

MANAGING OPEN INNOVATION IN SMEs: THE CAS SOFTWARE AG CASE STUDY

Frank Ehrenmann¹, Sabine Brunswicker²

¹University of Stuttgart, GSAME, Stuttgart, Germany

²Fraunhofer Institute for Industrial Engineering (IAO), Stuttgart, Germany

Abstract: *The concept of open innovation lies at the heart of the current research debate on innovation and strategy. Existing literature indicates that firms vitalize their interest in opening their innovation processes and business models to commercialize not only their own ideas but also external ones. However, existing work mostly concentrates on large firms and does not study open innovation in SMEs. This paper investigate the organizational capabilities for managing open innovation in SMEs. Our single case study analysis highlights that SMEs require new internal managerial capabilities for open innovation. It discusses six dimensions of a managerial system for open innovation: strategy, culture, corporate structure, cross-company network structure, process and IT-support. Further, it presents the transformation process of the CAS software AG and reveals the evolutionary character of the change process from closed to open innovation with different maturity levels.*

Key Words: *Open Innovation, SME, Management Systems for Innovation, Organizational Capabilities, Organizational Change*

1. INTRODUCTION

Traditionally most firms pursued relatively »closed« innovation strategies, limiting interactions with actors outside their organizational boundaries and emphasizing hierarchical control of all innovation activities. However, in recent decades the changing innovation landscape has undermined the traditional view of innovation at the firm level. The burgeoning literature on »open innovation« highlights the boundary spanning nature of innovation. It documents that firms have vitalized their interest to *purposely* open their innovation processes and to interact extensively with their innovation environment [1]. Indeed, the concept of open innovation lies at the heart of research on innovation and strategy and receives high attention in recent management literature [2; 3]. Recent work provides first empirical evidence that opening up the innovation process may positively shape a firm's innovation performance [4; 5; 6]. Further, case studies and exploratory research on large firms depict in a very detailed manner how large multinational firms organize themselves for open innovation and modify

their management practices to ease the implementation of the new management paradigm [4]. This exploratory work indicates that there are several challenges in shifting towards open innovation [7], and managing open innovation internally [8].

In spite of the increasing interest in open innovation and extension of the analysis of open innovation to various topics, most of existing work concentrates on large firms. Small and medium-sized firms (SMEs) have been excluded from the mainstream discussion in open innovation research, and only recently, some researchers explore the role of openness in the SME sector [9; 10]. However, we lack a significant understanding of how SMEs successfully shift towards open innovation and adapt their organizational system for innovation to the open innovation paradigm.

As SMEs are important actors in innovation [11] this paper seeks to place the concept of open innovation in the context of SMEs and studies the organizational innovation systems for managing open innovation in SMEs. It reports on a single case study of a highly successful German SME discussing the managerial levels of open innovation and depicting the transformation process from a closed innovator towards an open innovator.

The paper is organized as following: In section 2, we briefly introduce the open innovation concept and the peculiarities of open innovation in SMEs. Afterwards, we discuss the role of internal managerial capabilities for innovation and introduce our research framework. Section 4 presents the case of CAS Software AG and our research design. Section 5 discusses the different managerial levels of open innovation. In section 6 we describe the transformation process of CAS towards an open innovator. Finally, we conclude and discuss contributions of our research.

2. OPEN INNOVATION IN SMEs

2.1. The concept of open innovation

Traditionally, large established firms relied on their own R&D departments and favored a closed innovation model where all innovations are under the firm's control. This »closed innovation model« is contrasted with the open innovation paradigm that describes a new cognitive framework for a firm's strategy to profit from

innovation. It supports firms to purposively use inflows and outflows of knowledge to accelerate internal innovation, and to expand markets for external use of innovation, respectively [12]. Open innovation is a firm-level concept taking the firm level as the unit of analysis. Most research on open innovation differentiates between two concepts of open innovation: *inbound* where new ideas flow into an organization and *outbound* where internally developed technologies and ideas can be acquired by external organizations with business models that are better suited to commercialize a given technology or idea. Depending on the financial flows involved, both concepts can be either pecuniary or non-pecuniary in nature [2]. For example, in-licensing and acquiring of external technologies represent pecuniary inbound practices whereas crowdsourcing and informal networking are rather non-pecuniary inbound open innovation modes. Free revealing of knowledge and donations (e.g. to creative commons) represent non-pecuniary outbound activities.

Open innovation is already being adopted by firms from high-tech as well as low-tech industries [13]. They experiment with a variety of different practices to engage both in inbound and outbound innovation and choose different governance modes along the innovation process [14]. Recent literature depicts that large firms introduce both dimensions - inbound versus outbound - separately in their journey towards open innovation rather than jointly [8].

2.2 Peculiarities of open innovation and SMEs

SMEs are a relevant source of innovation. SMEs do have the capacity for radical, new-to-the-world innovation; not just large firms [11]. However, their innovation models and activities differ from those of large firms. While they are usually more flexible, less formalized and fast decision makers, their financial resources for internal R&D are limited [9], especially if they are young and small [15; 16]. In addition, they cannot cover all innovation activities required to successfully realize an innovation. Thus, open innovation is a relevant innovation strategy for SMEs. Indeed, young and small firms regularly rely upon external partnerships and networks to remain competitive [17]. Further, prior work on the market for ideas indicates that young technology start-ups are an important »source« for open innovation as they license their technologies to large firms rather than developing them into tangible artefacts [18]. While prior research on SMEs and networks indicates that open innovation – or at least some open innovation practices – seem to be of relevance to SMEs, only recently researchers perform studies specifically focusing on open innovation in SMEs. First empirical studies on open innovation in SMEs indicate that both inbound and outbound open innovation practices are adopted in the SME sector. In a descriptive survey among Dutch SMEs, non-pecuniary inbound activities such as cooperation with customers and suppliers were identified as the open innovation activities adopted most often, while outbound activities such as licensing and venturing are adopted by a small share of SMEs in the Dutch sample only [10]. Indeed, inbound open innovation seems to be a widely adopted

mode in SMEs from various sectors. A European study with more than 1500 SMEs indicates that SMEs engage with a variety of different external innovation sources including customers, suppliers, universities, and long-term complementary partners, to access new ideas and technologies [19; 20]. Further, Lee et al. (2010) argue that SMEs need to open up their innovation processes in the later stages, namely in the commercialization phases, rather than only in the early stage of the open innovation funnel [9]. Rather than entering the market for ideas, case studies on value constellations depict that SMEs form new value creation relationships in the commercialization phase to exploit their internal ideas [21].

2.3. Performance impact of open innovation for SMEs

A central question in research is whether open innovation can influence a firm's ability to innovate and to appropriate the benefits from it. Case studies on large technology-oriented firms such as Procter & Gamble suggest that open innovation may improve a firm's innovation performance (according to Procter & Gamble its open innovation strategy »Connect & Develop« has contributed to an increase of the firm's R&D productivity by nearly 60 %) [22]. In their influential article Laursen and Salter (2006) provide a more reliable empirical evidence of the performance impact of open innovation. Based on large quantitative study of manufacturing UK firms, they statistically explain the impact of openness, measured as *breadth* of external innovation sources, on a firm's income from innovation [5].

Following recent research results, open innovation may also impact the performance of SMEs [6; 20]. A recent large scale quantitative study on European SMEs indicates that SMEs engage in boundary spanning innovation activities going beyond transactional relationships in inter-organizational networks (»social embeddedness«) that improve their innovation performance when doing so. SMEs that engage with a variety of different external partners can achieve a higher innovation performance than those that remain closed and wall off their innovation activities. However, it matters with whom SMEs are interacting in their innovation activities. The study shows that the combination of different innovation sources rather than the total number of sources define how SMEs engage in external idea sourcing and benefit from it. Some SMEs engage in inventive sourcing and R&D collaborations to get access to new technological knowledge. Others work closely with partners along their value chain and combine input from suppliers and customers. Recent research indicates that there are SMEs that engage in eco-system wide open innovation activities and involve complementary partners in addition to R&D partners and supply-chain partners [19].

Overall complementary network partners and established co-development relationships are an important external source for non-pecuniary inbound activities and also outbound activities. They offer well-functioning interaction channels that are crucial to combine and transform inputs from different knowledge

domains. They also offer access to complementary assets that are critical to create value from an idea [23]. Some external partners may actually represent a risk. For example, the interaction with universities is somewhat risky for SMEs. If SMEs search in highly pre-commercial domains, they may get locked in and may struggle with turning ideas into value [20].

3. THE JANUS FACE OF OPENNESS: INTERNAL ORGANIZATIONAL CAPABILITIES FOR MANAGING OPEN INNOVATION

Openness and inter-organizational interaction pose new managerial challenges. Despite its growing importance, many firms experience several challenges to actively manage the processes of open innovation [3]. Research on large firms highlights that open innovation requires internal organizational complements that facilitate the absorption of external ideas and knowledge and to capture the value from it [5].

As already pointed out in the seminal work of Cohen and Levinthal (1990), internal organizational practices and resources for innovation are important antecedents of a firm's ability to benefit from external knowledge [24]. Internal activities are critical because open innovation usually does not result in a complete outsourcing of innovation activities [3]. For this reason internal investments in R&D and open innovation are complements rather than substitutes [2].

Further, established managerial practices for innovation are important antecedents of its absorptive capacity and may act as facilitators of open innovation. Results confirm the notion that both formal and informal managerial practices are important to capture the value from openness in SMEs: *investment into innovation potential, innovation strategy and planning, innovation development processes, innovation control, and culture for innovation* represent organizational antecedents of a firm's ability to successfully search, transform and exploit external innovation inputs. In general, formal operational routines for measuring the performance of innovation activities from the inception of the idea to the commercialization phase are extremely important. Indeed, SMEs need to have discipline throughout the innovation value chain to integrate external and internal innovation. However, to create value from openness operational proficiency in managing innovation internally is not sufficient. Strategic coordination, financial dedication towards innovation, and a culture for innovation should be successfully in place [20].

The shift towards open innovation requires firms - both large and small firms - to implement *new* managerial practices and structures, in terms of »how to do open innovation« [25]. First anecdotal case studies on firms that evolve from a closed towards an open innovator indicate that these firms implement new managerial capabilities for open innovation at different managerial levels [8].

Finally, to establish these new capabilities firms need to go through an organizational change process with different stages [25]. However, the transformation process in SMEs - from closed to open innovation - is little understood [25]. Thus, the following case study will

provide new insights into the managerial levels of open innovation and the transformation process towards open innovation in SMEs.

4. RESEARCH DESIGN: CASE STUDY - CAS SOFTWARE AG

4.1. Case study research method

As discussed above, there is a lack of understanding of *how* SMEs successfully manage open innovation [see also 28]. Thus, our research aims to investigate in detail the internal managerial systems for open innovation in SMEs and to understand the organizational change processes required to shift from a closed to an open innovator. As our research aim is exploratory in nature, we have chosen an explorative case study approach [29, 30]. A case study approach is an appropriate methodology for a holistic, in-depth investigation [31]. It facilitates researchers to get direct insights in and reflections of innovation practice as well as the design of an appropriate open innovation system.

According to recommendation of Yin the researchers followed a methodology including four stages [29]: (1) design the case study, (2) conduct the case study, (3) analyze the case study evidence, (4) and develop the conclusions, recommendations and implications. This case study relies on multiple data sources including expert interviews with key informants at CAS, secondary data on internal organizational structures and processes (e.g. process blueprints), and company reports. Data were collected in the time period 2009 - 2011. Within the design stage the researcher developed an interview guideline based on state-of-the-art literature on open innovation and determined the required skills and position of the interview partners at CAS. To conduct the case study the research team worked in close collaboration with the representatives of CAS. An interview with the head of strategy, innovation and business design provided essential data to the following in-depth case analysis. Semi-structured interviews were conducted face-to-face. The analysis of the comprehensive interview protocol was carried out according to the method of qualitative content analysis. On the basis of the structured data the researchers developed conclusions, recommendations and implications for innovation management in practice.

4.2. Single case study firm: CAS SOFTWARE AG

CAS is market-leader in the field of customer relations management (CRM) software for SMEs in Germany. The company was founded in 1986 and employs approximately 430 people today. Nowadays more than 200,000 people, in more than 7,500 companies and organizations, are using software solutions from CAS. In recent years the company has won numerous innovation awards and is one of the most successful innovators in small and medium-sized businesses in Germany today. In 2006 and 2011 CAS was the overall winner of the »Innovator of the year« award in the prestigious German TOP 100 innovation competition [26]. In this competition CAS defeated its competitors within five categories: innovation-friendly senior management, climate of innovation, innovative processes

and organization, innovations marketing and successful innovations. Altogether these categories give a valuable overview of the general innovation ability of CAS.

In terms of innovation performance and business growth the company has shown outstanding performance in recent years. The success rate of innovation projects which aim at »innovations in small steps« is about 90%. Five out of eight »radical innovation projects« initiated by CAS, had been realized successfully in the past years. At corporate level CAS is characterized by a steady double-digit growth rate of employees. In respect of sales, CAS showed similar positive results. Regarding its product business, CAS reported constant growth rates of up to 30% in recent years. Keeping in mind long term shareholder value as main objective, CAS invests to a great extent in future innovations and product development.

CAS defines itself as a networked enterprise and as an open innovator according to the above specified open innovation paradigm (see section 2). CAS is aware of its customers, suppliers, complementors, competitors, intermediaries [27] and uses its network both for commercialisation of products (i.e. operations) and for innovation management. Against this background the researchers of this research paper analyse the innovation system of CAS that facilitates open innovation in a successfully way. The second objective of the research paper will be the investigation of the prosperous transformation of CAS from »closed« towards an »open innovator«.

4.2. Business model of CAS Software AG

CAS emphasizes that innovations only can be successful along with an appropriate business model. For this reason the company has designed its business model based on the principles of modularity. CAS has developed an integrated software system consisting different in-house as well as external software applications. CAS holds necessary basic technologies to integrate these applications via interfaces to a total system. On the basis of its technologies, product portfolio and partner network CAS is able to combine existing and innovative solutions to a customer oriented bundle of products and services. By doing so, CAS can act as an innovator in the market for CRM software by itself. Figure 1 provides an overview of the diversity of over 100 currently available applications and solutions for the product »CAS genesisWorld« which are offered and distributed by CAS together with over 200 partners in more than 24 countries [32].

CAS aspires to expand its market leadership from Germany to all over Europe in the next few years. To achieve this challenging goal together with its business partners, CAS invests heavily in new product development and innovation management. Annually the company spends about 30% of its revenues in research and development. Investments in further education of employees and costs for relationships management (e.g. in respect of research institutes and universities) are not considered in that spending. Equity holdings secure access to strategic key technologies. Overall CAS aims a high degree of innovation. Following a »first-mover«-strategy, CAS sees itself as a »product and business

model innovator«. As a business model innovator, CAS dares new ways of commercialisation - both autonomous and in cooperation with partners. Despite the fact that CAS innovates in a turbulent environment (i.e. shortening innovation life cycles, complex technologies, a high degree of competition in the ICT-sector) CAS perceives itself in a good position to cope with business challenges in future. In an open and networked innovation landscape [27] its innovation system provides CAS necessary benefits and serves as barriers to failure.

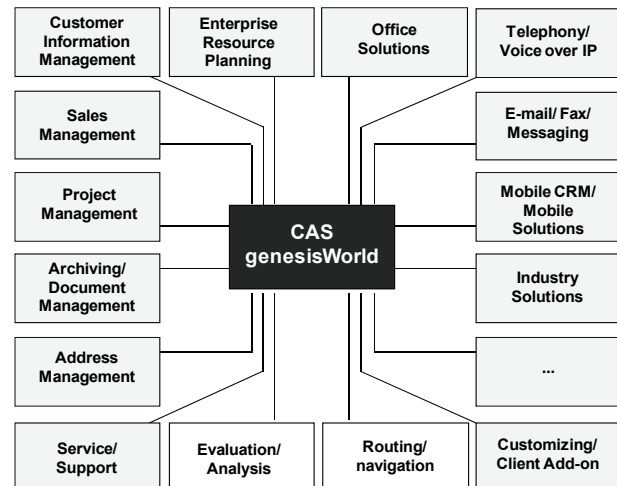


Fig. 1. Product portfolio of CAS

5. MANAGING OPEN INNOVATION IN SMEs: MANAGERIAL SYSTEM FOR OPEN INNOVATION OF CAS SOFTWARE AG

The case study analysis indicates that CAS has successfully opened its innovation processes for cross-company innovation with various external network partners [27].

The innovation system of CAS facilitates collaborative innovations and new product development in a systematic and profitable way. It fosters absorption of value-adding contributions from different external actors throughout the whole innovation process. Information, knowledge exchange and collaboration with universities, research facilities and partner companies increase CAS's innovation potential. Without having the market power of global players like IBM and SAP, CAS also builds up downstream partnerships to increase sales potential. The reduction of innovation risk and innovation costs is not a main objective of CAS for collaboration in innovation management.

The analysis of the innovation system of CAS within the research project was based on a explorative framework that differentiates six dimensions: strategy, culture, corporate structure, cross-company network structure, process and IT-support - see figure 2. Based on this rough framework the researchers identified different requirements for the design of a successful open innovation system:

Strategy: In order to successfully accomplish open innovation in practice, the concepts of inbound and outbound innovation (see section 2) have to be established in innovation and corporate strategy. Only on

the basis of a vision strategic plans and concrete objectives for single open innovation processes can be developed. In summary, the following implications for the design of an open innovation system could be identified:

- Consideration of open innovation in innovation and corporate strategy
- Alignment of open innovation strategy and company-specific product and service life cycles
- Balance between innovation »in small steps« and »radical« innovations within innovation networks (ambidexterity)
- Flexible innovation strategy: Adaptable innovation objectives for taking advantage of current (i.e. „Quick-Wins“) and future opportunities

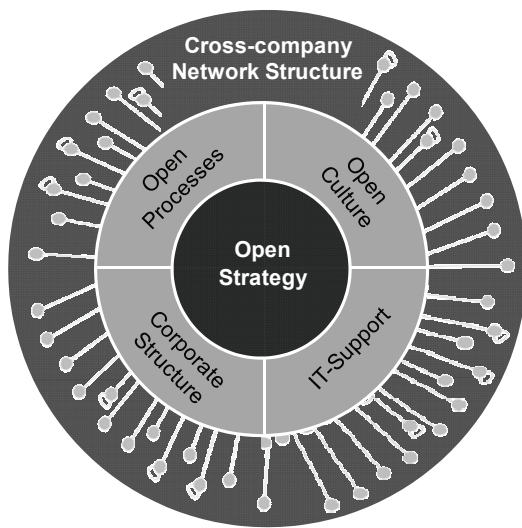


Fig. 2. Managerial System for Open Innovation

Culture: The overcoming of the not-invented-here syndrome [33] and an »open innovation culture« are key requirements for successful open innovation management in practice [34]. Only if employees are willing to consider external ideas and knowledge and apply external technologies in internal processes success in innovation management can be achieved. Same applies to the willingness of outbound activities (e.g. external commercialization, licensing, franchising of internal ideas, inventions and concepts). Overall, the following implications had been identified for the creation of an open innovation culture:

- Recruitment of open-minded and »sociable« staff with individual social (business) networks (e.g. in the field of research)
- Creation of a role model for openness and collaboration in innovation management/ strong commitment of top management
- Strengthening entrepreneurship in SMEs (i.e. participation of employees in innovation and company success)
- Counteract harmful fear of wrong decisions in terms of openness in the innovation

processes (i.e. establish a friendly climate for open innovation)

Corporate structure: The dimension of corporate structure focuses on actors in respect of task and people coordination within innovation processes. Different implications could be specified for the design of an open innovation system:

- Implementation of a relationship promotor (i.e. in addition to champions, power promotor) to facilitate cross-company innovation within networks
- Establishment of a steering committee as an organizational tool to promote openness, the development of strategic plans and for coordination and prioritization of innovation projects in a multi-project landscape
- Setting up customer-focused and flexible business units with flat hierarchies

The establishment of customer-focused and flexible business units is part of the innovative company structure of CAS (see figure 3) which has been implemented in 2011. This efficient network organization is based on a biological role model (i.e. »organizations as organisms«) and is called *Smart Enterprise*.

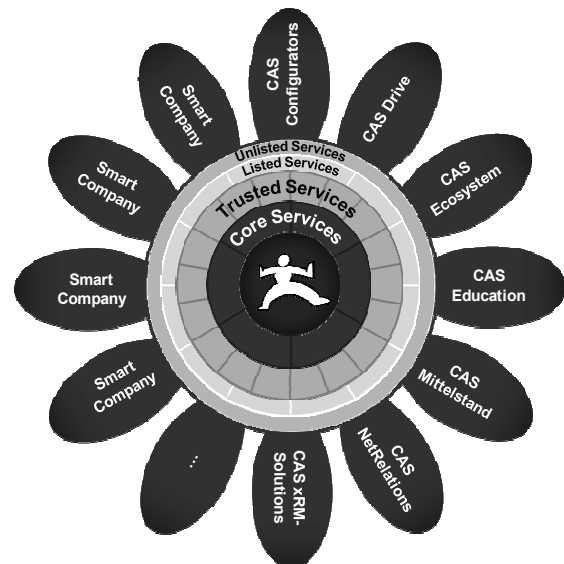


Fig. 3. CAS SmartEnterprise

Small, specialized company units make CAS more flexible, agile and enable the company to make the most of innovation opportunities. It consists of different specialized units (so called *SmartUnits*). These units allow CAS to react quickly and remain adaptable to market and sectoral requirements.

SmartCompanies focus on specific customer segments and pursue the goal of becoming the innovation and market leader for those segments. Within the CAS SmartEnterprise only SmartCompanies deal with the external customers. Other company units support SmartCompanies in handling the day-to-day operations. One objective of CAS is that new SmartCompanies should be operative and equipped with the necessary resources for business (e.g. own company management, own vision and market presence, own product and customer management) within a matter of

days only. Company strategy and goals are defined and developed by the CAS Software Board of Directors. The Board is also involved in the coordination of the optimal distribution of available resources among the company units. Agreements on obligations and expectations govern the overall activities of the company units within CAS SmartEnterprise.

Cross-company network structure: A further requirement for the design of an open innovation system is the configuration of an adequate cross-company network structure. It is crucial to maintain strong partnerships and close business relationships as well as informal contacts and loose relationships with different actors in innovation networks [27]. So CAS gains different innovation contributions from different network nodes and different innovation networks. While strong ties (e.g. to exclusive partners, lead customers and complementors) foster knowledge transfer and joint innovations, weak ties facilitate the identification of new trends, innovation potentials and opportunities for future businesses. The following recommendations for the design of cross-company network structure could be pointed out:

- Setup a network of informal contacts »linking« and close relationships »fitting« to take advantage of various forms of relationships [27]
- Creation of diversity within innovation networks to facilitate the potential of new ideas, concepts, innovations and new businesses

IT-support: Complex and distributed innovation processes with a multitude actors call for modern information and communication technologies as supporting factors for virtualization and collaborative innovation management (see e.g. "toolkits for user innovation and co-design" [35]). The following supporting factors for open innovation had been identified within the case study of CAS:

- Use of professional software tools for relationship management (»CRM becomes xRM«)
- Open and semi open wiki platforms for communication and knowledge management with customers and partners
- Weblogs for collaborative product development and problem solving in innovation processes

Process: A systematic and structured process model is a further basic requirement for efficient open innovation management. Based on a standard process model for example benchmarks, technology-scouting, customer and competitor analysis, feasibility studies and market analysis can be conducted. The following implications for the design of an open innovation process could be derived:

- Generation of a structured process model and systematic involvement of actors across companies

- Overview of ongoing innovation projects and establishment of a professional multi-project management with clear objectives and responsibilities based on a shared »innovation agenda«
- Transparency in innovation processes (e.g. in respect to technology, market and business strategy)
- Establishment and systematic use of a backlog for (partial) results, concepts and ideas in innovation management
- Building up routines for inter-company collaboration, project work and networked innovation management

6. ORGANIZATIONAL CHANGE: MATURITY LEVELS OF OPEN INNOVATION AT CAS SOFTWARE AG

In addition to open up their innovation processes for collaboration with external partners within networks SMEs have to build up internal capabilities and routines for open innovation management. In doing so, SMEs in general undergo fundamental changes. By means of a maturity model the development of such capabilities and routines and respectively the transformation of CAS towards open innovation can be illustrated. Figure 4 shows the specific maturity levels of CAS from a closed innovator to a successful open innovator, based on highly self organizing company units (»smart units« – see section 5).

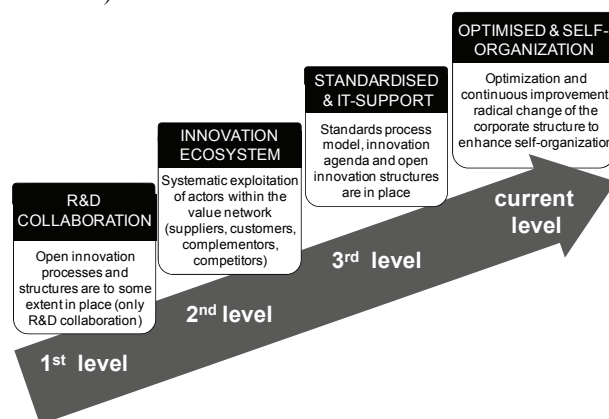


Fig. 4. Maturity levels of Open Innovation of CAS

More than fifteen years ago CAS had started to selectively build up research partnerships with universities and research institutions. Objectives of this *first level* of open innovation have been the acquisition of research results, technology scouting and learning. Till this day CAS is highly interested in knowledge exchange and stimuli in the way of a »technology push« by external partners. Finally the relationships to research institutions play an important role for the recruitment of highly skilled employees.

In a *second level* of maturity CAS intensified collaboration with various partners and customers. CAS started interacting more closely with its complementors, which offer complementary products and services to customers [36], and also with its competitors [37]. Driving forces for collaboration with sales partners,

customers and complementors for example had been expectation of a wider market access as well as access to relevant information about customer needs («market push»). Also opportunities in respect of a higher innovation potential and flexibility had been mentioned as driving forces for collaboration in innovation management.

Starting point for openness in the first and second maturity level always had been single success stories of CAS in form of joint projects, developments or collaborative marketing measures. Trust building and collective experiences seem to be most important factors for implementing openness in innovation management. For example the collaboration with universities and research institutions had been gradually intensified. At the initial phase universities only were consulted in order to obtain information in respect of specific technical issues. Within an ongoing relationship universities gained an increasingly important position within the innovation ecosystem of CAS. Meanwhile, CAS receives a broad spectrum of innovative contributions from universities. Thereby, also free revealing of knowledge in respect of long-term partners plays an important role for future developments.

The *third maturity* level of open innovation at CAS comprises standardisation and IT-support. It includes for example the implementation of a standard innovation process model for efficient collaboration (i.e. innovation agenda, backlogs, standardized innovation roadmaps), the establishment of structures for cross-company processes (e.g. steering committees, innovation teams) as well as the development of adequate software applications for networked innovation (i.e. xRM as a further development of CRM software).

At the *current maturity level* CAS aims for optimisation and continuous improvement of existing innovation structures and processes. For example CAS has institutionalized its business design for a more efficient lead to market. Simultaneously CAS strengthened both its top-down and bottom-up approach in innovation management. The overall objective of CAS is the establishment of a highly self-organized business and innovation system. By restructuring the organization towards a SmartEnterprise (i.e. a highly flexible network structure with business and service units – see section 5) CAS has already made the next key step to achieve its challenging objective.

7. CONCLUSIONS AND IMPLICATIONS

This paper studies open innovation in SMEs and focuses on managerial capabilities for open innovation in particular. Thus, we try to overcome a major gap in existing literature on managerial challenges for open innovation in SMEs. In studying the journey of an SME from a closed towards an open innovator, we provide detailed and rich information on the managerial system for open innovation established over time and also the change process to move from closed towards an open innovator. To this aim, we first provide a brief overview of existing research on open innovation in SMEs and potential performance impact.

Our paper contributes to the ongoing research on Open Innovation in two dimensions. Firstly, we make a contribution to existing literature on internal managerial capabilities for open innovation. Prior research has indicated, that internal organizational processes and systems represent important antecedents of a firm's ability to "absorb" external knowledge [19, 20, 24]. However, in open innovation firms need additional capabilities that go beyond absorptive capacity and systems supporting it. Open innovation implies interactions between internal and external knowledge, and thus, firms need new capabilities such as a "connective capacity" to retain external knowledge and manage knowledge within partnerships and alliances [7]. Our case study highlights that managing open innovation in SMEs implies new processes and systems at the strategy, process, structure, IT-support, culture and inter-firm level in order to embedded open innovation supporting both inbound and outbound innovation.

Secondly, our analysis indicates that transformation towards open innovation management requires fundamental changes of SMEs to move from closed to open innovation and, thus, also new managerial capabilities in *managing change*. The paper highlights key factors shaping a successful transformation process (e.g. trust, common experiences, and step-by-step procedure). On the one hand successful change management calls for holistic thinking and rational problem solving as well as awareness of interdependencies that may prevent failure of transformation processes. On the other hand irrationalities (e.g. the unforeseen) and people management (trust, willingness, and capabilities) are at the heart of change management. Against the background of people management, communication and motivation activities should emphasize the advantages of open innovation management in order to reduce resistance. Based on our in-depth analysis and interpretation of the CAS single case study we suggest that the transformation process related to open innovation implies a balanced approach of change management that follows a rational design paradigm (rules, norms, procedures like unfreezing-move-freezing) as well as realistic comprehension (e.g. learning from good practices like CAS). Change management interventions should follow a paradigm of a guided evolution (i.e. combination of a strict transformation and evolution approach) that corresponds to the idea of cultivating change [38].

Our analysis also provides first insights on the peculiarities of change towards open innovation in SMEs: In generally, innovation management in SMEs is less formalized and standardized than in large firms. The body of knowledge in innovation management is more likely tacit (i.e. people-bounded) than explicit (i.e. information in innovation handbooks and data basis). For this reason, SMEs need to establish fundamental managerial capabilities first before moving into open innovation. In contrast to large firms SMEs usually do not have specific internal company units for change management (e.g. change management offices, department for business development) and professional centralized units that offer necessary change-services

during transformation: HR-services (e.g. recruiting, training, workshops), IP-services (e.g. consulting, patenting), IT-services (e.g. implementation of new software tools for co-creation) [39]. For this reason SMEs have to build up cross-company relationships to external partners in transformation processes more likely than large firms. In general this is accompanied by specific challenges for SMEs and may come along with higher transaction costs (i.e. for searching, initiation, negotiation, execution, adaptation and controlling). This case study opens up a range of new research questions related to open innovation in SMEs and organizational change. Additional research is required to provide more in-depth insights into the journey of SME from a closed to open innovator.

8. REFERENCES

- [1] H.W.Chesbrough, "Open innovation: the new imperative for creating and profiting from technology", Harvard Business School Press, Cambridge, 2003.
- [2] L.Dahlander, D.Gann, "How open is innovation?", *Research Policy*, Vol.39, No.6, 2010, pp.699-709.
- [3] U.Lichtenthaler, "Open Innovation: Past Research, Current Debates, and Future Directions", *The Academy of Management Perspectives*, Vol.25, No.1, 2010, pp.75-93.
- [4] M.Dodgson, D.Gann, A.Salter, "The role of technology in the shift towards open innovation - The case of Procter & Gamble", *R&D Management*, Vol.36, No.3, 2006, pp. 333-346.
- [5] K.Laursen, A.Salter, "Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms", *Strategic Management Journal*, Vol.27, No. 2, 2006, pp.131-150.
- [6] J.Chen, Y.Chen, W.Vanhaverbeke, "The influence of scope, depth, and orientation of external technology sources on the innovative performance of Chinese firms", *Technovation*, Vol.31, No.8, 2011, pp.362-373.
- [7] U.Lichtenthaler, "Open Innovation in Practice: An Analysis of Strategic Approaches to Technology Transactions", *IEEE Trans. on Engineering Management*, Vol.55, No.1, 2008, pp.148-157.
- [8] D.Chiaroni, V.Chiesa, F.Frattini, "The Open Innovation Journey: How firms dynamically implement the emerging innovation management paradigm", *Technovation*, Vol.31, No.1, 2011, pp. 34-43.
- [9] S.Lee, G.Park, B.Yoon, J.Park, "Open innovation in SMEs-An intermediated network model", *Research Policy*, Vol.39, No. 2, 2010, pp.290-300.
- [10] V.van de Vrande, J.P.J.de Jong, W.Vanhaverbeke, "Open innovation in SMEs: Trends, motives and management challenges", *Technovation*, Vol.29, No. 6-7, pp.423-437.
- [11] Z.Acs, D.Audretsch, "Innovation in large and small firms", *Economics letters*, Vol.23, 1987, 109-112.
- [12] H.W.Chesbrough, "Open business models - How to thrive in the new innovation landscape", Harvard Business School Press, Boston, 2006.
- [13] W.Drechsler, N.Natter, "Understanding a firm's openness decisions in innovation", *Journal of Business Research*, Vol.65, No.3, 2012, pp.438-445.
- [14] M.Bianchi, A.Cavaliere, D.Chiaroni, "Organisational modes for Open Innovation in the bio-pharmaceutical industry: An exploratory analysis", *Technovation*, Vol.31, No.1, pp.22-33.
- [15] S.Birley, "The role of networks in the entrepreneurial process", *Journal of Business Venturing*, Vol.1, No.1, 1985, pp.107-117.
- [16] J.Freeman, J.Engel, "Models of innovation: Startups and mature corporations", *California Management Review*, Vol.50, No.1, 2007, pp.94-119.
- [17] J.A.Baum, T.Calabrese, B.S.Silverman, "Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology", *Strategic Management Journal*, Vol.21, 2000, pp.267-294.
- [18] J.S.Gans, S.Stern, "The product market and the market for "ideas" - Commercialization strategies for technology entrepreneurs". *Working paper*, 2002.
- [19] S.Brunswicker, W.Vanhaverbeke, "Beyond open innovation in large enterprises - How do small and medium-sized enterprises (SMEs) open up to external innovation sources?" *Working Paper*, Stuttgart, 2010.
- [20] S.Brunswicker, "An empirical multivariate examination of the performance impact of open and collaborative innovation strategies", Stuttgart, 2011.
- [21] W.Vanhaverbeke, M.Cloudt, "Open innovation in value networks", in: H.W.Chesbrough, W.Vanhaverbeke, J.West, *Open innovation: Researching a new paradigm*, Oxford Univ. Press, Oxford, 2006, pp 258-281.
- [22] L.Huston, N.Sakkab, "Inside Procter & Gamble's new model for innovation - Connect and develop", *Harvard Business Review*, Vol. 84, No.3, 2006, pp.58-66.
- [23] J.F.Christensen, M.H.Olesen, J.S.Kjær, "The industrial dynamics of open innovation - Evidence from the transformation of consumer electronics", *Research Policy*, Vol.34, 2005, pp.1533-1549.
- [24] W.M.Cohen, D.A.Levinthal, "Absorptive capacity - A new perspective on learning and innovation" *Administrative Science Quarterly*, Vol.35, No.1, 1990, pp.128-152.
- [25] E.K.Huizingh, "Open innovation: State of the art and future perspectives", *Technovation*, Vol.31, No.1, 2011, pp.2-9.
- [26] TOP 100 innovation competition, online: <http://www.top100-germany.com>, retrieved: 12.08.2012.
- [27] M.Reiss, „Konfigurationsanalyse von Innovationsnetzwerken auf der Basis des Extended Value Net“, in: M.Weissenberger-Eibl, *Gestaltung von Innovationssystemen*, Cactus Group, Kassel 2005, S. 251-268 (in German).
- [28] E.Huizingh, "Open innovation: state of the art and future perspectives", *Technovation*, Vol.35, No.1, 2011, pp. 2-9.
- [29] R.Yin, "Case study research: Design and methods", Sage Publishing, Thousand Oaks, 1994.
- [30] R.Yin, "Applications of case study research", Sage Publishing, Newbury Park, 1993.

- [31] J.Feagin, A.Orum, G.Sjoberg, “*A case for case study*”, University of North Carolina Press, Chapel Hill, 1991.
- [32] CAS Software AG, online: www.cas.de, retrieved: 12.08.2012.
- [33] R.Katz, T.Allen, “Investigating the Not Invented Here (NIH) Syndrome: a look at the performance, tenure and communication patterns of 50 R&D project groups”, *R&D Management*, Vol.12, No. 1, 1982, pp.7-19.
- [34] P.Herzog, J.Leker, “Open and closed innovation - different innovation cultures for different strategies”, *International Journal of Technology Management*, Vol.52, No.3/4, 2010, pp.322-343.
- [35] N.Franke, F.Piller, “Toolkits for user innovation and design: an exploration of user interaction and value creation”, *Journal of Product Innovation Management*, Vol. 21, No. 6, 2004, pp.401-415.
- [36] M.Reiss, “Complementor Relationship Management - Missing Link in Supply Chain Management”, R.Samson (Ed.), *Supply-Chain Management*, New York 2011, pp.139-156.
- [37] M.Reiss, „Complementor- und Competitor-Relationship Management in vernetzten Produktionssystemen“, H.-G.Kemper, B.Pedell, H.Schäfer (Eds.), *Management vernetzter Produktionssysteme*, Munich, 2011, pp.25-37 (in German).
- [38] M.Reiss, “*Change Management: A Balanced and Blended Approach*”, Books on Demand, Norderstedt 2011.
- [39] M.Reiss, “Change Leadership Value Net”, *Industrial Engineering*, Vol. 64, No. 3, 2022, pp. 28–31 (in German)

CORRESPONDENCE



Frank Ehrenmann, Doctoral cand.
University of Stuttgart
GSAME,
Keplerstraße 17
70174 Stuttgart, Germany



Dr. Sabine Brunswicker,
Head of Open Innovation
Fraunhofer Institute for Industrial
Engineering
Nobelstraße 12
70569 Stuttgart, Germany
sabine.brunswicker@iao.fraunhofer.de