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Open innovation in the construction industry with a specific focus on Swedish wood-construction companies

SHS-rapport: 2014-002

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Background

This report aims to deascribe the present status of open innovation in general and more specifically in small and medium sized companies and the construction industry (part 1). Further the aim is to provide an illustrative overview of the present status of open innovation activities among Swedish wooden construction companies (part 2) and finally to discuss how the application of more open innovation activities in the Swedish construction industry could enhance product development (part 3).

We are aware that this report only represent the first step in a process and we hope it will, in a true open innovation style, enhance future activities in order to develop our joint knowledge.

Results

We propose that this report should be used in two ways. First the report can be used as a starting point for industry related activities. A workshop on innovation, product development and open innovation approaches can be the starting point on these activities. The aim being that companies in the industry a) use more resources in product development b) begin to systematize the product development processes and c) make use of open innovation approaches in their product development activities.

The second way this report can be used supports the first application. The background here is that innovation and innovation related activities have been on the national agenda in Sweden for some time and several policy documents have been published. An emerging idea is to form an alliance between IVA, regional actors and the wooden construction industry in order to initiate a broad innovation oriented project in which an open innovation approach is applied. This could be operationalized with the assistance from resources made available within the EU framework (strutkurfonder).

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Introduction

Currently, many companies from a range of different industries are facing increasing levels of competition from companies producing products of similar quality but with lower costs. In the process of searching for ways to enhance their competitiveness, many companies are making use of, or are contemplating to embark on, open innovation.

The open innovation model was originally proposed by Chesbrough (2003, 2006) and focuses on the possibilities and limitations for companies to move from a rather closed approach (where innovation is done in-house, often in an isolated R&D department) to a more open approach, where innovation is done in collaboration with other companies and through the use of internal and external ideas. A range of scholars, not always explicitly referring to the open innovation model, increasingly emphasize that external linkages have become vital for companies to enhance their product innovation (e.g. Coombs et al., 2003; Huston and Sakkab, 2006; Quinn, 2000).

However, the decision of whether to go for open innovation and which part of the innovation process to open up requires a thorough understanding of the potential opportunities, challenges and risks of open innovation. One risk of open innovation can be, for example, that other companies might understand the basis of the internal core competence, which could make a company more vulnerable to competitors. The necessary openness to achieve open innovation is thus both a strength and a potential weakness, and the changing boundaries of the innovation process and the process of creating and maintaining partnership relationships over time have to be properly managed in order to maximize potential value and decrease potential risks (Vanhaverbeke, 2006).

During the past years, much has been published on open innovation, and especially outlining the benefits of open innovation within high-technology industries (Chesbrough and Crowther, 2006). Yet, open innovation is also a relevant phenomenon for other, and more traditional, industries. This paper aims at reviewing and integrating existing insights especially for the construction industry. This sector has been pointed out by international policies as one of the most promising for sustainable development. For example, according to the Intergovernmental Panel on Climate Change (IPCC), the building sector has the greatest and cheapest potential for delivering significant greenhouse gas emission reduction (cf. Albino and Berardi, 2012). Open innovation could contribute to delivering the innovations necessary to achieve such changes. Thus, this paper addresses a timely issue.

Literature review

What does open innovation imply? There is not one standard-form of open innovation. Instead, according to Spithoven et al. (2010), three indicators of open innovation can be distinguished: Firstly, a company makes use of external sources of information, for example from universities, and/or knowledge externalities in its innovation process (e.g. Cassiman and Veugelers, 2002; Laursen and Salter, 2004; Monjon and Waelbroeck, 2003). Secondly, knowledge exchange takes place through research cooperation *between* different organizations (e.g. Becker and Dietz, 2004; Fischer and Varga, 2002; Fritsch and Lukas, 2001; Tether, 2002). And thirdly, companies manage the degree to which they want to show their developments to external parties and the degree to which they want to avoid being copied, i.e. appropriation (e.g. Dosi et al., 2006; Laursen and Salter, 2006).

In a recent review of research on open innovation, West and Bogers (2013) identify three common steps in the open innovation process. The first step refers to *obtaining innovations from external sources*, including search, sourcing, enabling, incentivizing, and contracting. The second step refers to *integrating innovations*, including factors that enable or hinder integration as well as those that explain how integration changes the organization and its competencies. The third step of *commercializing innovations* is often only implied in studies on external sources of innovation (while an explicit part of conventional models of innovation). At any phase of the open innovation process, *interaction mechanisms* occur.

According to West and Bogers (2013), obtaining innovations from external sources requires two steps: firms must first find external sources of innovation and then bring those innovations into the firm. In terms of empirical context, studies on obtaining innovations from external sources originally focused on large firms in high-tech industries, although there has since been some research on firms in low-tech industries (Chesbrough and Crowther, 2006; Grimpe and Sofka, 2009; Spithoven et al., 2010) and an increasing body of research on small- and medium-sized enterprises (Barge-Gil, 2010; Hung and Chiang, 2010; Lee et al., 2010; van de Vrande et al., 2009; Zeng et al., 2010). Firms may source actual innovations, technical inventions or knowledge, market knowledge, components, or other useful information to support firm innovation efforts (Bogers and West, 2012). West and Bogers (2013) summarize the major activities of obtaining innovation from external sources as searching, enabling and filtering, and acquiring. In fact, a main topic of research interest is how open innovation takes place (in terms of which search patterns are used by companies, e.g. Christensen et al., 2005; Dodgson et al., 2006). But West and Bogers (2013) also point out that identifying and acquiring innovations from external sources is only half the battle.

In order for firms to profit from the external sources of innovation, the innovations must be fully integrated into the firm's R&D activities. This requires a compatible culture in the R&D organization to overcome tendencies toward "not invented here" barriers (e.g. Laursen and Salter, 2006; West and Gallagher, 2006), as well as the technical capability to assimilate innovations obtained from external sources. The authors point out that externally sourcing innovations could change the R&D competencies of the firm, both directly and indirectly. On the one hand, resources allocated to sourcing innovations from external sources could directly lead to a reduction of the resources made available for internal innovation. On the other hand, external sourcing can improve internal R&D capabilities (Ceccagnoli et al., 2010). Firms that have high levels of confidence in their competencies will tend to use internal innovations and bypass external sources in areas that overlap their core competencies (Dittrich and Duysters, 2007). However, Christensen (2006) predicts that in an open innovation world, deep technological competencies will play less of a role in firm success, but instead firms will need integrative competencies necessary to integrate externally sourced innovation.

The process of commercializing open innovation is rarely in focus regarding the commercializing activities per se, instead attention is paid to the performance outcomes of open innovation. In different studies, cooperation with other organizations has been found to increase the innovation performance of organizations, not only for large, but also for small and medium-sized enterprises (SMEs). For these companies, cooperation can help them overcome liabilities of "smallness" (created, e.g., through limited financial resources and limited manpower) (Pullen et al., 2012). In practice, companies face a number of challenges when in trying to make use of open innovation. For example, organizational and cultural issues can arise when SMEs start to interact and collaborate with external partners (Van de Vrande et al., 2009), there can be a risk of losing R&D as a core competence (Carpay, Hang, and Yu, 2007), or they could lose key technologies to third parties through know-how leakages and brain drain (Carpay et al., 2007).

Different interaction mechanisms also are an important focus of studies on open innovation, referring to the linkages between the different partners involved. As Pullen et al. (2012) point out, we know from alliance literature that many external alliances fail in practice (e.g. Duysters et al., 1999; Faems et al., 2005; Sadowski and Duysters, 2008; Spekman et al., 1996), for example due to differences in cognition, conflicting interests, differences in timing of contributions (Mahnke and Overby, 2008), opportunistic hazards, and managerial complexity and uncertainty (Park and Ungson, 2001). Since alliances are a type of collaboration, it is assumed that the high alliance failure rate also has its effect on the failure rates of collaboration in innovation and NPD networks. Therefore, Pullen et al. (2012)

examine which combination of network characteristics leads to high innovation performance. In a study of Dutch medical device companies, they find that the level of goal complementarity between network actors is decisive for high innovation performance. Other relevant factors for innovation performance are resource complementarity, fairness trust, and reliability trust. However, they also find that in practice, companies have a rather hesitant attitude toward using an open business model because of the risk of core competences becoming noncore. They show, in fact, that openness is not always beneficial. Instead, for SMEs that focus on incremental innovation projects, a relatively closed approach to open innovation is most beneficial in terms of innovation performance. Thus, Pullen et al. (2012) conclude that open innovation with a closed business model is the key to success for small and medium-sized companies in a highly regulated sector.

Spithoven et al. (2010) studied the company-level *performance effect* of moving towards open innovation. Based on firm-level data for Belgium, the authors find that openness in the R&D process goes hand in hand with a larger research intensity. Their findings suggest that the use of other companies as sources of information is an important determinant of R&D intensity and, indirectly, of innovative output and revenue growth. Research cooperation with both, firms and universities or public research organizations, is important. Moreover, they find that on average, research intensity is an important predictor of getting revenues from innovative products, which in turn predicts growth in revenues. Research intensity goes hand in hand with making use and recognizing external sources of information. Both having an absorptive capacity and being able to transform this absorptive capacity into innovative products are important explanations of high revenue growth. In other words, the more companies grow in revenues, the larger the coefficient is of innovative revenues as a predictor of that growth. The Spithoven et al. (2010) study also suggests that to be able to detect interesting future avenues, to spot opportunities, and to successfully accomplish postacquisition integration, internal R&D should be done as well. Open innovation is thus complementary to internal R&D and not a substitute. This also means that licensing in and out and spinning in and out new ventures can become an inherent part of the business model. Thus, innovation managers should be aware of the leveraging effect research cooperation has, especially those set up with other companies. But openness and collaboration with other companies also implies that strategic protection policies in a broader sense have to be managed with care. Their results show that companies with the highest growth rates do not emphasize strategic protection such as secrecy in the same way as do companies with lower growth rates, lower levels of innovative output, and less research intensity and collaboration.

From a managerial point of view, this implies that companies will have to manage the necessity for protection in a careful way. Many in-house R&D departments tend to overemphasize the secret character of their research. In fact, case study evidence in their population shows that if a successful collaboration strategy is pursued, trust and knowledge sharing are more important determinants than protection.

Tranekjer and Knudsen (2012) turn attention to firms acting as providers in an open innovation process. They find that the typical provider is a supplier or a customer to its receiver firm, but rarely a competitor. Often the relationship is mutual (48%) between provider and receiver, indicating that the firms are actively involved in each other's activities, and often the firms choose partners they know in advance (64%). These scholars suggest that more projects, more embedded relationships, and mutual rather than one-way exchange relationships significantly raise the probability that a firm experiences a substantial benefit from providing to other firms' new product development projects. Thus, the provider firm appears to benefit more with increased involvement in the relationship.

In production companies, the use of IT to monitor the production line has become a widely used method in recent years. For example, remote sensing technologies enable companies to monitor processes from a distance and provide opportunities for internal and external process innovation (e.g. Jonsson, Holmström and Lyytinen, 2009). Westergren and Holmström (2012) studied how LKAB, Sweden's largest iron ore mining company in their struggle to remain competitive by engaging in an interorganizational network, thereby moving from a predominantly closed to a more open approach to innovation. They explore the preconditions for open innovation and the role of IT in this process. The authors argue that open innovation is centered on the concept of knowledge flows between companies and individuals, and that different types of network ties provide a variety of ways in which knowledge can be both created and communicated. Their findings show that network ties provide value that is augmented or hampered by the role that trust plays in such networks. Their case study shows how the move toward an open innovation environment was facilitated through the ways in which trust in people (e.g. the social network) made trust in technology possible. Previous research had pointed out that knowledge is more easily shared between entities in close geographic proximity (e.g. Jaffe et al., 1993). Creating knowledge clusters in a specific geographical location is therefore an integral part of open innovation as it provides deep and strong ties between companies (Simard & West, 2006). Westergren and Holmström (2012) found this to be a deliberate strategy at LKAB, whose contract with the joint venture held jointly with two other companies stipulates that the service provider cannot move its headquarters from its current location. Geographical proximity brings new

job opportunities to the region, and causes knowledge to be contained. Another important feature of that joint venture was the transfer of knowledge into the network, as the participating companies also have ties with other firms and in other constellations. In addition, there was a conscious effort to establish both formal and informal ties, as the joint venture and its work were regulated by formal contractual agreements, but the relationships between companies and individuals were created by informal personal connections. This mix of formal and informal ties helped create a dual knowledge flow of both internal knowledge to the external network, and external knowledge to the internal network. Measures taken to facilitate knowledge exchange and creation were to introduce new technology and give courses and specific areas of competence, but also to have regular informal meetings.

Westergren and Holmström's (2012) study also points out how information technology can act as an enabler for social action, and how to this end any openness in the organizing practices has to be successfully enabled by technology. They show how both technologies and social networks must change as companies move from a closed to an open innovation approach. Technologies and social networks are found to be co-dependent as the move toward an open innovation approach was made possible through the ways in which trust in people (e.g. the social network) made trust in technology possible. As enabling technology, IT is a fundamental part of the communication and exchanges taking place in and between organizations. IT will interact closely with systems of trust and these systems have significant implications for the adoption, understanding, and use of technology. Trust in technology as an enabler of social action is important for the running of contemporary organizations, but the people behind the technology remain key agents in establishing that trust.

Conceptual framework for firm innovation logic transformation

	Innovation logic	
Area of concern	Closed innovation	Open innovation
Locus of innovation	Innovation process internal to !rm. Focus on having the best people working for you.	Innovation process result of a mix of internal and external contribution and a mix of various types of ties. Focus on having the best network working with you.
IT	Proprietary, belonging to innovating !rm.	Shared, either the actual object of innovation (e.g. Open source software) or providing common

		platform for network participants.
Interorganizational relationships	Contractual, short term, hierarchical.	Trust-based, long term, networked.
Management strategy	Staying in control	Balancing trust and risk

Source: Westergren and Holmström (2012: 213).

Innovation in the construction industry

Innovation in the construction industry can be defined as 'the act of introducing and using new ideas, technologies, products and/or processes aimed at solving problems, viewing things differently, improving efficiency and effectiveness, or enhancing standards of living' (CERF, 2000, p. 2). In one of the relatively few studies of innovation in the construction industry, Bosch-Sijtsema and Postma (2009) investigated how project-based firms cooperate in technological innovation projects. The main focus of their study is on the sharing of capabilities in cooperative innovation projects and how these cooperations are governed. Applying a knowledge-based perspective, they compare four cooperative innovation projects in the construction industry and define a set of propositions. First, they suggest, a cooperation aimed at a mutual strategic benefit in mutually gaining access to the knowledge bases of the involved firms, while maintaining their own differentiated knowledge base, can result in more stable and long term relationships with mutual trust between the cooperating firms. Second, in a cooperation aimed at a mutual strategic benefit in mutually gaining access to the knowledge bases of the involved firms, partners not only gain access to each other's technological capabilities but also develop and share knowledge about organizational aspects and market situations and gain knowledge about the way of working of the partner firm. Third, the authors propose, in a cooperation aimed at mutual strategic benefit in mutually gaining access to the knowledge bases of the involved firms, non-codifiability of the capabilities is conditional to create a win–win situation. And fourth, cooperation aimed at a mutual strategic benefit in mutually gaining access to the knowledge bases of the involved firms is based on mutual competence and intentional trust as its main governance mechanism, whereas contracting between market parties aimed at knowledge–output transactions is represented by limited trust and arms' length (contractual) relationships as its main governance mechanism.

For innovation in small and medium-sized firms in the construction industry, Barren and Sexton (2006) find two main modes of innovation. The first is based on single-project, cost-orientated client relationships and the second is based on multi-project, value-orientated client relationships. The mode of innovation is substantially determined by whether the interaction environment is enabling or constraining. The authors conclude from their study that small construction firms should not 'flip' from the first into the second mode of innovation, but suggest that they should rather incrementally nurture, or identify and move into, supportive enabling interaction environments. The authors also point out policy implications, namely that policies that are appropriate for large construction firms are not necessarily appropriate for small construction firms, and vice versa.

Not many studies have been conducted of the construction industry with an explicit focus on open innovation to date – probably as the building sector is not a pioneer in the area of open innovation (Verdonck, 2011). Therefore, a project in Belgium searched for examples of open innovation among early adopters or pioneers of open innovation in the field of energy-efficient building in general, and the E level in particular. The E level is a measure of primary energy consumption of the housing unit and a parameter for the EPB (Energy Performance of Buildings) audit. The E level in particular, and sustainable and ecological building in more general, trigger innovation. The Belgian research project found that in the building sector, cooperation takes place in three areas. Namely, there is cooperation between manufacturers of building materials and technology, cooperation on site and cooperation between manufacturers and those on site. Within building projects they found vertical and horizontal or B2B cooperation as well as cooperation with fellow enterprises. The researchers found that early adopters of innovations particularly cooperated at a B2B level with customers and suppliers. Cooperation was, however, limited to sharing knowledge and working together to develop improvements and innovations where there no competitive disadvantage was feared. Similar to the general discussion of open innovation above, protecting in-house knowledge is a major barrier to cooperation between firms. The Belgian project finds success stories to exist in the building sector mostly when firms offer complementary products or services and are able to maintain or expand their market share through cooperation. They provide the "massive passive" project, a joint venture between a manufacturer of bricks and a manufacturer of insulation, as an example of this. But they also found evidence of open innovation in skeleton building and provide the example of a joint

venture between a general contractor for skeleton building and a contractor for windows and joinery. But the researchers also point out additional barriers for small firms, who find it more difficult to approach larger firms because they are more geared to mass production and less interested in tailor-made solutions. This leads small firms to look for solutions with fellow SMEs, which is also easier thanks to a common business culture, less bureaucracy and greater flexibility. As pointed out above, successful cooperation is based on trust and that applies to all businesses. Interestingly, these researchers find for the Belgian context that although agreements are sometimes formalized, this does not appear to be essential for success. As a trigger for open innovation, E level requires greater communication and knowledge sharing about implementation. A challenge is that some general contractors try to maintain as many tasks as possible in house. Other contractors favor the building team method, bringing together all potential major players at the start of a building project. For this, architects appear to be important actors to take initiative for this, as the architect is a major communication channel for innovations from manufacturers and the site coordinator.

An elaborate approach seems to be required for implementing new energy-efficient materials but also technology effectively, aiming to achieve the E level. That airtightness is a crucial factor in achieving the E level is crucial in this regard. Manufacturers of materials and technology also use websites and living labs to raise awareness of innovation among potential customers. The innovations also generate increased demand for specialist training and interdisciplinary expertise. For the building sector in Belgium, this is channeled and coordinated by the Building TASK FORCE with a view to harmonizing building courses.

The Belgian government supports open innovation in building in various ways. Examples of cooperation that are provided are research centers that share their knowledge with manufacturers of materials and technology, creating innovative products together, with the support of organizations such as provincial innovation centers. Provincial organizations for sustainable building act as a source of inspiration for clients in the area of energy-efficient building and can lead to cooperation between building partners. The General Government Policy Service policy area - Sustainable Development Team and the Flemish Energy

Agency (VEA) can also help to support open innovation. Unfortunately, the full study is only available in Flamish (www.serv.be).

Recommendations for practice

Despite the success of open innovation as an academic topic of interest, many companies to date still hesitate with opening up their innovation processes. Rufat-Latre et al. (2010) explain the gap that exists between the promise and reality of open innovation in many organizations with the following reasons:

1. An unwillingness to change comfortable habits and practices, especially when it comes to sharing ideas and intellectual property with anyone outside the organization.
2. A managerial mindset that thinks of competition primarily in terms of a battle for market share in a zero-sum game – rather than a battle for new markets using competence-based advantage to produce customer value.
3. Organizational and incentive structures that promote and reward the exclusive use of internal resources for high-value added activities.
4. A mindset that views open innovation only as a new product development and commercialization process – rather than an integral part of ongoing strategy.

Rufat-Lutre et al. (2010: 27) suggest the following steps for organizations which consider moving towards open innovation in order to help them identifying productive avenues for open innovation:

1. Define your company's core competences – the one, two or three bundles of skills, processes, technologies, assets, and values that explain your success and deliver value to customers.
2. Define new areas of growth where you can leverage your core competences.
3. Each area of growth you define might require a business model that needs not only your core competence, but also some additional ones. Define competence gaps for each area of growth.
4. Look for potential partners who can fill these gaps so that you don't have to change your core competences.
5. Change your internal processes and culture to allow these outside partners to begin playing a vital role in filling the gaps and completing the business model required for success in your new growth area.

In addition, they (ibid: 28) suggest to consider some of the following principles wh en beginning the transformation towards a more open organization:

1. Stay true to who you are. Communicate (through words and actions) a commitment to who the company really is, where it is going, and why you need to embrace working with others outside your company to achieve success.
2. Open innovation starts at home. First work to break down the walls and barriers between internal silos. The mindset change towards more receptivity and cross-silo collaboration will extend to the outside.
3. Enable networks – both internally and externally. An important tool in dissembling the silo mindset is to provide a vibrant networked environment. Use technology as well as in-person interactions to form and support networks, inside the company and out.
4. Infiltrate existing structures and processes. Rather than a wholesale replacement of the current system with ‘‘open friendly’’ systems, start by adding ‘‘open’’ elements to the existing systems. For example, add a deliberate ‘‘partner search’’ step to your stage-gate process.
5. Leadership is required to foster a culture of openness. Direct hierarchical control is not part of the open ethos. Learn to manage an operating environment that accepts open innovation. Promote the importance of open-innovation partners while maintaining the confidence of in-house resources.
6. Manage your transition to open innovation. Don’t expect it to happen by itself or in a ‘‘big bang.’’ Carefully think through the changes you need to implement and their sequence. Monitor your progress.
7. Develop new skills – negotiation and relationship management. These will be some of the most important skills in open innovation and you need to nurture these skills now.
8. New incentives will lead to new behavior. Begin to reward the behaviors that are critical for open innovation. Track and reward new external relationships. Discourage the ‘‘not-invented-here’’ culture.

. Open innovation in the Swedish wood construction industry

To what degree is open innovation practiced by companies relevant for the Smart Housing project? In this second part of the project we aim to outline the present status of open innovation in the Swedish construction industry, with a specific focus on companies that include wood in the construction process. This part is of inspirational nature, as it was impossible within the given time and resource

frame to complete a comprehensive overview. The following discussion follows the three identified modes of open innovation;

- The first mode refers to when a company makes use of external sources of information, for example from universities, and/or knowledge externalities in its innovation process;

- the second mode includes where innovation is done in collaboration with other companies or industry related R&D organizations.

- The third mode is present when other external parties, such as customers, students and the general public are invited to participate in the innovation process.

In the following we will combine the two first modes, as it is very difficult to draw the line between the use of information only and some kind of collaboration.

The use of external sources of information and industry related collaboration

The relative use of external sources in construction companies' product development processes is difficult to outline exhaustively. Most companies in the construction industry do not apply a formalized product development process and thus do not have a formal R&D function in their organization. This could indicate that the involvement of information and knowledge from external sources is done on a more ad-hoc basis.

A well-known exemption from this pattern is the intensive cooperation between Lindbäcks Bygg, Martinsson, Moelven, Setra and Luleå Technical University. One feature of this intensive cooperation is that that one person is employed part-time at both Lindbäcks Bygg and Luleå University. Also, some companies take an active role as knowledge providers, as rather explicit part of their business model. Masonite and their flexible building system is a prominent example of this strategy (Brege et al., 2014). Further is the PhD education program Prowood, organized by Jönköping Technical University in cooperation with relevant companies, an example of an organized exchange of knowledge which will have consequences on product development processes in the participating companies.

The use of external sources in product development is obviously also encouraged by participating in national or international trade fairs. One prime example of this is Nordbygg, starting the following on their homepage. *"Nordbygg gives you a perfect grasp of developments in the construction, building services installations and real estate industry. More than 800 exhibitors from over 30 countries will be taking part with exciting innovations, smart solutions and new ideas."* (Nordbygg, 2014, homepage)

When we narrow the scope to the companies within the industry, the knowledge exchange within the industry association displays the trend towards open innovation activities. TMF, with about 800 member companies, runs a wide number of industry-related development activities, and a core group of companies, organized in product sub-groups, participate frequently. Some current themes are automatization/robotization and surface treatment.

Attempting to further narrow down examples of company collaboration without the involvement of external parties, we rely on an selected questions of an interview-based study of collaboration in internationalization activities, where more general question on collaboration between companies were included. The answers from the 18 industry experts industry revealed a low degree of such collaboration. However, collaboration on an operational level existed, meaning that for example neighboring companies help each other out when acute needs emerge.

Other than this, we only know of a few attempts that have been made to organize collaboration on a more strategic level. One example worth mentioning is the "Trähuskluster Småland", which aimed to strengthen a local cluster of manufacturers. However, we have not found much indication that this examples would have had an impact on how to organize product development activities in the participating companies.

The use of external parties in the innovation process.

In this pre-study we have only been able to localize one organized attempt to involve users and/or the public in the innovation process. This example is, however, very interesting and will therefore be presented in more detail below.

Inwido Compete & Incubate

In 2012, the business incubator Ideon Innovation in Lund and Implement Consulting Group in Copenhagen together with Inwido launched an open innovation competition to speed up innovation within Inwido's field of business. Inwido is one of Europe's leading manufacturers of doors and windows with a turnover of over 5 billion SEK. Every year, consumers in more than 15 markets are buying over 4 million products from them. The major part – 70 percent – of Inwido's sales are to the consumer market.

During a competition in Spring 2013, the public were invited to create new ideas and prototypes in a number of defined themes during ten creative weeks. In June, Inwido's management team selected those ideas and teams they wanted to continue working with in a development and launch phase. Digitization turned out to be an important are, covering

anything from products, services, supply-chain or sales of windows and doors – basically digitization of any part of the life-cycle.

Participants were invited to apply to one or several of the following descriptions:

- Offerings: Have an existing offering that can be applied to the windows and doors market – providing an existing windows and doors offering in a way that benefits from the digitization opportunities.
- Networking: In order to jointly develop new ideas, networking forums were provided, marketed as phantastic opportunity to work closely with exciting companies in and around Ideon. In addition, inspiring speakers were invited every Thursday and networking dinners were held.
- Innovation: This criterion was aimed at companies wanting to experience firsthand the value from a quick and focused innovation effort and inspire their employees.

So far, the results of the process can be summarized as:

- 16 business ideas thrown up in the air and pitched to Inwido's board of managers.
- 5 business critical challenges were defined by Inwido needing outside solutions, each competing for investment, glory and fame.
- 50 enthusiastic entrepreneurs participating in Compete & Incubate Innovation Challenge.
- Of those about 50 percent were Swedish and 50 percent from other countries.
- Meetings took place on eight Thursdays to discuss and analyze ideas, angles and business models.
- 5 interesting and inspiring speakers have helped on the way.
- 4 experienced business developers from Ideon Innovation and ALMI have helped all entrepreneurs in the process.
- 2 concrete business opportunities between existing incubator companies and Inwido and its suppliers
- 1 lead between one Inwido supplier and Lund university for finding a solution on a tech issue
- >100 hours have been spent in business coaching over 8 weeks
- 8 of 22 ideas are from outside Sweden

In addition, much informal networking has taken place, developing the type of trust pointed out above as crucial for successful open innovation.

The way forward: Future open innovation-related activities

We propose that this report could be used in two ways. First, it can be used as a starting point for industry-related activities. A workshop on innovation, product development and open innovation approaches can be the first step of such activities. The aim of this next step would be that companies in the industry a) use more resources in product development b) begin to systematize the product development processes and c) make use of open innovation approaches in their product development activities, based on a systematic assessment of the respective pros and cons for their specific situation.

The second way this report could be used supports our first application. The background here is that innovation and innovation-related activities have been on the national agenda in Sweden for some time, and several policy documents have been published. A recent example (2012) is IVA's Innovation for Growth program, in which the following recommendations were made:

- Display engaged, strong and concrete leadership for innovation and growth.
- Drive an innovation policies which reaches beyond political blocks and which is anchored ain all relevant departments.
- Create a culture which is based on values that stimulate renewal and risk-taking.
- Strengthen the incentives for innovation in existing businesses and within public organizations, but also for individuals.
- Create the best long-term prerequisites and infrastructure for entrepreneurship, business activities and growth in large and small, as well as new and old companies.
- Strengthen productivity and international competitiveness by increasing the degree of knowledge in products and services.
- View business opportunities in the light of global challenges.

IVA is continuously emphasizing innovation as a driver for industrial growth and has initiated actions to translate the policy statements to operational activities. An emerging idea is to form an alliance between IVA, regional actors and the wooden construction industry in order to initiate a broad innovation oriented project in which an open innovation approach is applied. This could be operationalized with the assistance of resources made available within the EU framework (Strukturfonderna).

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