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Internal and External Network Structure and Innovation Capability

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Abstract: The potential of open innovation to increase innovation capacity has been discussed for some time. In this context, the relationship networks of enterprises are of central importance, since they influence the generation of new ideas and innovations. While large companies have already been using their relationship networks in a structured way, relationships in small and medium enterprises (SMEs) have more informal and unstructured nature. The paper provides an insight into the work of a research project on the interrelation between relationship networks and innovation capacity of SMEs. As a result it introduces a software tool under development and a management approach that enables the design and control of the relationship structures in terms of innovation.

Keywords: innovation capacity; network of relation; self-analysis tool

1 Introduction

The globalization prozess, shorter product life cycles, new market players as well as the growing competition pressure demand high flexibility and innovation capability from enterprises. Due to inherence of restricted resources and the limited capability on managerial know-how, SMEs have to find new ways to cope with these challenges. With the emergence of the open innovation approach at the end of the last century (Gassmann, Enkel 2006; Gerybadze, Reger 1999; Chesbrough 2003), constructing successful relations with external actors turns out to be both a promising opportunity and a big challenge for companies, particularly SMEs (Nooteboom 1994; Bougrain, Haudeville

2002; Rogers 2004). Through collaboration with external partners, SMEs reduce risk by error compensation and investment sharing, achive cost advantages by economies of scale and scope, broaden the development potential, increase and relieve the application of technologies unused so far (Pinkwart 2001). Furthermore, efficient networking for using and developing internal and external knowledge for idea generation and development is an essential requirement for the successful innovation process. Against this background, it is of paramount importance for the enterprises to find the right balance between closed and open innovation as well as to have an overview over the existing internal and external network of the employees.

With reference to the improvement of the organisational innovation capacity, our research attempts to explore the structure of internal and external relationship networks in SMEs as well as the role of their key persons within the innovation process. Therefore we designed a survey with questions addressing in particular following dimensions: key persons within the innovation process; enterprise culture; existing practices and processes; existing communication structure and quality and knowledge transfer. The survey, the analysis of the results as well as the improvement recommendations provides furthermore a basis for the developed self assessment IT-tool for SMEs.

The aim of the paper is to present our current research on the interdependence between network structure and innovation capacity of SME as well as the current stage of the tool development. This study is an integral part of the applied research project ‘Open Network’ at the University of Potsdam together with the University of Aachen.

The procedure of this paper is as follows: first, we present a brief depiction of the theoretical background and past research. Second, the methodological approach is characterized. Third, preliminary findings are described and their implications are discussed. We conclude with a summary and a brief outlook.

2 Innovation Capacity and Network of Relations

Innovation capacity is the ability of a firm to generate innovation in order to strenghten and to ensure its own competitive position (Suarez-Villa 2007). The extent of a company's ability to innovate depends on various factors. The innovation capacity of firms is influenced by economical (e. g. growth, inflation, resource availability) and social (e. g. human knowledge, human relations, process structure) factors (Faix 2011). Our paper stresses the internal factors of innovation capacity as they can be influenced more or less by the firm (see table 1).

The active use of personal and business networks has high potential for the corporate innovation management (Vladova et al. 2011) for both large companies as well as small and medium enterprises (Jorgensen, Ulhoi 2010). The relations among the members of a corporate network play a decisive role for innovation success, especially during the generation of new ideas or the development and evaluation of several idea suggestions (Björk, Magnusson 2009; Carlos et al. 2012). Consequently, the relations to external actors (e. g. customers, suppliers, even competitors) gain importance (Chesbrough 2006, Hippel 1987), especially in the phase of idea generation (Conway 1995). A lot of new product developments fail before entering the market, which mostly can be avoided by using and considering external contacts (Franke 2007). Through collaboration with external partners, SMEs reduce risk by error compensation and investment sharing, achieve cost advantages by economies of scale and scope, broaden the development

potential, increase and relieve the application of technologies unused so far (Bougrain, Haudeville 2002; Pinkwart, 2001).
The practice shows that small and medium enterprises already use the open innovation approaches and open networks of relations, but predominantly without a clear structure: there is no connection to the strategic goals of the firm (Hugginsa, Johnston 2010). Small and medium enterprises have to structure their relations by identifying experts and promoters as well as strengthening the communication between these actors and other members of the company, so that the performance of the innovation process can be increased (Eppler 2007; Ettlie, Elsenbach 2007). A well-defined and structured innovation process is important for generating innovations, because it helps to build a vague idea up to a concrete marketable product or a more efficient corporate process and will finally have positive influence on the innovation capacity (Diener, Piller 2010).

The following table presents the important indicators as well as evaluation dimensions for corporate innovation capability and which are transferred into the analysis concept (further details in chapter 4).

Table 1 Evaluation dimensions for innovation capability

Evaluation dimension	*Description*
Values and Norms ...	… as part of the organizational culture define rules and standards of behaviour. But values and norms often are perceived differently at different corporate units. This dimension helps to identify differences between corporate units in order to achieve an organisation-wide innovation culture.
Practices and Processes ...	… as visible part of the organizational culture. This dimension includes aspects of “Identifying”, “Transferring” and “Exploring” new knowledge and ideas.
Human Motivation ...	… is the underlying cause of behavior for the emergence of a certain culture. We discover in which situation and under which condition employees share their knowledge and contribute to innovation generation.
Communication quality ...	… is defined as evaluation dimension towards communication width (Who communicates with whom?) and communication intensity (How often does communication take place?)
Promoters …	… are important for innovation capability. The analysis concept enables the verification of their existence.
Innovation process ...	… as basis for the successful generation and development of innovations.
	Independently, innovation processes have individual sequence within the company, certain core process steps can be defined in scientific literature. By this dimension the company will be able to discover which phases and sub-phases of a typical innovation process are already established within the company and a

	guidance supports to structure the process.
	This aspect is regarded as important but it serves as indirect indicator for innovation capability.
Knowledge Transfer ...	… is a critical variable for the innovation capability of a company. Beside the fact that knowledge is the basis for new ideas, its transfer within the innovation process is indispensable in order to place the innovation successfully in the market.
	This aspect is regarded as important but it serves as indirect indicator for innovation capability.

Source: Own consideration

Our aim is to evaluate these identified innovation capability indicators / dimensions and to fit these results with the status quo of the corporate network of relation. This is one of the most challenging tasks within the project and our research team is still investigating how this "fit" can be done in the right way.

3 Methodological Approach within the Research Project

Due to the nature of our topic we had to analyse the social network in SME's, develop specific innovation indicators, identify the current situation in the participating companies, and develop a technical solution. That is why we chose the following methods: Firstly, we looked at the literature to establish the theoretical background. Then, we identified the innovation indicators for SME. We created a survey enabling us to capture the network structure, the culture of the enterprise and aspects about handling with knowledge. Furthermore, we identified the tool requirements and began the tool development. At the end of our work next year, we should be able to measure the interrelation between network structures and innovation capability in SMEs. We will also contribute a concept and evaluation tool as practical solutions for these enterprises.The next steps are the validation of both the tool and the concept.
The literature review focused following topics: existing values and norms as well as existing practices and processes (especially in terms of innovation and knowledge management), motivational aspects, communication quality, individual skills of employees and test for existence of promoters. The identified indicators had been evaluated in expert interviews to ensure that the assumptions become fungible indicators.

The identification of the tool requirements as well as the tool development are based on SCRUM (Sutherland, Schwaber 2013) as a classic software development framework. Due to the permanent group discussion and reflection at the end of each work phase, a continuous improvement process ensures the very positive effect on the technical results.

4 Presentation of Self-Analysis Tool

The project findings are operationalized in form of a self analysis tool. It enables small and medium enterprises to capture and evaluate their relationship networks automatically while preparing for as well as during the innovation process. The tool not only provides an accompanying control mechanism of the network structures, it also serves as a decision aid for structuring the relationship networks.

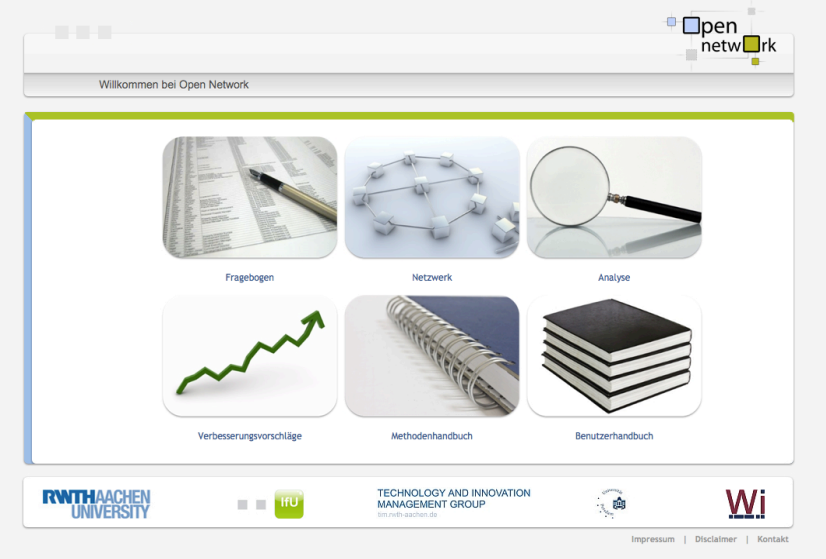

Fig. 1: Starting page of the self analysis tool

The core element of the tool is the analysis concept built on a questionnaire, which is accessible for all members of a company. The questionnaire includes not only the structural organisation, which is implemented by the depiction of company-specific relationship networks, but it also consists of the aspects of operational organisation, which is connected directly as well as indirectly to the innovation capability.

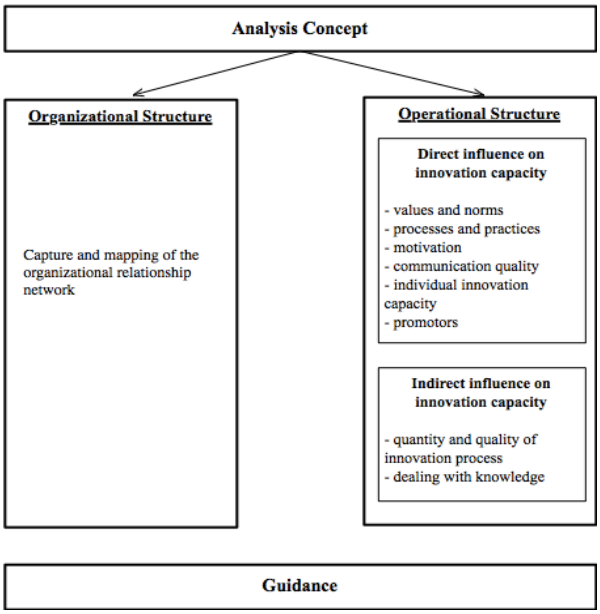

Fig 2: Analysis concept

Each employee is to fill out the questionnaire as to adhere to the completeness of the operational network. Data privacy issues have been included into the tool as it is possible to present the networks using the anonymized option (the knots are not marked as employee name) or the non-anonymized option (the knots are marked as employee name). Private contacts can be found and marked easily since the questions are provided in relation to the employee lists. The employee lists are normally existent in the company itself so that they can be directly uploaded to the tool. A digital handbook serves as a manual that describes the procedures of the steps, however, it is advisable to name a responsible IT expert for potential questions.

The tool analyses how the relationship networks over the entire company is being spread. For example, it identifies whether there are people or departments with especially weak or strong knots, which ones they are, what kind of relationships exists and how they are distinguishable from each other.

Regarding the innovation capability the tool also analyses the following aspects: existing values and norms as well as practices and processes (especially of the knowledge management and innovation process), motivation issues, the quality of the communication, individual capabilities of the employees, assessment on the existency of promotors and the success of innovations.

Moreover, the tool also examines the existing innovation process in the company. Based on the answers provided by the employees the company will be able to discover which phases and sub-phases of a typical innovation process are already established within the company and who the involved actors are.

The analysis result is illustrated by traffic light symbols, which make it easier for companies to comprehend. Subsequently, the tool offers recommendation of measures in order to enable the company to achieve a higher level of result or to remain on the current one.

The self analysis too is open sourced and will be installed in the internal server of the

company. The employees can access it through the intranet. The views in the tool is categorized into the administration and employee view. The administration view allows a full access on all functions and the analysis results, it also imports the employee lists. The employee view allows to retrieve and activate the questionnaire.

5 Conclusion and Outlook

This paper gives insights into the current application-oriented research work about the influence of networks of relation towards innovation capability of small and medium enterprises. These companies already use external partners during innovation projects and gain the advantages of the open innovation approach. Up to now, this happens rather sporadic and without strategic direction. The aim of the presented research project is to present an actual overview of companies‘ current networks of relations and a guidance in order to analyse and improve the relations as well as to find starting points for structuring their innovation process. It covers the specific needs of small and medium enterprises, where rigid structures are neither required nor possible. In the course of the cooperation of science and practice indicators were identified and developed that affect the entrepreneurial innovation both directly and indirectly. As a result SME get the opportunity to capture the coherence between their network of relation and several framework conditions and their innovative strengths. The development of a self-analysis tool finally allows the independent application of the project insights within the company.

In our next steps, we need to evaluate the tool and indicators in practice in order to reveal requirements for amendment regarding usability aspects or content.

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Areas for feedback & development

In your opinion, how strong is the interdependence between innovation capacity and a good structured network structure?

What is your advice to find the right “fit” between the evaluation dimensions and innovation capability?

What are the requirements for a software tool and management concept, which enable SMEs to capture their relationship structures within the organization?

Which are the most important features of formal and informal communication and knowledge transfer in open relationship networks and who are the relevant internal and external players?