COMPETENCES AND CHALLENGES & FIRST COLLABORATION EXPERIENCE FOR DANISH SMES

REPORT

A decade after introduction of open innovation idea many aspects of this field remain untouched or not yet addressed and our understanding of the open innovation concept is still limited. Among all scientific publications related to the field of open innovation (a search in Google Scholar provides over 2,5 million hits) still very few studies concentrate on small and medium enterprises (SMEs). Successful innovation increasingly relies on a more open approach towards obtaining, integrating and commercializing external sources of knowledge. SMEs may, to a large extent, become dependent on external sources of innovation to complement their internal knowledge base. As such, SMEs are challenged to find new ways to organize their innovation activities in the larger context than their current operational scale.

The purpose of our research was to investigate what are Danish SMEs competences and challenges and their approach towards innovation and future regional development. Taking into consideration that generating new opportunities for additional value creation happen much more often in open innovation than while following closed innovation principles, this report will explore their current open innovation competences and challenges to identify, how they could improve their performance through various open innovation collaboration modes.

Even though the field of open innovation has been dominated by qualitative studies, most of them focus on larger firms: both single firms like IBM, Lucent or Intel, DSM or P&G and cross company analysis. That is why despite of the potential advantages of quantitative studies, we claim that in case of SMEs, qualitative cross company analysis could help in better understanding of the open innovation phenomenon as well as in developing new theories. Exploratory interviews were conducted among 12 Danish manufacturing companies (see Table 1 Characteristics of interviewees). Each company was interviewed twice in the period of 3 months. All the interviews were recorded and transcribed. The gathered data was used for creating company 10 case studies.

Company	Strategic Profile	Strategic Orientation	No. of interviews	Position	Established	External capital available
A	Micro-enterprise	Technology	2	CEO	2007	
B	Small enterprise	Technology	2	Technical Manager	1997	
C	Small enterprise	Technology	2	Managing Director	1983	
D	Small enterprise	Service	2	Managing Director	1982	
E	Small enterprise	Technology	2	Development Manager	1987	X
F	Small enterprise	Technology	2	Managing Director	1998	X
G	Micro-enterprise	Technology	2	CEO	2010	
H	Small enterprise	Technology	2	Managing Director	1958	X
I	Small enterprise	Technology	2	Managing Director	1972	
J	Medium enterprise	Technology	1	Managing Director & HR Director & Development Manager	1986	
K	Big enterprise	Technology	2	Site Manager	1967	
L	Big enterprise	Technology	2	Director of Innovation & Senior Director	1970	

Table 1 Characteristics of interviewees

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Our research took a starting point in exploring current enterprises' open innovation competences as well as challenges and their approach towards it. After building better understanding of company's operational activities we will further focus on technology exploration and exploitation as well as personal skills and competences that help in managing knowledge flows between different external and internal partners. Both technology exploration and exploitation will be additionally investigated in terms of collaborative innovation with their current or potential partners.

COMPETENCES AND CHALLENGES

We noticed that there is a slight difference between companies that have more than approximately 50 employees and those that have less. The first group seems to have much better established processes in general and particularly in the area of innovation management. What is more, in some cases it is also positively correlated with the time that they are present on the market, but that is not a rule. Furthermore some of them became a part of an international capital group and therefore have some additional possibilities of financing. One of the biggest challenges for all of those companies is lack of qualified manpower available or willing to work in the region. This problem applies to various areas of engineering. Some of them could foresee some potential challenges in leadership development, especially in terms of managing multinational teams working simultaneously in different parts of the world. In terms of challenges related to innovation, even though they do not have a problem with incremental innovation (mostly maintenance of current products), they express lack of 'big' ideas for investment.

As for the latter group (companies under 50 employees), what they underline as their main asset is knowledge (know - how) that they have as well as people that work for them. As most of them create highly customized products, they perceive themselves as highly innovative companies. Moreover, thanks to good references from customers they are able not only to maintain current clients, but also attract new ones. The main challenges that they point out is lack of standardized products and due to that also deficiency of automation in their production facilities. Marketing and business development activities are in their case rather scant. Some of them (micro-enterprises) point out their financial situation as something that sometimes stops them from taking big orders. Nevertheless, they are aware of existence of external funding provided both locally in Denmark as well as in EU zone.

What applies to both of those groups is a good perception of their knowledge and capabilities regarding to their field of operations as well as technologies that they work with. All of them underline high quality of their products and accompanies services as a crucial point in their everyday agenda. They not only seems to have a quite good network of contacts in the region, but also are able leverage from it what gets them new partnerships and orders. Challenges that apply for both of those groups are cost related to manpower and due to that also to manufacturing in Denmark.

FIRST EXPERIENCE FROM COLLABORATION

Based on the empirical date from the interviews, as for a practical case, we decided to focus on the second group of companies (under 50 employees) and try to utilize their engineering competencies, while helping them out to overcome their challenges. Therefore we established an automation project (AutoSYd). For this project we invited four SMEs (the consortium). Important criterion for inviting companies to be a part of the consortium was that participants' future consortium's competencies could be melded together to a suitable common goal – in this case providing free automation consultancy. Our main goal was to create a situation where all companies would have the potential to achieve collaborative advantages. Here we mean not only knowledge exchange and networking, but also opportunities for generating additional monetary benefits - different than the partly refund of their hours spend on the project covered by the Syddansk Vækstforum and EU. As a result, there were four companies invited to join the consortium of the automation project. These four SMEs exhibited a complementary set of skills: two companies are mechanical solutions providers, and two companies deliver software and hardware solutions. We included two representatives of each set of competences in order

to test for competitive behaviors. The core team comprises representatives from the four industrial partners as well as a Project Support Team including: the local University, the Local Development Council and a Vocational training center. SMEs from outside consortium (project participants) are also beneficiaries of the project (those that seek improvements in their manufacturing facilities).

In order to conduct this investigation we applied action research, which enabled us getting in-depth understanding of actual companies' practices as well as in designing and developing the most suitable solutions for the participating SMEs (project participants) from the regional Danish ecosystem. Participating companies, which were southern Danish manufacturing received free automation consultancy provided by consortium members. The AutoSyd project offered them a structured and competent support for clarification and development of automation solutions. By this project we also wanted to support retaining manufacturing jobs in the region.

As action research elements we understand a tight link between the researchers and the research participants as well as deliberate involvement in actions of the research participants. The researchers (officially being a part of project support team) investigated the process of value creation and capturing by the consortium as well as participated in the project as facilitators and discussion partners. The motivation for implementation of those elements, as well as its positive implications, was to increase understanding of the context of actions, performed activities, and the reasoning behind them.

This collaborative automation project was in place from August 2013 until March 2015. The project has been in close contact with 41 enterprises, made detailed analysis of manufacturing facilities of 22 companies, and come with an operational strategy and plan for 14 of them. During this course of activities we could observe two different collaboration experiences: one between companies inside the consortium and the second one between consortium members and participating SMEs. Both collaboration experiences were outcome of implementing the smart factory concept, namely

"a way to enhance the collective and individual capabilities of manufacturing companies to foster growth and competitiveness by providing integration and alliance between partners and systems when they collaborate in an open innovation ecosystem where competences and technologies are mutually shared".

The creation of such an innovation community resulted in "generating more opportunities for knowledge sharing where the innovation process is facilitated for each member".

The first collaboration that SMEs had a chance to experience was very positive. The AutoSyd project both strongly influenced and made significant changes at the consortium level as well as in the vast majority of companies that have been participating. Thanks to working in an open innovation environment we open up a purposive knowledge inflows and outflows channel. Companies stated that the university's use of theoretical analysis tools have taught them a different and more effective approach to customers without specific requirements. Many of the SMEs have mentioned that AutoSyd project has opened their eyes to look for small improvements that can eliminate repetitive work and release labor for more demanding processes. This change of thinking was raised at several business throughputs.

FURTHER DEVELOPMENTS

The AutoSyd project showed us that our considerations about establishing new smart factories are not just theoretical, but they have a meaningful practical impact and further positive implications. The process of setting up new collaborations between SMEs is on place. We are investigating new possible collaborative setups, which will be documented through business cases.

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