Strategies for Innovation Networks

Bode, Alexander\textsuperscript{1}*/Alig, Simon\textsuperscript{2}

\textsuperscript{1} Prof. Dr. Alexander Bode is Assistant Professor at Department of Law & Economics, Chair of Business Administration: Cluster- & Value Chain Management, University of Technology Darmstadt. Address: Hochschulstrasse 1, 64289 Darmstadt (Germany). Email: bode@bwl.tu-darmstadt.de; Phone: +496151-166566.

\textsuperscript{2} Dipl.-Wirtsch.-Ing Simon Alig is research assistant and doctoral candidate at Department of Law & Economics, Chair of Business Administration: Cluster- & Value Chain Management, University of Technology Darmstadt. Address: Hochschulstrasse 1, 64289 Darmstadt (Germany). Email: alig@bwl.tu-darmstadt.de; Phone: +496151-162423.

* corresponding author

Abstract

It is this paper’s aim to examine strategies taking into account companies’ resource base and individual goals companies follow in order to achieve a competitive advantage using innovation cooperation. First different types of innovation cooperation are deduced according to relevant dimensions. Second the theoretical background for creating competitive advantage is explained including the different motives companies pursue when entering innovation cooperation. Companies are modeled according to their innovation strategy, their aims and their set of resources. These ideal types of companies are in a third step assigned to the different types of innovation cooperation. Using a confirmatory case study of eight companies which all are involved in different innovation cooperation the assignment of the different strategic types of companies to the different types of cooperation is empirically tested.

Key Words: Innovation management; innovation strategy; innovation cooperation; innovation network

JEL Classification O30
1. Introduction

Innovations are the basis for a long lasting successful market presence of companies (Utterback 1994). Being innovative, firms can differentiate themselves from competitors, can adapt to changes in the environment and the market, which shall result in competitive advantage for the successful innovator (Von Hippel 1988); (Porter & Van der Linde 1995). The requirements for innovation management, which represents an organizational framework for the phenomenon “innovation”, have changed during the past decade (Hagenhoff 2008); (Boutellier & Gassmann 2002). From an external perspective new products often combine different technologies, which make exchange with the owner of the other technology necessary. From a company internal perspective the focus on core competencies including a reduction of the depth of added value, lead to the need of cooperation in the field of innovation management. Innovation cooperation shall support companies at combining resources and at enlarging the knowledge base for fulfilling the needs of global markets (Hagedoorn 1996) and thus shall lead to a competitive advantage in the market place.

There is a trend in research in examining specific innovation cooperation and the mechanisms leading to successful projects. However, results show that there is a high failure rate of more than 50% (Schmidthals 2007). This means that companies understand the potential benefits of innovation cooperation, however, they often do not succeed in achieving their goals.

Innovation cooperation is especially relevant for those industries which have a high R&D intensity and which are heavily influenced by the above mentioned trends like reduction of depth of value added and a high environmental dynamic. However, innovation cooperation still is an underresearched area (Dilk 2009); (Fischer 2006).

The research question we want to address in this paper is “which strategies towards innovation cooperation do companies apply taking into account their resource base and their individual goals for achieving competitive advantage for themselves”. As a result implications are provided which help companies with different strategies to approach innovation cooperation.

To explore this research question we use resource-oriented theories. Resource-based View (Barney 1991); (Wernerfelt 1984) is applied to clarify company internal preconditions which are crucial to form promising innovation cooperation. The relational view (Dyer & Singh 1998) is applied to study the relation specific factors.

To answer the research question the paper is structured in five parts: First, we describe in more detail the motives for creating innovation cooperation. Afterwards the theoretical background is explained. The creation of competitive advantage in innovation cooperation is
explained based on resource-oriented theories. In a next step a model regarding innovation cooperation is developed. It shall explain the fit of a company to a specific type of cooperation. Afterwards a case study is conducted which shall shed light on the phenomenon innovation cooperation with regard to different company strategies. In the final paragraph of this paper limitations and directions for further research are discussed.

2. Conceptual Framework

2.1. Innovation cooperation

Innovation cooperation combines two research areas: innovation management and cooperation or network management respectively (Freeman 1991). Both fields are introduced in the following section.

The phenomenon innovation was first introduced by Schumpeter (1939). He regarded innovation as a discontinuous event of implementation of new factor combinations (Dilk 2009).

However, there is not yet one unique definition of the phenomenon innovation. Undisputed is the fact that innovation means something “new” (Wasson 1960). Moreover there is consensus in literature that innovation consists of invention and its diffusion. Invention means an idea or a technical solution, while innovation means the successful implementation of the idea in a certain market or within a company respectively (Roberts 2007).

Innovation is regarded as result of multi-stage process. This process can be split up into phases of invention and those of diffusion (Robertson 1967). The invention stages comprise the following: (1) Idea generation, (2) Project definition, (3) Problem solution. The result of these phases is a basic solution to a certain problem based on combination of information together with technical aspects. The consequent diffusion phase consists of (4) design, development and production and (5) commercialization (Gopalakrishnan & Damanpour 1994).

The term cooperation or network respectively comprises a wide range of different concepts of intercompany collaboration. Cooperation in general is a hybrid form of coordination between market and hierarchy (Dilk 2009). There is a large variety of types of networks as depicted in figure 1. All share the common base that they are a voluntary intercompany form of collaboration of companies which limit their independence through the cooperation (Sydow 1992).
However, innovation cooperation as one functionally specific form of intercompany collaboration can be determined more precisely: All types of innovation cooperation have in common that they are some kind of basic institutional arrangement to cope with systematic innovation. Innovation cooperation can comprise different stages of the previously introduced innovation process. It can range from idea generation until commercialization and aims at implementing a competitive advantage to the partners (Dilk 2009). The type of innovation cooperation or network respectively can be very different. Freeman (1991) distinguishes the following types according to the degree of intercompany cooperation: R&D-Joint Ventures, R&D agreements, technology exchange agreements, technologically motivated direct investment, licensing, research associations, government sponsored R&D programmers, databases for scientific exchange and R&D-specific networks (Freeman 1991). Other possibilities for categorization are according to number of partners, time frame of collaboration, the position of the partners in the value-chain (Backes-Gellner u. a. 2005).

The underlying motive for entering innovation cooperation is, as previously stated, the aim of increasing innovation success (Ahuja 2000); (Man & Duysters 2005). The strengthening of innovation activities is caused by different mechanisms. Consequently companies have different motives to enter innovation cooperation, as depicted in table 1.

Companies entering cooperation aim at getting access to resources and capabilities of the partner. Especially interesting for innovation cooperation are technological resources and capabilities. Thus the resource and competence base can be enlarged and as a result the cooperation is capable of developing products and processes that none of the partners could produce on its own (Man & Duysters 2005).

Moreover companies get access to technical assets of the partner (Ahuja 2000), to external Know-How (Hoang & Rothaermel 2005) and specific market know-how (Chang et al. 2008).
Based on the exchange with the partner there is the possibility of organizational learning in cooperation (Gulati 1995).

Within cooperation the partners may jointly develop idiosyncratic resources, which do not exist before in one of the companies and which can only be developed because of the joint application of competencies of the partners (Gulati & Singh 1998).

Other companies joining innovation cooperation aim at an increase of flexibility (Narula 2004). They intend to increase the potential pool of resources they could use for R&D projects. According to the actual work load partners are integrated in the process more intense.

Other companies starting innovation cooperation try to reduce the risk. They want to share the risk of budget overrun regarding time and money (Borchert & Hagenhoff 2004).

Tab. 1: Motives in favor of Innovation Cooperation (Own illustration)

<table>
<thead>
<tr>
<th>Motives in favor of Innovation Cooperation</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to technological resources and capabilities of the partner</td>
<td>Man/Duysters (2005)</td>
</tr>
<tr>
<td></td>
<td>Ahuja (2000)</td>
</tr>
<tr>
<td>Possibility for organisational learning from the partner</td>
<td>Gulati (1995)</td>
</tr>
<tr>
<td>Access to assets of the partner</td>
<td>Ahuja (2000)</td>
</tr>
<tr>
<td>Access to external know-how</td>
<td>Hoang/Rothaermel (2005)</td>
</tr>
<tr>
<td>Access to specific market know-how</td>
<td>Chang et al. (2008)</td>
</tr>
<tr>
<td>Joint development of idiosyncratic resources</td>
<td>Gulati/Singh (1998)</td>
</tr>
<tr>
<td>Increase in flexibility</td>
<td>Narula (2004)</td>
</tr>
</tbody>
</table>

Although innovation cooperation may generate advantages for companies there are still some factors which prevent companies from entering cooperation, as depicted in table 2.

Companies fear unintended knowledge spillover. During a collaboration where employees from different companies work closely on a project together managers fear that employees exchange too much knowledge so that core competencies are disclosed (Borchert & Hagenhoff 2004).

Another potential problem in innovation cooperation is opportunism of the partner. To reduce the risk of opportunism governance structures have to be applied. The necessary governance structures increase the cost of cooperation (Kim & Song 2007).

Other companies state the problem of a loss of flexibility because decisions have to be coordinated with the partners. The required amount of coordination rises with an increasing degree of collaboration (Kim & Song 2007).
2.2. Competitive Advantage through Innovation Cooperation

Innovation cooperation or networks are hybrid forms of coordination between network and hierarchy which are set up between different companies and/or research institutions with the aim to engage together in innovation activities.

The motives which dispose companies to enter innovation cooperation are two-fold: (1) On the one hand companies search for an advantage for themselves by using resources and competencies of the partner. (2) On the other hand there is the potential to create new resources together with the partner. This indicates that companies try to establish relation specific assets which support the involved companies in gaining competitive advantage.

Based on these two different types of motives for entering innovation cooperation, two theories are used to explain competitive advantage through innovation cooperation. For explaining the advantage for one company on its own, resource-based view (RBV) (Barney 1991) is applied. The relational view (RV) is used to explain the relation specific advantage that might be created by a close collaboration of companies (Dyer & Singh 1998).

Resource-based View focuses on company’s resources as source of competitive advantage (Duschek & Sydow 2002). Resources are all factors which might be strength or weakness of a company such as knowledge, technology or brand (Wernerfelt 1984). The underlying assumption is that unique resources, capabilities and competencies are the basis for competitive advantage of companies (Gersch et al. 2005). Resources which have the potential to generate competitive advantage have the following characteristics (Barney 1991): (1) valuable, (2) rare, (3) inimitable and (4) non-substitutable.

The company centric view of the RBV is used in this paper to model the perspective of companies when they look for suitable partners. In context with innovation management RBV is used to explain the benefits of company structures which promote an innovative culture and which strengthen R&D activities – all critical resources according to RBV (Priem & Butler 2001). Moreover cooperation is according to RBV a mean to increase the resource base and to reach a critical resource allocation (Das & Teng 2000).
While the RBV is used to explain the benefits one partner of cooperation can achieve through this collaboration, the relational view is to illustrate that competitive advantage is the effect of intercompany relation. The RV is to explain the creation of competitive advantage through cooperation processes and structures (Dyer & Singh 1998). According to Dyer/Singh (1998) there are four mechanisms for generation of competitive advantage within networks: (1) Interfirm relation specific assets, (2) knowledge-sharing routines, (3) complementary resources/capabilities and (4) effective governance. With regard to innovation cooperation, RV is to explain the organizational arrangement of the intercompany collaboration.

![Diagram of Functional Chain of a resource-oriented cooperation strategy](Own illustration)

Figure 2: Functional Chain of a resource-oriented cooperation strategy (Own illustration)

Figure 2 depicts the functional chain of resource oriented cooperation strategies. The available resources determine the strategy, while strategy has an impact on company performance; strategy itself has a reverse effect on the development of resources (Miroschedji 2002). In the specific case of cooperation the company’s resource base makes a cooperation strategy adequate. This cooperation strategy itself with a focus on cooperative innovation activities has an impact on innovation output and consequently on company performance. The strategy of innovation cooperation itself has an impact on the resource base of the participating companies.

Competitive advantage as final target of resource oriented theories is characterized by a relatively superior market share and a superior economic success of the company which is sustainable for a certain period (Hunt & Morgan 1995). The paper grounds on the underlying assumption that successful innovation activities in innovation cooperation lead to a superior position of a company, i.e. a competitive advantage, which is expressed by long-term superior results of the company.

These considerations show that the appropriate cooperation type for achieving competitive advantage depends on the resource base and thus the innovation strategy respectively. That means that different types of innovators require different types of cooperation.
3. Model Development

Based on above explained theory a model is explained which explains the fit between specific company set-ups and the different types of innovation cooperation. This paper has the aim to develop suitable strategies towards innovation cooperation for different strategy types of companies. For this sake first relevant types of innovators with different innovation strategies are introduced. Second the different types of cooperation are introduced. Afterwards a model based on propositions is deduced from the theoretical considerations.

3.1. Types of Innovators

The approach of companies towards innovation management differs according to innovation strategy. Innovation strategy is embedded into overall company strategy. The integration into company strategy ensures that goals and approach of innovation strategy are complement to each other. Innovation strategy sets goals for innovation management which are deduced from overall company strategy. It ensures that company resources are efficiently used for innovation purposes (Miles et al. 1978).

According to Miles/Snow (1978) there are four different innovation strategies which can be followed:

Defenders focus on core competencies and the known market. They offer a limited product portfolio. Growth strategies are implemented by intensifying the coverage of the established markets and not by new product innovation. Defenders act on relatively stable narrow niche markets. In case of new entrants to the markets, defenders hold their position by increasing price competition or product quality. These companies have a strong focus on their competencies and their own product portfolio (Miles & Snow 1978).

Prospectors, however, have a broad product portfolio which they continuously change by innovation. They actively enter into new markets within a dynamic environment. Prospectors are very flexible companies which are trendsetters and first movers regarding new technologies or applications. They take the risk of relatively high investments into innovation projects. If the return on new products is lower than predicted company profitability targets are not achieved (Miles & Snow 1978).

The third strategic type according to Miles/Snow (1978) is called Analyzer. It is a combination of both above mentioned strategic types. Their strategy is two-fold: With a relatively stable product portfolio they act on their core market similar to Defenders. Moreover they develop based on detailed analysis of dynamic markets trends and ideas for new products. These trends are adopted for the own products so that they act as fast-follower. As Analyzers learn
from experiences Prospectors make, they avoid investments in product failures. In addition they can even improve the product ideas of the Prospectors.

The fourth strategic type – Reactor strategy – is slightly different to the others and is not part of the continuum between Prospector and Defender strategy. Companies following this strategic type only react to developments in the market and the environment (Miles & Snow 1978).

The chosen strategy reflects the risk orientation or opportunity orientation respectively of companies: Prospectors take high investments under uncertainty for future returns they expect from their innovation activity. They rank the opportunities higher than the risks which originate from innovation. Analyzers avoid not definable and quantifiable risks. However, they take such risks after accurate analysis and consideration of opportunities in relation to risks. Defenders don’t invest in new product developments where it is hard to predict the potential return. They rather focus on an efficiency increase and improvement of existing products through process innovation (Miles & Snow 1978; Miles et al. 1978). The three strategic types’ different degrees of opportunity and risk orientation are depicted in figure 3. While defenders only take low risks and as trade off they waive of some opportunities prospectors take as well projects including higher risks and higher opportunities.

Figure 3: Strategic Orientation Grid (Own illustration)
According to the used strategy company’s resource base is established so that it fits to strategy (Contant, Mokwa & Varadarajan 1990). Defenders innovation resources are organized for process innovation, so that resources are dedicated to production and controlling. Classic innovation activities in marketing, NPD or R&D are not first priority and consequently less developed. In contrast Prospectors set value on R&D as well as marketing and sales resources. These functions are drivers for idea generation, development and market introduction of new products. Analyzers have a quite balanced resource base. They have the resources and capabilities to identify opportunities and drive the resulting innovation. Thus they have strong resources in R&D and marketing field. However, they are also capable of predicting and analyzing developments in the market. So their resources and expertise in other functions like controlling or production management are quite advanced as well.

However, there might be misfits between the resource base and the strategy of a company. This situation appears when there has been a recent change in strategy. Company’s which switch from one strategic type to another one still have to adapt their resources to the new strategy and so a misfit between resources which are required because of the chosen strategy.

### 3.2. Types of Innovation Cooperation

The collaboration within innovation cooperation varies according to several factors which constitute the type of cooperation (Dilk 2009; Backes-Gellner, Maas & Werner 2005): (1) direction of collaboration, (2) time horizon of collaboration, (3) number of partner institutions and (4) provenance of the partners.

An important differentiator is the direction of collaboration. In total three general types of cooperation can be distinguished: (1) Vertical cooperation, (2) horizontal cooperation and (3) lateral cooperation: In vertical cooperation a manufacturer collaborates either with suppliers or customers. Horizontal cooperation means cooperation with a company of the same position in the value chain and lateral cooperation includes cooperation with companies from a different industry as well as with research institutions (Bronder & Pritzl 1992).

The projects which are possible to be carried out in the different types of cooperation differ. Vertical projects with suppliers serve to improve a specific part of the product while cooperation with a customer is often started with the aim to develop a new customer specific solution.

Horizontal cooperation is often used in order to develop industry standards. Another possibility is that projects are too large to be handled by only one company, so that the
customer requires the bidders to form an alliance for project execution. This scenario often applies to government funded projects e.g. in armaments industry.

Lateral cooperation with research institutes is often used for basic research. Cooperation with companies from another sector is a mean for integrating new technologies into the own industry or for own diversification purposes.

Vertical cooperation have relatively low risks because of the dependence of the cooperation partners and the relatively clear cut competences in the supply chain. However companies may benefit from greater opportunities in horizontal and lateral cooperation as they reach beyond their original supply chain, they represent greater risks. In these types of cooperation partners have complementary resources from different fields which open up new opportunities but makes governance more difficult.

One more point which heavily influences the collaboration is the time horizon of the cooperation and the overall partnership. One can differentiate between strategic long-term cooperation and short-term ad-hoc cooperation. Short-term cooperation are often established due to urgent needs because of problems in ongoing innovation projects. Long-term innovation cooperation, however, are of strategic nature. They are established as partners recognized a fit between the companies and on this basis strategic targets are established (Morschett 2003).

Long lasting cooperation are of strategic nature and include the opportunity to develop radical innovation by combining different competencies and resources. This approach requires a very intense collaboration and results in interdependencies of the partners on each other. These potential benefits require a trade-off with the risk dimension and consequently include higher risks than short-term cooperation for the resolution of a predefined problem.

The number of partners which participate in the cooperation is an essential factor for classifying the type of cooperation. With an increasing number of partners in the cooperation the resource base enlarges and thus the scope of possible projects. The larger resource base increases the potential for problem solving within the cooperation. Despite the advantages of a higher number of partners there are also some consequences of increasing number of partners which make the collaboration more difficult: The different partner companies all have individual goals and preferences which may differ from each other. Moreover according to their individual objectives they prioritize the work in the cooperation differently. These considerations demonstrate the increasing time and effort and consequently cost for coordination activities in larger cooperation. These higher coordination costs comprise different coordination activities: first a larger cooperation requires more time for search and selection of the suitable partners and second a larger group is more difficult to
coordinate, as individual goals of all partners have to be respected and aligned (Kutscher 1994).

Another major influencing factor is the provenance of the partners. It makes a difference for governance of the cooperation whether the partners have a different cultural background or not. The potential for conflicts because of misunderstandings is much lower for those cooperation where partners have a similar cultural background. When cooperating with partners from the same cultural background those cooperation with partners in the same region, so called clusters, are specific as well. The governance of these structures is special, as there are no large distances between the partners and the involved persons often know each other even before the collaboration (Morschett 2003); (Imai & Baba 1989).

These considerations are graphically depicted in the risk-opportunity grid in figure 4. The grid classifies the different types of cooperation within the mentioned dimensions according the degree of risk and opportunity.

![Risk-Opportunity Grid of Cooperation](image)

**Figure 4: Risk-Opportunity Grid of Cooperation (Own illustration)**
3.3. Propositions

In our theoretical approach we suppose that there are different motives leading to different innovation cooperation and there are discrepancies regarding approaches towards innovation among the different types of cooperation, i.e. different innovation strategies can be observed. Depending on the individual innovation strategy’s goals innovation activities differ. Different goals means different innovation objects, i.e. process vs. product innovation as well as different measurable targets, like market expansion vs. penetration. Company’s innovation resources and innovation management activities are aligned according to strategy and differ consequently among companies with different strategies. Thus the necessity and motives for establishing innovation cooperation are different. As result, the type of cooperation which the different types of innovators set-up varies.

Defenders which have an approach characterized by risk avoidance, establish innovation cooperation more likely with vertical partners. Cooperation with customers in innovation projects help to be close to the clients and to have an information advantage. This may lead to an image as innovative problem solver from the perspective of the customer. These activities strengthen the relationship to the respective customer and consequently enlarge the entry barriers for competitors. Cooperation with suppliers is quite convenient for Defenders as potential improvements on supplier side may result in process innovation driving process efficiency.

Horizontal or lateral cooperation are more risky than vertical ones. They aim at developing completely new products or larger components of existing products. The project scope and the actually equal distribution of power, in contrast to vertical cooperation, make coordination more difficult. Consequently Defenders set-up these cooperation only in case they are forced to due to superior competitors.

Defenders focus on those cooperation with a limited number of partners which accomplish short-term to mid-term goals.

Proposition 1a: Defenders work continuously in cooperation which offer low to medium opportunity and medium to low risks with the aim of customer-centric innovation or process improvements.

Proposition 1b: Defenders are forced from time to time to enter into those types of cooperation which include higher risks and opportunities due to market pressure.

Analyzers proactively take risks when they have fully deconstructed and understood the whole situation including probable trends. Innovation activities are pursued after balancing opportunities and risks against each other.
For strengthening their own position in the core business vertical innovation cooperation similar to those of Defenders are established. Similar to Defenders, companies following an Analyzer strategy establish close relations with customers and suppliers. Innovation cooperation with these partners are to establish incremental process and product innovation in order to keep the advantage in the market compared to competition.

Apart from that Analyzers actively screen the market for opportunities and evaluate their potential business impact. For this sake in an early stage of analyzing technical and economic impact lateral cooperation with research institutes are used possibilities. Especially prevalent in this respect are state-funded projects of several partners in one research cooperation. These projects reduce financial risks in an early stage of the innovation process. Consequently (state-funded) cooperation with research institutes in an early stage of innovation process are used for assessing potential and thus for determining the relevance for the own company.

After having assessed the potential of innovation projects Analyzers enter lateral cooperation or horizontal cooperation for accomplishing the innovation project, when potential benefits through cooperation are detected.

Proposition 2a: Analyzers focus on cooperation with medium risks and opportunities in an established setting for marginal product or process improvements.

Proposition 2b: After close examination of the potential impact of an innovation and the analysis of feasibility and benefit of cooperation, partnerships with higher risks are established.

Prospectors aim at positioning themselves as leading edge in their industry. Their primary target is radical innovation and not only incremental improvements. For achieving these targets they take large investments under uncertainty. Prospectors are always curious about getting new ideas and working on leading edge projects they search for suitable partners.

Proposition 3: Prospectors have a diverse portfolio of innovation cooperation and it is more likely to find those partnerships which possibly bear greater risks and greater opportunities.

4. Case Study

4.1 Methodology & Data Analysis

The theoretical analysis shows that innovation cooperation is a manifold phenomenon: Different set-ups of the cooperation support accomplishing different targets. Individual company's goals depend on their specific strategy. Consequently different set-ups of innovation cooperation are suitable for different strategies. In order to get a detailed image of
the approach towards innovation cooperation with regard to different strategic types of companies interviews with experts for innovation cooperation are conducted.

For this research issue a multiple case study approach is used (Yin 2003). Multiple case studies make comparisons of the findings across cases possible. Moreover, constructs are more precisely explored, as it is easier to determine multiple construct dimensions to their full extent (Eisenhardt & Graebner 2007). A multiple case study should contain with regard to the specific research questions between four to nine cases (Eisenhardt 1989).

As method of data collection the approach of a structured expert interview is chosen. Because of the predefined structure all interviews follow a similar cycle and are consequently comparable (Borchardt & Göthlich 2007).

We conducted interviews with 9 interviewees from 8 different companies, as depicted in table 3. Moreover we used company reports for analysis. The companies are either form manufacturing industry or are from technology intensive logistics companies which use products and technologies. This sample guarantees that findings show the approach companies from manufacturing industry take towards innovation cooperation. Moreover when choosing the companies for the sample SMEs were chosen as well as MNEs. This differentiation is important as innovation management in smaller companies differs from that in larger ones. The experts were chosen based on the knowledge they had regarding innovation within their companies. In SMEs we talked to the CEO as there often is no R&D department. In larger enterprises the experts hold positions like R&D or innovation manager.

The duration of the interviews was between 45 minutes and 1:25. The interviews were all recorded and transcribed.

**Tab. 3: Companies participating in case study**

<table>
<thead>
<tr>
<th>Company</th>
<th>Activity</th>
<th>Size</th>
<th>Interviewee</th>
<th>Experience in Innovation Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Machinery</td>
<td>40.000</td>
<td>R&amp;D Manager</td>
<td>First experiences (customers, universities)</td>
</tr>
<tr>
<td>B</td>
<td>Automotive</td>
<td>8.000</td>
<td>R&amp;D Manager</td>
<td>Regular cooperation with customers</td>
</tr>
<tr>
<td>C</td>
<td>Logistics</td>
<td>300.000</td>
<td>Manager Innovation Cooperation</td>
<td>Broad Experience</td>
</tr>
<tr>
<td>D</td>
<td>Technology</td>
<td>20.000</td>
<td>R&amp;D Manager</td>
<td>Broad Experience</td>
</tr>
<tr>
<td>E</td>
<td>Logistics</td>
<td>4.500</td>
<td>Innovation Manager</td>
<td>Broad Experience</td>
</tr>
<tr>
<td>F</td>
<td>Machinery &amp; Components</td>
<td>100</td>
<td>CEO and Technical Director</td>
<td>Regular cooperation with customers</td>
</tr>
<tr>
<td>G</td>
<td>Machinery &amp; Components</td>
<td>7.000</td>
<td>R&amp;D Manager</td>
<td>Experiences (customers, universities)</td>
</tr>
<tr>
<td>H</td>
<td>Machinery</td>
<td>500</td>
<td>CEO</td>
<td>Experience (other sectors, university)</td>
</tr>
</tbody>
</table>
4.2 Findings and results

Aim of this paper is to detect a connection between company's strategy and its approach towards innovation cooperation and to develop based on these findings strategies for cooperation.

In order to determine a link between company strategy and the chosen types of cooperation, the first step of analysis is to determine company strategy:

Company “A”, a MNE from machinery industry, is a leading player on its market. The company is active on relatively stable core markets which are selectively influenced by external events like technology changes. Moreover for business development it enters into new markets where from perspective of the company imponderables a consequently dynamic is higher. The company has continuous R&D activity both for process and product innovation. Before entering new markets or starting innovation projects the opportunities and risks are balanced. Company “A” follows the strategic type “Analyzer”.

Company “B” is a midsized company working as supplier in the automotive industry. It is supplier for basic materials where new technologies have a large impact. They focus on product innovation and they aim at establishing themselves as leading edge in the industry. This company is classified as Prospector.

Company “C” is a leading player in logistics industry, which actually is a not very innovative industry. This fact is recognized as problem. As counter-measure the company established a specific department aiming at searching opportunities for the company and implementing projects for product and process innovation helping to accomplish the opportunities. This department is a counterweight to the core business’s departments which focus primarily on routine processes. This company is classified as “Analyzer”.

Company “D” has a history as innovator in the technology sector. It has pursued a Prospector strategy in earlier years, which has been quite successful. However with maturity of its core market the leading role as radical innovator has reduced as well. Today the company still is innovative but takes less risk. Moreover they focus on process innovation and product improvements in core markets. It pursued the strategy of “Analyzer”.

Company “E” is a player in logistics sector and strictly follows a strategy as leading innovator in its industry. The company is proud of newly introduced products and adoption of technologies from other sectors to the industry. It follows the “Prospector” strategy.

Company “F” is a SME serving as supplier for large companies from machinery industry. It has a stable core market, which historically has been the germ cell. In this market company “F” acts as Defender. However, they saw the necessity to expand to other markets.
Company “G” is a Business Unit within a MNE. It is supplier for the automotive industry and is according to innovativeness the benchmark. However it pursues a strategy which contains more parts of Analyzer conduct than from Prospector.

Company “H” is a SME in machinery industry. It is a subsidiary of an MNE. As other affiliates of the corporate group serve potential markets the specific company could expand to it is restricted to its core business. Consequently the target is to defend the own market position. The company focuses on process and product improvements and follows Defender strategy.

During the preparation of the interviews we already learned that innovation cooperation has been an issue for all of the target companies.

Company F and H were identified as pursuing Defender strategy. They are both SMEs acting as specialists in a niche market. They both have a high reputation among their customers. At company H according to the CEO customers are willing to pay a premium, because the benefit for customers from their product is higher. Interview partners from both companies strengthened that they have long lasting customer-relations. Both companies base the close customer-relation on the ability to provide customer specific solutions. For this sake both companies state to work continuously in cooperation with the important customers for adapting the product to the special needs of the customer. These innovation cooperation aim at improving the product, i.e. incremental innovation, and of improving the value generation process with the customer. The companies have a relatively high depth of added value so that they can flexibly react to requirements of the customers. However they use flexible key suppliers to whom they establish close cooperation for process improvement.

These considerations proof proposition 1a as largely correct. To check proposition 1b we asked for external influences on the market and how companies reacted on these challenges. Company H has the limitation that it cannot expand to other related markets as these are covered by sister companies belonging to the same corporation. The external challenges for both companies were slightly different: Company G suffered from shrinking of the core market. As reaction after close analysis which markets are attractive and have a fit to own competencies they decided to expand into another market where they could as well use their core competences. For this expansion they identified potential partners who have those resources which lack themselves. They established cooperation with the aim of learning form the partners. Company H was faced the challenge of a technology substitution in the core market. New competitors entered into the market for the past couple of years and put pressure on prices as they sold new technology. By this new technology they stole market share from company H which is the market leader. As reaction company H established cooperation with a research institute for developing this new technology. However, this cooperation didn’t reach the goals, as the chosen partner had not all needed
competencies. As a next step they set-up cooperation with a company from another industry already using the new technology. Prior to the decision for this cooperation, a detailed analysis of the own competencies and the needed external competencies was accomplished. Based on these requirements towards external partners the partner was chosen from a long-list of potential partners. In this setting the development and market-introduction of the new product was successful.

These considerations show that proposition 1b is correct and Defenders are forced due to market pressure into cooperation.

For checking proposition 2a and 2b the companies which are classified as Analyzers are examined. In the case study sample, there are three companies following the strategy as Analyzer. Their attitude towards innovation cooperation is quite similar compared to the one of Defenders. They work with customers and suppliers in innovation cooperation with the aim of incremental product innovation or process improvements. However Analyzers in contrast to Defenders always aim at identifying new potential trends and needs which are not necessarily related to the specific project aim. These ideas are used for the structured innovation management process. This is as well a major difference between Defenders and Analyzers: Analyzers have established a defined innovation management process. This stage-gate process ensures that with regard to project progress predefined criteria have to be met. This method helps structuring innovation projects and establishing a project prioritization according to an assessment of risks vs. opportunities. In company C there is a department dedicated to the execution of those projects which have to be accomplished in innovation cooperation because of missing internal competencies. These cooperation are often multilateral cooperation including lateral and horizontal partnerships. In company A and C there are no specific departments for cooperative innovation projects. In these two companies there is no formalized process for lateral or horizontal innovation cooperation. These horizontal and lateral innovation cooperation are established with regard to the specific project.

According to these considerations propositions 2a and 2b can be regarded as supported.

In order to analyze the relevance of proposition three we analyze the interviews with companies B, E and G. All three are classified as Prospectors. In their company strategy they have defined innovation leadership as their target and they are positioned as innovation benchmark with regard to their product portfolio. Even companies B and G from traditional machinery industry have an innovation manager who is responsible for identifying future trends, prioritizing them together with experts from R&D department and setting up a project team. These companies have a clear structure of different types of innovation projects: They pursue projects with short or mid-term goals often in cooperation with customers and
suppliers. These projects are often problem driven. A second type of projects are mid to long-term innovation projects. They have a longer time-frame and are established because of trends and consequent predicted needs. In these projects cooperation with research institutes, horizontal and lateral partners are quite common.

The considerations above prove proposition 3 as correct.

4.3. Strategies for Innovation Cooperation

The case study gives a good overview on the prevalence of different strategies towards innovations and their effect on the approach towards innovation cooperation. Moreover the cases proof the propositions that according to the prevailing strategy companies choose different types of cooperation as correct.

The success of innovation cooperation depends on different factors. However, a prerequisite for a successful cooperation is that the type of innovation cooperation fits to the company with its goals. Before entering innovation cooperation companies have to analyze their own resource base with regard to innovation and determine their innovation strategy. Defenders do not have the same resources dedicated to innovation as Prospectors have. Consequently the type of cooperation which fits to the company is different.

For determining the appropriate strategy for innovation cooperation and networks, companies shall use an approach as described in the following:

As a first step companies shall deduce their innovation strategy from company strategy. The resource base shall be examined with regard to its contribution to company’s innovation activities. Here companies can determine their position in the Strategic Orientation Grid from figure 3.

This assessment of risk and opportunity orientation including positioning of the company in the grid visualizes the resulting possibilities for innovation cooperation which fit to the company from figure 4.
5. Conclusion

This paper structures the different types of innovation cooperation according to dimensions and classifies companies’ strategic orientations. Using a multiple case study we examine the relation between companies’ strategic type and the chosen type of innovation cooperation. Moreover the critical factors of innovation cooperation leading to success are analyzed.

The results show that successful innovation cooperation depend on factors which have to be taken into account before entering an innovation cooperation and those factors which are crucial in the innovation cooperation.

The results indicate for researchers the necessity to examine the coherence between factors taken into account before entering the cooperation and success. Existing studies examine either the formation or the core phase of cooperation. It would be interesting to examine empirically coherences between factors in both phases not only in a case study as we did, but with a larger sample with the aim of identifying the most important factors. Moreover the results show coherence between strategy and cooperation type. However the study uses only a small sample. These results shall be verified using a large scale sample.

Managers can use these results to assess their own company regarding strategy towards innovation and resources for innovation activities. Based on these findings they can assess their portfolio of innovation cooperation.
Bibliography


