. Actors that are in the structural holes of two or more networks have a better chance of coming up with good ideas (Burt, 2004). A regional visionary capability is beneficial in functioning in multi-actor networks (Uotila, Melkas, & Harmaakorpi, 2005).

In order to benefit from external knowledge in innovation activities, an organization needs to have proper acquisition and assimilation procedures. The term "absorptive capacity" means an organization's ability to value, assimilate, and apply new knowledge. Potential absorptive capacity enables the exploration of knowledge (often) over the weak ties, and realised absorptive capacity secures the exploitation (often) in the strong ties of the networks (W. Cohen & Levinthal, 1990; Zahra & George, 2002). Thus, the greater the internal capabilities of the firm, the greater are the effects of the different external knowledge acquisition strategies on innovation performance (Vega-Jurado, Gutierrez-Gracia, * Fernandez-de-Lucio, 2009). We will now turn to the internal capabilities of the firm.

Mode 2b Knowledge Generation and Innovation

One way to benefit from internal knowledge is to capitalize on the knowledge and ideas of current employees, including especially those who are not employed at the internal R&D department. An employee's engagement in innovative work behaviours requires the employee to be both able and willing to be innovative. Amabile (1997) writes that expertise, creative thinking skills, and motivation, when mixed together, identify the level of creativity within an individual. The expertise component includes the memory for factual knowledge, technical proficiency, and special talents in the target domain. Creative thinking means that an individual is able to see things from more than one perspective and is able to question the existing working models. If problems are solved "the way they always have been solved," it blocks creativity and prevents new ideas from penetrating the organization. This requires that individuals can live with uncertainty (Shalley & Gilson, 2004).

Organizational culture is considered crucial to an organization's ability to innovate (Van der Panne, Van der Beers, & Kleinknecht, 2003). The possession of positive cultural characteristics such as high autonomy, tolerance of mistakes, and continuous learning provides the organization with the necessary ingredients to innovate (Miron, Erez, & Naveh, 2004). For example, workgroups tend to have a common, usually tacit understanding of how things work. These groups are called the subcultures of an organization (Schein, 1996). It is a challenging task to build communication and mutual understanding between different subcultures (Bechky, 2003; Schein, 1996).

A culture that favours playfulness enhances innovation capability. Styhre (2008) suggests that play contributes to the innovation research by highlighting factors such as serendipity and chance. Dodgson, Gann, and Salter (2005) use play to mediate the transfer from ideas to action by an exploration of the possible outcomes in the early stages of the innovation process. Anderson (1994) claims that play can be a significant motivator for employees.

Organic structures allow diversity and individual expression, and they are well suited to the initiation phase of innovation processes. They are also often more conducive to open and effective or-

ganizational and interdepartmental communication. On the other hand, some level of stability, clarity, and coordination is needed. If formal mechanisms are absent, communication comes to depend solely on the discretionary and ad hoc effort of the organization members, which may not be sufficient (Parzefall, Seeck, & Leppänen, 2008).

Creative work is ambiguous, risky, and subject to criticism. It can be expected that supportive supervision will facilitate creativity and innovation in the organization. For example, Oldham and Cummings (1996) found that support for creativity was related to innovation. Leaders may also influence creative work through the vision provided by charismatic or transformational leaders (Mumford, 2000). At the heart of transformational leadership is the notion that every employee has potential and a leader can help uncover the potential (Viitala, 2005).

Leadership that nourishes the renewal and motivation of the employees makes them aware of how important their work results are. It encourages employees to acquire new experiences and do more than is expected in their job description. In an ideal situation, leadership pushes employees to reach for higher needs and goals (Viitala, 2005; Yukl, 1998). Attending to people and managing their emotional connections is important for all kinds of organizational transformation. In order to manage the change successfully in the organization, the primary focus on leadership should be on managing the dynamics instead of on the individual parts of the organization (Duck, 1998).

Categorization for Innovation Capability in Mode 2b Practice-based Innovation

Factors that support an employee's innovativeness are usually divided into four broad categories: individual, job, team, and organizational level (Shalley & Gilson, 2004; Woodman, Sawyer, & Griffin, 1993). Our division of practice-based innovation capability follows this logic. It is presented in Figure 1. As for organizational innovation capability, employees as individuals are the internal driving force for innovations. Tackling organizational silos opens the organization also inside and it is namely transformational leadership that enhances innovation capability. Absorptive capacity creates a link to externally (as well as internally) available sources of innovation.
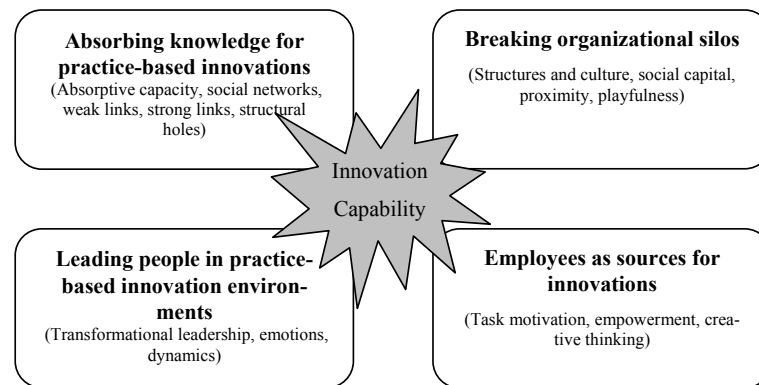
Figure 1: Elements of innovation capability

Figure 1 is a rough description of the factors that influence innovation capability. In organizations all these four elements are mixed, and probably the most effective combination is a mixture. This division, however, helps organizations to get a bigger picture of what is attached to innovation capability.

Measurement of Innovation Capability

Current Understanding

Measurement can be used for different purposes in an organization. The basic function of measurement is to provide information about factors considered important. This information can be used for controlling that the targets are being reached and that the activities agreed upon are carried out as planned. Measures also act as "signals" highlighting the importance of the factor being measured and, thus, guide personnel in focusing their efforts. In addition, measurement can be used for learning. For example, reviewing measurement results and comparing them to previous results or results of another company/unit can provide an improved understanding of the development of the organization. Comparing the results with targets should, in the case of discrepancies, lead to asking questions such as "why has the target not been reached?" or "what new corrective actions can be implemented to improve the situation?" (Jääskeläinen, Kujansivu, & Lönnqvist, 2009).

Measures can be divided into objective and subjective measures: objective measures are based on quantitative operational information, while subjective measures are based on the personnel's subjective assessments. Subjective measurement data is usually collected using survey questionnaires. On the other hand, measures can be classified as direct or indirect (Kemppilä & Lönnqvist, 2003). When the phenomenon under examination cannot be measured directly (e.g., many intangible phenomena, such as the competence of employees), it can be approached indirectly. In such situations, surrogate factors (e.g., education) can be measured. What kind of measure is used should be decided specifically in each case. It is important to consider the benefits and burdens caused by the measurement when choosing the measure(s) for a specific phenomenon in a specific situation (Lönnqvist & Mettänen, 2005).

In the literature, there are several models introduced for measuring certain components of innovation capability or related factors. For example,

1. Isaksen, Lauer, and Ekvall (1999)'s measurement procedure for a creative climate includes nine dimensions which are measured by using from three to seven items (answered on a four-point scale).
2. Prajogo and Ahmed (2006) introduced an instrument for innovation stimulus, innovation capacity, and innovation performance. The questionnaire includes eight elements, which comprise 34 questions. The questions are answered utilising a five-point Likert scale.
3. Kleysen and Street (2001) presented a revised measurement model for individual innovative behaviour. The model suggests 14 items to be measured using a six-point scale.
4. Kianto (2008) developed a model for an organization's renewal capability for continuous change. The model consists of six categories and the questionnaire is answered by the employees on a five-point Likert scale (strongly disagree – strongly agree).

The above-mentioned measurement models have some common features. They all use subjective evaluation to measure the phenomenon under examination. In addition, instead of trying to capture the phenomenon itself, they approach it indirectly by measuring surrogate factors. The approach is natural because gathering objective and direct measurement information of these phenomena is difficult or even impossible. Thus, subjective indirect measurement seems more appropriate also for our purposes.

The majority of the existing measurement models are based on STI-knowledge generation in innovation. However, Jensen et al. (2007) call for studies that use DUI-based indicators on innovation and learning. For example, in our measurement model we are not interested in patents, but rather in the interaction, i.e., whether people talk to people who have a different background. In

the end, however, it should be recognized that measuring innovation needs both STI and DUI to some extent.

Questionnaire for Evaluating Innovation Capability

Our goal is not to measure the level of innovation capability but to locate the weak points that the organization currently has in innovation capability. Even though a questionnaire produces data that needs interpretation of its contextual factors, it seemed to be an appropriate procedure for our purposes. The aim was to develop a general procedure that is suitable for any kind of organizations and that takes into account the various elements of innovation capability (presented in Figure 1). In this study, designing a procedure can be characterised as researcher-driven, since the authors were responsible for creating the model. The questionnaire includes 15 statements (originally in Finnish) representing the four categories of innovation capability. The statements included in the questionnaire are presented in Table 2. The column 'Theses' explains how the authors see the statement as part of innovation capability. There was also a possibility for open answers after each category.

Table 2: Statements (including references and theses)

	Statement	*References*	*Theses*
Absorbing knowledge	I use time to make and nurture connections outside the organization	Burt, 2004; Granovetter, 1973	Not all connections are useful today
	I get ideas from our associates	Hargadon, 1998; Todorova & Durisin, 2007	To acquire ideas is one thing, to recognise the potential is another
	We collect systematically customer feedback	Griffin & Hauser, 1993; Von Hippel, 1988	A systematic channel is ensured
	We generate ideas for new products and/or services with customers	Sawhney & Pradelli, 2000; Von Hippel, 2005	The customer's role is changing from object to subject
Breaking organizational silos	Cooperation between different functions works well	Brown & Eisenhard, 1995; Kallio & Bergenholtz, 2011; Moorman & Miner, 1998	Innovation potential lies in the interfaces of different fields of expertise
	We learn from mistakes	Miron, Erez, & Naveh, 2004;	Mistakes are important- as long as lessons are learned from those
	My nearest working environment is playful	Anderson, 1994; Dodgson, Gann, & Salter, 2005; Styhre, 2008;	"Play energizes us" (quote from Andersson 1994)
	Meetings are discursive and open	Bechky, 2003; Huber & Lewis, 2010; Schein, 1996	Very often organizations suffer from a communication gap that prevents innovation and creativity
Leading people	My supervisor encourages me to express my opinion on things	Bass, 1985; DiLielleo & Houghton, 2006; Viitala, 2005; Yukl, 1998	The leader does not have all the knowledge, but is supported by the professionals
	I am contributing to the future of our organization	DiLielleo & Houghton, 2006; Jung, Chow, & Wu, 2003	By taking the employees along to design strategy, there is no need to translate and diffuse it to the personnel
	I can try out new things, even if they weren't part of my duties	Gumusluoglu and Ilsev, 2009; Viitala, 2005	You see the storm better if you don't stand in the eye of it

	My supervisor makes effort to make things happen	Hyypiä & Parjanen 2008; Yukl, 1998	If the leader makes all the effort, I want to do my best as well
Employees as sources for innovation	I tolerate uncertainty well	Lester & Piore, 2004; Shalley & Gilson, 2004	An open-ended process leaves room for serendipi-tous events
	I participate in the organiza-tion's innovation activities	Axtell et al., 2000	The employee is the best developer of his/her own work
	I am good at generating ideas	Amabile, 1997; Bandura, 1993; Morrison & Phelps, 1999	Self-efficacy

The 15 statements presented were chosen among 55 initial statements during a process that in-volved other researchers as well in the field of practice-based innovation. First, a small group of people gathered to list themes. Then a brief literature review was written and it was sent out to researchers for comments and additions. Then statements were formed according to the literature review on practice-based innovation as well as earlier research available on measuring innovation capability. Then a workshop was held with a few researchers where the questionnaire was re-worked again and sent out for a final comment round.

The survey was carried out at the employee level. The responses were gathered from those people that are (or should be) affected by the possibly following intervention. This gives the developers information of the actual practitioners' opinions. Overall, the survey provides an understanding of the innovation capability of the organization at current time. After carrying out the survey and analysing the data, the weak points of innovation capability were revealed.

All groups of statements are equal regarding innovation capability and should, thus, be in bal-ance; it is not enough to reinforce leadership if the structures are not flexible. Nor is it meaningful to absorb external knowledge if the organization is incapable of turning it into something useful. The statements, however, cannot be held equal as they are dependent on the context. The interpre-tation of the results matters the most.

Implementing the Model

Case Context

The case organization is a part of a bigger group providing services for the supermarket trade, the service station store and fuel trade, the department store and speciality store trade, the tourism and hospitality business, the automotive and accessories trade, as well as the agricultural trade. The case organization is a department store for products related to living. Its main product areas are plants and the garden and interior decorating, renovating, and building. From the case organi-zation, a customer can get interior decorating equipment and tools as well as house packages. In addition, there are also store-specific services such as garden design and interior decorating de-sign available. There are 55 employees in the case organization.

Data and Analysis Methods

A survey was conducted in September 2009. In practice, an invitation to participate in the study was sent via email. The survey was carried out at the level of individual workers. In total, 39 re-sponses are included in the study. The background information of the respondents is presented in Table 3.

Table 3: Background information of the respondents

		n	*%*
Age	Under 20 years	2	5.1
	20–30 years	23	59.0
	31–40	7	17.9
	41–50	4	10.3
	51–60	3	7.7
Gender	Male	15	38.5
	Female	24	61.5
Working years in the organization	Under 2 years	6	15.4
	2–5 years	25	64.1
	6–10 years	5	12.8
	Over 10 years	3	7.7

We used ZEF software in gathering the responses and analysing the data. ZEF software allows answering by using a continuous scale (0–100 %) in two dimensions. So being, answering the questionnaire is visual and answers can be put into a visual diagram. We had "is important" on the x-axis and "currently happening" on the y-axis. Since the statements were subjective, it can be assumed that even though people would have thought about the answers from the company's point of view, their personal interests affected their answers.

Later, responses related to each statement were classified into four groups according to their importance and whether they are happening currently. The groups are the following: "not important and does not happen currently"; "not important but happens currently"; "important but does not happen currently"; and "important and happens currently". Issues that are considered important but are not happening currently are the ones that should be prioritized in development. If people feel the focus of a development project is important, they will more likely be engaged with it. On the other hand, issues that are happening a lot but are not considered important consume resources ineffectually, since people will participate in the project only because they have to but they do not think the focus is important. In conclusion, it is not that the other weak points would not be worth focusing on, it is just better to start with those that people can be engaged with to make the changes happen by themselves.

Results and Analysis

The data is first examined by using the means of the responses related to the 15 statements. Twelve of the statements were assessed from the point of view of their importance and whether the issue in question is currently happening within the organization. The last three statements were only assessed from the perspective of "importance." This can be considered a weakness for the scientific testing of the model, but in practice in the case at hand, it was seen as a proper way at the current time. In designing surveys, it is good to make them as easy as possible to answer. As the emphasis was on the organizational innovation development projects, it was not seen as essential to collect personal-level self-reflective data. In communicating the results and implementing development projects, this data was actualised only on a normative level. The means are presented in Table 4.

Table 4: The means of responses related to different statements

Statement	Importance (mean)	Currently happening (mean)
I use time to make and nurture connections outside the organization	39,8	40,0
I get ideas from our associates	54,2	54,9
We collect customer feedback systematically	63,6	62,1
We generate ideas for new products and/or services with customers	44,2	33,3
Cooperation between different functions works well	52,1	38,6
We learn from mistakes	70,4	63,4
My nearest working environment is playful	58,9	53,1
Meetings are discursive and open	61,3	54,4
My supervisor encourages me to express my opinion on things	59,8	63,7
I am contributing to the future of our organization	51,3	49,3
I can try out new things, even if they weren't part of my duties	65,4	71,0
My supervisor makes effort to make things happen	65,3	64,7
I tolerate uncertainty well	30,9	
I participate in the organization's innovation activities	61,6	
I am good at generating ideas	65,6	

Learning from mistakes (mean 70.4) was considered the most important issue. It is followed by other important aspects: generating ideas (65.6), trying out new things (65.4), effective supervisor (65.3), collecting customer feedback systematically (63.6) and discursive and open meetings (61.3). The least important matters were tolerating uncertainty (30.9) and making connections (39.8). It was surprising that tolerating uncertainty was so low, because earlier the organization was able to operate relatively freely and could decide many things locally. Now there are more department stores under the same concept and there is confusion about what things can be decided locally. With respect to innovation capability, the low figure of tolerating uncertainty and making connections is interesting. Tolerance of uncertainty has links to the cross-boundaries co-operation. It can be interpreted that the innovation process in the organization is analytical. In a well-defined project world, there is no slack or room for serendipity. In an interpretative innovation process (Lester & Piore, 2004), the end result is not foreseen in the beginning. It requires the ability to believe in serendipity and to be able to live in that uncertainty. It also requires faith that the right answers will be revealed in the course of action.

Issues that are considered to be currently happening are trying out new things (71.8), effective supervisor (64.7), encouraging supervisor (63.7), learning from mistakes (63.4) and systematically collecting customer feedback (62.1). On the other hand, the results show that generating ideas (33.3) and co-operation between different functions (38.6) are the ones that are not happening that much.

Figure 2 presents the percentage of the responses in the various groups regarding the four statements on *absorbing knowledge*. According to the results, one of the challenges seems to be generating ideas with customers. 25 % of the respondents felt that it is an important issue but not happening. Another important matter, but which is not that much carried out, is collecting customer feedback (around 23 %). However, around 18 % of the respondents did not think that it is an important issue, but the company is doing it. This could be a signal of using one-way and inappropriate ways to collect customer knowledge. In fact, some of the employees do not even recognize that customer feedback was collected in the first place. Thus, we recommend that the company should adopt dialogical manners to interact with customers.
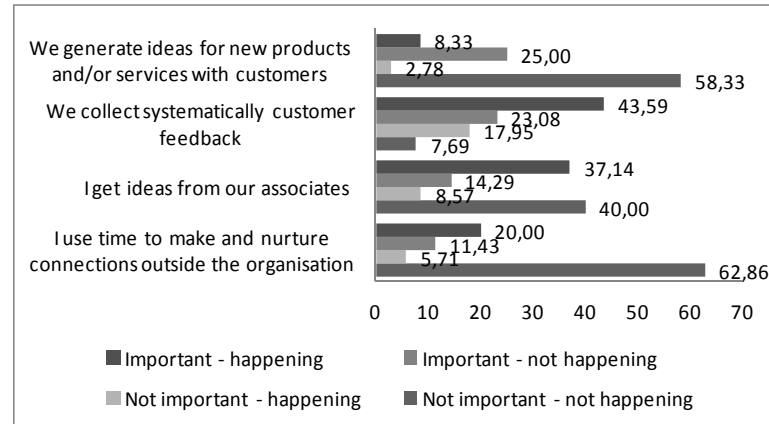
Figure 2: Absorbing knowledge

From the perspective of *breaking organizational silos* (see Figure 3), the most significant development target is co-operation between different functions. Around 37 % of the respondents consider it an important issue, but it is not happening currently. The results show that the other three factors were also regarded as important but not actualised in practice, according to 23–27 % of the respondents. Even though a first hands-on development project to be considered would be cooperation between different functions, other statements need attention as well. As it is now, we suggest cultural tools, for example organizational theatre (Pässilä & Oikarinen, in press; Pässilä, Oikarinen, & Vince, 2012) to be used in this case. If the other statements were to be considered more important, a more analytical and traditional tool could be used.
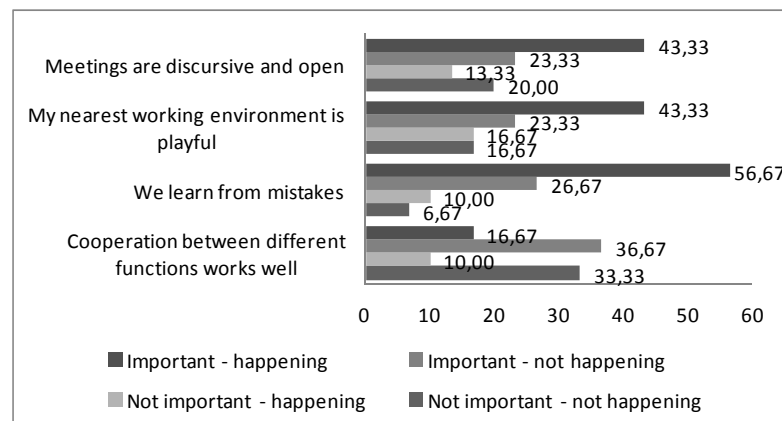

Figure 3: Breaking organizational silos

The results related to *leading people* statements are provided in Figure 4. According to 25 % of the respondents, contributing to the organization's future is an important matter but not very

much actualised in practice. The results show that around 28 % consider trying out new things not that important an issue, but it is happening in practice.
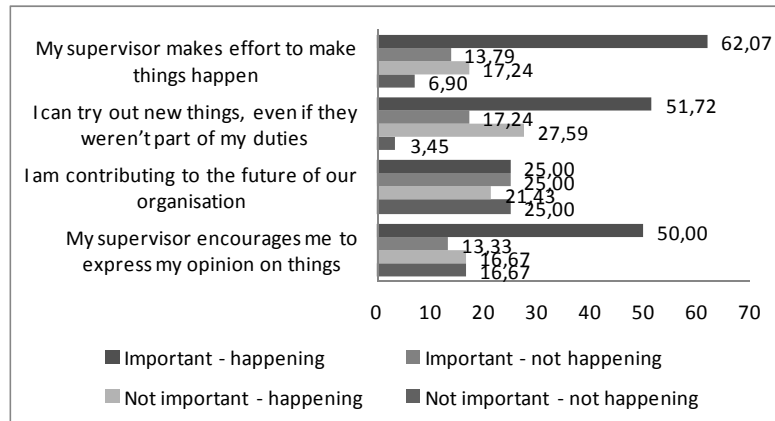

Figure 4: Leading people

Summary of Survey Results and Suggestions for Development Work

It is assumed that the factors of innovation capability considered important but which do not happen currently are the ones that should be paid attention to in the first place. People are most likely to make an effort for these kinds of development projects. If they do not see the development target as important, they will participate in the project only because they are forced, not because they want to make a difference.

The majority of the respondents thought that "We generate ideas for new products and/or services with customers" is not happening. In addition, most respondents did not see this as important, whereas one fourth considered it important (but not happening). It can be interpreted that a customer is seen as an object of innovation activities that happen inside the organization. In order to leverage their innovation capability, the employees could enhance the two-way dialogue by upgrading the customer to be a subject of innovation activities.

"Cooperation between different functions works well" was definitely not happening according to the respondents. Moreover, around half of them considered it important and a half did not. This is clearly a fruitful, yet difficult, development area. Often the greatest innovation potential lies in the interfaces between different focus groups. The boosting of communication between different units could increase the amount of "lucky coincidences" in innovative ideas. However, the creation of multi-actor dialogue is not an easy process and it should be provided with enough time and delicacy.

"We learn from mistakes" is interesting. It is clearly seen as important and the majority of the respondents think that it is happening at the moment. However, a significant amount of the respondents feel that it is not happening. This could be a start of a fruitful discussion - how do the employees perceive that they are / are not learning from mistakes?

In general, the respondents were pleased with the leadership in the organization. They thought that it is easy to talk to the supervisor and that the supervisors are putting themselves on the line as well. All the issues presented in the statements were seen as important and going well, except for one: "I am contributing to the future of our organization". Half of the respondents think it is

important, but only 25% think it is happening. What is alerting is that 25% of the respondents think that it is neither important nor happening.

Those statements that the respondents see as important but which are not currently happening are the kinds of development areas that are recognised. However, there are areas that the respondents did not see as important for them. The development interventions should be targeted first to the areas that the employees already feel that are important. In the meantime, the general level of consciousness of innovation capabilities can be increased, and the employees may be more willing to engage in other development areas later. For example, over 60 % of the respondents think that "I use time to make and nurture connections outside the organization" is neither happening nor important. In the long run, this kind of thinking leads to a situation where no new ideas are absorbed into the organization. Examples of possible actions towards excellence in organizational innovation capability are:

1. Breaking organizational silos: Practices to boost the communication between different functions; this is suggested to be done with cultural tools such as organizational theatre (For organizational theatre, see Pässilä & Oikarinen, in press)
2. Absorbing knowledge: Customer to be subject of innovation activities; this is suggested to be done with dialogical methods that entail two-way communication, not just a questionnaire to the customers
3. Leading people: Personnel brought along to design the next strategy

At this point we know which areas need development the most. In order to increase innovation capability, it is necessary to increase cooperation between different functions and to take the customer to be an active subject of innovation activities. One point further, the organization could take the employees along to design the next strategy. Employees consider it rather important that everyone takes part in the organization's innovation activities. When it comes to the individual tolerance of uncertainty, the case is not the same. It should not be taken as a strict requirement for everyone to be comfortable with uncertainty. However, if the organization seeks interpretative innovation (Lester & Piore, 2004), employees should acknowledge that the uncertainty is an important part of it.

The suggestions described here are not something a company can conduct in a quarter of a year. In fact, organizational change emerges from cultural rethinking. Change most probably takes years and requires resources and long-distance planning. The choice of tools depends on the available resources. However, employees should be taken along to design the change.

Discussion

With the help of a single case study, this study sheds light on the practical question of how an innovation intervention should be targeted in order to enhance organizational innovation capability. This study contributes to developing measures for DUI environments (see Jensen et al., 2007). Building on the work of Harmaakorpi and Melkas (2012), this study further develops measures for the division in DUI Mode 2a and DUI Mode 2b knowledge generation and learning.

This paper makes a contribution to the existing research on innovation management by increasing the understanding of the concept of innovation capability (e.g. Koivisto, 2005) in the context of practice-based innovation activities (Ellström, 2010; Melkas & Harmaakorpi, 2012). More specifically, it provides a theoretical categorization for the elements of innovation capability in this context.

The results of this paper may be considered valuable also from the managerial point of view. Managers recognise the importance of innovation capability for the success of the organization. However, the decisions on what should be developed specifically are often based on intuition.

The questionnaire created to measure innovation capability is used not only to assess the status of innovation capability with the help of bottom-up knowledge of the current state of affairs but also as a diagnosis method for facilitating the decision making of managers as to where to target the development projects.

In analysing the results, it is important to bear in mind that even though something might stand out as a problematic area for innovation capability, possibly years of work may be needed before it is possible to tackle that spot directly. It should also be discussed whether actions aiming at changing one thing will have an effect on the other areas of interest. For example, the uncertainties will probably increase when starting communication between different functions that have different interests. Another thing is, will the tolerance of uncertainty actually increase?

As limitations of our measurement instrument, some points can be recognised. First, the amount of data used in this paper is quite small. Our purpose was to design a questionnaire and to test it in a single case organization in order to find weak points related to innovation capability. For this purpose, the data can be considered representative (39 out of 55 employees responded). However, from the point of view of developing the measurement instrument further, a larger sample is needed. To be able to validate the measurement method, additional case studies need to be carried out. The measurement model should be examined as a whole, i.e., two dimensions should be used with all statements. Furthermore, a factor analysis could be carried out in order to find out whether the questionnaire includes sound elements. The third limitation of the questionnaire is that it does not say anything about the actual outputs or outcomes. The questionnaire should be repeated after the development project. In this way, it is possible to evaluate the effects that the actions have had. However, it should be noted that in addition to a specific intervention, other changes may also occur (changes in the economic situation and other development work carried out in a similar manner). Thus, it can be difficult to determine which of the acquired benefits are caused by the development initiative in particular and which result from other factors. On the other hand, it may take some time before the impact of a development project is realised. Thus, the outcomes may not have been realised at the time of assessment.

Acknowledgements

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Biographies

Anne Kallio, M.Sc. (Econ. & Bus. Adm.) is a researcher at LUT Lahti School of Innovation, Finland. Her PhD studies focus on revealing the innovation potential hiding in everyday activities of organizations. She has conducted several action research processes in different organizations. Anne Kallio's research interests are absorptive capacity, social capital and shopfloor employees' role in innovation. She has previously published in Urban Studies and International Journal of Technology Management.

Paula Kujansivu (Dr.Tech., M.Sc.) works as a Senior Researcher at the Department of Industrial Management, Tampere University of Technology, Finland. Kujansivu has ten years of research experience on the measurement and management of organizations' intellectual capital and business performance. Kujansivu's research has previously been published in, e.g. International Journal of Learning and Intellectual Capital, International Journal of Services Technology and Management, Production Planning & Control and Measuring Business Excellence. In addition, she has written practical books on those research topics. Kujansivu also acts as the Managing Partner of Prodia Ltd.

Satu Parjanen (M.Soc.Sc.) is a researcher at LUT Lahti School of Innovation, Finland. Her research interests are related to brokerage functions and distances as sources of innovation. The theme of her post-graduate studies is collective creativity in practice-based innovation. She has published, for example, in Interdisciplinary Journal of Information, Knowledge and Management and International Journal of Innovation and Learning.

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