

A Collaborative Mode of Innovation related to Energy Efficient Rehabilitation of Buildings

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WORK-IN-PROGRESS PAPER¹

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ABSTRACT

The intention of this paper is firstly to explore theoretically how the actors in the building construction industry can enhance their own and the collective innovation potential through planned learning processes both in interorganizational and intraorganizational settings. The main contribution to the IMP discourse is to supply additional understanding to the IMP network models related to the link between intra- and interorganizational innovation/learning processes. Secondly, we connect this to preliminary empirical data generated from a case study of a regional innovation project related to the construction industry. However, even though the regional innovation project is well up and running, the construction industry is not yet involved in the project. This has made it impossible to study how and in what way the innovation project has commissioned new intraorganizational activities in the industrial companies. So far, those involved in the project are mainly consultancy companies and R&D actors. Progress has been steered by activities aiming at producing basis a rehabilitation pilot. A college building has been selected as the potential pilot, but the financing of the actual rehabilitation depends on a positive outcome of a political decision process. So far the case under study could be defined as stuck in the idea structure, decoupled from the existing activated structure, i.e. the construction industry (Brunsson, 1989/c2002;

¹PLEASE NOTE: This paper is not yet fully developed. The analysis is incomplete, and further work needs to be done on the theoretical model. However, we still hope the paper may form the basis for some discussion of how a project like the one outlined in the case study can be used to understand how the actors in the building construction industry can enhance their own and the collective innovation potential through planned learning processes both in interorganizational and intraorganizational settings. How could they be included in order to fulfill the aims of the regional innovation project? Inputs to such developments are appreciated.

Håkansson&Waluszewski, 2002). However, we have related what actually *has* happened to the proposed model for linking intra- and interorganizational innovation/learning processes and we have speculated on possible further outcomes of the regional innovation project.

INTRODUCTION

The triple helix actors² (Etzkowitz&Leydesdorff, 2000) in a region are often encouraged to act together in regional innovation projects with an aim to construct innovation systems as this is said to be beneficial for innovation and value creation (e.g. Edquist, 2005). The hypothesis behind the regional focus is that geographical proximity between actors promotes interaction and hence innovation. Regional collaboration is also promoted in order to outweigh the effects of global competition (add reference). In Norway there are several R&D-programs aiming at developing or strengthening regional innovation systems through facilitated initiatives.

However, uncertainty surrounds the worth of a strategy based on facilitated initiatives encouraging actors to work more closely and hence innovate. The argument is that facilitated initiatives only result in temporary relationships confined to the duration of the initiative (add reference). The relationships are thus not included in the long-lasting business relationships between customers and suppliers (Håkansson, Ford, Gadde, Snehota&Waluszewski, 2009, p. 13; Håkansson&Ingemansson, 2011, p. 68)

However, some issues, for instance solving the environmental challenges the world is facing, presumably cannot be left alone for the businessmarket to solve. In order to find sustainable solutions there is a strong need for taking responsibility for the upstream and downstream impacts of any activity that consumes resources. This calls for collaboration, and to include the relevant actors in the process of finding solutions (add reference; Ballard, 2005).

(To be expanded. Explore the possibility to use elements from the IMP conference track: Collective action and mobilization in networks.).

The building construction industry has an important role in handling the challenges related to climate change and the environment, as buildings account for 40% of the total energy consumption in Norway. This industry is characterized as being mainly local, project based, with short-term interactions between the business actors (Bygballe&Goldeng, 2011; Håkansson&Ingemansson, 2011). These can hamper learning opportunities (Håkansson&Ingemansson, 2011), which in turn might compromise the potential for innovation (Holmqvist, 2003, 2004). However, practice-based organization studies have shown how boundary spanning and the formation of non-consensus-based practices are crucial to learning between interconnected practices in the construction industry (Gherardi&Nicolini, 2002). Different practices represent different mind-sets - a shared arena such as a regional innovation project, offers opportunities to exchange knowledge, learn and teach. The learning opportunities are considerable. Such activities and learning opportunities can subsequently be transformed into innovations as they form bridges to worlds (and ideas) one does not daily walk within. In order for the transformation into innovations to happen, some structured/ planned learning processes need to be present both in the regional innovation project and in the single participating organization (Klev& Levin, c2009; Rubach,

²Triple helix actors: academia – industry - state

2011). The learning has to be made relevant or internalized into the companies before it will be put in active use (Klev & Levin, c2009, p. 187). It is therefore the actual *arranging* of these processes that is important. Whilst results can't be planned, planning the process of making this transfer can be (increasing the likelihood that it will happen). Just bringing something new back to one's own organization doesn't mean it will be used, since it may often remain decoupled from the value-creating, daily activities in the company (Klev & Levin, c2009, p. 187; Rubach, 2011, p. 171). Without intraorganizational learning processes, learning will not be utilized as a potential for change and development for the company (Lipshitz, Popper, & Friedman, 2002; Rubach, 2011). In addition, it is the exploited intraorganizational experiences that fuel interorganizational exploration (Holmqvist, 2004; Klein, 2004; Rubach, 2011). Thus, intraorganizational learning processes stands out as a prerequisite for interorganizational innovation initiatives.

Questions which are raised in this paper are: How can the actors in building construction industry enhance their own and the collective innovation potential through planned learning processes both in interorganizational and intraorganizational settings? The background here is the claim that focusing on the environmental issues creates different and new opportunity for interactions in this industry (Bygballe & Goldeng, 2011).

Håkansson and Ingemansson's (2011) perspective on networked knowledge acquisition in the construction industry is combined in this paper with a dual organization-development (OD) conceptualization of network participation (Rubach, 2011) to promote co-operation and networking (interaction which can also lead to the creation of new/and or joint knowledge).

INNOVATION RELATED TO THE BUILDING INDUSTRY

INNOVATION SYSTEM PERSPECTIVES VS BUSINESS NETWORKS

An innovation system consists of important economic, social, political, organizational, institutional, and other factors that influence the development, diffusion, and use of innovations (Edquist, 2005, p. 182). Innovation systems are thus a network of organizations, people, and rules which is directly connected to how efficiently new knowledge is created and used. The innovation system concept rests on the interactive innovation model, which has been developed from the chainlinked model of Kline and Rosenberg (1986, p. 289). In this model, innovation is seen as a continuous, interactive process where the innovations happen in and between different bodies of knowledge (for instance between companies, departments or institutions) and in a cyclical process. Innovation is thus outlined as an interactive phenomenon and as a social, collaborative achievement (Oddane, 2008, p. 29).

To erect bridges between the different parts in the innovation system and forming or joining a network are among the policy implications OECD lists for a more collaborative mode of innovation. Other implications include building soft skills that can traverse disciplines, cultures, and organizations and developing absorptive capacity (i.e. the ability to learn). Several recent studies have emphasized practice – both intra- and interorganizational – as the locus for learning (e.g. Gherardi & Nicolini, 2002; Araujo, 1998), and support the outlining of innovation as an interactive phenomenon (Mørk et al., 2010; Hoholm, 2011,

Håkansson&Waluszewski, 2007). Moreover, some recent studies have called for connecting local and global (or more widely distributed) practices when studying networked interaction, such as innovation and learning (e.g.Hoholm, 2011:41).

Learning and building knowledge through interaction in practice stands out as a pillar in order to build an innovative environment. The connection between interaction and knowledge is discussed by Håkansson and Ingemansson (2011), who categorize five different types of interaction based on the kind of knowledge involved (op.cit., p. 70). The five categories are: 1) pure exchange; 2) minor social exchange; 3) technical exchange; 4) co-operation and 5) networking. Pure exchange is explained as interaction deriving from exchange of products and services for money. Resources remain unchanged by the interaction and there is no knowledge transferred except the one existing in the product. Minor social exchange is set to include some social sentiments developing through repetitive exchanges. It can result in minor changes in the orientation and/or knowledge of the involved actors but only regarding the counterpart's existence and features. Technical exchange is explained as interaction that results in changes being made to the product and/or production facilities where specific technical knowledge can be transferred. Co-operation is defined as interaction that results in changes being made to multiple tangible and intangible resources, where both sides in the relationship are affected. The knowledge content is often extensive. At last, networking is explained as interaction that results in changes being made to several tangible and intangible resources and where several parallel knowledge processes appear. Here more than two parties are affected.

Håkansson and Ingemansson thus state that the three last categories represent more extensive transfer of knowledge and the development of joint knowledge between two parties. These interorganizational learning processes are those that seem most relevant, and indeed necessary, to establishing an innovation system.

However, interaction as found in technical exchange, co-operation or networking is not sufficient in order to create an innovative environment. The link between intra- and interorganizational innovation/learning processes seems to be underfocused in Håkansson and Ingemansson's categorization. Some "black box" models for this interlinkage can be found in the combined intraorganizational and interorganizational learning theories (which are few (e.g. Holmqvist, 2003, 2004)). To thrive on business interactions has been suggested to rest on the ability to build and maintain the bridge, i.e. the link between both the learning processes in the interorganizational arenas and within one's own company (Rubach, 2011). From this one could propose that (1) lack of intraorganizational learning, will hamper interorganizational learning and innovation, (2) lack of interorganizational learning will hamper intraorganizational learning and innovation, (3) lack of bridging of intra- and interorganizational learning may hamper learning and innovation both in the company and in the network. To counter this, one could argue that (1) lack of network learning opportunities is handled by companies producing the knowledge they need internally instead, and that (2) ample access to/participation in network learning may leave intraorganizational learning less important for innovation. The bridging argument, then, could enable interesting explanations of why and how the first propositions are more likely. (*To be expanded*).

Håkansson and Ingemansson (2011) conclude that to transfer more substantial knowledge, or to transfer knowledge that is more complex and more embedded (sticky), there is a need for both cooperation and networking. Such interaction can lead to creation of new and/or joint knowledge. Håkansson and Ingemansson further state that the kind of interaction which they have called networking happens when there are three or more knowledge bodies confronting each other. The number of interfaces increases and the situation becomes more complex, but this also gives more opportunities for change and development. The actors are then involved in continual learning situations on a more long-term basis. They must be motivated to learn from specific suppliers and customers; the overall goal is to establish a more efficient and knowledgeable organization through interaction with other companies and organizations.

This is mirrored in the dual organization-development(OD) model for network participation(Rubach, 2011), see Figure 1. The model is based on the co-generative learning model initially developed by Elden and Levin (1991), and further developed by Greenwood & Levin (2007) and Klev and Levin (c2009). Here communicative processes at different arenas are integrated in the same learning process (Klev & Levin, c2009, p. 73). The model captures that insiders and outsiders use different frameworks, i.e. ways of understanding, language, or cognitive maps. These need to be combined to develop “local theory,” which is a newly shared framework. Knowledge development through concrete problem solving (actions) is what actually moves the OD process forward. The sociotechnical systems perspective here becomes evident because it is through changing praxis development and readjustments in organizations are created. The results of an OD process should be both an increased ability to accomplish the right tasks and to handle future challenges in a smarter and more effective way. The proof of this is simply improved abilities in action (Klev&Levin, c2009). This model can be used to understand what happens both in the cooperating or networking arena and back in the singlecompany/organization. The common engagement in concrete problem solving will help in the process of revealing tacit and explicit knowledge and knowing how (e.g. Lundvall& Johnson, 1994; Polanyi, 1967; Ryle, 1949).

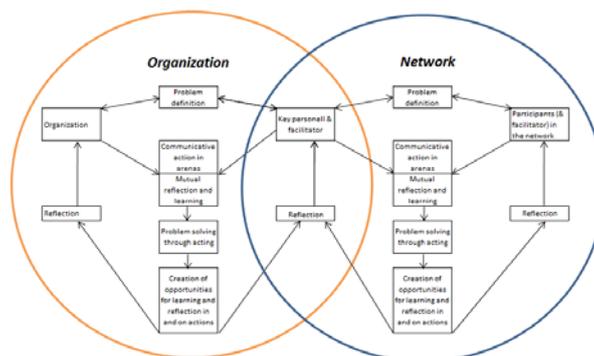


Figure 1 The dual organization-development (OD) model (Rubach, 2011)

To base the view of OD as a learning process (Klev& Levin, c2009) put emphasis on the role of those who are the actual problem owners and the emphasis on a continuous change process (long-term process) rather than a limited-time one. If the problem owners are invited into and are allowed to participate in the process, then a coreflective learning process is initiated from the very beginning. This invites to a dialogue where different viewpoints are brought to the table, and the learning opportunities expand.

Relating the dual organization-development (OD) model for network participation to cooperation and network initiatives in the construction industry, the following processes emerge:

- Define area of exploration, both internally (opening-up, entering an explorative process) and in the network (joint opening-up). These areas of exploration must partially overlap each other, otherwise the actors can't cooperate. However, not all companies/ individual actors will have the same view either on the focus area or the results due to the differences between them (Klev & Levin, c2009, p. 87).
- Plan, act, and learn in the network (joint experimentation and/or joint acting).
- Reflect and bring back learning and knowledge to one's own company (explorative internalization and/or exploitative internalization).
- Plan, act, and learn in the company (opening-up and focusing internalization).
- Reflect and bring learning and knowledge from one's own company back to the network (exploitation, opening up, exploration and new opening-up extension).

The goal is Håkansson and Ingemansson (2011)'s interaction category 5 - networking, where the interaction evolves into an alternating and interactive process between the intraorganizational (organization) and the interorganizational setting (network)(Figure 2).

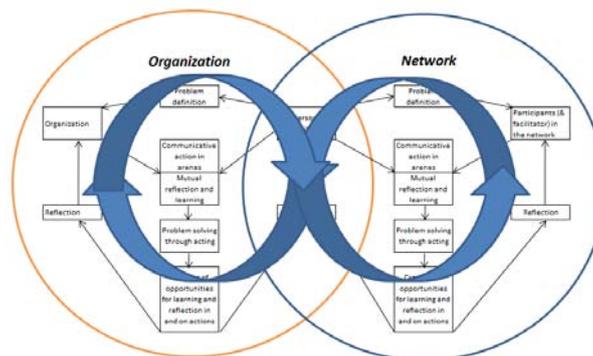


Figure 2 An alternating and interactive process between the intraorganizational (organization/company) and the interorganizational setting (network)

However, the participants in regional innovation initiatives (network) must be motivated by the opportunity to work together and explore opportunities with others. In addition to collaboration, time, training, and trust are the key elements which one must be willing to invest or develop. In return they will gain access to a web of knowledge of new ideas, learn a new structural way to work based on collaboration (Miles, Miles & Snow, 2005). Obstacles can include the lack of willingness to invest time in the collective process, hence failing to establish and develop the common more efficient and knowledgeable organization (the network in the dual OD model) (Miles, Miles & Snow, 2005; Rubach, 2011). In order to succeed in this the actors have to become *learning organizations*(Miles, Miles & Snow, 2005; Senge, c2006).

Håkansson and Ingemansson (2011) claim that learning based on cooperation and networking is rare within the construction industry. They claim that the companies are trying to handle most of the development internally (their interaction category 1, 2 and 3). This results in standardised interorganisational interfaces and difficult stepwise development and integration of new solutions as well as learning. This indicates that companies do not take their internal learning back to the network or further development, but end up as a more or less closed

system. Even in category 3 – technical exchange - Håkansson and Ingemansson (2011, p.70) state that there is no joint problem solving. However, in this category there is some specific knowledge exchanged regarding technical features, but adaption, or change, are always done one-sided.

The different categories suggested by Håkansson and Ingemansson’s (2011) and the elements of the dual OD model (Rubach, 2011) are attempted combined in Table 1.

	Intraorganizational learning processes	Interorganizational learning processes	Bridging intraorg. and interorg.
Pure exchange	No	No	No
Minor social exchange	No	No	No
Technical exchange	Yes, minor	No	No
Co-operation	Yes	Yes	Yes
Networking	Yes	Yes	Yes

Table 1 Combining interaction categories and the elements of the dual OD model

To elaborate on this, some different scenarios for minor or more extensive learning opportunities can be developed combining Håkansson and Ingemansson’s (2011) interaction categories 3) technical exchange; 4) co-operation and 5) networking with the dual OD model (Rubach, 2011) (see Table 1).

1. Main focus on the left side (organization/company) of the dual OD model is found in **category 3** - knowledge transfer in the technical exchange category – which gives minor overlapping learning opportunities. However, there is no joint problem solving.
2. Main focus on the right side (network) of the dual OD model is not found in any of the categories.
3. Focus on both processes (organization/company and network) of the dual OD model which gives minor to mayor overlapping learning opportunities is found in
 - a. **Category 4** - knowledge transfer and creation of joint knowledge in the co-operation category –which gives minor to major overlapping learning opportunities. Joint problem solving or individual problems where the counterpart has to be involved in order to find a solution is in focus.
 - b. **Category 5** - knowledge transfer and creation of joint knowledge in networking category - where the learning processes are extensively overlapping (can differ between the different involved actors). At least one third party needs to be involved in order to solve the problem.

These scenarios implicates that if the building construction industry is going to develop and live up to the demand for a more environmental sound development, the industry must be included and involved in initiatives where knowledge transfer and creation of joint knowledge is focused. In addition, the bridging between the intraorganizational and interorganizational processes should be focused in order for the total industry as well as the single organization to develop and innovate. Purchasing standardized products and services will not force this wanted development, ending in,as categorized by Håkansson and Ingemansson’s (2011), pure exchange or minor social exchange interactions.

METHODOLOGY

The case study (Stake, 2000) is concerned with a regional, interorganizational project where the initial goal is to increase development and introduction of new products and solutions for energy efficient rehabilitation of buildings. This project is hereafter called ERB.

The empirical data used in this article are preliminary, as ERB is in an early phase and per this date the project has only been running for eleven months. This study is therefore mainly based on a literature review and limited research data.

The unit of analysis in this paper is the ERB project group. The research design could be classified as an instrumental, single case (Stake, 2000) and as a longitudinal process study (Van de Ven, 2007, p. 194).

The existing data has emerged from taking part in workshops and meetings. During the first seven months one of the researchers has followed ERB mainly from taking part in administrative and reporting meetings at the VRI-O level (please see the description of the case study setting and Figure 1), and by attending a public seminar related to ERB. During these months the project leader sat up ERB together with a limited number of selected people. In this period he didn't want the researchers to take part in the activities. The last four months the researchers have been welcome to follow the activities in real-time as participants of the project group. However, still some of the information has bypassed the researchers, as there are now many actors who are actively engaged in activities which are going on simultaneously. The researchers' role has in some activities been as engaged researchers or actors (Levin & Ravn, 2007; Van de Ven, 2007) and in others activities the role has been more as onlookers (Van de Ven, 2007). During the last four months participatory field observation has been the main data source. The data material consists of field notes from meetings and workshops, minutes of meetings, and project documents.

THE CASE STUDY

THE NORWEGIAN CONSTRUCTION INDUSTRY

Bygballe and Goldeng (2011) have evaluated the Norwegian construction industry in the study "A knowledge based construction industry". This industry is an important part of Norwegian economic life, and it is also of great importance for employment in most parts of the country. It is mainly a local industry, acting within and influenced by local rather than international competition. In addition, it is an important industry because the "products" have considerable influence on human life and they are very visible. As already mentioned, this industry has an important role in handling the challenges related to climate change and the environment, as buildings account for 40% of the total energy consumption in Norway.

Furthermore, Bygballe and Goldeng (2011) highlight that the construction industry is project based and highly complex, involving huge amounts of information. Every project is unique, making knowledge transfer a challenge. They further characterize the industry as fragmented, with many small companies which lack resources for competence development. The absence of systems and systematizing routines related to knowledge is also typical. The need to organize for interplay and interaction between sources of competences is highlighted. Even though conscious organization might be lacking Bygballe and Goldeng state that cooperation

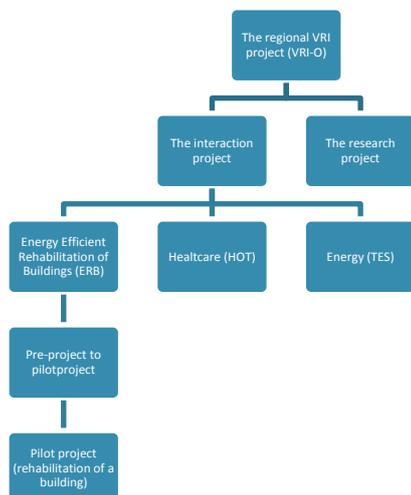
is often forced by the fact that the buildings are becoming more complex, demanding the use of many sources of competence.

Related to innovation, Bygballe and Goldeng (2011, p. *add page*) point to that studies which compare innovation in the construction industry in various countries all have found that this industry generally has a low degree of innovativeness compared to other industries. In Norway, the construction industry had half of the rate compared to other industries in 2008. These findings is based on that investments in R&D are generally low, likewise the development of new products. On the positive side the industry has good ranking related to cooperatively development product. However, the organizational and relational sides of innovativeness is difficult to measure.

In this industry, issues and goals relating to sustainable innovation and the environment are set forth strongly in regional, national and international regulations. As such, environmental issues represent both a serious challenge to, and a great opportunity for, this industry. Also, Bygballe and Goldeng (2011, p. 111) point out that a strong focus on environmental issues, design, functionality and well-being in homes and at workplaces may appeal strongly to the public (especially young people) which further enhances opportunities in the industry for those who are able to grasp them. However, low profit margins often rule out new and more innovative solutions; the industry is strongly price-competitive. Here increasingly demanding customers are emerging as important drivers for innovation. More R&D and stronger linkages between actors, promoting a more free flow of knowledge, are also highlighted as key needs.

THE RESEARCH PROGRAM VRI

The project which forms the empirical base for this paper is part of one of the regional VRI projects in Norway. VRI is the Norwegian Research Council’s primary support mechanism for regional research and innovation. The primary goal of VRI is to encourage innovation, knowledge development, and added value through regional cooperation and a strengthened research and development effort within and for the regions. Fundamental components of the VRI programme include research activity, exchange of experience, learning, and cooperation across scientific, professional, and administrative boundaries. Each regional VRI project must consist of one overall project that promotes interaction between various regional parties (interaction project) and at least one research project related to the interaction project.



In the specific regional VRI project (hereafter called VRI-O) there are three prioritized focus areas in the interaction project (see Figure 3): Energy - Green solutions in Smart Cities; Healthcare - New technical solutions in healthcare; Buildings –Energy Efficient Rehabilitation of buildings (ERB). The case referred to in this paper is related to the latter. The research project’s main agenda is to do research on

Figure 3 Project structure

conditions for cooperation and innovation by following the different activities in the interaction project.

ERB began as an initiative from the County Council and other regional actors. The overall goal of ERB is to establish a competence based network in the region, or permanent structures which can enhance research and development in the companies and improve skills and knowledge in the regional building industry. The main strategies in ERB are to establish an arena³ for cooperation and knowledge sharing, and to facilitate the enhancement of competence related to energy efficiency in existing buildings.

As such, ERB picks up on three points made by Bygballe and Goldeng (2011): that improving energy efficiency in buildings is one of the simplest and most straightforward environmental efforts for climate gas reductions, that environmental issues represent a considerable opportunity for the industry, and that further R&D and stronger linkages between actors are key pathways to success.

During the work with the application related to VRI-O and in the time span before the project's official startup date (1.8.11; date set by the Norwegian Research Council), the selected project leader for ERB and the County Council started mobilizing and anchoring the project with the construction industry and other actors in the extended⁴ building construction value chain in the region. The industry expressed their interest in establishing better contact with the different actors in the sector, and they welcomed the possibility of closer contact with relevant research institutions.

At the same time as VRI-O, the County Council gained acceptance for another project, a pre-project financed by The Norwegian State Housing Bank. The pre-project aim is to describe the activities and resources needed to accomplish a rehabilitation pilot project (hereafter called the pilot). The object for the pilot was set to be one of the buildings owned by the County Council. The pilot's aim is to, as far as possible; make the selected building a zero emission building (energy neutral). Further, the ambition is to make this building an exposition for industrial and development actors related to sustainable buildings. The building is also planned to be a regional learning arena, i.e. a place for research and educational training for apprentices and students connected to relevant studies in the county.

After the official startup date in August 2011 the activities in ERB has been steered by the deliveries in the pre-project for the pilot, which had completion deadline 22.06.12. During the first couple of months the project leader established a workgroup containing actors from a university, the regional university college, an architect and consultancy firms. In March 2012 this workgroup performed an inspection of four college school buildings as candidates for the pilot. They selected a school building built in the 1970s. It is characterized as "not fit to stand outdoors" and is in need of comprehensive rehabilitation.

³The term *arena* is used in this paper to emphasize that the meeting places which is sought established include both possibilities for dialogue (which occur in forums) and practical training (which occur at training arenas).

⁴By extended value chain we mean to include activities supplemented by for instance universities and other R&D actors and users, i.e. we do not limit the value chain to for instance Michael Porter's (1985) value chain activities, i.e. inbound logistics, operations (production), outbound logistics, marketing & sales and service.

Also, in early 2012 a consultant was hired to perform a set of foresight workshops centered on how to make the selected school a flag ship, meaning beyond the state-of-the-art energy efficient rehabilitated building. The foresight activity is one of the main means to reach the aim of ERB. Foresight is foreseen as a tool for bringing the actors in the business sector together, establish contact with R&D organizations, start up discussions about the current situation in the business sector and bring to light the pronounced challenges. The main goal of the foresight activities is for the business sector to establish a common holistic view of their own situation.

A foresight workshop was held at the selected college in late March 2012. This workshop gathered approximately 20 people. Among these were the members of the workgroup, employees from different divisions of the County Council and representatives from development agencies which operates different relevant financial instruments. However, besides some consultancy firms there were only a couple of representatives from the construction industry present.

At the next meeting, which was held in mid April at the County Hall, the workgroup had expanded with new actors, now also involving a regional research institute, an energy management & consultancy firm and a provider of wireless mesh networking technology. In this meeting, people from different divisions of the County Council were present. It became clear that there was frustration and uncertainty related to ERB and rehabilitation pilot as the people normally dealing with rehabilitation and new building projects in the County Council were uncertain if and how they had to engage in and take into account the activities in these projects. The main outcome of this meeting was that the workgroup now got divided into three subgroups, dealing with more specific areas of concern related to the pilot: R&D and teaching; training, educational building and modeling of room (in the school building), and finally: plan of progress and process.

The different subgroups had separate meetings throughout May. Two of the authors participated as engaged researchers in the “R&D and teaching” group. The work concentrated on giving input to necessary R&D activities to establish a viable fundament for the pilot and how the pilot should be shaped to act as a platform for student thesis work.

At the end of May there was a new meeting at the County Hall, where the expanded workgroup and representatives from different divisions of the County Council again participated. The different subgroups’ work was presented and discussed. Still the construction industry in the county (the target group of ERB) was hardly mentioned, besides that one of the authors tried to raise a discussion about it without succeeding.

Finally, in mid June, an “expert workshop” was held with the people from the expanded work group and invited guest lecturers from consultancy firms (=expert group). The main objective of this workshop was to pin-point the different deliveries in the detailed statement report which was soon due. Because of the lectures and following discussions, the ERB project - energy efficient rehabilitation of buildings – was rephrased to *sustainable* rehabilitation of buildings. The expert group decided that the pilot should apply green-design principles (category excellent in BREEAM), helped by tools as BREEAM⁵, LCA and LCC⁶.

⁵Building Research Establishment Environmental Assessment Method, BREEAM
<http://www.breeam.org/page.jsp?id=66>. BREEAM is an environmental assessment method and rating system for buildings. It takes into account the building’s design, construction and operation, i.e. measuring a building's environmental performance. BREEAM-NOR is in use in Norway <http://www.ngbc.no/>

BREEAM was also highlighted as a process tool, as a help in making the right decisions at the right time in a building or rehabilitation process. They pointed to that solid and good cooperation is needed to reach the goal of a BREEAM certification.

The pre-project has now come to an end, and the document which it has produced now enters the decision-making process in the political system of the County Council. “Fylkestinget” (the Council) will decide whether or not to finance the rehabilitation of the college building on the 27th of September. If the answer is no, ERB has to find another building as pilot case for the regional innovation project. The main question now, according to the project leader, is how to keep the different actors’ interest in the coming months, and especially if “Fylkestinget” turns down the pilot project. ERB is planned to continue until the end of 2013, as already mentioned, aiming at establishing a competence based network in the region, or permanent structures which can enhance research and development in the companies and improve skills and knowledge in the regional building industry.

ANALYSIS& DISCUSSION

In ERB the main objective is to establish a network within the regional industry in order to enhance the collaboration and knowledge building related to energy efficient rehabilitation of buildings. Hence, these aim correlates well with Håkansson and Ingemansson (2011) call for both cooperation and networking in order to create new and/or joint knowledge. ERB was early on merged with a pre-project, which brought in a strict focus on the required deliveries for this project. The process of working towards these deliveries eventually led to the assembly of a project group which could be defined as a technocracy, including actors from a limited part of the extended building construction value chain. However, none of these actors are really performing construction or belong to the relevant building industry. Rather they are actors who train (university, university college and the college), or give advices (consultancy firms) or sets the boundaries (County Council and regulations and standards). All these actors are perhaps special in that their mandate is to operate for others, to give away knowledge to other parties rather than to exploit it themselves.

Relating this to the processes at the interorganizational side of the dual OD model (Figure 1), the area for exploration has been the pre-project encircled by its aims. The actors which have been enrolled in the “network” have been those who could inform the pre-project on an idea structure level (Brunsson, 1989/c2002; Håkansson&Waluszewski, 2002). The actors have been busy designing a mental model of the rehabilitation process and the rehabilitated building. The joint acting has resulted in documentation of this mental model and its demands and conditions. This documentation has been delivered to the County Council, the owner of the pre-project.

It could be argued that the current involved actors so far are involved in pure exchange or minor social exchange interactions (Håkansson&Ingemansson, 2011). Focus has been on “delivering” one’s own existing knowledge into the project in order to produce a joint product, the documentation commented on above. To claim cooperation and networking

⁶LCA: Life Cycle Assessment. LCC: Life Cycle Cost. For instance: Using a life-time perspective can alter for instance evaluating preservation instead of building new. In a life-time perspectives, sometimes preservation is not the best solution viewed from an environmental impact view. Environmental and economic level (life cycle cost, LCC) Fewer resources are used than when. However, this will be challenged by applying life cycle assessment (LCA) of the choices made.

effects, the main question is whether the different actors have gone back home to their respectively own organizations and changed anything as a result of their attendance in the project. In most cases the answer is probably no. One actor which might have slightly changed is the County Council (at least short-termed), as the normal procedure in building and/or rehabilitation projects has been challenged. If the process the County Council runs for public purchasing of construction services is changed because of the project, this may be seen as a result of a learning process fuelled by their project participation. However, we have no evidence that their project attendanceso far has resultedinsome sort of change within the County Council.If nothing has changed (“problems” solved or opportunities seized) in the organization as a result of the project participation, then no intraorganizationalcollective learning processes/organization-development has taken place. This also means that no sets of actions (corrective actions, enabling actions, or alignment activities) to change situations internally related to the issues dealt with in the project has taken place. Some actors could have got ideas for further development of their own practice; for instance there have been several proposed innovations for consultancy firms presented at meetings: for instance 3D-models for thermal bridges in buildings, or online measurement of leakages. Whether or not these possibilities have been acted on is not known to the authors.

Another change could be the way several different R&D institutions have started working together across professional borders, and the way several consultancy companies, which usually compete for bids, have acted together. This change mostly affects the borders between the different actors, it is probably short-termed, and it probably does not lead to intraorganizational changes within the single organization.

In thecase project there is no certainty for outcome for the involved actors.If the conclusion ends uppitive to finance the rehabilitation of the college building, public purchasing rules could “threaten” the collaboration which has been established. Those who have participated in the pre-project work could be in imminent danger of being excluded from mandatory bid competitionrelated to the actual rehabilitation pilot project - or at least loose the commission in this competition.

One main question is how and when the actor which is going to innovate (the construction industry: contractors, producers of building materials and other relevant actors) is going to be included in the project(i.e. the activity structure (Brunsson, 1989/c2002; Håkansson&Waluszewski, 2002)). So far, this industry has not got access to the learning arenaestablished by the project and thus not got the opportunity to take part in defining the focus/problem areas. If and when different industrial actors are included in ERB, the process of including them will to a large extent determine whether the interaction will encourage to 1) pure exchange; 2) minor social exchange; 3) technical exchange; 4) co-operation or 5) networking. Here the combined theoretical model (of Håkansson and Ingemansson’s (2011) categories and Rubach’s (2011) model)can be used in order to understand and discuss possible outcomes of the case.The following outcomes can be outlined:

- A. The industry is asked for specific deliveries to the project. They are not included in the processes of finding new and innovative solutions. It is decided to only useproducts which are already found at the producers’ shelves. It is considered that the industry neither have the interest nor the competence to work outside the knowledge of each firm.

This equals pure exchange and/or minor social exchange, and will most likely lead to neither intraorganizational learning processes nor interorganizational learning processes for the industry.

- B. The industry is asked for specific deliveries to the project; however the solutions which are ordered are new to them. They are not included in the processes of defining the new solutions, as this will be done by other actors (for instance R&D institutions). This equals technical exchange, and will most likely lead to minor to major intraorganizational learning processes but no interorganizational learning processes for the industry.
- C. The industry is invited to deliver to the project; however the solutions are not pre-set. They are included in the processes of defining and finding the new solutions together with one or more other actors (for instance R&D institutions). This equals co-operation and/or networking, and can potentially lead to majorintraorganizational learning processes andmajorinterorganizational learning processes for the industry.

Based on the foundations of the dual OD model, it is essential that those who are going to innovate (the industry) are included and allowed to be actively engaged in the “problem definition and problem solving processes”, i.e. the learning/knowledge building processes. If the project ends up using model A or B listed above, it could be asked if the aims of ERB stand the chance of being fulfilled.

The continuation of ERB will be followed by the researchers. In the prolongation we want to follow and explore how the different actors open up, share and develop knowledge, and how they work towards the goal: sustainablerehabilitation of buildings. Will the different actors which are and will be enrolled have different possibilities for opening up and really explore new solutions together? Willthe owner of the building which is object for rehabilitationcontribute to or restrain the possibilities for finding new and innovative solutions? Will the owner be visionary enough to reach the set goals, or will they end up demanding the well-known and/or cheapest solutions? And finally;how will this affect the possibility of ERB to facilitate the enhancement of competence and innovation in the regional industry related to sustainable rehabilitation of buildings?

CONCLUSION

To sum up, this paper has explored theoretically how the actors in the building construction industry can enhance their own and the collective innovation potential through planned learning processes both in interorganizational and intraorganizational settings. This has been done by combining Håkansson and Ingemansson’s (2011) perspective on networked knowledge acquisition in the construction industry with a dual organization-development (OD) conceptualization of network participation (Rubach, 2011) to promote co-operation and networking (interaction which can also lead to the creation of new/and or joint knowledge).

By drawing on insights from a case study and theorizing the bridging between inter- and intra-organizational learning processes the paper contributes to our understanding of how to enhance networked innovation as well as the development of innovation networks. The main contribution to the IMP discourse is to supply additional understanding to the IMP network models related the link between intra- and interorganizational innovation/learning processes.

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