Institut für Tierwissenschaften

Inter-organisational innovation processes in the agrifood industry: An approach to improving management support services applied to the meat industry

Inaugural-Dissertation

zur

Erlangung des Grades

Doktor der Ernährungs- und Haushaltswissenschaften

(Dr. oec.troph)

der

Hohen Landwirtschaftlichen Fakultät

der

Rheinischen Friedrich-Wilhelms-Universität

zu Bonn

vorgelegt am 21.12.2010

von Maren Bruns

aus Rheine

Referent:	Prof. Dr. Brigitte Petersen
Korreferent:	Prof. Dr. Ludwig Theuvsen
Tag der mündlichen Prüfung:	18. Februar 2011
Erscheinungsjahr:	2011

Kurzfassung

Überbetriebliche Innovationsprozesse in der Agrar- und Ernährungswirtschaft: Ein Ansatz zur Verbesserung von Unterstützungsleistungen angewandt in der Fleischwirtschaft

Ziel dieser Arbeit war es, einen Ansatz zu entwickeln, in welcher Weise sich das Dienstleistungsportfolio von Innovationsbrokern kundenorientiert ausrichten lässt. Die Rolle des Innovationsbrokers wurde in diesem Zusammenhang als Dienstleistungsgeber definiert, der in einem Innovationsnetzwerk darauf fokussiert ist, die übrigen Netzwerkakteure (Dienstleistungsnehmer) im Innovationsprozess zu unterstützen.

Die Grundlage der Konzeptentwicklung bilden drei empirische Studien. Für die dienstleistungsnehmerorientierten Analysen wurden etwa 700 Unternehmen der Fleischwirtschaft befragt. Diese quantitative Analyse wurde ergänzt durch eine qualitative Analyse in Form von drei Fallstudien. Für die dienstleistungsgeberorientierte Analyse wurde eine Pilotorganisation, agierend als Innovationsbroker, betrachtet.

Der in der Arbeit entwickelte Vorschlag umfasst im Wesentlichen drei Elemente:

1. Ein strukturiertes Verfahren zur Ermittlung des Unterstützungsbedarfs

   Die Ergebnisse zeigen, dass der Unterstützungsumfang deutlich zunimmt, wenn die Größe des Kooperationskonsortiums wächst, geeignetes Personal im Unternehmen für Innovationsprojekte fehlt, Kenntnisse und Zugang zu neu angestrebten Zielmärkten nicht vorhanden sind, strategische Allianzen zwischen Stufen der Wertschöpfungskette sowie Erfahrungen bei der Initiierung, Beantragung und Durchführung von öffentlich geförderten Projekten fehlen.

2. Ein Katalog von Unterstützungsleistungen

   Definiert wurde ein Katalog von 37 spezifischen Unterstützungsleistungen. Diese lassen sich vier Aspekten überbetrieblicher Innovationsprozesse zuordnen. Sie beziehen sich auf die Initiierung und Vorbereitung von Innovationsaktivitäten, die Realisierung von Innovationsaktivitäten, die Wissensverbreitung und das Netzwerken mit Akteuren des Innovationssystems.

3. Definition von Kennzahlen zur Charakterisierung der Entwicklung von Netzwerken, die die Basis eines kontinuierlichen Verbesserungsprozesses bilden

   Branchenspezifische Kennzahlen wie die finanzielle Ausstattung zur Realisierung geplanter Innovationsaktivitäten, die Mitgliederzahlen und –beiträge im Netzwerk, die personelle Ausstattung des Innovationsbrokers als zentral agierender Akteur im Netzwerk sowie der Unterstützungsschlüssel als dimensionslose Zahl zur Quantifizierung des Unterstützungsumfangs bei Interaktionen bilden die Grundlage für einen kontinuierlicher Verbesserungsprozess und dienen dem Benchmarking mit anderen Netzen.

Abstract

Inter-organisational innovation processes in the agrifood industry: An approach to improving management support services applied to the meat industry

The goal of this study was to develop an approach by which the service portfolios of innovation brokers can be aligned to become customer oriented. In this context the role of the innovation broker was defined as a service provider within an innovation network, who is focused on supporting the other network actors (service recipients) in the innovation process.

The concept development is based on three empirical studies. Approximately 700 companies from the meat industry were surveyed for the service recipient oriented analysis. This quantitative analysis was supplemented by a qualitative analysis in the form of three case studies. For the service provider oriented analysis, a pilot organisation acting as an innovation broker was looked at.

The proposal developed in this study is essentially comprised of three elements:

1. A structured procedure for determining the demand for support

   The results show that the scope of support increases significantly when the size of the cooperation consortium grows, there is a lack of suitable personnel in the company for innovation projects, there is a lack of knowledge and access to the new markets being striven for, there is a lack of strategic alliances between stages in the value chain as well as experience in initiating, applying for and implementing publicly funded projects.

2. A catalogue of support services

   A catalogue with 37 specific support service elements was defined. These can be categorised into four aspects of inter-organisational innovation processes. They relate to the initiation and preparation of innovation activities, the realisation of innovation activities, the dissemination of knowledge and networking with actors within the innovation system.

3. Definition of key performance indicators to characterise the development of networks, which create the basis of a continuous improvement process

   Branch-specific key performance indicators on how the financial capacity to implement planned innovation activities, member numbers and contributions within the network, personnel of the innovation broker as the central operating actor in the network, as well as the support ratio as a dimensionless key for quantifying the scope of support in interactions, constitute the basis for a continuous improvement process and serve benchmarking with other networks.

Content

Glossary

Terms	Definition
Diffusion of innovations	Diffusion of innovations is a process of spreading new ideas and technologies from the innovator to other individuals and groups. The phases can be described as following: basic research, invention, innovation, adaptation and diffusion (incl. interrelations and back coupling between the described single phases)
Innovation activity	Innovation is based on a range of different activities like scientific, technological, organisational, financial and commercial processes. By the combination of several innovation activities the overall goal of an innovation can be reached: Introducing new ideas to increase performance.
Innovation broker / innovation intermediary	“An innovation broker is an organization acting as a member of a network of actors in an industrial sector that is focused neither on the generation nor the implementation of innovations, but on enabling other organizations to innovate” (Winch and Courtney, 2007).
Innovation cooperation	In innovation cooperation, actors make use of the innovation system, which contains the interaction between actors that are needed in order to turn an idea into something new to be introduced on the market. The cooperation is a relationship between organisations that involves sharing resources and competences to follow complementary goals.
Innovation management	Innovation management is the discipline of managing processes in innovation. It is not purely a function of R&D. Instead, the other innovation activities need to be integrated as well (see above).
Innovation network	Innovation networks comprise of strategic alliance with universities, research institutions, business actors etc. Networks bring actors together who are connected by a specific link or knowledge basis. Innovation networks are small innovation systems with similar system characteristics and interactions.
Innovation process	Innovation process is the process of generating innovation. An innovation process is initiated by changing conditions and environmental influences. It can be divided into three main phases: initiation, realisation and exploitation. The process is characterised by iterations of single process steps. The process is successfully achieved after an innovation becomes a commercial success. The innovation has to be implemented on the market and then has to increase the performance of the market actor(s).
Innovation system	The innovation system is the total of innovative units in an economy, including the related external structures. The innovation system is characterised by business, other private, public and governmental institutions. Furthermore science, research, financial institutions are of relevance. The innovation system is understood as a system with connected actors, organisations and institutions that are part of the generation, the transfer and the market implementation of innovation.
Inter-organisational innovation process	Instead of realising innovation processes as single actor cooperation with others are accomplished by sharing of knowledge and resources (see as well above “innovation cooperation”).
Management support or management support services	Services that support actors by initiating and implementing innovation activities. By this, actors within an inter-organisational innovation process would be able to concentrate solely on the content of an innovation activity – the generation, adaptation and exploitation of new knowledge. While the service provider is taking over transaction and coordination tasks.
Multi-actor innovation activity	Innovation activities involving a multiplicity of actors. Only by integrating more than one actor it is possible to implement the innovation activity.

Terms	Definition
Research and Development cooperation	R&D cooperation is similar to the inter-organisational innovation process (see above) expect that the focus is only on the research and development as one innovation activity (without focussing on other innovation activities; see above)
Single-actor innovation activity	Innovation activity that can be implemented by a single actor.
Supply chain / value chain	Supply chains are defined by having several production stages (e.g. farm, processing, retailer and consumption level)
Supply net chain / value net chain	The net chain is a supply chain supplemented by further elements to networks (e.g. technology suppliers, services from veterinarians, laboratories, animal trading and transportation companies, inspections etc.)
Transaction and coordination tasks in inter-organisational innovation processes	Barriers related to the initiation and accomplishment of inter-organisational innovation activities occur due to the fact that actors need to make efforts to handle uncertainties by opening up their institutional borders and to interact with others.

List of abbreviations

BtB	Business to business collaboration
BtO	Business to others collaboration
BtPA	Business to public authorities collaboration
CIP	Continuous improvement process
CIS	Community innovation survey
F&E	Forschung und Entwicklung (research and development)
GDR	German Democratic Republic
GMO	Genetically modified organism
IBtB	Innovation broker to business collaboration
IBtO	Innovation broker to others collaboration
IBtPA	Innovation broker to public authorities collaboration
IBtS	Innovation broker to science collaboration
ICT	Information and communication technology
KIBS	Knowledge intensive business services
MSSE	Management support service element
NACE	Statistical classification of economic activities in the European Community
NPD	New product development
PAtO	Public authorities to others collaboration
PAtPA	Public authorities to public authorities collaboration
PGI	Protected geographical indication
PR	Public relations
R&D	Research and development
SME	Small and medium sized enterprise
SR	Support ratio
StB	Science to business collaboration

StO	Science to others collaboration
StPA	Science to public authorities collaboration
StS	Science to science collaboration

1 Introduction

1.1 Problem description and objectives

Consumer demand orientation and more effective value chain coordination mechanisms are essential for the competitiveness of the agrifood industry. This requires a complex mixture of innovations: like new products, redesign of production processes, new or improved chain coordination mechanisms and new market approaches. Single companies are not able to deal with all the needed innovations on their own (like for example an industry wide orientation shift, value chain or network oriented innovations etc.). But the fact is that innovation processes involving a multiplicity of actors (multi-actor innovation) can be particularly complicated especially in the meat industry. Since the meat industry is structured by numerous small and medium sized enterprises (SMEs) in various stages of the value chain but also by a few large (multi-)national companies. Furthermore, the meat value chain is based on the division of labour (often across national borders) (Theuvsen, 2004).

The need for complex, system oriented and inter-organisational innovation processes in the meat industry is present. And cooperation (e.g. business to business, BtB, and science to business, StB) will inspire the improvement of processes and systems within the meat industry. As a result, networks and clusters have been created in various areas of research and development, which, among other things, are aimed at increasing the innovative power of business companies. However, so far there have been hardly any concepts on how the range of services can be made to be customer-oriented through the management of such networks. Looking at network research shows that although different management practices and diverse management instruments are discussed in a differentiated fashion and in regard to their contribution towards network development (Sydow, 2006), the topic of services for networks is not being treated explicitly (Sydow and Zeichhardt, 2009). Network services are a specific network management tool, a more or less formalised method, the use of which makes network development possible (Sydow, 2001; Sydow, 2006; Windeler, 2001). The customer-oriented approach for identifying a network's need for support as the basis for the service portfolio being offered is a step towards continuous improvement on the network management level.

The essential reasons for missing concepts in this area are:

- Lack of inter-disciplinary research groups in this area,
- Lack of incentive mechanisms for structural advancement of innovation networks, especially in the agrifood sector,
- Lack of company awareness to utilise resources in order to strengthen and expand their innovative power,

- Lack of insight to be able to promote sector-specific support services and take advantage of them,
- Lack of organisational structures geared toward value chains and networks.

Within the framework of this thesis a procedural model is to be suggested, as a problem solving strategy, on how support services in inter-organisational innovation processes can be designed in a customer-oriented fashion. Within this process the side of the potential service recipient (network partner) and that of the service provider is to be observed using the example of an organisation active as a network manager in inter-organisational innovation processes. Methodical-theoretical approaches to strategic management as well as principles of quality management will be brought together hereby. The agrifood industry and especially the innovation activities within the value chains of the meat industry serve as examples here.

The aim of this thesis is to present and explain how the network actor's need for support can be identified. Hereby a procedure is to be tested on how this demand can be covered by employing different service elements. This will be done with the aim of creating customer driven services as a success factor to determine the sustainability and competitiveness of innovation networks. The customer-oriented approach in this thesis refers in particular to business actors in innovation networks that make use of support services for the initiation and implementation of innovation activities (service recipients). It will then be shown, from the point of view of the service provider, in which characteristic phases a network and network management (as a service provider) develops, and how it can be described with the help of key performance indicators.

The study follows two theses hereby:

Thesis statement 1: Support services are requested by network actors in particular when innovation activities prove to be especially complex and much interaction between actors is necessary in order to implement the innovation activity. Through the resulting interface between the participating actors the transaction and coordination costs in inter-organisational innovation processes increase.

Thesis statement 2: Network management is decisively responsible for the development of the network. It is indispensable as a central actor for the control of networks. Hereby it is necessary to know the network members' support needs and to direct the range of services towards them.

In accordance with these hypotheses a concept is to be developed and tested, with which the support needs of business actors in inter-organisational innovation processes can be identified. The aim is to test how a support service offer can be made to be target group specific.

Last but not least the key performance indicators for the characterisation of network and network management development, which are suitable for showing the continuous improvement process, are to be identified and defined. In accordance with this the following central research questions (RQ) should be answered:

RQ 1: How to identify the demand for management support in inter-organisational innovation processes?

RQ 2: How can management support be organised in inter-organisational innovation processes?

RQ 3: How can the development of networks (with sectoral characteristics) be determined?

1.2 Research design

The quality management method of the Deming Cycle will be used in this work for the improvement of services in the area of offering management support in inter-organisational innovation processes. An approach according to the Deming Cycle has been established for almost three decades as a successful strategy in quality management (Geiger and Kotte, 2008; Madu and Chu-hua 1993; Pfeifer, 2001). The concept is often referred to as the “Shewhart Cycle” since it was originally developed by Walter Shewhart. Nevertheless, it was taken up and promoted very effectively from the 1950s onward by the famous quality management authority, Edward Deming. Deming ensured the prevalence of the Shewhart Cycle to the extent that it is practically only known as the Deming PDCA Cycle for development and quality improvement (Injac, 2007). The cycle consists of four stages, referred to as Plan, Do, Check and Act (PDCA). It is used when a new improvement project starts. It can also be used for the development of a new or improved design of services. Figure 1.1 clarifies the content presented in the individual chapters of this thesis, which is aimed towards the regulating principle and schedule of the PDCA Cycle phases.

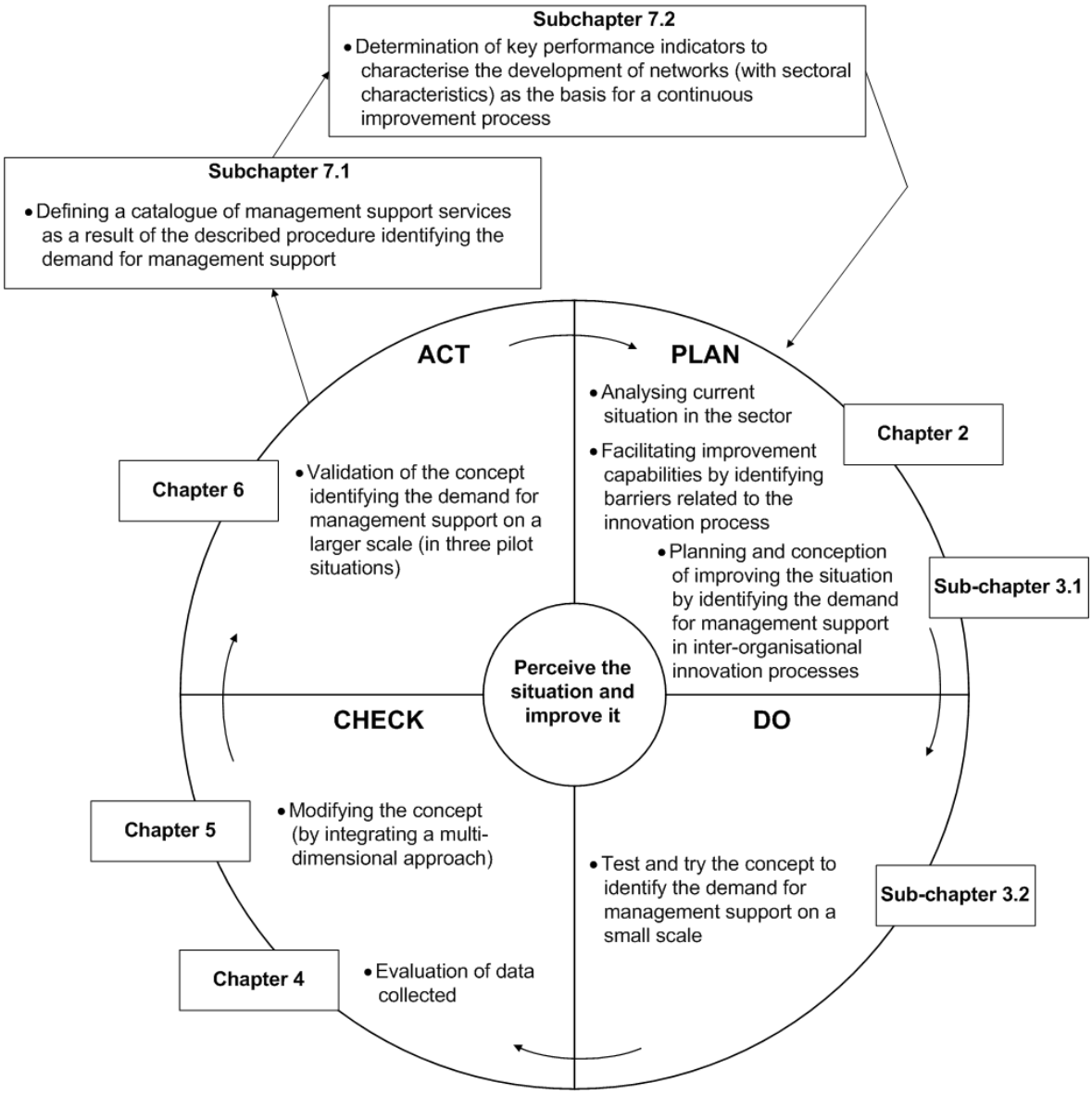


Figure 1.1: PDCA-Cycle as a method for developing customer driven management support services in inter-organisational innovation processes

In the first step of the Deming Cycle, "**PLAN**", the analysis results of the initial situation are summarised. In chapter 2 the challenges and trends in the agrifood sector are introduced in order to highlight the need for innovation cooperation. In addition, the barriers in regard to the initiation and implementation of inter-organisational innovation cooperation, and thereby the potential for improvement, are presented in this chapter. Furthermore, sub-chapter 3.1 elaborates on concept development for the improvement of the initial situation. Hereby the question is in the foreground as to whether and which demand for support during the initiation and implementation of inter-organisational innovation processes exist in this sector, and which support services are to be offered to cover the demand.

Sub-chapter 3.2 describes the implementation of the empirical-quantitative study for identifying the demand for support ("**DO**"). With this study the first assessment of the demand for support in inter-organisational innovation processes (using the example of the

innovation activity “R&D cooperation”) will be carried out. Table 1.1 gives a summary overview of how the different studies are classified within the context of the entire paper.

Chapter 4 presents the results of the empirical-quantitative study (“**CHECK**”). Hereby the identification of the demand for support by actors in inter-organisational innovation processes concentrates on two groups. These can be distinguished based on the features of company size and cooperation experience (single-company criteria). Aside from small-scale implementation of the empirical-quantitative study, a modification of the concept based on the experiences and knowledge gained will be made in chapter 5.

Where the **ACT**-Phase of the Deming Cycle is carried over onto the content of the next chapter (6), then it is in regard to the concrete application. The modified concept for identifying the demand for support of actors in inter-organisational innovation processes is validated in three pilot situations (empirical-qualitative study, see Table 1.1). In addition, using the example of the case studies, chapter 6 describes how the need for support services can be covered with specific service elements.

As a result of the case studies, chapter 7 describes a catalogue of service elements or whole service bundles. It can be made to suit the respective customer needs (7.1). In addition, in sub-chapter 7.2 the analysis of development of a branch-specific network is shown over time. This is done with the help of key performance indicators for characterising the development of such networks.

Table 1.1: Characteristics of sub-studies

Sub-studies / Criteria	Literature study	Empirical study (quantitative)	Empirical study (qualitative)	Empirical study (quantitative)
Phase of the Deming Cycle	• Plan • Do • Check	• Check	• Act	• Start of 2nd PDCA Cycle (continuous improvement process)
Aim	• Theoretical background • Data & methods	• First estimation of the demand for management support services • Determination of a relationship between the demand for management support services and single company criteria	• Identification of the demand for management support services based on multi-dimensional criteria • This is done by identifying missing resources in three pilot situations • Exploration of the organisation of management support services for resource procurement as a basis for the catalogue of management support service elements	• Exemplary analysis of an innovation broker with sectoral characteristics • Determination of key performance indicators to characterise the development of networks (with sectoral characteristics) as the basis for a continuous improvement process
Sub-question	1.a, 1.b, 2.a	1.a	1.b, 2.a	-

1.a Is there a relationship between the scope of expressed demand for management support and single company criteria?

1.b How to identify the demand for management support based on a multi-dimensional approach?

2.a How to organise management support in inter-organisational innovation processes?

2 Challenges and trends in the agrifood industry related to inter-organisational innovation processes

Within a modern industrial economy there is an enormous need for continuous innovation so as to compete with or to have a lead over competitors, independent of the sector. This applies both on the micro and macro-economic level. All companies and all sectors are confronted with increased competition resulting from the open internal European and global markets. To meet this competition, scientific research, technological development and innovation are crucial. They represent core aspects of the knowledge-based economy. On the micro-economic level, innovation is of relevance since the competitiveness of single companies depends on their innovative capability. The competitive pressure caused by globalisation requires continuous improvement of performance. Furthermore, increasing competition generally leads to shorter product life and innovation cycles (Vahs and Burmester, 2005). At the macro-economic level, innovation is of great importance since it is associated with large investments (e.g. construction of research facilities, acquisition of operating resources or recruitment of additional personal). Besides that, Vahs and Burmester (2005) have detailed the interrelation between these investments and a positive effect on turnover and acquisition activities. Innovation is combined with multiplier and capital accumulation effects. Due to that, innovation becomes the driving force behind economic development. A positive relationship between innovation activities and annual turnover can be observed also in the food industry (see Figure 2.1 which is based on a German example).

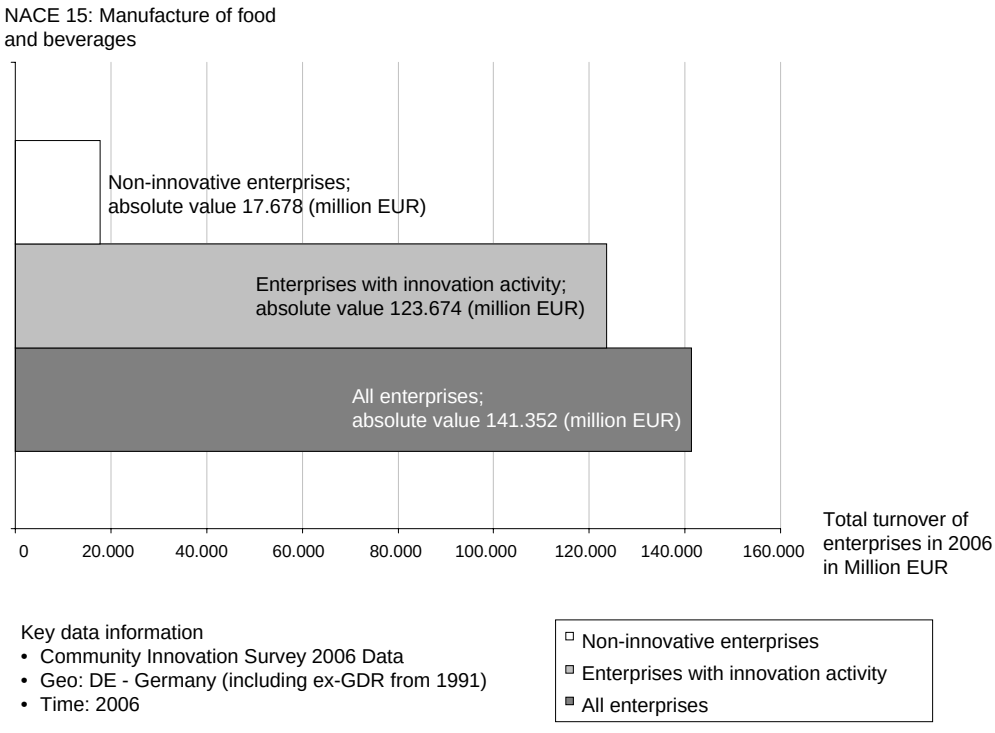


Figure 2.1: Relationship between the implementation of innovation activities and annual turnover in the food industry (based on data from the 2006 Community Innovation Survey – CIS)

Innovation in the food industry (taking Germany as an example) has a positive impact (among others) on the range and the quality of goods and services provided, on the entering of new markets and increasing market share (Figure 2.2).

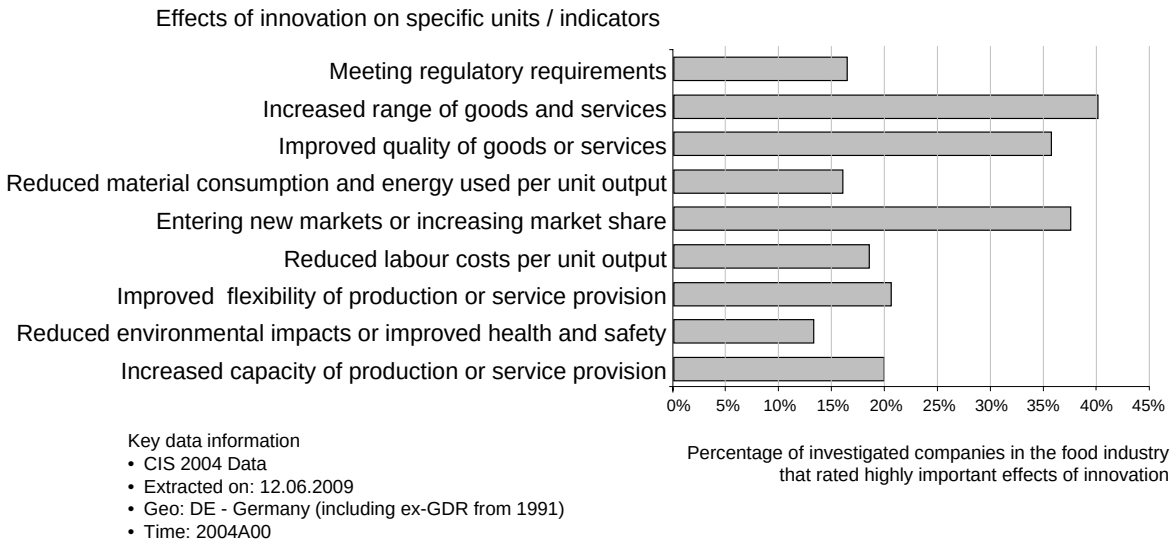


Figure 2.2: Effects of innovation in innovative enterprises within the food industry (based on data from the 2004 CIS)

It is a challenge for those involved in politics, the economy and the scientific world to promote innovation within and between companies with the aim of improving performance in the globally competitive environment. This also concerns the meat industry – at both the value chain and network levels. Value chains in the meat industry are as follows:

- Farm production,
- Processing (incl. slaughtering, cutting and deboning),
- Wholesale and retail (including export),
- Consumption (gastronomy and consumers / citizens[1]).

The value chain described by the above production steps is supplemented by further elements involving value-adding networks (Deimel et al., 2009; Lazzarini et al., 2001; Plumeyer et al., 2009). These elements are raw materials suppliers like feed producers, animal genetic resources in terms of animal breeds, food ingredients and food additives. Furthermore, technology suppliers are essential factors for meat production. Additionally, the production process relies on particular services from veterinarians, laboratories, animal trading and transportation companies, market research, consulting, inspections, certifications institutions etc. (a typical pork value net chain is illustrated in Figure 2.3).

[1] People relate to the pork-producing sector and to pork-based products in two ways: via their role as citizen, and via their role as consumer. Negative externalities of pig production (e.g. odour, nitrates in drinking water) shape citizens' reactions and may give rise to societal concerns. As consumers, people relate to pork-based products and their characteristics based on their eating habits and preferences for quality attributes, nutritional aspects, price etc.

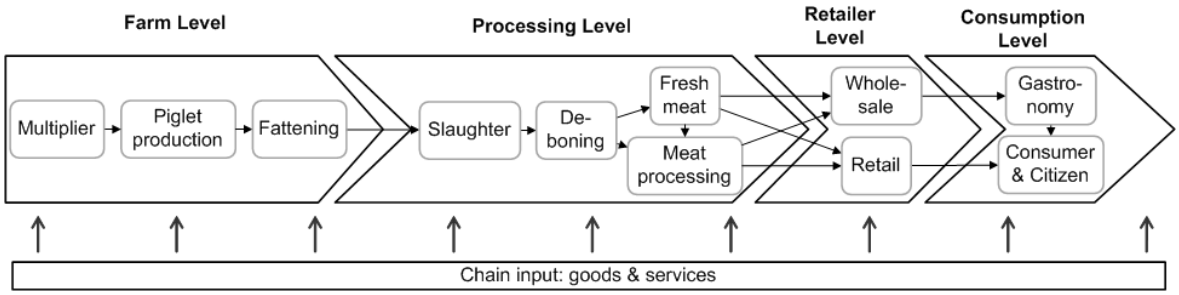


Figure 2.3: Levels of the pork value net chain (modified after Deimel et al., 2009; Mack, 2007; Plumeyer et al., 2009; Schulze Althoff, 2006; Schütz, 2009)

After the positive effects of and necessity for innovation have been briefly presented, the agrifood industry will be examined as regards the aspect of innovation. Following this, the process of generating innovation will be illustrated (see 2.2). This process can be hampered due to missing resources and competences. One possibility to avoid or reduce these problems is inter-organisational innovation cooperation (see 2.3). Nevertheless, this solution process presents a number of difficulties that are outlined in subchapter 2.5).

2.1 Innovations in the agrifood industry

The term innovation is used in many different technical disciplines. One can find a very wide range of definitions. All of these definitions contain the aspect of something new. The Latin origin of the word innovation is “innovatio”, which means renewal and change (Baer and Wermke, 2000). Schumpeter (1934) defined innovation as “the creation of new combinations”. “These innovations can be new products, new methods of production, new sources of supply, the exploitation of new markets, or new ways to organise business“ (Batterink et al., 2006). A result of the process of introducing new ideas to the firm is to increase its performance[2] (Rogers, 1998). It should be noted that an innovative idea, an innovative concept or an invention is no innovation until the idea has been productively incorporated into the enterprise’s activities. Subsequently, it has to be introduced to the market (European Commission, 2004; Hauschildt, 2004; Rogers, 1998). That means that specific organisational, financial and commercial steps (which are intended to lead to the implementation of innovations) are as crucial for the innovation process as is the result of successful R&D. This implies that an innovation can only be finally evaluated after it has been put into action, which is a difficult task. The success of an innovation can be measured by using criteria defined by different interest groups (Gärtner, 2007). It might be easier to measure the return on innovation investment for a single company by comparing the profits due to new products or services with the research, development and other direct expenditure related to the innovation (with a time dimension of three, five or ten years). In contrast, it is more difficult to measure the success of an innovation being for example the result of public funded research projects. A public financing and development

[2] Performance can be increased on several levels: On the level of a single enterprise, at production chain level, at production network level, at sectoral level etc.

fund provider need to compare the profits of a whole sector based on innovations with the research and development (R&D) investments. This is additionally more difficult since a public fund provider has the tasks to support in addition basic research (beside applied research) as the foundation for future long-term innovations. But often basic research is an expensive activity and the return on investment (if any) will take place at an indeterminate future date (see as well p. 13).

Innovation is a quite diffuse term. For further clarification the term can be classified using several dimensions (Hauschildt, 2004; Gärtner, 2007):

1. Regarding the content and type of innovation (what is new?)
2. Regarding the scope of innovation (new to whom?)
3. Regarding the degree of innovation (where does the new aspect start and how new is it?)

(1): Regarding the type of innovation, the literature distinguishes mainly between process, product / services, business, marketing and organisational innovation[3] (Pleschak and Sabisch, 1996; Porter, 1990; Schülin, 1995; Vahs and Burmester, 2005). Some authors mention as well more difficult to define types of innovation such as a shift in corporate culture (Henry and Walker, 1991) or social innovations.

(2): To differentiate between two types of innovation, the dichotomy “new for the firm” versus “new to the market” should be pointed out. An innovation can be implemented in a single enterprise, in a regional market, at the national market or on the global market. Innovativeness can be analysed from the macro- and micro-perspective. The macro-perspective focuses on the market and the resulting competitive environment while the micro-perspective focuses on a particular innovation in a firm (Bröring et al., 2006; Garcia and Calantone, 2002). Due to that, the term “diffusion” can be explained. An innovation is diffused after it is implemented on the market after being implemented by single firms (Bierfelder, 1994).

The management of a company can independently decide to implement an innovation activity (single-actor innovation). Conversely, new implementations within the value chain (such as logistical issues, chain oriented IT-communication systems or chain oriented quality management systems) need to be agreed upon and adopted by several managers from different companies (multi-actor innovation). This is a more complex approach with a wider range of variables (see Figure 2.4). If the entire system (chain and network perspective) including all its public and private stakeholders needs to be developed further, the innovation has to be based on a multi-actor innovation (for example the development of a new image or a new sustainable production system standard for all companies in a certain region). Figure 2.4 illustrates the difference between single- and multi-actor innovation. The more complex the institutional system that is working on an innovation (from one enterprise to a whole network of actors), the more organisations and

[3] Including innovations regarding the value chain organisation.

actors need to be involved in the innovation activity. If more than one actor is involved, it can be called a multi-actor innovation.

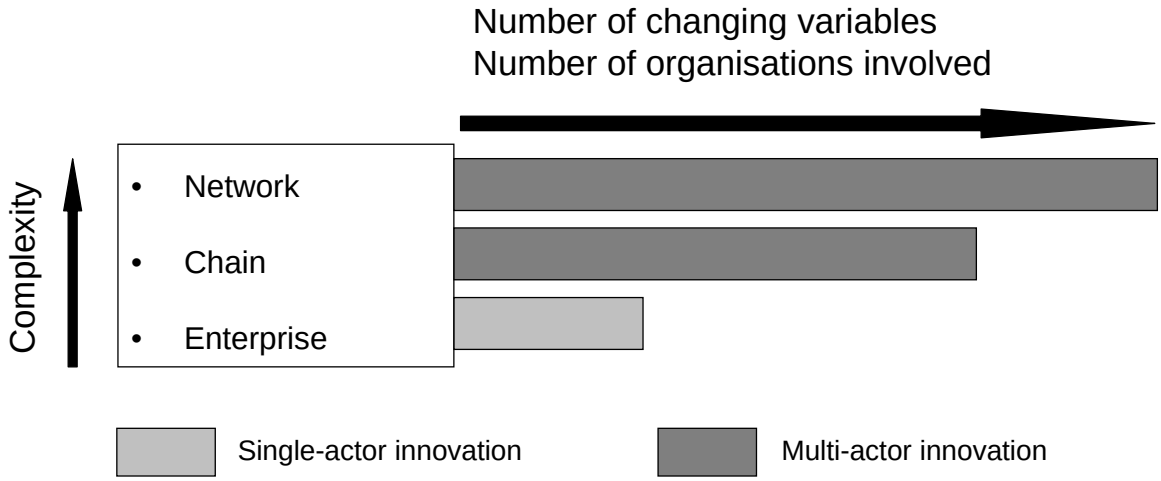


Figure 2.4: Scope of innovation regarding the number of involved organisations (modified after NRLO, 1999; Bruns et al., 2008)

Whether a change is new to an individual, an organisation or a sector depends on the respective points of view (Hausschildt, 2004). The evaluation criteria are defined by the individual, the organisation or the sector. This implies that a change can be an innovation for a single enterprise even if it is not an innovation for a specific market (Gärtner, 2007).

(3): The degree of novelty is difficult to capture. An innovation can be radically different to incremental change. “Radical innovations are innovations that cause marketing and technological discontinuities on both a macro and micro level. Incremental innovations occur only at a micro level and cause either a marketing or technological discontinuity but not both” (Garcia and Calantone, 2002). Similar to that an innovation can be revolutionary or evolutionary (Hauschild, 2004). Revolutionary innovations are mostly fundamentally new, thus they are radical (like the steam engine in the 18th century[4]). After introducing a new core technology on the market a continuous improvement process starts (attempts to increase efficiency, create further applications etc.) by generating evolutionary and mostly incremental innovations.

Freel and Jong (2009) combine internal and external newness with internal competences and external output dimensions of newness (see Figure 2.5). In this connection the authors illustrate the complexity of innovation activities without reducing it on the measurable output (like commercial success, e.g. the effect on turnover) of the innovation process.

[4] The first commercially successful steam engine introduced to the market in the 18th century can be called an innovation. This innovation is based on an invention already made in the 17th century. After introducing the steam engine to the market a continuous improvement process started. The core technology was a trigger for the Industrial Revolution and had great influence on many aspects of the economy and social life.

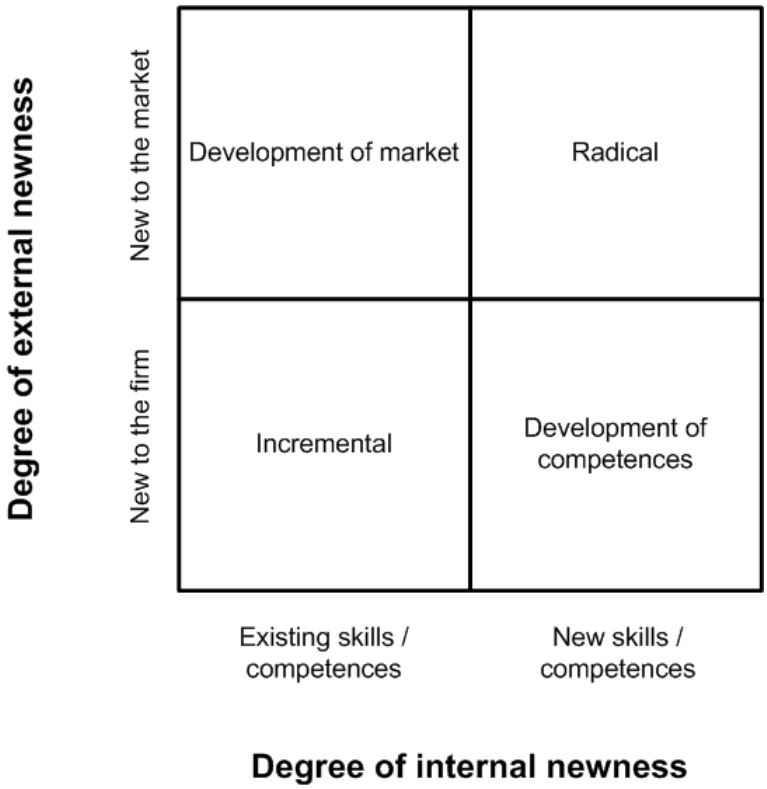


Figure 2.5: Innovation scheme after Freel and Jong (2009)

Importance of technology adaptation for the agrifood industry

Technological change, development and innovation processes differ from sector to sector. Certain sectors are characterised by fundamental innovation, whereas other sectors generate rather incremental innovation (OECD and Eurostat, 2005). In this context, high- and low-tech industries can be distinguished. In high-technology industries innovations have a higher priority than innovations in low- and medium-technology industries. For reasons of survival it is necessary to have innovation as well in low- and medium-technology industries. This is the situation if the success of a sector depends mainly on low- and medium- technology industries, as it is the case in the agrifood sector.

However, in terms of competitiveness, the general conclusion should not be made that high-tech industries are more competitive than low-tech ones, since a technological change is based both on the production of technologies (as core competences) as well as on the application of technologies for the production of other goods. In this context Porter (1985) differentiates between technologies “embodied in primary activities” and in “supportive activities”. In both cases technologies can generate a competitive edge. In the agrifood industry, technologies that are foreign to the sector are often adapted to meet the demand of the sector (Tunzelmann and Acha, 2005). This can be observed, for example, in the field of information and communication technologies (ICT). The adaptation of sector-specific information and communication technologies is necessary in order to exchange technical production data and accompanying data between actors up and down the production chain. The exchange of information is simplified through the application of ICT or, made possible in part (Petersen et al., 2002; Schulze Althoff, 2006; Ellebrecht,

2008). If, for example, information is needed within the framework of consumer protection on whether polluted intermediate products may have been integrated, the traceability system based on ICT provides transparency in the production chain. Based on this, certain batches can be excluded from the market and / or taken off the market. Besides this example, adapted technologies are used along the entire value chain.

In the field of agricultural engineering, stable construction, air conditioning, ventilation systems and feed manufacturing plants can be named for example. Industrial slaughter and cutting is automated as much as possible by technological input from the engineering field. The same applies for the meat processing step in the value chain. Here, for example, the use of cooling technologies is legally required. Furthermore, test and inspection technologies for the control of critical quality relevant measuring points along the entire production chain are needed. The case of the agrifood industry mainly follows the description of Porter (1985): “Technologies come from outside […] and such technologies can be a source of discontinuous change and competitive disruption”.

Hereby the adaptation of existing technologies to the needs of the sector, from the point of view of innovation character, is not to be underestimated. Specific skills are necessary for this in order to generate new knowledge in additional research work. In accordance with this it can certainly be said that the agrifood industry itself brings forth innovations. It depends on the innovation capabilities, particularly through the adaptation or modification of innovations primarily developed by others through a process of diffusion. In general, the diffusion of an innovation can be described as a decision-making process. Rogers (1983) categorises several steps in this process: knowledge, persuasion, decision, implementation and confirmation. However, at the beginning of a possible innovation diffusion is the concept. The process from the concept to the innovation through to the innovation diffusion was viewed as a linear sequence of the phases of basic research, concept, innovation, adaptation and diffusion in the 1960s and 1970s. In the 1980s this linear process was furthered around inter-weavings and feedback between the individual phases (Raueiser, 2005).

Generation of innovation processes in the agrifood industry

Among other things, the agrifood industry has gone through different generations of innovation processes because of technology diffusions. Rothwell (1994) describes this as a cross-sectoral general validity which can also be used on the agrifood market: through the technology push which took place after World War II, the productivity of the agricultural industry could be increased considerably. Here the transition from self-sufficiency to industrial agriculture began. However, at the time it was still called a supply market, whereas in later years the influence of consumer demands on innovation processes increased (market driven). A more consumer-oriented food sector (shift from raw materials to more processed food) was already recognised in the USA before World War II in terms of self-service stores filled with prepared and packaged foods. In pre-war Europe most of the foods were sold in loose weight (Beckeman and Skjöldebrand, 2007).

With the economic crisis in the 1970s, companies had to economise more efficiently. In accordance with this, the focus of many innovation processes was put on the optimisation of production processes. Rothwell (1994) describes the increasing significance of opening company boundaries in order to be able to withstand the competitive pressure as the fourth and fifth generation of innovation processes. This also applies to the agrifood sector (see chapter 2.4).

Innovation performance of the food industry

After presenting a rough outline of the impact of technology adaptation within the agrifood industry and the generation of innovation processes during the last few decades, the innovation performance of the agrifood industry will be briefly examined. Data bases measuring innovation performance within food value chains focus mainly on the manufacturing level of the value chain. The agricultural level is often not integrated in these measurements. Therefore, the following descriptions are focused on the manufacture of food products and beverages (short: food industry). The Innovation Sector Index (ISI) measures sector innovation performance. The analysis of innovation performance in the frame of the ISI uses CIS[5] data from Eurostat and sectoral level innovation data from the ANBERD[6] and STAN[7] dataset of the OECD. The ISI is a composite indicator that is calculated as an average of 12 innovation indicators (Hollanders and Arundel, 2005):

1. Proportion of employees with higher education
2. Proportion of firms using training for personnel directly aimed at the development and / or introduction of innovation
3. R&D expenditures as a percentage of value-added
4. Proportion of firms that receive public subsidies to innovate
5. Proportion of firms innovating in-house
6. Proportion of SMEs (small and medium sized enterprises) cooperating with each other
7. Innovation expenditure as a percentage of total turnover
8. Proportion of total sector sales from new-to-market products

[5] CIS stands for Community Innovation Statistics. It is based on a cross-sectional survey of all firms in all EU member states. The Community Innovation Statistics are the main data source for measuring innovation in Europe. CIS data cover the basic information of the enterprise, product and process innovation, innovation activity and expenditure, effects of innovation, innovation cooperation, public finding of innovation, source of information for innovation patents, etc. (Eurostat, 2010).

[6] ANBERD stands for Analytical Business Enterprise Research and Development database. Through the use of established estimation techniques, the OECD Secretariat has created a database designed to provide analysts with comprehensive and internationally comparable time-series on industrial R&D expenditures (OECD, 2010).

[7] STAN stands for STructural ANalysis Database. The database provides a comprehensive tool for analysing industrial performance at a relatively detailed level of activity across countries. It includes annual measures of output, labour input, investment and international trade which allow users to construct a wide range of indicators to focus on areas such as productivity growth, competitiveness and general structural change (OECD, 2010b).

9. Proportion of total sector sales from new-to-firm but not new-to-market products
10. Proportion of firms that patent to protect innovation
11. Proportion of firms that use trademarks to protect innovation and
12. Proportion of enterprises that use registration of design patterns.

The food industry is performing below the average in 9 out of 12 indicators compared to the other sectors (CIAA, 2007) (see Table 2.1).

Table 2.1: Innovation indicators of the European food industry (based on Hollanders and Arundel, 2005; CIAA, 2007).

	Average food industry	Average NACE[1]	% of average
Proportion of employees with higher education	6.6	13.1	51
Proportion of firms using training for personnel directly aimed at the development and / or introduction of innovation	12.8	17.7	73
R&D expenditures as a percentage of value-added	1.2	1.7	68
Proportion of firms that receive public subsidies to innovate	14.2	12.2	116
Proportion of firms innovating in-house	35.6	35.4	101
Proportion of SMEs cooperating with other	3.9	5.8	67
Innovation expenditure as a percentage of total turnover	1.1	2.1	53
Proportion of total sector sales from new-to-market products	2.9	6.4	45
Proportion of total sector sales from new-to-firm but not new-to-market products	9.1	17.4	52
Proportion of firms that patent to protect innovation	4.7	8.1	57
Proportion of firms that use trademarks to protect innovation	18.0	12.3	147
Proportion of enterprises that use registration of design patterns	4.8	6.9	70

[1] NACE is the acronym used to designate the various statistical classifications of economic activities developed since 1970 in the European Union. NACE provides the framework for collecting and presenting a large range of statistical data according to economic activity in the fields of economic statistics and in other statistical domains (Eurostat, 2010b).

The indicators where the food industry shows relatively good performance are the proportion of firms that receive public subsidies to innovate, the proportion of firms innovating in-house and the proportion of firms that use trademarks to protect their innovations. The food industry is one of the leaders in using trademarks. To give a European sector perspective, the top three most innovative Member States as regards food products are Belgium, Sweden and France (CIAA, 2007).

2.2 The process of generating innovation

The best way to exploit the potential of different innovation activities is through structured planning and control of innovation activities from the initial idea to successful market entry. Based on experiences in innovation consulting, A.T. Kearney developed the “House of Innovation”. In Figure 2.6 the slightly modified model of successful innovation management including important elements in shown. Although the “House of Innovation” primarily concentrates on the individual operational level, the components can be used for any type of innovation process (also for network management on the network level).

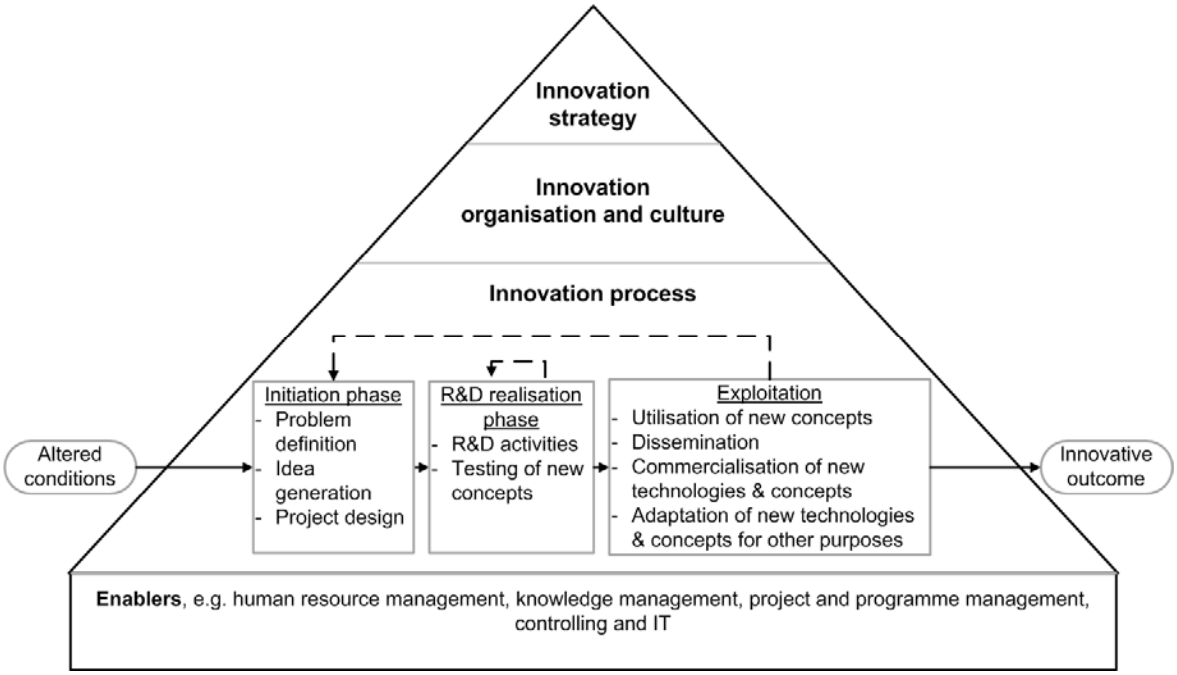


Figure 2.6: “House of Innovation”
(modified after European Communities, 2008; furthermore based on Bruns et al., 2008; Menrad, 2004; Rosenfeld and Servo, 1991; Rothwell, 1994; Schlicksupp, 1992; Schroeder et al., 1986; Trommsdorff, 1990)

The roof of the “House of Innovation” is the innovation strategy, a planning process, which clearly defines which company and network goals require innovations. Besides the innovation strategy, an innovation-oriented company or network should include these goals in the organisation and company / network culture. In this way innovative impulses can be strengthened and promoted. An existing strategy and innovation culture makes the innovation process easier. The innovation process encompasses activities from the generation of ideas to the implementation of new developments and introduction to the market. Innovation processes are made possible through the presence of resources and management structures. An innovation process is initiated by changing conditions and environmental influences. It can be roughly divided into three main phases: initiation, implementation and utilisation (see Figure 2.6). Even when innovation processes are depicted as linear processes it normal for some process steps to be repeated. Since some

parts of the innovation process are at a high risk (for example, new development), corrections are possible or alternative solution approaches need to be tried. In accordance with this an innovation process can be understood as an iterative process or a learning loop.

Innovations are based on different innovation activities like scientific, technological, organisational, financial and commercial steps (OECD, 2002). In individual innovation activities it can also be a matter, for example, of a self-contained R&D project or a project dealing with entering the market or commercialisation. An innovation activity does not necessarily create an innovation (commercial successful implementation of something new). It might be one step in the whole innovation process. Through the combination of several innovation activities the overall goal of an innovation can be reached. Hereby it is firstly a matter of an innovation when commercial success on the market or the performance of market participants has been increased based on the implementation of the innovation (European Commission, 2004; Hauschildt, 2004; Rogers, 1998).

Innovation process phase “Initiation”

The identification and description of problems supply a basis for innovation activities. The earlier actors recognise internal as well as external changes emerging, the earlier they can face the challenges resulting from it. Thus it is a significant competitive advantage when actors are in the position to already look ahead and see market changes approaching as opposed to having to react to them ad hoc. The identification of new and future demands on companies, production chains, networks, or whole sectors is also called “foresight and diagnostics” (Howells, 2006). Such a step should be carried out regularly on the company and network levels. On this basis short, medium and long-term strategies can be developed.

Once the problem has been recognised and described, a central challenge for a successful innovation process follows – finding and bringing forth ideas for new products, processes or services. The generation of ideas can take place through exchanges with customers and suppliers within the framework of exhibitions, on location appointments, conferences etc. (Kausch, 2007).

Idea generation is a very creative part of the innovation process. It consists of the excessive search for the best possible solution approaches. Methods can be applied hereby to initiate or promote creativity. However creativity cannot be forced. But it is more likely to develop in a certain innovative atmosphere (characterised by open exchange, trust, tolerance of mistakes, reward etc.) and a living innovation culture (Ekvall, 1991).

After the creative generation of ideas the analytical assessment and selection of ideas takes place. While the first assessment of innovation ideas only aims at getting a rough grid and timeline of the respective approach, the analysis of feasibility and potential aims as much as possible at getting reliable statements about possible products. Internal knowledge can be supplemented by market analysis, surveys, comparative analysis etc. In this way final statements on the four following parameters should be obtained:

1. Technical feasibility (incl. the necessary / existing know-how)
2. Financial feasibility (incl. the resources available for this purpose)
3. Market volume and return of investment (for every participating actor)
4. Probability of success and risk (incl. consequences of worst case scenarios)

Based on these parameters, which can be detailed and made to suit any individual case, a prioritisation of the projects to be executed should take place.

At the end of the initiation phase a coherent project plan is developed, which describes the goal of the project and its potential. Furthermore the project gives information on the timeline (work and milestone planning) and resource planning (budget, equipment, personnel) etc. Fundamental goals are to be structured into action-oriented sub-goals, which simplify the processing of the problem (DGQ 2000; Pleschak and Sabisch, 1996). In addition, in this step it should be checked which additional external resources (partner, subsidies) are needed and how they can be acquired. Often the elaboration described offers a renewed opportunity to check the project idea thoroughly since logical gaps, erroneous assumptions and insufficient information are quickly revealed during the systematic presentation. In the detailing of the project it is important always to keep the market situation in mind in order to bring forth market-oriented and thereby successful innovations. Since the internal elaboration already exhibits all the characteristics of a funding application, the sketch can also be used respectively for the acquisition of financial resources.

Innovation process phase “R&D realisation”

The development of the project plan is the transition to the project realisation phase. The implementation of projects is a central step for the innovation project. In this phase innovation management is supplemented with the classic functions of project management. Project management is necessary for the smooth progress of the planned project. Accompanying project management in particular is an essential component in the innovation process phase in which individual, self-contained projects are defined, such as during the implementation of R&D or introduction to the market, for example. Through planning, supervision, and control in terms of a closed control circuit, those areas which present shortages for achieving the project goal will be identified. If problems arise in the implementation of the project, which are recognised by project controlling, then the project plan can be adjusted to the new situation (DGQ, 2000).

It should, however, be noted hereby that project management in innovation processes can differ from usual project management. The development of innovations holds unpredictable challenges. Especially when the innovation is of a radical nature, the implementation process is difficult to plan. Research and development work can lead to a dead end. For example, when a solution approach turns out to be unsuitable. The work can be characterised by trial and error situations making the timeline and financial dimension of such projects difficult to estimate. In addition, the timeline of technology development can deviate in relation to the development of the market situation. At the end of the development period it is possible that the market demand determined at the start is no longer present to the same extent and / or has changed. Thus project plans should observe the necessary scope for development. Nonetheless elements of classic project management should be integrated into risky innovation projects.

Project management is responsible for the correct use of subsidies and resources as well as for achieving milestones and goals. Regular controlling is indispensable for the inspection of project implementation and observance of planning. Such a tool cannot be supported by numerical values alone; parameters in regard to content must also be considered to make a continuation, termination, adaptation or alternative implementation of the project possible. Progress reports in regard to content, in combination with number based controlling (based on the financial and timeline dimension), supply information for decision makers, so that control points are built in during the implementation of the project, in order to make strategic decisions based on this information as to whether the work should be continued or whether the costs are skyrocketing and thus exceeding the expecting benefit (Cooper et al., 1999; Fortuin et al., 2007).

Innovation process step “Exploitation”

In the exploitation phases the commercial benefit of innovations is prepared. If commercialisation is absent then it is not an innovation. Within the framework of the exploitation phase, new developments, new knowledge and discoveries, for example, can be made publicly known. This path is often taken by scientific institutions through the publication of research results in professional journals. Another possibility, which is more likely to be used by companies but increasingly by research institutions, is endeavouring to obtain commercial protective measures for new developments (for example, applying for patents). The owner of a certain protective measure has the right to hinder the imitation and use of the new development (for a certain period of time) or to determine the conditions for its use. It is hereby made possible to generate profit and compensate more than just the research and development costs (Gold et al., 2007).

As has already been indicated, the innovation process is an iterative process or a learning loop. This statement can be illustrated clearly in this phase: if, for example, the results from a research project are used on a specific company or production chain or a company buys technology concepts, an adaptation of the developed technology or results, which exist on a general or conceptual level, is often necessary in order to get a practical “fit” (Bessant and Rush, 1995). In this case, further demand for R&D planning can result in order to adapt the general concept or existing technology to specific problems (see also

further models under “Importance of technology adaptation for the agrifood industry”, p. 12 f.). In accordance with this the exploitation phase can be defined as a new self-contained project (incl. objectives contained, tasks, timeline and budget planning).

2.3 Networks as a nucleus for inter-organisational innovation processes

Innovations can be implemented in-house (by a single enterprise). This can be done if the enterprise has the necessary resources and competences available internally and if the topic of the innovation activity concerns only this single company (e.g. food product development). Another strategy for increasing innovation levels is to use external resources (Chesbrough, 2003). In this case, an enterprise makes use of an innovation system which involves the interaction between actors that is needed in order to turn an idea into something new that is to be introduced on the market. This is often necessary if the topic of the innovation activity has a value chain or a value network perspective. These are innovations with an impact on the organisation of these systems. In this case, more than one actor is needed (see 2.4).

Innovations are mainly results of a complex set of relationships among actors like enterprises, public authorities, universities and research institutes (Freeman, 2002; Lundvall, 1992; Klerkx, 2008; Boon, 2008). The term “open innovation” describes the approach of companies that open up their institutional boundaries for other actors to implement innovation activities with the aim of stimulating innovation instead of solely internally innovating. To increase innovation, companies use external resources of the innovation system for their internal sustainable development (Chesbrough, 2003).

The innovation system in regard to a company is determined by the mutual networking of internal requirements within the company and external environmental requirements. In comparison to this, the national innovation system consists of the entirety of innovatively active units in a national economy and the associated external general conditions. However, the national innovation system is not only shaped by its economic units. In addition, state and private institutions and policy areas like science, research, finance, environment, transport etc. are of importance. It is seen as a system of actors, organisations and institutions that are connected to one another and who are involved in the generation, transfer and market introduction of innovations (Klerkx, 2008; Meier zu Köcker and Buhl, 2008; Pleschak and Sabisch, 1996). The definition of the concept of “innovation systems” varies. Despite many different definitions of national innovation systems, Freeman (2002) and Lundvall (1992) came to the conclusion that both a narrower and a broader definition could be used. The narrower interpretation encompasses only the institutions that are the main source of innovations and which serve the acquisition of knowledge and the passing on of knowledge. The broader interpretation also contains the socio-economic system, which is determined by political, cultural and economic influences. Raueiser (2005) follows this approach and defined a national innovation system as the sum of elements and their interactions which influence the process of the use and generation of new technological knowledge in a country. In accordance with this, innovation systems are dynamic social systems that are

characterised by positive feedback and imitation and whose central activity is learning (Lundvall, 1992).

Social sub-units can form within an innovation system in order to bring forth innovations together. These are called networks or clusters. Networks are cooperation alliances of expert partners from science, research and possibly public authorities that are characterised by close interaction and communication amongst each other. Through intensive and, particularly, early cooperation between these partners, the transfer of knowledge and technology is accelerated. This results in a win-win situation. On the one hand companies profit, for example, from the research results. On the other hand, for example, research institutions can more effectively find business partners for the implementation of their research products (Meier zu Köcker and Buhl, 2008). The interlocking of research institutions, businesses and public actors, including the functioning transfer of technology, is a key to strengthening innovation power and is thus a motor for the growth process (Buhl, 2009).

The definition “network” is often used as a synonym for the definition of “cluster”. However, despite the variety of definitions two specific criteria for the definition of clusters can be highlighted: on the one hand there is a geographic focus and on the other hand an innovation based focus. According to this differentiation most authors use Porter’s (1998) understanding of the definition to classify clusters or that of Hamdouch (2010). Porter (1998) understands clusters to be a critical mass of companies in one region that are unusually competitive and successful in certain fields of business; therefore “clusters are geographic concentrations of interconnected companies and institutions in a particular field” (Porter, 1998). Hamdouch (2010) criticises that Porter’s definition of clusters leaves several key questions unanswered; for example, the question of naming a cluster based on geographical borders. The inter-industrial features of a cluster also remain unclear. Moreover Porter characterises the connection between companies, organisations and institutions as being informal. Hamdouch (2010) contradicts this; he holds the formal relationships to be significantly more important since these are essential for business transactions and innovation processes.

In the last decades, clusters have been discovered worldwide as competitive tools. Economic growth, innovation and the creation of jobs have been and are associated with them. An outstanding example most often cited is Silicon Valley in the USA, which is known worldwide for its innovative computer technology and software. Therefore the hope of being able to implement a similar concept in other countries with similar success is connected to the definition of clusters. Through clusters and network politics this goal is pursued.

In comparison it can be said that networks are mainly seen as a web of relations between economic and / or social units, whereas clusters are mainly seen as geographical assemblages of cooperating companies, institutions and / or organisations. If this specification is absent as well as the geographical statement in the definition, then there is no difference between the term cluster and network and they can thus be regarded as synonyms. In the following, both terms will be contained under the definition of network.

In summary it can be said that networks include strategic alliances with universities, research institutions, businesses etc. Networks bring actors together who are connected to each other over a certain link or knowledge base within the value chain. It is a matter of innovation systems on a small scale with similar system characteristics and interactions (Hertog and Roelandt, 1999).

In order to be able to differentiate between existing networks, Meier zu Köcker and Buhl (2008) came up with characterisations of ideal types: the authors hereby differentiate between:

- Bottom-up networks
- Exogenous top-down networks
- Endogenous top-down networks

Bottom-up networks usually develop through the collaboration of companies focused on clear economic benefits, usually SME. These companies already have long-term temporary cooperation at their disposal that can be structured and developed within the framework of a network. For this, network management is determined and deployed by the actors. Additional actors like universities, research institutions and other typical members of an innovation network are targeted and brought in by the initiators. Since the priority actors consider these networks to be a merger primarily for their own economic benefit as well as for exchanging experiences, and promise themselves clear competitive advantages, the services made available through the network management must include surplus values.

The members themselves primarily determine subjects and emphasis of work within the network. Networking and exchanging experiences, collaborative technology development as well as cooperative development of new markets are usually the dominating goals of work within the network.

Exogenous top-down networks develop, for example, when it is promising from a political point of view to actively promote and / or stimulate regional network development. Exogenous top-down networks often develop in relation with the strengthening of regional innovation or competitive ability. The initiators can be regional economic funding institutions as well as the federation or individual federal states. Networks initiated in this way cannot provide sufficient financing independently at the beginning for various reasons; since, for example, the member structure does not allow it (yet) or if the subject area is one in which the public demand for action seems to be especially necessary. Therefore the public sector often takes on the respective financing.

From the beginning, the initiators transfer the responsibility of network management to an institution of their choice (for example, an economic funding agency, project administrator etc.). This institution is often not a direct member itself, but guides the network from outside. Accordingly a so-called “inner circle” often exists, which determines content and measures.

Endogenous top-down networks are characterised by one or a few central actors within the centre of a network. Usually such an actor is a university and / or research institution, which, as its initiator, runs the network management with its own personnel. The respective financing is hereby usually undertaken with resources from the respective central actor and / or is ensured proportionally by the R&D projects operated together with the members. Therefore the cooperative R&D work is also a core element of network performance for the members. The communication and cooperation within networks is concentrated between central actors on the one hand, and between the partners on the other hand. Objectives, activities and topics are mostly determined by the central actor in charge. Membership often has a noncommittal character and is mostly temporary, for example, depending on the specific time period of a project. Member contributions are seldom imposed and if they are usually low, since they do not serve the basic financing of the network coordinator.

Even though most networks can be mainly classified as one of these ideal types, it can be observed that the networks change over time and, for example, take on elements of other ideal forms. Authors find that networks go through different phases of development, from foundation to development, growth, maturation and finally, transformation (Meier zu Köcker and Buhl, 2008; Lorleberg et al., 2010).

In the **foundation and development phase** the constituent circle of actors comes together (committed founding members, network initiators etc.). Moreover, the development phase is characterised by setting up contacts and clarifying the position of interests. Goals, guiding principles and core tasks of the future network are defined.

After development and the thematic focusing of the competency network, the **growth phase** is characterised by developing a clear, network specific profile. Also, the cooperation relationships within the network intensify and stabilise and the number of members increases significantly. During this phase new projects are developed and / or acquired, areas of activity are configured and control structures are established.

In the **maturation phase** the network has developed into a successful cooperation alliance. Often in this phase the number of members stagnates and / or decreases, therefore within the framework of natural fluctuation network members leave and new members join.

Through the reflection of long-term actors and new partners, the maturation phase begins to re-work the goals of the network. The first change to (division of) activities, processes and structures results from this. These build the transition to the **transformation phase**. Through the interplay with the dynamic of the innovation areas and business as well as technological markets, the network must constantly face new developments and challenges. Based on thematic openings or also national or international openings, future network goals are defined that can often, in combination with a comprehensive change of structures and organisation forms, lead to a fundamental realignment of the competency network. In this time of transformation, the trusted structure of contacts, achieved during the growth and maturation phase, is one of the particular stabilising elements. Alternatively the decline of a network can be described when the transformation phase,

i.e. the reorientation, is not successful (Lorleberg et al., 2010). The following diagram clarifies a characteristic curve shape of the development of networks.

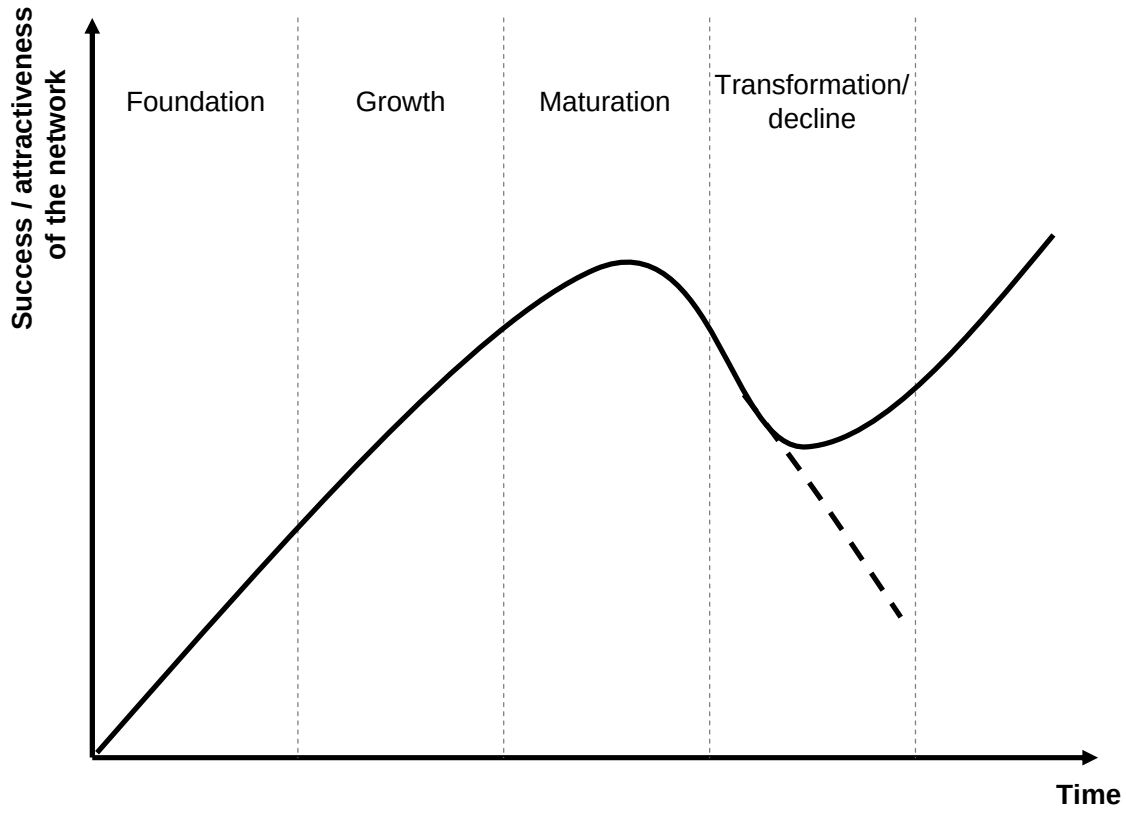


Figure 2.7: Development phases of innovation networks (modified after Meier zu Köcker and Buhl, 2008; Lorleberg et al., 2010)

The success or attractiveness of a network can be evaluated from different perspectives. Network performance can be measured both in terms of outputs, as well as economic outcomes. Outputs can include things like reduced costs (from labour-pooling or technology-sharing) and innovation (from knowledge-sharing and networking). Outcomes include general economic measures such as employment, wages and exports. Outcome measures illustrate the network impact on the regional or national economy (Meier zu Köcker, 2008). Concentrating on the output perspective, one can summarise the evaluation criteria as follows (Meier zu Köcker, 2008; Lorleberg et al., 2010; Kompetenznetze Deutschland, 2009):

- Collaborative projects initiated within the network,
- Development of the number of members,
- Reputation of the network in the region or within the scientific community,
- Sustainable financing of network activities,
- Quality and intensity of the network management,
- Human resources for network management activities

- Services offered for network members by the network management
- Internationalisation.

2.4 The need for inter-organisational innovation activities in the agrifood industry

If one shifts focus from innovations in the agrifood industry and the generation of innovations and looks at the innovation demand of the future, various factors can be observed which influence the agrifood industry and thereby the meat industry as well.

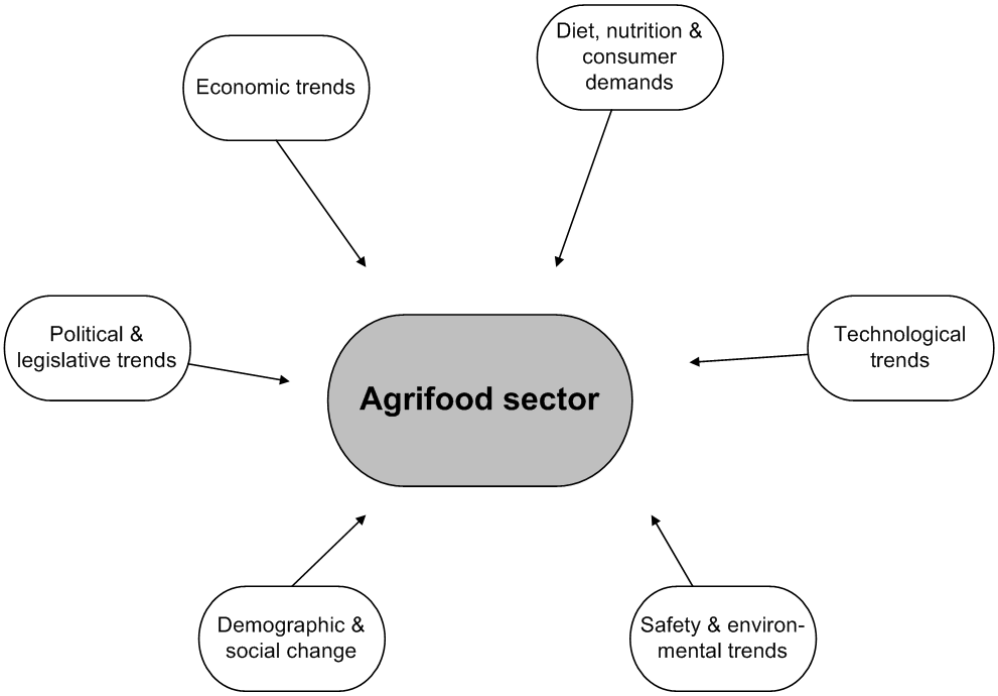


Figure 2.8: Factors affecting the agrifood industry (modified after the European Foundation for the Improvement of Living and Working Conditions, 2004)

The European Foundation for the Improvement of Living and Working Conditions (2004) summarises future trends under the factors listed in Figure 2.8. With the help of trend analysis based on the individual factors, new and future demands on companies and production chains can be identified. Such an approach is labelled “foresight and diagnostics” (Howells, 2006). Early detection of changing conditions and with it the detection of the demand for innovation is a very essential step for competitiveness.

Below a selection of challenges with focus on the meat industry will be elaborated on. These topics are in relation to the case studies chosen for this work (see chapter 6): in order to ensure a global competitive advantage and thereby stay in competition with low-income countries, the European meat industry is dependent on efficient production processes, an increase in the quality of manufacturing processes as well as intermediate

and end products (see case study 2) as well as product differentiation[8] (see case study 1) and standardisation[9] (see case study 3) (Clipson, 1991; Spiller et al., 2006; Trienekens et al., 2009). Moreover, deciding on product differentiation follows economic recommendations to improve the image of the pork sector and also meets customer demand (Trienekens et al., 2009). Product differentiation is especially seen as an opportunity for SMEs to offer products with additional features to niche markets like, for example, products produced under special ethical, ecological or sustainable conditions (European Foundation for the Improvement of Living and Working Conditions, 2004). Because of their low complexity innovation projects within the subject area of classic product differentiation can be achieved in individual companies. Innovation cooperation does not seem to be necessary. Yet as demonstrated in case study 1, innovation cooperation can also prove to be beneficial for innovation projects that are classified as in-house activities.

The aspects of product and process quality named above are of key significance in food production – for actors from public authorities (within the framework of preventive consumer protection) as well as production companies. Food quality and safety express the central concerns with aspects that are vital to the relationship with the consumer and the credibility of the industry. Modern quality standards are the basis, a licence to be in the marketplace, they do not bring competitiveness in themselves (SMEs-NET, 2006). However, the European General Food Law is an important cause of innovations for improvement in this area. In order to improve food safety and quality within the company or apply new quality management tools, innovation cooperation is not necessary. However if the innovation pertains to coordinated and cooperative action within the entire value chain, then cooperations are beneficial and / or necessary (Petersen, 2003; Theuvsen et al., 2007; Theuvsen, 2009). For example this is the case in case study 3 of this thesis which broaches the issue of the alignment of quality programmes with the goal of developing a process standard through vertical cooperation.

Since, aside from the issue of food safety and quality, value chain business actors strive as much as possible for efficient and economic production, the focus is also on process innovations for increasing efficiency (time saving, reduction of by-products and waste products etc.). In accordance with this, methods, for example, to be applied at the interface between primary production and the first / second processing stage in meat production are sought after; these are used to measure natural variations e.g. in weight, product yield and product quality in “real time” (online and non-destructive). Decisions can be made based on this to sort out or initiate measures (see case study 2) (Tunzelmann and Acha, 2005). The development of test systems which crosses over different production stages through testing technologies is increasingly called for by legal requirements, but also by quality programmes initiated in the private sector. Hereby

[8] The demand for differentiation is characterised by the “attraction and risk of moving into new and untested product markets, broadening and changing technological resources and, more radically, changing the fundamental directions and goals of the organization.” (Clipson, 1991)

[9] The demand for standardisation is characterised by the ”economies of standardization, the need for interchangeability in product systems, the need for control of processes, the need for a standard quality product, specialization of markets and the need for common management controls” (Clipson, 1991).

sector-specific applications of information and communication technologies can assist in making information available across all stages (Ellebrecht, 2008; European Foundation for the Improvement of Living and Working Conditions, 2004; Petersen et al., 2002; Petersen et al., 2008; Schulze Althoff, 2006).

In this context there is a demand for cooperation to coordinate between bureaucratic and private-sector actors as well as for the collaboration of public authorities in national border regions. Collaborations of this kind can, for example, minimise economic damages in the case of an epizootic disease. Through alignment in public European contingency planning and by creating a sufficient exchange of public and private information, time can be saved. Because of this, the high risk period of animal diseases can be shortened[10] (Breuer et al., 2008). In order to make relevant information available, technology supported system functionalities in inter-organisational information and communication systems for activation in the case of a crisis are in development and / or are already in use as a prototype (Ellebrecht, 2008).

It can be summarised that cooperation in the meat industry along complete value chains is essential for some innovation projects (Lambert and Cooper, 2000). The study of Pannekoek et al. (2005) focusing on the agrifood industry identified product superiority, and cooperation with value chain partners as the most important success factors for entrepreneurial innovation (Fortuin et al., 2007). This is especially important for quality management processes. For example, different companies at the level of primary production, processing and trading take responsibility regarding their own areas of accountability so as to produce high quality meat products. The majority of producing companies in the meat value chain have adopted their internal control systems as a result of legislation (the EU General Food Law) in recent years. Regarding this, one can say that the meat industry has already made significant progress in the last decade. The current challenge is to interlink internal systems on an inter-organisational level in order to create efficient quality management systems for complete value chains (Robinson and Malhotra, 2005). To improve such systems it is of high importance to implement inter-operational inspection and communication systems rather than to rely on single components and isolated applications (Trienekens et al., 2009; Schulze Althoff et al., 2005).

As a sequel to the examples described above, innovation cooperation between value chain actors in the frame of a concerted innovation process is needed to develop inter-organisational quality management systems. The various stages within the value chain – including agricultural production as well as slaughtering companies, processing plants and retailers – have to communicate and cooperate with each other as well as with suppliers of technologies and services on the one hand and with scientists on the other hand. The challenge is to combine all these actors into functioning innovation consortia. This implies that synergies will be created in the cooperation. By that, single actors (as well as complete value chains) should have more advantages than disadvantages as is expected to be shown by the joint generation of new knowledge and by finding collaborative

[10] The longer the high risk period, the more money is spent and the more losses in trade and animals cannot be avoided.

solutions to accomplish present and future demands of the market (with respect to food safety, food quality, traceability etc.). The growing complexity and pace of industrial technological change is forcing firms to forge new vertical and horizontal alliances and to seek greater flexibility and efficiency in responding to market changes (Rothwell, 1994). Degrees of cooperation needed should be estimated as well against the background of economies of scale in product development (Clipson, 1991). In a cooperative development, costs and risks can be shared. As well as this, a considerable advantage for participating companies is the keeping up to date with the latest technological developments and to have access to new technologies and knowledge. Innovation through collaboration with competitors, suppliers and research institutions also gives new insights into the value chain. Gemünden et al. (1996) illustrated that innovation success is significantly correlated with a firm's network. However, the complexity of inter-organisational innovation projects could make it difficult for companies to participate (see 2.5).

2.5 Barriers related to the innovation process

Unlike large-scale enterprises, SMEs are not usually equipped with to implement innovation management processes due to scarcity of resources (e.g. lack of project management staff and experiences). Instead, SMEs frequently have unsystematic and ad-hoc innovation processes. For example innovation activities in SMEs normally lack long-term strategic thinking. It is often quite the opposite as often innovation activities take place as immediate responses to short-term customer demands. Or sometimes without integrating customers in the innovation process at all, as the most important external innovation source (Aslesen et al., 1999; Buhl, 2009; Fortuin et al., 2007; Rammer et al., 2006). Furthermore, SMEs lack detailed market information (including information on technological trends and new technological possibilities) during the innovation initiation phase (Rammer et al., 2006). Without market information it is difficult to implement an innovation to satisfy market demand. Furthermore, they lack experiences to identify and codify currently existing internal technical, organisational or strategic problems (Klerkx, 2008; Klerkx and Leeuwis, 2008a; Aslesen et al., 1999). A clear demand articulation is of great importance for finding a knowledge provider and cooperation partners as part of the problem-solving process.

During the implementation of innovation activities, SMEs face problems due to lack of professional staff (Buhl, 2009). Rammer et al. (2006) argue that large scale enterprises are able to offer more promotion prospects and higher salaries compared to SMEs. Therefore, highly qualified staff might choose rather to work for bigger companies as employer than SMEs. Furthermore, deficient organisational coordination is a main barrier for the implementing of innovation activities. Especially in SMEs, management time and skills are in short supply (Lienemann and Lehnert, 2005). In this field, a demand for management support is recognised since missing management skills could harm an effective implementation of innovation projects (Batterink et al., 2006; Henry and Walker, 1991; Lienemann and Lehnert, 2005). Finally, high innovation costs and missing financing opportunities are further barriers (Batterink et al., 2006; Buhl, 2009; Klerkx and Leeuwis,

2008a). These barriers can be minimised by management initiatives, e.g. by the acquisition of subsidies and public funds. Beside these barriers SMEs have a major advantage compared to large scale enterprises when it comes to innovation: Short management ”chains of command” are common in SMEs, enabling them to make prompt decisions (Buhl, 2009).

In conclusion, economic considerations and insufficient innovation competencies are the main barriers to innovation in the agrifood industry. Further, Costa and Jongen (2006) list the following major barriers to the implementation of consumer-oriented innovation strategies focussing on new product development (NPD)

- The lack of concrete guidelines for the effective implementation of consumer-led food product development in everyday industry practices;
- The sequential nature of consumer-led NPD, in a clear contrast with the reality experienced by R&D practitioners in their activities;
- The lack of intra- and inter-organisational coordination or integration of R&D and Marketing’s research activities and know-how.”

Barriers that hamper inter-organisational innovation activities

Some of the innovation barriers mentioned above can be overcome by inter-organisational innovation processes. But it is difficult for a large number of enterprises to initiate and participate in innovation cooperations. A survey conducted by Lienemann and Lehnert (2005) indicates several barriers in connection with R&D cooperation expressed by SMEs in the German agrifood sector.

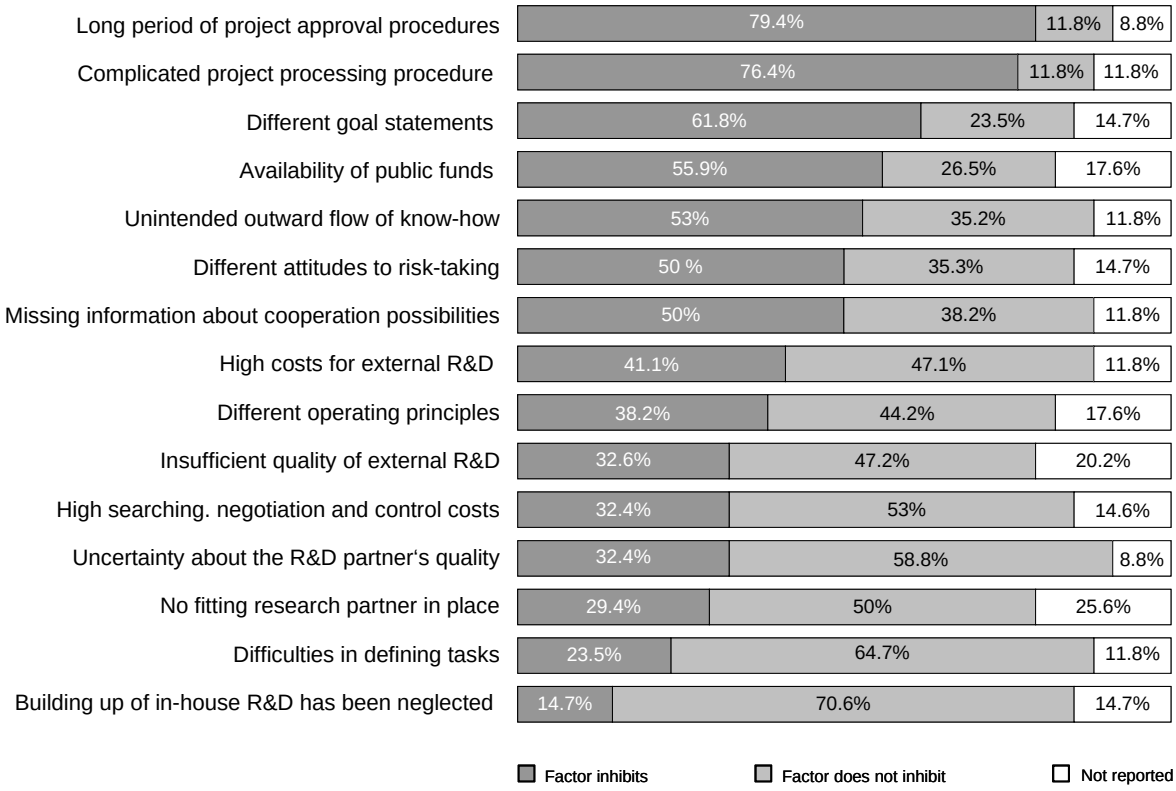


Figure 2.9: Barriers in connection with R&D cooperation in the agrifood sector (Lienemann and Lehnert, 2005)

In relation to potential innovation cooperations, companies as well as research institutions are complaining about the lack of interfaces between business and science as being an obstacle for innovation cooperations (Lienemann and Lehnert, 2005; Aslesen et al., 1999). It is difficult for companies to obtain an overview of the research landscape, and so the knowledge market is not sufficiently transparent (Aslesen et al., 1999; Buhl, 2009; DGQ, 2000). In addition, the quality of service offers from cooperation partners is difficult to assess beforehand (Czarnitki et al., 2001; Lienemann and Lehnert, 2005; Pollard, 2006; Klerkx and Leeuwis, 2008a). In this context, the notion of reputation can also be cited. The quality of cooperation partners can often only be rated through good experiences or through their reputation. Hereby trust in the competence of potential cooperation partners plays a decisive role. Scepticism and lack of trust towards cooperation partners can impede the readiness to cooperate (Czarnitzki et al., 2001; Buhl, 2009; Lienemann and Lehnert, 2005; Pollard, 2006).

Furthermore, actors within cooperation have to come to terms with different work cultures: while companies follow the generation of quick solutions, the research institutions concentrate more on the applied method. This can lead to business and science working in different chronological dimensions (Klerkx, 2008).

Limited by the large circle of actors, the coordinated decision making mechanisms must be implemented and complied with, which can, however, slow down the coordination process (Buhl, 2009). In accordance with this, longer process running times present

further barriers to the innovation cooperation process, because of the comprehensive coordination of the involved actors.

A very significant aspect, which is of great importance to the innovation cooperation, is the subject of intellectual property. Even on the individual business level and especially in SMEs, a lack of knowledge, high searching, application and policing costs can be observed in this area. If an innovation is generated within cooperation, there can be problems with the perception of ownership in that, for example, what counts as individual business knowledge and what counts as joint knowledge has not been clearly defined (Ladeur and Vesting, 2008). Further challenges (possible boundaries for networks of individual partners) would be: no sole use of patents of newly developed product / process innovations, or also the exposure of personal knowledge when opening up to competition (Buhl, 2009). Regulations for handling joint intellectual property as well as already existing knowledge that individual partners bring should definitely be laid down in contract. Such contractual regulations offer protection for network partners and can support the necessary openness within the cooperation.

Barriers in connection with innovation processes that have an impact on the initiation and implementation of innovation cooperations are relevant for all companies, even if these barriers are mentioned more frequently in connection with SMEs. It can be assumed that in cooperation situations involving scientific and industrial actors, special problems regarding planning (e.g. searching for appropriate partners) and management (e.g. the coordination of consortia) are likely to occur. Reasons these difficulties might be the different backgrounds of various partners regarding organisational culture and more specifically research approaches, the availability and deployment of missing resources, and, not least, the huge administrative effort required in the management of innovation networks.

Potential barriers related to the formation and establishment of innovation networks and as well the initiation and realisation of innovation projects are listed in the following table (Table 2.2).

Table 2.2: Barriers hampering the innovation process

	Barriers
During initiation	• Lack of market information • Lack of expertise regarding identification and accurate description of innovation demand • Lack of expertise regarding structured idea management • Lack of (long-term) innovation strategy • Thematic focus of cooperation project does not totally fit to the innovation strategy of the single company • Lack of expertise regarding searching for external competences and potential cooperation partners • Lack of SMART project planning (by defining **s**pecific, **m**easurable, **a**chievable, **r**ealistic, **t**ime-bound tasks) • Lack of expertise in applying for public funds and subsidies
During realisation	• Lack of funds • Lack of time • Lack of highly qualified personnel • Lack of project management expertise • Lack of cooperation experience • Different culture of cooperation partners • Different levels of language skills of cooperation partners • Lack of, or defective, information flow and communication • Extensive administrative procedures e.g. in publicly funded projects • Unsatisfactory agreements regarding common intellectual property • Risk of spill over of knowledge

It is a major challenge to match different interests and characteristics of innovation system actors in order to make innovation cooperation possible. Hurdles need to be overcome. In the framework of this work the first results (based on an empirical quantitative study, chapter 4) give an impression of the demand for management support in inter-organisational innovation processes of the meat industry (focusing on R&D cooperation). It can be assumed that particular company features (like the company size or cooperation experience) require a targeted support to enable companies to participate or even to initiate innovation cooperation.

SMEs in particular face many problems in connection with innovation processes (indicated above). SMEs are an important pillar of the European economy. For example, the EU food industry consists of more than 99.1% of SMEs. SMEs employ 61.3% of all workers and generate 48.5% of turnover in the sector (CIAA, 2010). Concerning the meat industry, companies involved in primary production, from the meat processing level and the majority of suppliers of technologies and services are overwhelmingly SMEs. Therefore, the analysis focuses in the empirical quantitative study on the relation between the demand for management support and the company size.

Furthermore, it can be assumed that actors who have already participated in innovation cooperation ventures experience fewer barriers since they gain expertise with each new cooperation. To increase the tendency for cooperation as well for companies without

previous cooperation experience and to lower the threshold for entering cooperation agreements, the second analysis focus is on the relationship between the demand for management support and the cooperation experience.

3 Framework for identifying the demand for management support based on single company criteria

To overcome the barriers in the frame of the initiation and realisation of inter-organisational innovation processes (described in 2.4), actors within innovation networks can make use of management support services. In the following, the theoretical background for offering management support services will be provided. Subsequently, the execution of the empirical quantitative study involving an investigation made as to the views potential customers of management support services will be introduced. This study has been implemented with a view to offering customer oriented services by organisations in charge of the coordination and management of innovation networks.

3.1 Theoretical background for the provision of management support services

Barriers related to the initiation and accomplishment of inter-organisational innovation activities (described in 2.4) occur due to the fact that actors need to make efforts to handle uncertainties by opening up their institutional borders (Williamson, 1985). These efforts can be subsumed under the term “transaction and coordination tasks”. A transaction is an agreement carried out between several actors, often involving the exchange of items of value (Walker and Weber, 1984; Williamson, 2005). Failures arising during this process are explained by transaction cost theory, which is classified within the field of new institutional economics (Erlei et al., 2007). New institutional economics considers additional costs arising which occur in connection with transactions – such as coordination costs. Transaction costs are cost based on the division of labour for the clarification, agreement and control of the production or distribution of a good or service (Theuvsen, 1997). Whereas coordination costs are expenditures and opportunity costs for the information procurement. They are comprised of transaction costs and costs for the organisational structure (Windsperger, 1996). In comparison, neoclassical theories assume complete market transparency. Goods and services are interchanged without recognition of additional costs which occur on top of the expected price. Coase (1999), (who introduced transactions costs into economic theory), causes the existence of firms by the costs of market utilisation. Firms exist since market utilisation costs are higher than firm's internal hierarchical utilisation costs (Voigt, 2002). The transaction cost theory provides an explanatory approach regarding the making of decisions to carry out transactions in the market, corporation internal or that relate to preferring a hybrid organisation mode (Erlei et al., 2007).

In this regard three kinds of transaction cost categories need to be considered (Richter and Furubotn, 2003):

- *Searching- and information costs:*
  Eligible transaction partners have to be found; therefore, prices and the quality of potential transaction partners have to be compared,
- *Bargaining- and decision costs:*
  Expenditure for the exchange of rights of disposal – such as drawing up agreements, agreement negotiations, taking legal advice, preparation of information,
- *Policing- and enforcement costs:*
  The observance of agreements has to be controlled.

If actor(s)[11] recognise a lack of resources in order to put an innovation activity into action, they need to make a decision on the degree of organisational integration of external resources with the aim of bringing about the planned innovation activity (see Table 3.1). The degree of organisational integration can be placed on a continuum between market-based transactions and hierarchical modes of full integration (Batterink, 2009). The choice of the suitable organisational mode depends, as well, on strategic objectives (Grant and Nippa, 2006).

[11] Actor(s) can be a single company or a group of different actors (multi-actors like innovation consortium or -network).

Table 3.1: Degree of organisational integration of resources and competences (based on Batterink, 2009; Grant and Nippa, 2006)

Low (Market utilisation) ⟷ **High (Hierarchical utilisation)**

	Licensing-in	*Outsourcing*	*Cooperation*	*Mergers & Acquisition*	*Building up competences in-house*
Description	• Purchasing of resources / knowledge (e.g. technology, designs)	• A particular part of the innovation process is carries out by another organisation (e.g. contract research) • Enables access to external resources and competences	• Cooperative relationship between organisations by sharing resources and competences to follow complementary goals • Enables combination of resources and competences especially for resources not readily available on the market	• Firms acquire or merge with other firms in order to have full access to resources and competences	• Innovation activities are carried out internally (in-house innovation) • All competences need to build up internally (e.g. by hiring skilled personnel able to solve the problem)
Benefits	• No need for upfront capital investment • Rapid establishment of position in new areas	• Decreased capital requirements for investments • Control and ownership of new knowledge by the contracting entity • Results are geared to the contracting entity	• High flexibility • Organisation remaining autonomous • Economies of scale • Shortened development time • Spreading costs and risks of generation of new knowledge	• Full control • If new competences can only be developed over long periods of time it might be time saving to integrate competences by acquisition of a firm that has already built up these competences	• Full access to, and control of, resources
Risks	• Purchased technology, design etc. is often not exclusive → does not lead to a sustainable competitive advantage • Knowledge is not specifically developed for licensee → needs to be adjusted	• High searching and negotiation costs • Dependence between knowledge suppliers and customers (contracting entity)	• Competitiveness among partners • Unwanted knowledge spill-over • Cultural differences between partners	• The acquisition itself does not lead to the intended objective → new competences need to be combined with existing competences • Unwanted resources need to be adopted as well • High investment costs	• Missing opportunities to catch up with fast technological development • High investment costs • High risks

In the scope of this work the focus is on the hybrid organisational mode (like cooperation). This organisational mode allows a flexible integration of missing resources to bring the innovation activities into being. Depending on the problem definition, needed competences can be compiled demand-oriented. Furthermore, the decision to focus on this is supported by Batterink's (2009) investigation: Batterink (2009) found a significant positive relationship between cooperation and innovation performance. A positive relationship was not such evident for the other organisational modes listed in Table 3.1.

In any case, barriers in connection with the initiation and realisation of inter-organisational innovation processes need to be taken into account (see 2.4). Transaction and coordination failures accrue especially at interfaces between participating actors. These failures might be minimised by a third party taking over coordinating tasks. When integrating a third party into inter-organisational innovation activities, this party should focus on the reduction of transaction and coordination barriers. "Such intermediary activities include: helping to provide information about potential collaborators; brokering a transaction between two or more parties; acting as a mediator, or go-between, bodies or organiszations that are already collaborating; and helping find advice, funding and support for the innovation outcomes of such collaborations" (Howells, 2006). According to Howells (2006) this third party might be "an organization or body that acts [as] an agent or broker in any aspect of the innovation process between two or more" actors. Beside that definition the literature describes many diverse terminologies regarding third parties with different functions. Most of them act as an innovation broker or intermediary in an innovation network. One can differentiate between two main and differing kinds of third parties: Some concentrate solely on the intermediation between actors. They work as a supporter in innovation systems aiming to facilitate collaborative innovation processes and innovation activities. Others additionally provide content and knowledge. They function as well as an innovation source (Chesbrough, 2006; Hargadon and Sutton, 1997; Hertog, 2000; Howells, 2006; Klerkx, 2008; Klerkx and Leeuwis, 2009; Winch and Courtney, 2007). The terminology is very varied. While Hargadon and Sutton (1997) for example define the term "knowledge or technology broker", this work follows rather the definition of Winch and Courtney (2007) by using the term "innovation broker": "An innovation broker is an organization acting as a member of a network of actors in an industrial sector that is focused neither on the generation nor the implementation of innovations, but on enabling other organizations to innovate." The innovation broker does not participate directly in the generation of new knowledge during the innovation process. Assuming, by the integration of a third party supporting another organisation to innovate, inter-organisational innovation consortia would be more efficient and effective since the actors within the consortium would be able to concentrate solely on the content of an innovation activity – the generation, adaptation and exploitation of new knowledge.

Service provider and service recipients in inter-organisational innovation processes

Offering management support during the initiation and implementation of inter-organisational innovation processes is a service. The term services are used in the literature and in general language usage in many ways (Schütz, 2009). Schütz (2009) highlights, by a combination of certain characteristics, a range of acceptable definitions. Following Evanschitzky (2003) services can be defined as a combination of internal and external production factors. Furthermore, a service is the result of at least a temporal, but also temporal and spatial interaction between the service provider and service recipients. The result of the combination of production factors is a tradeable service pursuing the aim of achieving a value effect. Schütz (2009) summaries the following characteristics of services:

- Intangibility
- Integration of at least one external factor (e.g. customer integration)
- Simultaneousness of production and consumption (uno-actu principle)
- Impossibility of storage
- High level of individuality

In the case of management support services offered in the frame of inter-organisational innovation processes (e.g. in innovation networks) innovation brokers or innovation intermediaries function as **service providers**. By the use of services that support the initiation and implementation of innovation activities, the innovation strengths of the service recipients should be improved and the innovation performance should be strengthened. This can be achieved by reducing transaction and coordination failures (see above). The function of an innovation broker as a service provider is mostly taken over by organisations in charge of the coordination and management of innovation networks. An innovation broker can offer single management support service elements or a whole service bundle. During the planning process of customer oriented services, the service provider needs to consider on the one hand their own available resources and competences and on the other hand, the demand and the service accomplishment quality (Schütz, 2009).

Service recipients are actors within innovation networks who concentrate on the innovation content – like the generation, adaptation and exploitation of new knowledge. These are:

- Scientific actors as knowledge and / or technology provider
- Business actors as knowledge and / or technology provider,
- Business actors as knowledge and / or technology user,
- Public authorities etc.

In this work, the range of services considered involves business actors as service recipients. These are relevant actors required to promote innovations based on new ideas and new and improved concepts. It has to be mentioned that an innovation is only considered as satisfactorily completed if commercial success is achieved. And this can only be done by business actors (see 2.1).

Based on a combination of transaction cost theory and the third party approach, a preliminary catalogue of management support service elements has been developed to overcome transaction and coordination barriers (Table 3.2). The catalogue lays down the groundwork for the development of the inquiry instrument for the empirical quantitative study. As already indicated, this study aims to get a first impression of the demand for management support in inter-organisational innovation processes to be able to offer customer oriented services. In order not to overwhelm the respondents with a full range of potential innovation activities, it has been decided to focus on one specific inter-organisational innovation activity – R&D cooperation. Therefore, the catalogue lists management support service elements relevant for R&D cooperation.

Table 3.2: Catalogue of management support service elements in R&D cooperation projects

	Management support service elements
During initiation	• Support regarding the identification of innovation demand • Initiation of R&D cooperation • Organisation of direct contact possibilities between business persons, research and representatives from the political level • Bringing project partners together • Matchmaking between partners without prior knowledge of each other • Looking for subsidies and applying for subsidies • Development of a consistent project plan • Setting up and tuning the consortium agreement
During realisation	• Taking over project specific management and administration tasks for the whole consortium (project controlling regarding costs, time and tasks compliance, project documentation) • Translation of financier's requirements into specific project guide lines • Guaranteeing the communication between partners • Mediation, if conflicts and disagreements occur between partners • Chairing of team meetings • Support as to the legal protection of results / know-how (e.g. patent advice) • Management support regarding the implementation of new technologies, new concepts • Support during the implementation of successfully tested concepts / techniques into the daily business or during the commercialisation of successfully developed products • Dissemination of results (publications, training, workshops)

3.2 Concept for identifying the demand for management support services

In order to be able to measure a relationship between the scope of expressed demand for management support and single company criteria the empirical quantitative study has been designed by focussing on company criteria like company size and cooperation experience. That has been decided based on the following assumptions (see 2.5):

1. SMEs face many problems that hamper innovation cooperation. Therefore it is assumed that SMEs are more dependent on management support to overcome hurdles than larger enterprises.
2. The hurdle to enter innovation cooperation is lower if an enterprise already experienced cooperation. Therefore it is assumed that enterprises without innovation cooperation experience are more dependent on management support to overcome hurdles than enterprises with cooperation experience.

To be able to analyse the relationships, an inquiry instrument, in form of a questionnaire, was sent out to approximately 700 companies at the beginning of 2009. The inquiry instrument was developed based on the catalogue of management support service elements (see Table 3.2). Likert-scales have mainly been used to measure the level of agreement to a statement: Which of the listed single management support service elements are demanded for the initiation or realisation of R&D cooperation? In addition, enterprise data have been compiled for a statistical analysis to enable the examination of differences between expressed demand for management support and single company criteria (like company size and cooperation experience).

To address companies with cooperation experience, enterprises involved in an integrated project (funded by the EU 6th framework programme) were selected for the inquiry. The consortium consists of 62 partners from 20 different countries including 33 research institutions, 29 business partners and industry associations. Furthermore, the questionnaire has been sent to members of the innovation network investigated in the frame of this work (see 5.3 for a description of the investigated innovation network). The network management has the objective of supporting actors in value chains and networks within the agrifood industry, regarding the initiation, design and implementation of inter-organisational innovation projects. Furthermore, the targeted transfer of knowledge is a particular focus of this organisation. To address as well companies without R&D cooperation experience, support has been given by a pig producer association and also by a consultancy in the agrifood industry. These institutions also sent questionnaires to their network members.

Table 3.3: Sample description for analysis based on single company criteria

Sample size	Response rate	Selected target groups
700 enterprises	• 10 %, 67 enterprises Sorted by company size[1]: • 28 SMEs • 21 large companies Sorted by cooperation experiences: • 46 with cooperation experiences • 21 without cooperation experiences	To address enterprises with cooperation experience the questionnaire was sent to: • Enterprises participating in an integrated project funded by the EU 6th framework programme • Enterprises of a European innovation network To address enterprises randomly (without knowing about their cooperation experience) the questionnaire was sent to: • Members of a pig producer association • Clients of a consultancy in the agrifood industry

[1] To be able to classify companies in groups regarding their size, the survey examines information about the number of employees, annual turnover and annual balance sheet total. The total amount of companies decreased (from 67 to 49) due to the fact that not all companies gave sufficient information regarding their company size for classification into one group.

In order to find a relationship between the scope of expressed demand for management support and company criteria (company size, cooperation experience), the respondents were categorised into groups in order to compare demand profiles:

1. Comparison of demand profiles depending on company size by dividing the companies into two groups: SMEs and large companies.
2. Comparison of demand profiles depending on cooperation experiences by dividing the companies into two groups: With and without cooperation experiences.

For analysing differences between these groups, the independent samples t-test is normally been used. However, the t-test is invalid when certain critical assumptions are not met. The t-test assumes that the sample mean is a valid measure of centre (distance between all scale values is equal). In case of an ordinal test variable (distances between the values are arbitrary) a t-test is invalid. Since the assumptions of a t-test are not met (like normal distribution) the nonparametric Mann-Whitney-Wilcoxon test for two independent samples has been chosen to determine the significance of demand profiles of company groups (by size and by R&D cooperation experience). The Mann-Whitney-Wilcoxon test can be used regardless of the sample characteristics (Pappas and DePuy, 2004; UCLA, 2010).

4 Identification of the demand for management support based on single company criteria

This empirical quantitative study is intended to ascertain the opinions of potential recipients of management support services. It has been implemented with a view to the offering of customer oriented services by organisations in charge of the coordination and management of innovation networks. In the following, an evaluation of the data collected is presented with a focus on the question: Is there is a relationship between the scope of expressed demand for management support and single company criteria? Before focussing on the measurement of this relation an overview of the frequency of demanded management support services by all inquired companies is given.

By analysing the frequency of desired management support services, it can be stated that, out of the entire portfolio of suggested management support service elements, certain service elements connected to financial issues, typically "*Applying for subsidies*" and "*Translation of financiers' requirements in project guidelines*" are required with a high frequency (Figure 4.1). Besides financial and administrative support issues, networking activities are services particularly in demand by the meat industry. These service elements are most frequently desired by all company groups, by SMEs as well as large companies, and by companies with and without R&D cooperation experience. A ranking of management support service elements needed is given in the following figure.

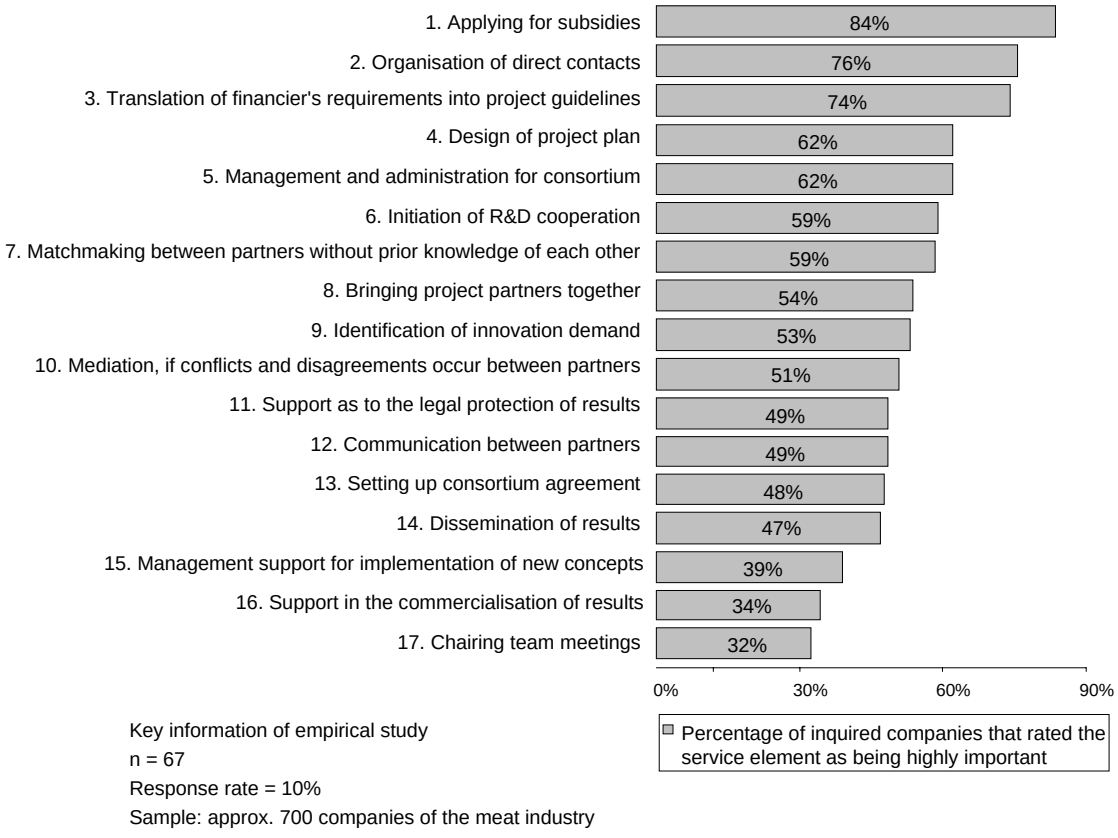


Figure 4.1: Industry demand for management support service elements

4.1 Demand profiles of SMEs and large companies

Beside the three service elements mentioned above, which are desired by all companies in a similar frequency, differences can be observed by comparing the demand profiles of SMEs and large companies. The most identifiable difference can be recognised regarding service elements which are valued with a higher importance by SMEs (Figure 4.2). In any case, the comparison indicates only one significant difference regarding the service element "*16. Support for the commercialisation of results*", which is desired more by SMEs compared to large companies (.013 Mann-Whitney-Wilcoxon Test, 2-tailed).

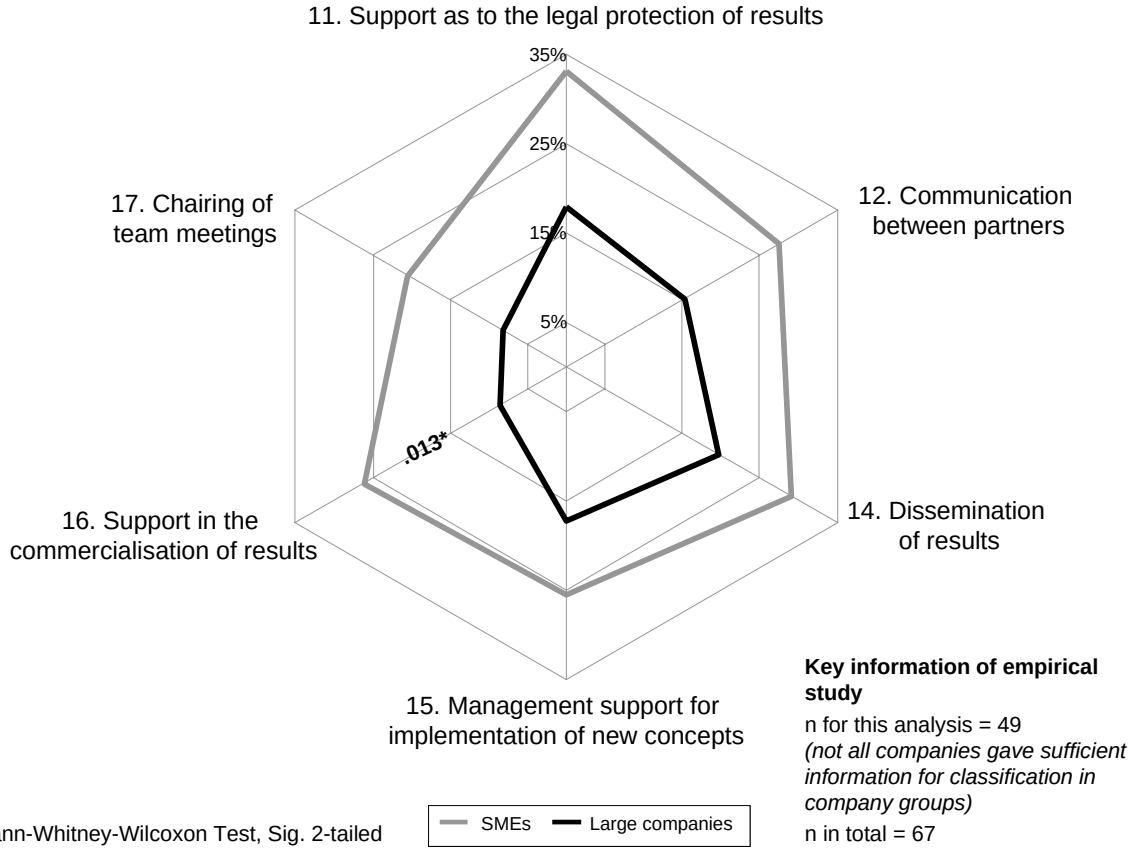


Figure 4.2: Comparison of demand profiles of SMEs and large companies

By comparing the demand profiles between SMEs and large companies it can be concluded, regarding the first eleven ranked service elements, that no precise distinction between SMEs and large companies can be made. This is in contrast to the less demanded service elements in ranks 11, 12, 14-17. In this case, differences can be recognised between SMEs and large companies. It has been proved that only one significant difference between SMEs and large companies has been found regarding support desired in terms of commercialisation of innovations like the market launch of new products or implementation of new knowledge to optimise processes etc.

4.2 Demand profiles of companies with and without R&D cooperation experience

The analysis of demand profiles of companies with and without R&D cooperation experience (see Figure 4.3) reveals significant differences regarding the demanded service elements "*6. Initiation of R&D cooperation*" (.008 Mann-Whitney-Wilcoxon Test, 2-tailed), "*15. Management support for implementation of new concepts*" (.019 Mann-Whitney-Wilcoxon Test, 2-tailed), and "*13. Setting up consortium agreement*" (.046 Mann-Whitney-Wilcoxon Test, 2-tailed). Regarding the service elements "*6. Initiation of R&D cooperation*" and "*13. Setting up consortium agreement*" companies with R&D cooperation experience desire more support than companies without R&D cooperation experience. In contrast to that, it is more important for companies without R&D cooperation experience to receive support in the field of "*15. Management support for the implementation of new concepts*".

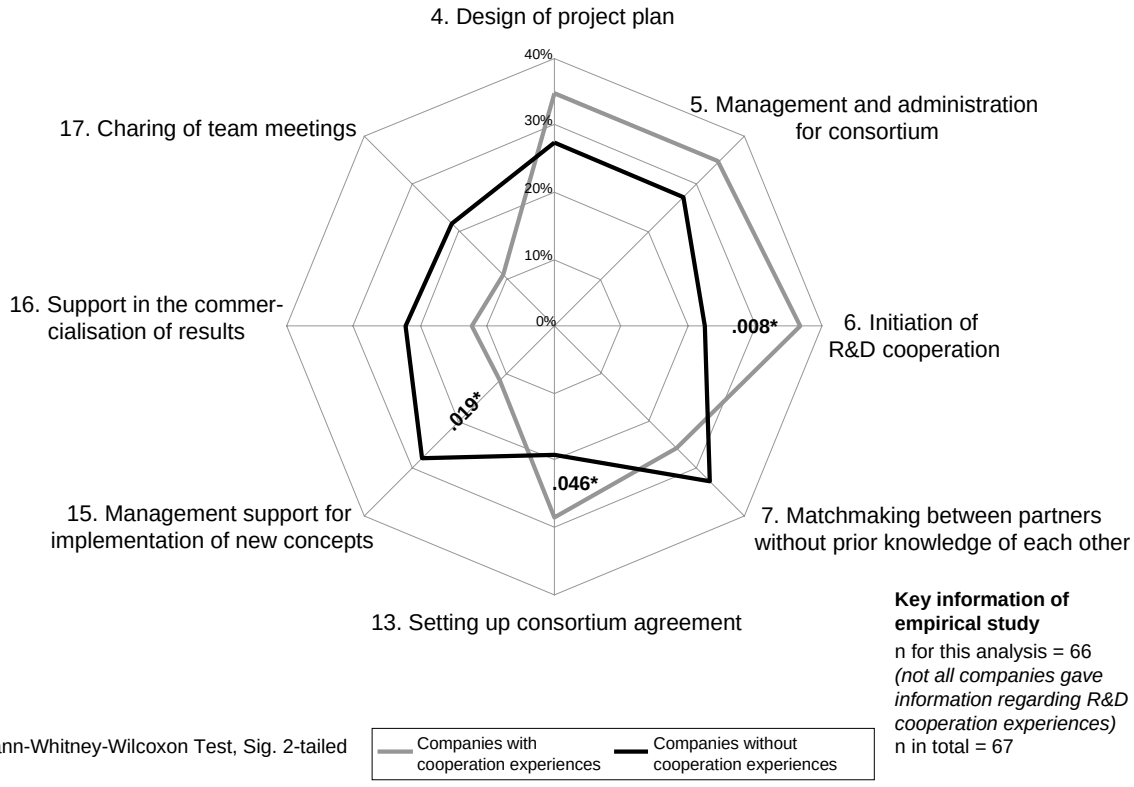


Figure 4.3: Comparison of demand profiles of companies with and without R&D cooperation experience

The analysis indicates that a distinction between companies with and without R&D cooperation experiences can be made. Significant differences are visible regarding the service elements "*6. Initiation of R&D cooperation*", "*13. Setting up consortium agreement*" and "*15. Management support for implementation of new concepts*".

4.3 Interim discussion

The aim of the small scale conducted customer survey was to get a first impression of the demand of actual and potential recipients for management support services. The data has been analysed to determine the demand for management support for pre-defined customer groups (defined by company size and cooperation experience). Within that, the sub-question 1.a has been posed: Is there a relationship between the scope of expressed demand for management support and single company criteria?

By comparing the demand profiles between **SMEs and large companies** it can be concluded that only one significant difference between SMEs and large companies has been found and this service element is a less demanded service element (by all questioned companies). These results are not consistent with statements within the literature. From the literature it is evident that SMEs face more problems during the initiation and realisation of innovation processes than large companies (see as well 2.5). Based on the study sample it is difficult to ascertain definitely whether the differences in demand profiles are related solely to the investigated company characteristics like company size. To be able to make a general statement further quantitative studies are needed, since the empirical study sample is comparatively small. And even then, if no precise distinction is evident, it could be assumed that more a combination of company characteristics than single company features are crucial factors for the demand for management support. It is recommended that an analysis be conducted to attempt to find out whether demand profiles depend only on single company characteristics or not. The demand might rather be related to a combination of company characteristics or environmental circumstances in R&D cooperation projects. The presented analysis focussed only on isolated company characteristics without including mutual interferences with further company features. Other characterising features could be the location within the value chain (whether the company is a producing plant or a supplier of technologies and services) or whether, for example, the company that delivers technologies is concerned with another sector than the agrifood industry. To answer these questions further qualitative analyses are proposed. On the basis of these first results a modification of the concept identifying the demand for management support by integrating a multi-dimensional analysis is recommended (and has been undertaken, see chapter 5).

Beside the comparison of demand profiles between SMEs and large companies the analysis, based on the first empirical study, focused on a comparison of demand profiles between **companies with and without R&D cooperation experience**. In this case, a distinction between these two groups can be made. Especially in terms of companies with and without R&D cooperation experience, the data indicate that companies without R&D cooperation experience do not expect obstacles during the organisational initiation and administrative handling of R&D cooperation projects. Whereas, the response of companies with R&D cooperation experience implies that barriers need to be overcome. Due to their experiences, this group of companies explicitly desires support in the initiation phase of R&D cooperation projects, also regarding administration aspects, during all phases. Therefore, it can be deduced that the effort required for coordination tasks in R&D

cooperation projects is underestimated by companies without R&D cooperation experience (which participated in the survey).

At first glance, the results may seem surprising since especially inexperienced companies do not demand management support services for the initiation of R&D cooperation (demanded over all surveyed companies). However, the results can as well be interpreted in terms of an inability of these companies to estimate hurdles in complex R&D cooperation projects. This interpretation is, for example, supported by an empirical study by Batterink (2009) who suggests assisting companies which are inexperienced with inter-organisational processes. Therefore support services during the organisational initiation and administrative handling of R&D cooperation projects seems to be a latent demand rather than an active demand. This is the case if actors might have a certain need that is ill-defined (Boon, 2008). The term “latent demand” means that most stakeholders will not have an evident idea of what they desire or need (Orihata and Watanabe, 2000). By contrast, for an active demand articulation it is necessary that business actors are able to recognise or already experienced organisational problems during the initiation and realisation of inter-organisational innovation processes. If this is the case, the respondents are able to estimate their demand for management support services. And they are competent to assess if specific services can contribute to minimise coordination and organisation problems during the initiation and realisation of innovation cooperation. Therefore, the results of this study support the statement of Boon (2008), that differences between the expressed and the latent demand for management support are obvious.

In contrast, companies without R&D cooperation experience express a demand when it comes to the adaptation and implementation of research results within their own company. This may result in the fact that companies without R&D cooperation experience have observed R&D cooperation projects only as an external actor. On the contrary, companies with R&D cooperation experience already applied research results during the R&D cooperation project. Due to that, companies involved in R&D cooperation projects generate a competitive advantage on the one hand. On the other hand, they carry the risk of a potential unprofitable investment. If the subject of the R&D cooperation project contains a public benefit element and the R&D cooperation consortium has applied successfully for public funds, the risk involved in innovation is minimised because of public funding.

Based on the results the conclusion can be drawn that this small scale direct customer survey as the only analysis instrument is not sufficient to determine the demand for management support in inter-organisational innovation processes. Especially the results of the comparison of companies with and without cooperation support the assumption that the demand for management support services is a latent demand rather than an active demand. This applies in particular for actors who have not received management support services, yet. According to that, the inexperienced but potential recipients of management support services is neither able to estimate the need for management support nor able to estimate the quality and the expected outcome of management support services. Whereas it has to be mentioned that the quality and the designing of management support

services are highly dependent on the level of collaboration between the service recipient and service provider (see as well Schütz, 2009).

5 Framework for the planning and conception of a procedure model to identify the demand for management support based on multi-dimensional criteria

Based on the results from the empirical quantitative study, a modification of the concept identifying the demand for management support is recommended. This is undertaken in the following (chapter 5 and 6) by integrating an empirical qualitative analysis in the form of case studies. By a detailed study of specific innovation cooperation, the complexity of such interactions can be illustrated. As a basis for the studies, a procedure model has been developed to identify missing resources for the realisation of innovation activities. Based on that, the organisation of management support services for resource procurement can be undertaken.

5.1 Theoretical framework to develop a procedure model for a multi-dimensional analysis

The development of the procedure model draws from transaction cost economics and governance aspects (described in 3.1), extended by the resource-based view. Especially the resource-based approach covers the biggest part of the theoretical foundations for this analysis step. The resource-based approach is an economic instrument for a structured analysis of enterprise resources. Resources are considered to be company assets at a particular point of time (Barney, 1991). The literature distinguishes between human, intangible and tangible resources (see Figure 5.2). In general, resource analysis is conducted to work out options for strategic operations for a company (Wernerfelt, 1984). In this context, Wernerfelt (1984) combines the resource-based approach with Porter's (1980) model of "Five Competitive Forces". Porter's model considers external forces affecting the market success of a company (see Figure 5.1).

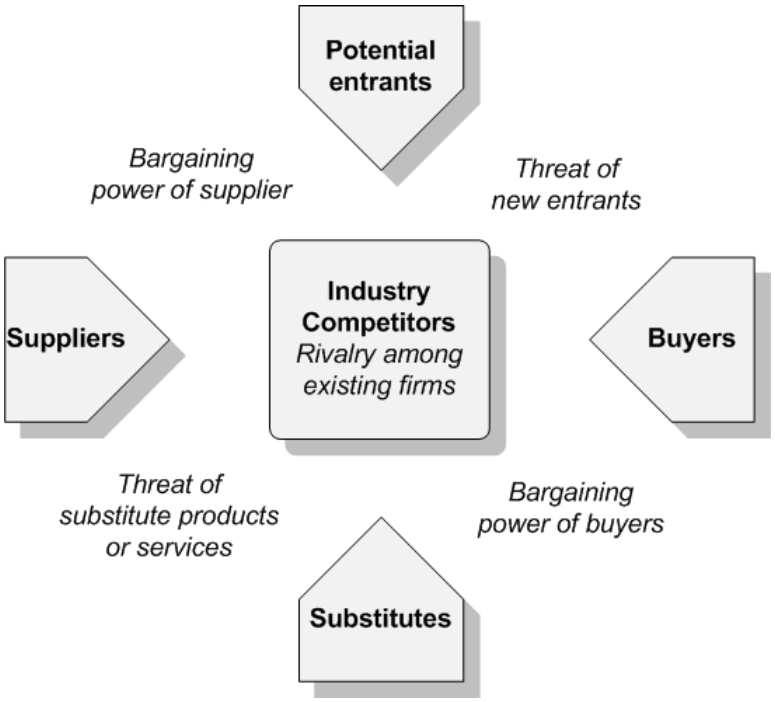


Figure 5.1: Five-forces model after Porter (1980)

The essential competitive forces are (see Figure 5.1):

- The threat of new entrants,
- The bargaining power of suppliers,
- The bargaining power of buyers and
- The threat of substitutes.

Competition within an industry results from these competitive forces. Depending on the dimension of competitive forces, the intensity of rivalry among existing firms differs. The stronger the threat from competitive forces, the less attractive is the considered branch of industry and the more difficult it becomes to achieve a sustainable competitive advantage.

By combining Porter's Five-forces model with the resource-based approach, resources that are not available are considered to be entry barriers for a specific market. Whereas available resources represent a competitive advantage. Similarly, other authors have argued by outlining a relation between a company's internal resources and specific competences related to competitive advantages (Grant and Nippa, 2006; Mahoney and Pandian, 1992). Competence "is a function of the resources which a firm possesses at any point in time" (Mahoney and Pandian, 1992). Therefore, internal resources and the resulting competences of a company combined with external success factors in a branch of industry determine the corporate strategy (see Figure 5.2). The strategy should exploit internal strengths (determined by core competences) by responding to environmental opportunities (determined by factors of the industrial sector) while neutralising external threats and avoiding internal weaknesses (Barney, 1991).

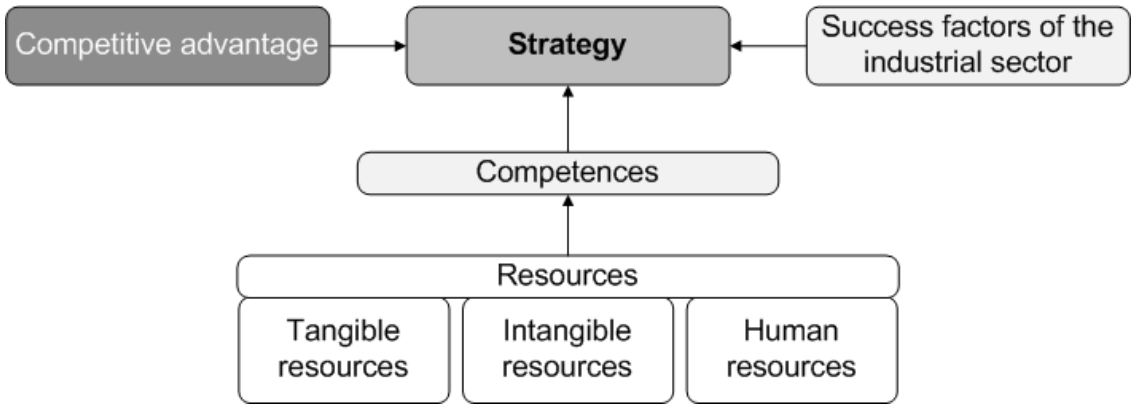


Figure 5.2: Connections between resources, competences and competitive advantages after Grant and Nippa (2006)

Building on this foundation, it is a company's economic objective to generate a competitive advantage using its own resource portfolio and core competences. On the one hand, this objective can be pursued by targeting a defined goal with the use of as few resources as possible (economic minimum principle). On the other hand, the maximum possible benefit can be generated by making better use of a given range of resources (maximum principle) (Penrose, 1959). The developed procedure model within the scope of this work has one additional feature. Not only are the available resources of a single company relevant. Additionally, it needs to be considered if a combination of internally available resources together with external resources might extend the range of available resources to generate a competitive advantage for the single enterprise and ideally create a win-win situation for all actors participating in innovation cooperation projects (see as well Hamel, 1991; Gemünden et al., 1996). Nevertheless, a resource extension or resource combination is associated not only with advantages. Theoretical approaches to transaction cost economics also point out limitations (see 3.1).

The present work applies the resource-based approach of Wernerfelt (1984) in a slightly modified form. It does not identify possible barriers to market entry, as it is done by Wernerfelt (1984). In this work, the main focus is the analysis of internal resources to identify possible weaknesses impacting on successful implementation of innovation activities due to the lack of resources. Based on an analysis of available resources, actors can come to a decision as to whether it might be necessary to integrate external resources and further actors in the innovation process (for more details on options for the organisational integration of resources and competences see Table 3.1).

5.2 Methodical procedure for a multi-dimensional analysis

A combination of theoretical approaches forms the framework for a case-oriented procedure to identify the needed management support in inter-organisational innovation processes. In doing so, the procedure is based on a multi-dimensional analysis model (Figure 5.3).

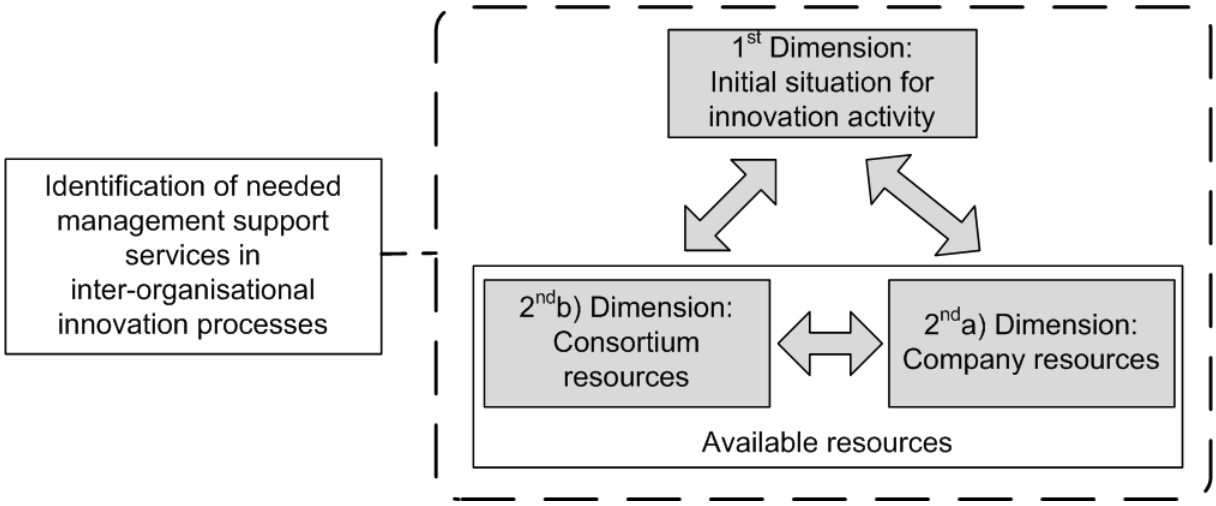


Figure 5.3: Multi-dimensional analysis model to identify the demand for management support in inter-organisational innovation processes

The dimensions of resources are already addressed by the resource-based approach. However, a specific case is needed for a resource analysis. Therefore, the first dimension concentrates on the initial situation of an innovation activity. In this context, the setting is examined. Based on this, a resource analysis will be conducted to identify a lack of resources that is likely to hamper the initiation and realisation of the innovation activity. Management support services can be provided for the resource procurement function so as to fill the gap between available and needed resources.

The procedure model is combined with a category system. The category system formulates broader and narrower terms for a more detailed analysis of the dimensions. To begin with, the following describes the procedure model (see Figure 5.4) before dealing with the category system.

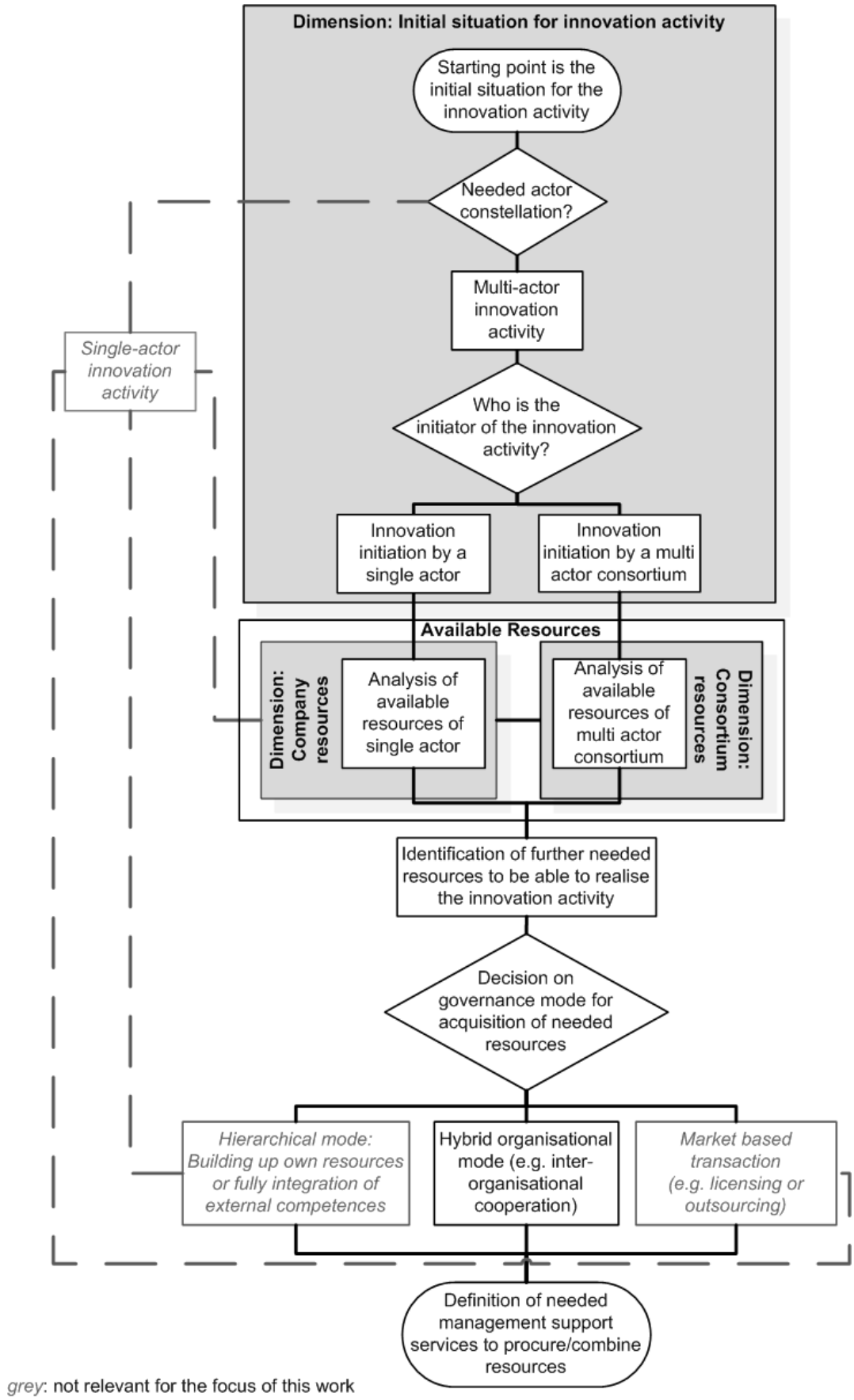


Figure 5.4: Procedure model to identify the demand for management support in inter-organisational innovation processes

In the first step, it needs to be determined whether an innovation activity can be implemented by a single actor (single-actor innovation) or if a consortium of actors is needed (multi-actor innovation). This needs to be decided based on the planned content of the innovation activity. In doing this, two aspects have to be taken into consideration:

1. It needs to be decided whether or not the objective of the planned innovation activity has an inter-organisational or a value chain / network oriented character. In this context, innovation activities only can be implemented by integrating actors from more than one production level of a production chain (for illustration see Figure 2.3). Furthermore, it needs to be decided whether the competences of a scientific knowledge or technology provider are needed or not.
2. If there is no obvious need to open up institutional boundaries for implementing the planned innovation activity, the analysis of available resources at the company level needs to be done to make a final decision as to whether resources are missing or not. If resources are missing it might be beneficial to open up company boundaries.

The following step is the resource analysis as a basis for the determination of the required management support in order to procure further resources or to combine inter-organisationally available resources. Resource procurement aims to be able to implement a desired innovation activity, even if there is a lack of resources. For the procurement and integration of external resources different forms of organisational integration of resources and competences need to be considered (see Table 3.1). If the actors choose a form of organisational integration beyond the level of cooperation – this is not part of the work. The possible range of forms for the resource procurement function shown for completeness in Figure 5.4. The same applies for the analysis starting from a single company. If the analysis reveals that the realisation of an innovation activity inhibited due to a lack of resources, this innovation activity is only observed in the scope of this work if the single actor decides to become involved in cooperation. If no cooperation takes place (but rather other forms of the resource procurement, see Table 3.1), the case will not be studied. For reasons of completeness, the possibility of a single-actor innovation activity is illustrated in Figure 5.4 (in grey).

The analysis procedure ends with the determination of the needed management support services for the procurement of identified missing resources or the identified needed combination of inter-organisational available resources.

Figure 5.4 emphasises the dimensions that are illustrated as well in the analysis model (Figure 5.3):

- Initial situation for innovation activity (1st Dimension)
- Available resources:
  2nda) Dimension: Company resources & 2ndb) Dimension: Consortium resources

Within these dimensions the analysis procedure is supported by a category system formulating broader and narrower terms for a more detailed analysis of these dimensions. The aim of this combination is the development of a generic framework for a detailed analysis procedure. The following section introduces the category systems for the dimensions ”Initial situation for innovation activity“ and “Available resources“.

5.2.1 Category system for the analysis of the initial situation

The category system related to the setting of the innovation activity provides analysis factors that help to identify a “potential need for management support” in inter-organisational innovation processes (see Figure 5.5). It is a matter of a “potential need” since the final need for management support can only be identified by an integrated analysis of the initial situation and an analysis of the resources available.

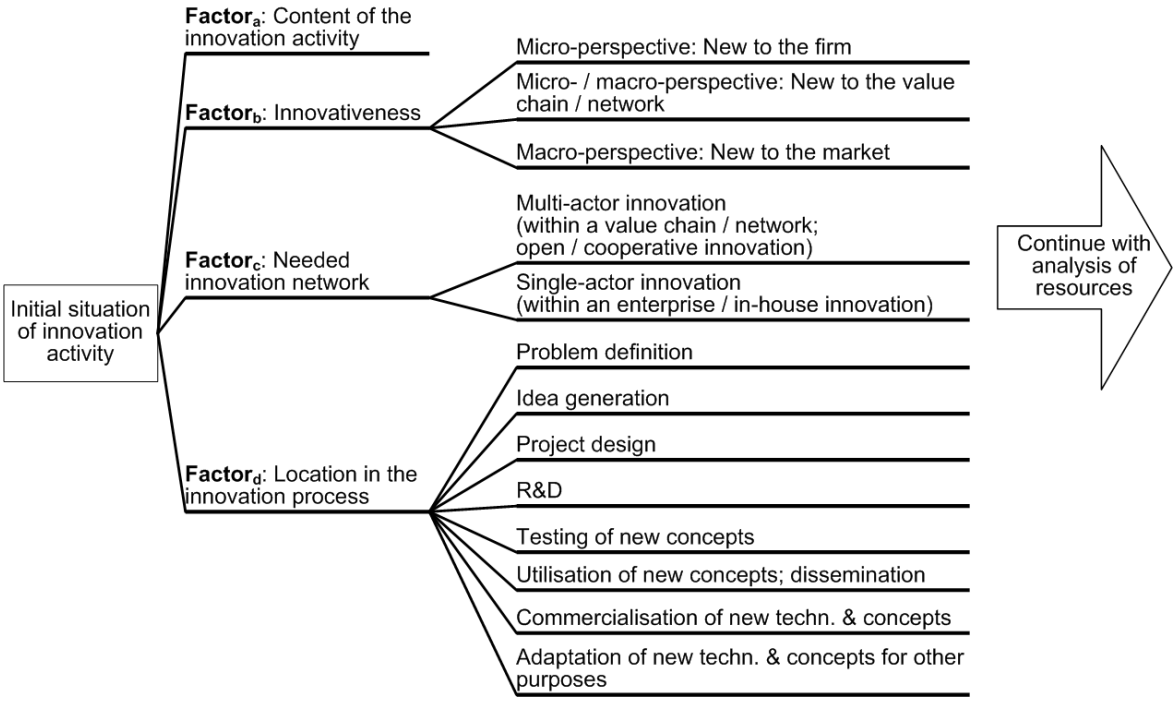


Figure 5.5: Category system focussing on the dimension “Initial situation of innovation activity” of the procedure model

At the commencement of the analysis, the content of the innovation activity needs to be explained in more detail (**factor$_a$**: Content of the innovation activity). In the course of this, questions dealing within the innovation activity need to be answered. Furthermore, the aspect of innovativeness (**factor$_b$**: Innovativeness) needs to be determined, as related to the scope of the innovation activity. An innovation can have a minimum range by being only new for a single company (e.g. implementation of e-commerce at company level). This innovation does not need necessarily to be new for other actors or markets. A maximum range is achieved if an innovation is new for the global market (e.g. the opening of the World Wide Web for public use the early 1990s). Between these extremes, the

scope of the innovation can focus on a production chain or on a regional, national or European market etc. (for further explanations on innovativeness see sub-chapter 2.1). Resulting from an integrative studying of the factors “Content of the innovation activity” and “Innovativeness” it is evident as to whether the necessity for an inter-organisational innovation activity is present or not. A first estimate regarding the necessary configuration of the innovation group can be done (**factor$_c$**: Needed innovation network): In the case that the innovation activity has an inter-organisational or chain-oriented character, several actors within the production chain or network need to be involved (multi-actor innovation activity). In the case that the implementation of an innovation activity is possible within a single company, the identification of the needed management support for inter-organisational innovation processes might end at this point (for a further explanation see p. 53).

Furthermore, the need for management support depends on the phase of the innovation process in which the innovation activity is located. It might be the case that the intended innovation activity is already well advanced within the innovation process (for further explanations regarding the innovation process see sub-chapter 2.2). It should be determined at which phase of the innovation process the actors are located that are concerned with the intended innovation activity (**factor$_d$**: Location in the innovation process).

5.2.2 Category system for the analysis of available resources

For the resource analysis, a category system is used as well (Figure 5.6). The aim of this analysis step is to identify resources missing for the implementation of intended innovation activities (barriers as a result of missing resources are described in sub-chapter 2.5). Based on the identified lacking resources, management support services for the resource procurement can be defined (for further information see 5.2.3).

The category system is based on the classification of resources into human, intangible and tangible resources by Grant and Nippa (2006) (see Figure 5.2).

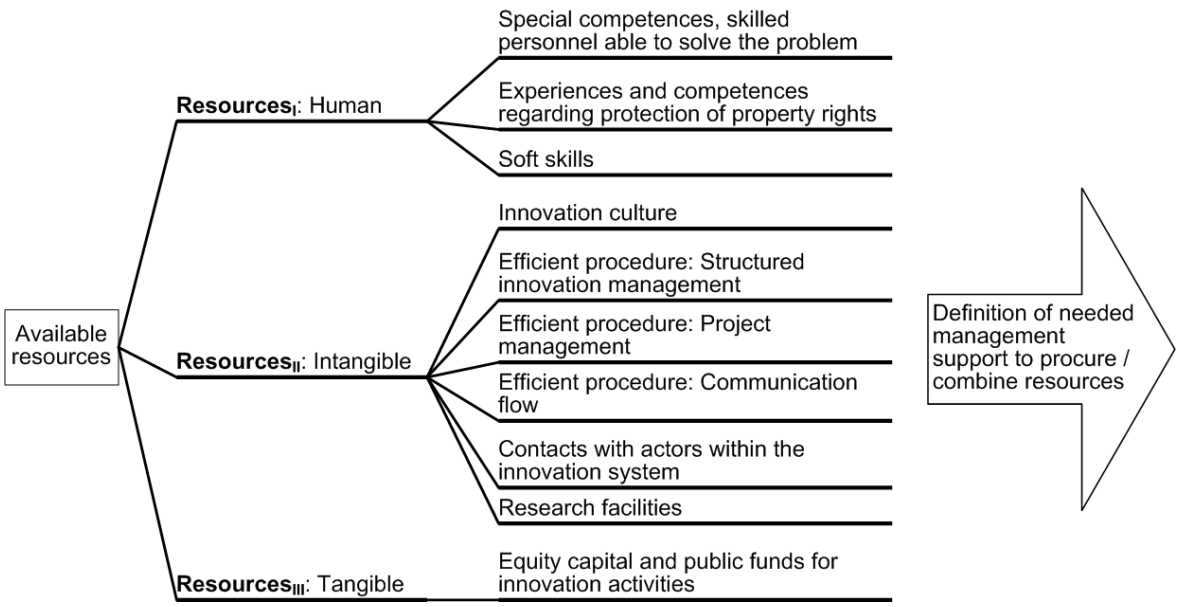


Figure 5.6: Category system focussing on the dimension "Available resources" of the procedure model

Resources$_I$: Human

For innovation projects, qualified personnel with specialist skills and competences are needed. Human resources are the fundamental basis for innovation projects. Humans contribute skills, knowledge, logical thinking, decision-making abilities and so on. Additionally, they bring along the commitment and the motivation to implement innovation activities (Cooke-Davies, 2002; Grant and Nippa, 2006).

If an innovation activity is initiated at the company level, it is worth investigating to see if the necessary human resources are already available within the company[12].

If necessary resources are missing or incomplete, the company can decide to open up for an inter-organisational cooperation[13] to compensate for these missing resources. In the case of an innovation activity being initiated by several actors, the resources in this core working group need to take into account. When a lack of resources is recognised, further resources can be incorporated by opening up the consortium for new partners.

In addition, special skills like experience and competences regarding protection of property rights are auxiliary. Legal protective measures (e.g. patent application) might be advantageous to benefit from economic success based on inventions, new products, processes etc. The legal aspects regarding the protection of intellectual property are a particularly sensitive and difficult area when several actors participating in the generation of new knowledge (Hagedoorn, 2003; Vrande et al., 2009). In this case it is necessary to

[12] Which specific competences for the problem solving are needed needs to be clarified in each individual case.

[13] Further decision making possibilities for the organisational integration of resources and competences, beside inter-organisational cooperation, are listed in Table 3.1. Other options than inter-organisational cooperation are no longer pursued, since this work concentrates on inter-organisational innovation cooperation.

create a satisfactory legal foundation in the form of a consortium agreement. This agreement should provide a clear specification regarding the distribution of rights of regarding new knowledge generated by the partners and also deal with joint ownership questions. Not only detailed rules regarding joint ownership should be agreed, the access rights to pre-existing knowledge should also be specified[14].

Last but not least, the presence of so-called social skills and / or "soft skills" is significant for cooperation within innovation teams, which are often project-based and put together in an interdisciplinary manner (Fortuin et al., 2007). In team work, as well as within the company, not to mention inter-organisational innovation projects, an openness for other professional disciplines and other approaches is required in addition to professional and technical skills, communication, social and decision making competences. This is made clear by the requirements in the different phases of the innovation process alone (see Table 2.6). Whereby analytical skills are sought after in the phase of problem recognition, creative minds are needed in the idea generating phase. Should an innovation activity take place in an inter-cultural context then language skills as well as inter-cultural competences are advantageous (Ritter and Gemünden, 2003). Furthermore the actors need to adjust to the different work culture of partners (Vrande et al., 2009).

$Resources_{II}$: Intangible

In order to promote existing individual skills or to combine competences on the consortium level, the environment and / or work atmosphere is of great importance. This is determined by the intangible resources of an organisation's culture or by a consortium (Perez-Freije and Enkel, 2007; Barney, 1986). The definition of culture is based on living values, traditions and social norms (Ekvall, 1991; Grant and Nippa, 2006). Within the framework of innovation projects it is called innovation culture. This can be based, for example, on an open and constructive way of dealing with new ideas. On the individual company level, appreciation of employees as a potential source of new ideas (for example, expressed through the creation of a financial incentive programme for submitting ideas) also falls under this concept. In addition, the creation of free space to work on individual ideas or the existence of top management commitment to innovation is what distinguishes innovation culture within a company (Rosenfeld and Servo, 1991; Fortuin et al., 2007). On the other hand the innovation culture and / or climate influences organisational processes like communication, decision procedures or general motivation (Ekvall, 1991). If structured innovation management is being executed on the company level, then this is an indication of an innovation-oriented company culture. This can in turn have an influence on the innovation culture within the cooperation.

The comments on innovation cultures allow for the recognition of yet another intangible resource – Efficient procedure: Structured innovation management. Innovations can be promoted in a targeted fashion (Ven, 1986; Borchert, 2006). Early detection of changing

[14] Pre-existing intellectual property is as well deemed to be intangible resources. Capital can be derived from it.

conditions and thus the recognition of the need for innovation is an essential step for the preservation of competitiveness. For this, companies are dependent on sufficient market information to be able to identify possible innovation triggers (like, for example, new legal regulations, new scientific knowledge or development on the markets) (Grunert et al., 1995). But the targeted generation of ideas for problem-solving is also an aspect of innovation management. Many different creativity methods are employed hereby (for more commentary see sub-chapter 2.2)

An efficient approach within the framework of innovation projects is not only necessary in the area of innovation management but also in the area of project management (Efficient procedure: Project management).Only a very limited number of innovation projects will turn out to be a success (Cooper, 1999). It is therefore crucial to redirect or kill the potentially unsuccessful projects in an early stage of development. This needs to be done to prevent costly failures (Cooke-Davies, 2002; Cooper et al., 1999). In order to minimise the risk, innovation activities should be realistically planned and the implementation should be accompanied by a project manager.

Furthermore, for an efficient and successful implementation of cooperation projects, functional communication procedures between partners as well as with the project environment are important (for example, in relation to the fund provider and the professional public) (Lienemann and Lehnert, 2005) – Efficient procedure: Communication flow.

Another intangible resource is contacts with actors of the innovation system. Especially when innovation activities are being carried out in cooperation with external actors, business contacts with previous and subsequent production levels as well as contacts with scientific establishments and additional actors in the innovation system are crucial (Nijhoff-Savvaki et al., 2008; Trienekens et al., 2008) (see as well 2.3).

Last but not least the presence of research facilities also counts as an intangible resource. This technological resource, aside from technical and scientific employees, is an important resource necessary to even be able to implement research and development tasks (Grant and Nippa, 2006). Hereby the availability of research and laboratory establishments certainly is not relevant for every planned innovation project (like, for example, organisational innovations or innovations in the area of developing new business models).

Resources$_{III}$: Tangible

Aside from observing intangible resources, in the analysis of available tangible resources, light will be shed on the question of whether actors can generate the financial resources necessary for the implementation of innovation activities (Equity capital and public funds for innovation activities). The company-internal generation of capital resources as well as creditworthiness is of relevance. The acquisition of funding to create additional capital resources is of great importance for individual businesses as well as inter-organisational innovation activities (Rammer et al., 2006, Brinkmeyer, 1996). Depending on the political general conditions and economic funding tools, there is the possibility of minimising the risk of implementing innovation projects through public funding.

5.2.3 Organisation of management support services for the resource procurement

The previous analysis steps are a basis for the determination of the management support needed in order to procure further resources or to incorporate inter-organisationally available resources. The aim is to be able to implement a desired innovation activity, even if some needed resources are absent.

In the following, a number of aspects are presented that need to be considered when considering satisfying the demand for management support in order to be able to implement inter-organisational innovation activities (Figure 5.7):

- Who are the actors in inter-organisational innovation activities?
- What interactions between actors are needed so as to offer management support services?
- Where does the realisation of inter-organisation innovation processes take place (scope of application)?

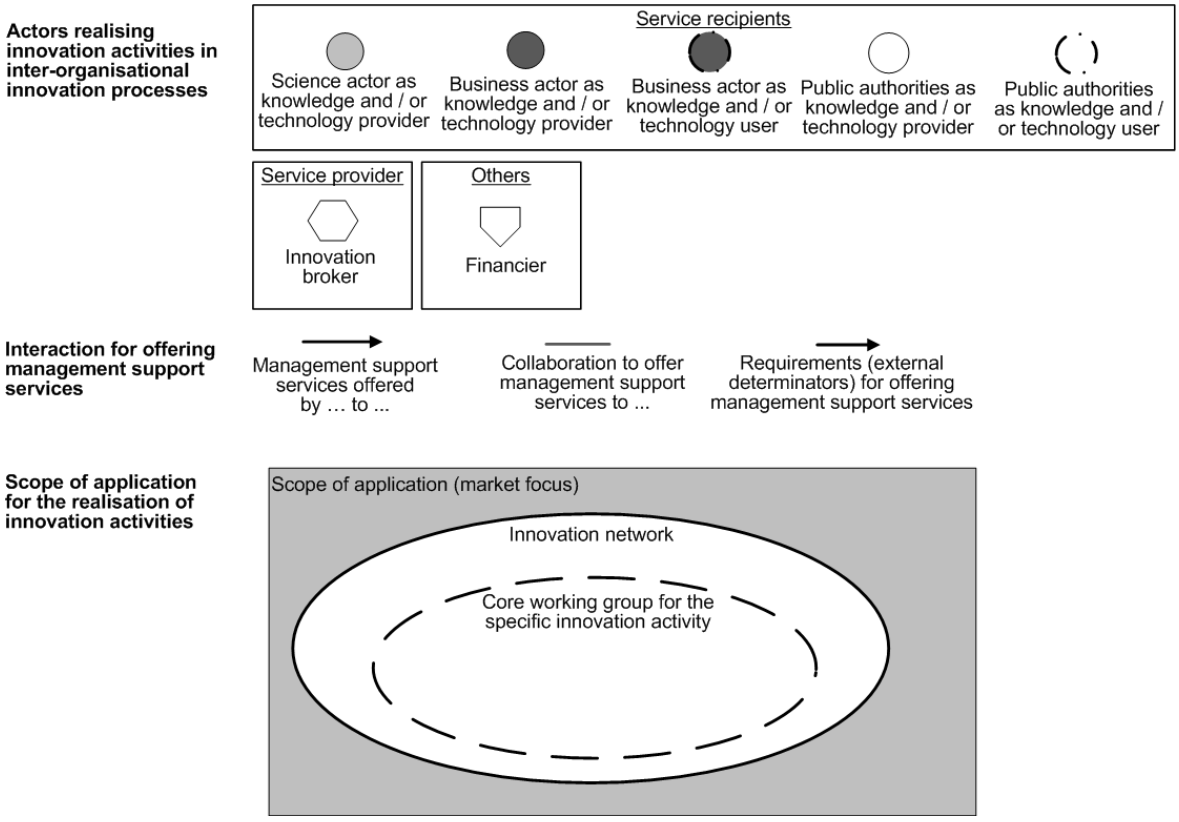


Figure 5.7: Organisation of management support services for the resource procurement

Figure 5.7 lists the symbols used and applied in explaining the organisational procurement for missing resources in each case study (see chapter 6). **Actors** such as service recipients and service providers of management support services in inter-organisational innovation processes have been roughly outlined in sub-chapter 3.1. Each symbol in

Figure 5.7 stands for one relevant actor in inter-organisational innovation processes. One further actor is listed in Figure 5.7 that has not been mentioned in sub-chapter 3.1 – financiers. This actor is important to provide missing material resources. **Interaction** between these actors is necessary for offering management support services (e.g. between services recipient and service provider; see 3.1). Furthermore, the offer of management support services does not only depend on customer demand. Management support services are, as well, dependent on requirements coming from outside of the working group or the network (circumstances of the broader innovation system like requirements formulated by external financiers). All these actors and interactions take place in a **scope of application**, with a market focus. In these surroundings, a core working group needs to be built to implement a specific innovation activity. This is intended to have an impact on the market. In inter-organisational innovation processes this core working group acts mostly inside an innovation network. Further actors within this innovation network (beside the actors of the core working group) support the core working group in specific areas during the implementation process.

5.3 Selection of cases for the application and validation of the procedure model

The developed procedure model was used and tested in an inductive case study observation (Yin, 1984). Three case studies in inter-organisational innovation activities were used to validate the procedure model. A research network from the agrifood industry assured access to the case studies and the actors. This research network offers a platform for international collective research. It is currently in its ninth year of existence. Two universities, three animal health services and two business actors founded it. Actors from business, science as well as public authorities are united in this network. The purpose of the network is to initiate and implement cooperative projects in the area of consumer protection and quality management of the agrifood industry with a strong tie to the entire value chain. Hereby the interests of the general public receive attention for general research and development. What is special about the network is its classification as a public equivalent body. Public equivalent body means any legal body governed by public or private law established for the specific purpose of meeting needs of the general interest, not having an industrial or commercial character. By this classification the management office of the research network can act and bridge between involved network actors as a neutral body. Furthermore, the network and its members profit from the networking of network management employees. They can be found in the different universities involved in the network as well as in some ministries. Through both of the aspects named above, a trusting cooperation with administrative bodies and ministries could and can be created in order to implement non-profit innovation projects with the network members. The network members are mostly SMEs, who carry out their innovation projects together with other network members and thereby balance out resource gaps. Moreover several large scale enterprises are also network members.

Another large success factor of network management is the positioning within the innovation system as a link between the project partners of a planned innovation activity

(network member) and the funding consulting institution (network-external actors). Funding consulting is more informative, whereby the network management in focus offers operational support. For example, the services within the framework of the application do not only have an advisory character. In addition the writing of project applications is coordinated and thereby implemented in cooperation with the project partners (the consortium). The network management often acts as the lead partner in the research projects. The network members, on the other hand, take on fields of activity having to do with content.

The most controversial case studies for concrete innovation activities were chosen from this network in order to depict a broad spectrum through the comparison of polar cases (Pettigrew, 1988). When making the selection the different starting points in particular were taken into account for the analysis: In several cases an inter-organisational core consortium had already been initiated. In other cases the analysis start was identical to the initiation of an inter-organisational innovation activity by an individual company. Furthermore, attention was given to depicting the different phases of the innovation process as well as the different types of innovations (see Table 5.1).

A uniform analysis procedure was made possible by the developed procedure model. Relative comparability is created herewith (Eisenhardt, 1989). In the individual case studies, the data basis is compiled from qualitative information like interviews, participating observations in the framework of workshops, meetings and group discussions as well as archival sources. With the help of this data the predefined factors of the category system are analysed in a multi-causal fashion in order to work out complex connections.

The focus of the analysis is determined by the following research questions:

> *Sub-question 1.b: How to identify the demand for management support based on a multi-dimensional approach?*
>
> *Sub-question 2.a: How to organise management support in inter-organisational innovation processes?*

Table 5.1: Case description for multi-dimensional analysis

Topic of the case	Start of analysis	Location in the innovation process	Type of innovation	Actors
Integration of sustainability aspects in a regional pig and pork production chain	At an agricultural producer association (SME)	• Testing of concepts during the R&D realisation phase • Exploitation and market launch	• Process innovation • Product innovation • Marketing innovation	<u>In the core working group</u> • Customer of services: 1 B; 3 S • Service provider: 1 IB <u>In the extended working surrounding</u> • Customer of services: 25 B; 33 S • Service provider: 7 IB • Others: 1 F
R&D on innovative measuring technologies in the meat industry	At a technology supplier (SME) without any connections to the meat industry	• Idea generation • R&D realisation	• Product innovation • Market innovation	<u>In the core working group</u> • Customer of services: 2 B; 1 S • Service provider: 1 IB <u>In the extended working surrounding</u> • Customer of services: 12+ x B; 2+ x S; x PA • Service provider: 3 IB • Others: 1+ x F
Standard for data collection to detect animal health status of piglet farms	At a consortium of four animal trading cooperatives	• Exploitation and market launch	• Marketing innovation • Organisational innovation • Process innovation	<u>In the core working group</u> • Customer of services: 4 B; 1 S • Service provider: 1 IB <u>In the extended working surrounding</u> • Customer of services: x B; 4 S; 8 PA • Service provider: 2+ x IB • Others: x F

B: Business actor; S: Science / research institution; IB: Innovation broker; PA: Public authorities; F: Finance / funding actor

1-n: number of actors

6 Implementation of the concept to identify the demand for management support in three pilot situations

The concept developed in chapter 5 for identifying the demand for management support services is applied in this chapter. This occurs in three pilot situations. First, the developed concept undergoes validation. The approach to the case studies is described in Figure 5.4: in the first step the initial situation and / or the framework of an innovative project is portrayed in order to present the specific case (Figure 5.5). The second step deals with resource analysis. The goal here is to recognise whether the necessary resources are available for the planned innovative activity or whether additional (external) resources need to be procured (Figure 5.6). In the last step the procurement of missing resources is shown in the case studies (corresponding to Figure 5.7).

6.1 Case study 1: Integration of sustainability aspects in a regional pig and pork production chain

6.1.1 Initial situation

The main initiator of the innovation activity is an agricultural producer association in which farmers within a region have joined together. Within the framework of the producer association pigs, cows, geese and lambs are produced and marketed. The case study observation focuses on pork products. In pork production the farmers fall back on a traditional, domestic local breed that was re-established in the 1980s. Furthermore, the production of pork follows a strict meat quality programme. The existing programme is a mandatory contract between the farmer and the producer association. Within the framework of the existing meat quality program the following criteria, among others, have been formulated:

- Ban on GMO (genetically modified organisms) and descendents of them in breeding, feeding and cultivation,
- Ban on antibiotics and any chemical medication,
- Ban on full-slatted floors (pigs must be kept on straw),
- More space for pigs than requested by legal regulations,
- Use of regionally grown feed including ban on carcass-meal,
- Farms must be located in a defined administrative district,
- All pigs must be slaughtered in a pre-defined slaughterhouse.

The pork is mainly marketed in fresh meat form. In addition a small selection of processed products is offered. The meat and sausage products produced in the producer association are presented with the addition of protected geographical indication (PGI). PGI covers

agricultural products and foodstuffs closely linked to the geographical area. At least one of the stages of production, processing or preparation takes place in the area.

The producer association serves a niche market with its premium products. Market access at the time of analysis occurred through the following distribution channels: own shops in the region (delicatessen shops, farmer's markets, regional markets, market halls in the nearest major city), direct sales to gastronomy as well as marketing through selected butcher's shops and delicatessen shops across the whole country. Mainly fresh meat is marketed to gastronomy as well as to butcher's shops.

Based on trend analysis conducted by management, the prognosis is, in relation to the market being served, that there will be an increase in consumer demand for high quality products with additional trust characteristics in the area of sustainable production. This estimation is also the result, among other things, of public discussions, which indicate the increasing importance of sustainable aspects in the production of food. (see also Spiller et al., 2006). Trust characteristics are thereby described using information which influences purchasing decisions. The following distinctions apply:

- Selection characteristics (relevant before the purchase, i.e. the appearance of food; fresh look, smell etc.),
- Experience characteristics (experiences after the purchase, i.e. taste, digestibility etc.),
- Trust characteristics (cannot be checked on their own, i.e. health value, organic production, GMO free etc.).

The consumer has to rely on the producer or vendor statement when it comes to trust characteristics. Ideally the producer's statement is certified by a neutral third party (Schoenheit et al., 2007).

In order to confront this trend the expansion of business activities is being striven for through a diversification strategy: the current meat quality program should be expanded in terms of further sustainability aspects or alternatively a new programme should be applied. Production can be called sustainable if it meets "the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations General Assembly, 1987). Sustainable production requires the reconciliation of environmental, social and economic demands (United Nations General Assembly, 2005). These aspects of sustainability are covered in pig and pork production by the following aspects: animal health, animal welfare, economic performance, environmental issues, genetics, human working conditions, carcass and meat quality, social conformity (Edwards, 2008).

This strategic decision follows the scientific suggestions to improve the image of the pork sector as well as providing consumers with more diversification offers (Trienekens et al., 2009).

In addition to product differentiation new distribution channels should also be expanded. To be able to offer competitive processed meat products (with additional trust

characteristics when it comes to sustainability) on the national market, it was also decided to develop a product that can be sold as self-service products in food stores.

The aim of doing so is to create innovations in the following areas (**Factor$_a$**: Content of the innovation activity) (see Figure 6.1):

- Integration of qualitative production criteria in existing production processes on the farm level, based on trust characteristics in the form of a sustainability approach (process innovation).
- Development of residue-free, cold-cut processed and packaged self-service pork products that meet food retailing requirements like long shelf life, appealing and appetising colour etc. (product innovation).
- Extension of distribution channels as well as development of a marketing concept adjusted to the products, which are regionally produced quality pork products with a high-quality standard entering conventional food retailing labelled with a farmer-owned brand which stands for sustainable production (marketing innovation).

Figure 6.1 lists all the factors relevant to this case study, which are relevant to identifying the need for support in association with the category system for the description of the initial situations (non-relevant factors are in grey).

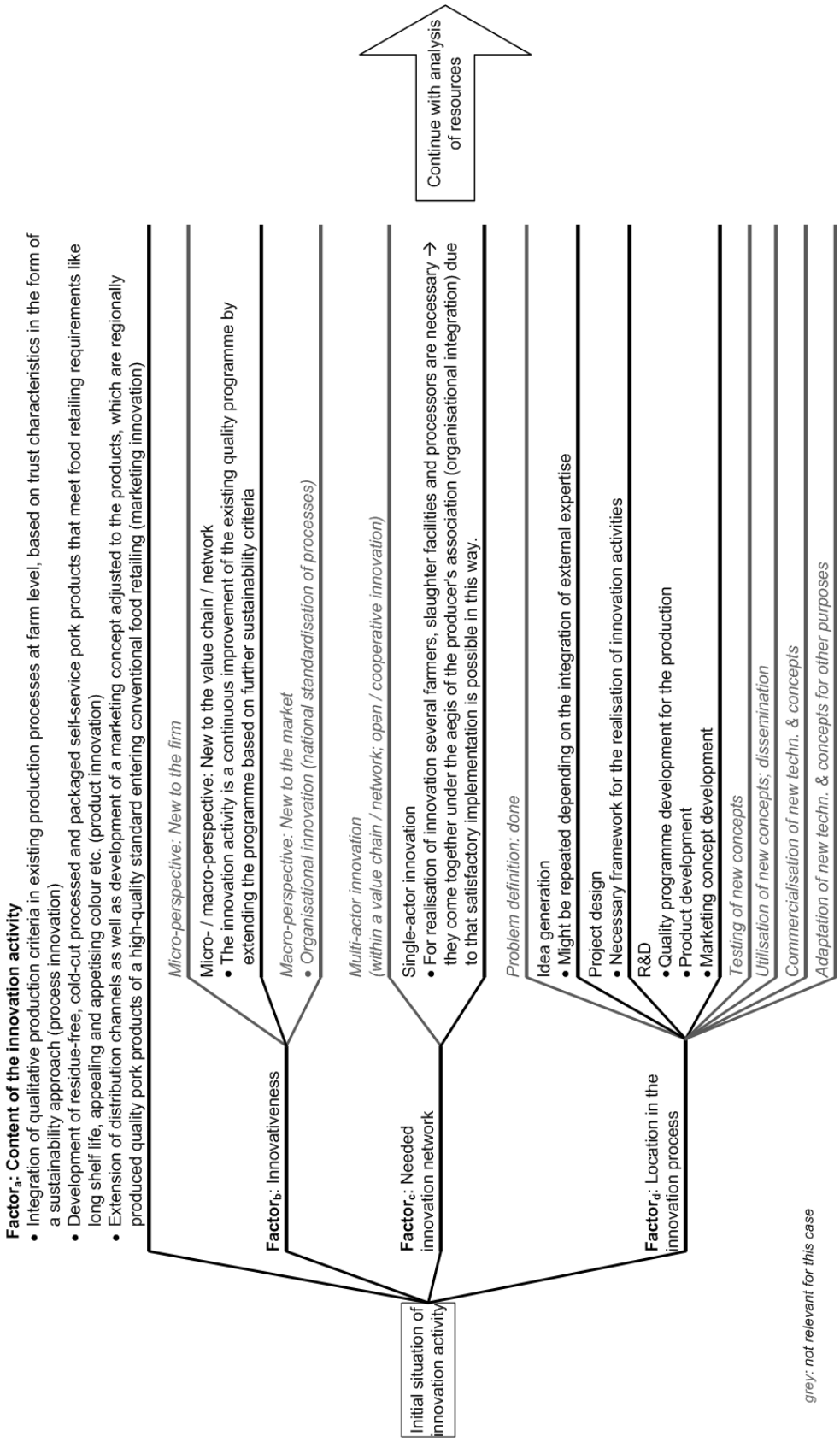


Figure 6.1: Initial situation of the innovation activity in the first case study

The innovation project consists of innovations related to the production chain from breeding to processing (**Factor$_b$**: Innovativeness – new to the value chain / network). The innovation activity has an incremental character here in relation to the changes in production methods within the producer association; at the time of the analysis the existing meat quality program was already based on several sustainability aspects. Further factors will be integrated with the innovations. In relation to the market it is also a matter of an innovation with incremental character because differently advertised products with sustainability aspects have already been established[15].

Through the integrative observation of factors$_{a, b}$ "content of the innovation activity" and "innovativeness" it is recognisable that although different actors must be integrated on the agricultural level as well as in the area of slaughter and processing for the implementation of the innovation activity, they already operate within the producer association. Through the already existing organisational integration, the implementation of the innovation activity is basically possible within the framework of the producer association (**Factor$_c$**: Needed innovation network – single-actor innovation). Whether the producer association should open its institute boundaries for further actors and needs management support in order to do so can only be decided after the available resources are considered.

Furthermore, the need for management support depends on which phase of the innovation process the innovation activity is in (**Factor$_d$**: Location in the innovation process): The initiating actor, the producer association, has already carried out the first step of the innovation process; problem analysis and the description of the innovation need. The generating of ideas has already begun (see above). Parallel to this the first analysis of resources available within the company has taken place. Based on the results of the resource analysis it might make sense to open the company to external expertise. If this is the case it should be considered to enrich the generation of ideas with external actors. In addition the focus of the innovation activity is on the phases of project planning, implementation of the innovation activity as well as testing the concepts. The R&D activities relate to:

- Development of a quality programme based on sustainability criteria for the production process
- Product development
- Development of a marketing concept for the new developed products.

[15] For example
- The Marine Stewardship Council eco-label indicates that fishery operates in an environmentally responsible way and does not contribute to the global environmental problem of overfishing;
- The Animal Welfare Approved program audits and certifies family farms that utilise high-welfare methods of farming as a selection of some established sustainability labels.
- Furthermore, first steps are taken for the development of a label based on life cycle assessment and CO_2 emission).

6.1.2 Available resources

Resources$_I$: Human

In regard to the formulated content of the planned innovation activity (see above), human resources in the area of process innovation (development or extension of a quality production programme based on sustainability criteria) are available in the form of experience with the development of quality programmes. The in-house agricultural consulting service is responsible for implementation. Here qualified employees advise affiliated farmers within the framework of the introduction of a quality programme with extended sustainability criteria. However concrete experience regarding knowledge-based assessment criteria for sustainability is missing in order to develop the programme (see Figure 6.2).

Expertise in the area of food technology is missing for the product innovation being striven for (residue-free, cold-cut processed and packaged self-service pork products that meet food retailing requirements). The producer association does have internal product development at its disposal but up to now the development has not specialised in packaged self-service pork products.

Experience is present in the area of marketing innovation. However this experience is concentrated on direct sales, for instance distribution through butcher and delicatessen shops as well as through gastronomy. Experience in distribution through classic food retail stores and through anonymous distribution channels (with no direct consumer contact) is not present.

Furthermore, there is experience present in the area of marketing with external certification and labelling based on it. These areas of competence can be allocated to protective measures in the area of commercialisation. In addition to the quality programmes named above (quality meat programmes, non-genetic modified certification, organic certification etc.), the meat and sausage products produced in the producer association are offered with the addition of (PGI). Competence and experience in the area of labelling can be considered a human resource as well as an intangible resource. For example PGI represents value for the company with an EU-quality label similar to a brand. Through external certification and labelling it is possible to communicate the trust characteristics of products (communication of quality) on the one hand and to follow a high-price strategy by a targeted position of quality leadership on the other.

Cooperation experience with scientific institutions, for instance within the framework of diploma projects and doctoral theses, is present in the area of soft skills. Furthermore, the company also has experience in the area of international cooperation (mostly business-to-business). Here the set-up of producer associations for spice cultivation in countries like Romania and India are an example. The spice cultivation also follows a strict quality programme. The goal is to use the spices produced in this program as ingredients for the meat or sausage products in order to guarantee they are residue free.

Through the experience as well as the high level of training (corresponding to a university or advanced technical college education) of some employees, the necessary language knowledge as well as experience for potential international innovation cooperation is present.

Resources$_{II}$: Intangible

As made clear in sub-chapter 6.1.1 the producer association deals with the challenges of the market and looks for opportunities to develop further through innovations. Therefore there is an innovation culture present in the company. The management board and the highest level of management issue innovations. These actors take the initiative. Since the producer association initiates the innovations as well as the innovation projects related to them, the approach to an innovation as well as project management is recognisable. However a structured and thus efficient management is not defined within the company. Efficient work structures (like structure innovation management, project management and communication flow) are important factors, which influence the success of innovation projects. Even though the company shows a deficit at this time, the relevance of such structures increases when making decisions about the number of participating players. The more actors are integrated in the framework of implementing the innovation activity, the more important it is to establish efficient structures.

Aside from human resources the company has access to intangible resources in the form of contacts which are relevant for the innovation activity being aimed for: In order to test the quality programme which is to be developed, based on sustainability criteria, agricultural operations in the member network can be won in preparation for a broader implementation on many levels of the value chain (breeding, farming, transport, slaughterhouse). During programme development their own laboratories can be used within this framework to measure meat quality traits according to changing conditions on the farm (by integrating sustainability aspects). However contacts to the research community are missing for the development of knowledge-based quality programmes in order to include the newest scientific knowledge. Furthermore, strong contacts with food retailers are missing in order to market regionally produced and newly developed self-serve products. Without them there is the barrier that the retailers will not list the new products.

Resources$_{III}$: Tangible

The producer association calculates a fixed annual budget for innovation activities. However an increase to this budget by external financial sources benefits the implementation of riskier and more expensive activities.

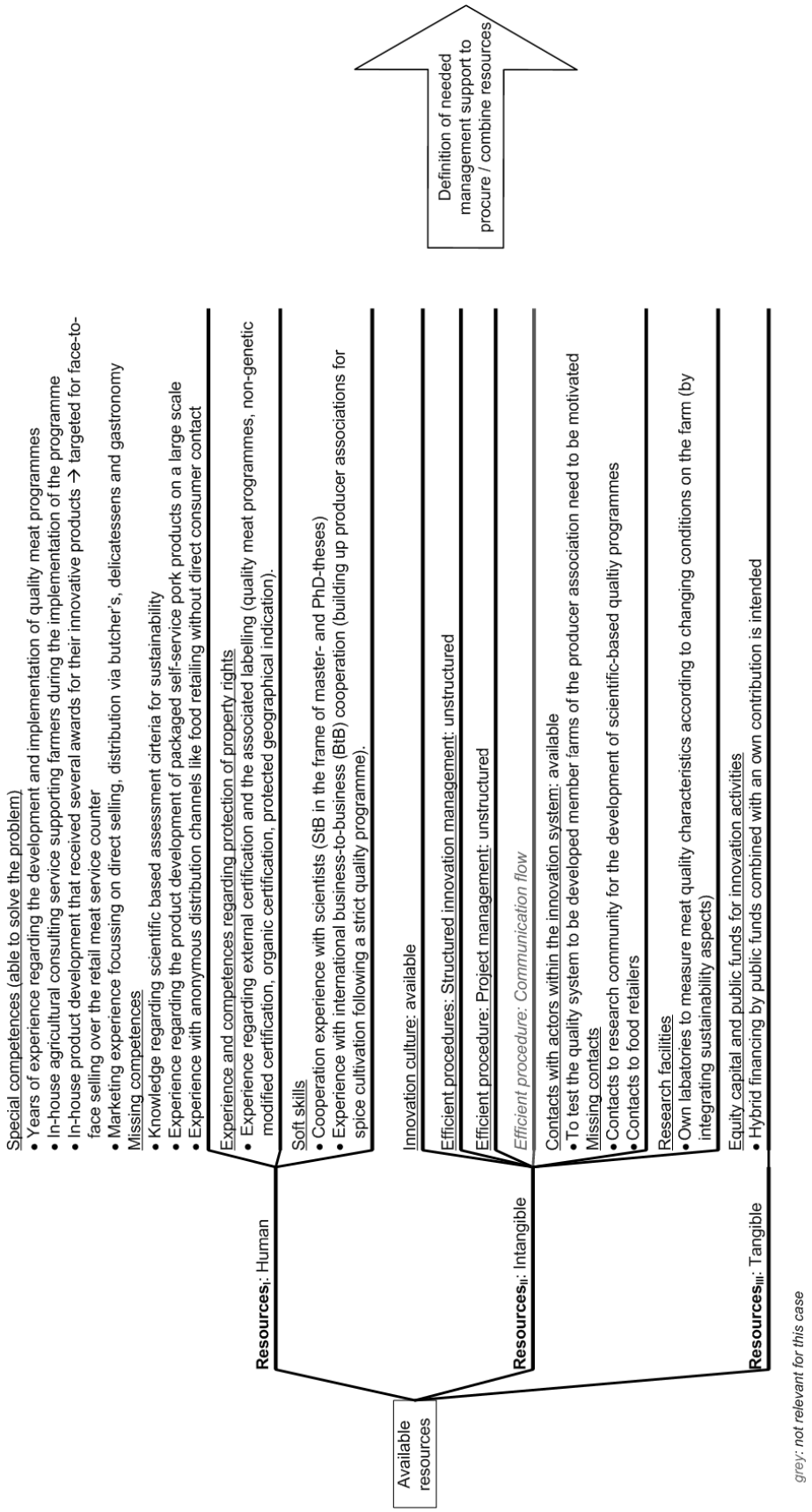


Figure 6.2: Available resources regarding innovation activity in the first case study

Interim conclusion

The interim result of the analysis of existing resources on the business level is that the producer association is reliant on the procurement of additional resources for the implementation of the described innovation activity (see 6.1.1):

- Information and knowledge regarding scientific based assessment criteria for sustainability need to be integrated as a basis for the development of a quality programme. The association has no forms of contact with the research community in this specific field,
- Experiences regarding the development of packaged self-service pork products on a large scale need to be integrated,
- Experiences with anonymous distribution channels like food retailing without direct consumer contact are missing. Furthermore in this context, no business relationship exists with food retailers.

6.1.3 Organisation of management support services for the resource procurement

After the aforementioned missing resources were identified, the company decided to integrate external resources for the implementation of the planned innovation activity. In doing so, two methods of procuring resources were adopted: Both a bilateral and multilateral cooperation was initiated. In regard to the food technological challenges for product development with corresponding specifications a bilateral cooperation with a well-known meat and sausage producer was entered into. Since in the case of bilateral cooperation there is no need for management support (based on the long-standing cooperation relationship) Figure 6.3 concentrates on the multilateral cooperation which is to be initiated.

As already made clear, the producer association is interested in the newest scientific knowledge in order to create, among other things, a quality programme for sustainable production. There is also interest in support for the challenge of introducing regional products onto the mass market using specific marketing expertise. The producer association has accounted for work groups in a research project already in existence at the time of analysis in these fields of research. The producer association received information on the content of the research project by way of information tools (newsletters, information events etc.) from a disseminator[16] of the research project (industry association) (*MSSE D1: Facilitating the flow of information*).

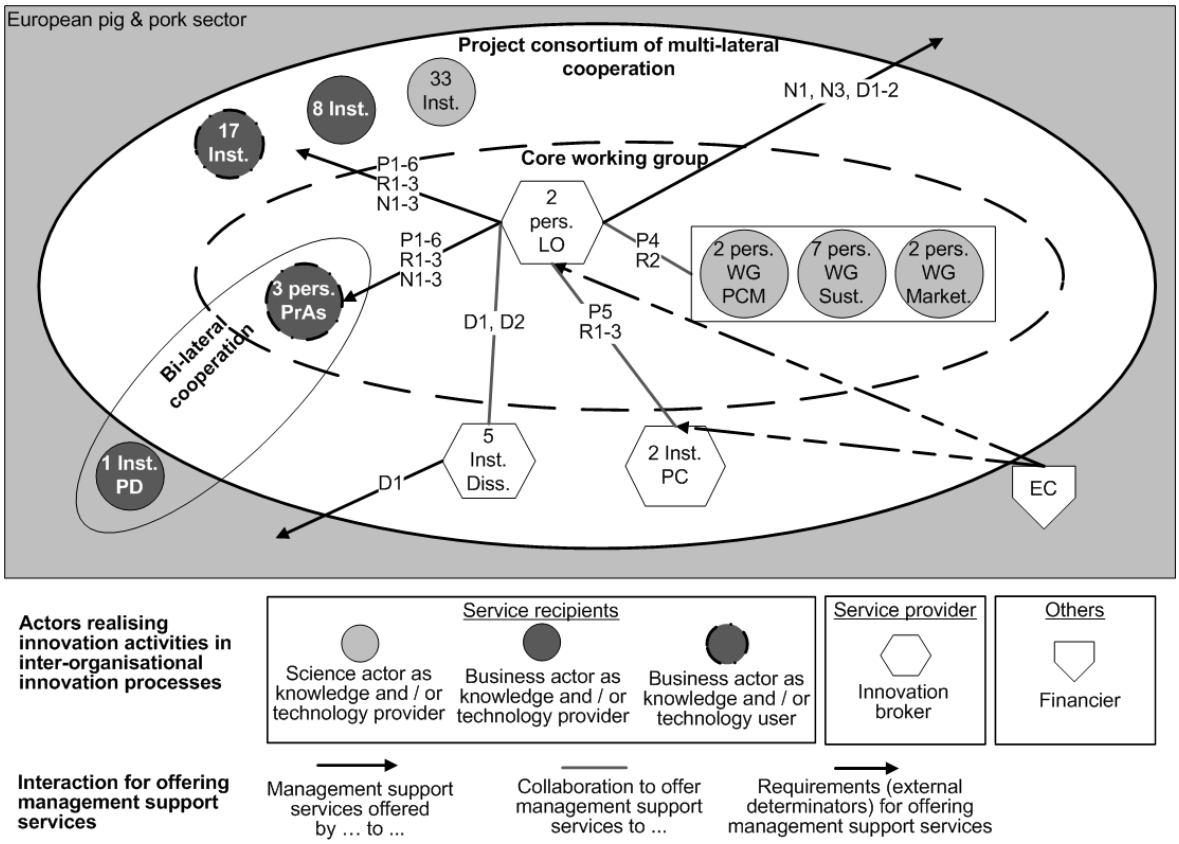
As a result the producer association turned directly to the research consortium. Within the framework of the project the research consortium had set up a so-called Industry Liaison

[16] For the purpose of information distribution the project had a team of persons who were responsible for dissemination on the European level to specific transmission of information in individual EU countries. Different target groups were approached during the dissemination activities (interested trade public, industry, university graduates etc.), and a large number of information tools were also implemented: websites, newsletters, events, workshops, official trips, conferences, demonstrations, eLearning material etc. (*MSSE D1: Facilitating the flow of information, D2: Offering trainings*).

Office (this acts as an innovation broker), which offered management support services specifically for economic actors. The Liaison Office took on a bridging function in the research consortium by mediating content between the work groups relevant to the producer association and the interested producer association[17].

The following figure illustrates relevant actors of the specific inter-organisational innovation process including the indication of interactions to offer management support service elements (MSSE) for the resource procurement and resource combination process.

[17] The Liaison Office had a general overview of the ongoing research activities of the individual work groups and could thus take on mediating functions.



Offered management support service elements (MSSE)		
P: in the frame of the preparation of innovation activities	P1: Facilitating idea generation process P2: Matchmaking between described problem and problem solution P3: Matchmaking of competences resulting in synergistic effects	P4: Development of consistent project plan P5: Support during the application for subsidies P6: Obtain consent of new partners regarding consortium agreement
R: in the frame of the realisation of innovation activities	R1: Controlling regarding budget, time and tasks compliance R2: Coordination of project documentation	R3: Translation of financier's requirement
D: in the frame of dissemination	D1: Facilitating the flow of information	D2: Offering trainings
N: in the frame of networking	N1: Organisation of direct contact possibilities N2: Initiation and chairing of meetings	N3: Supporting international relationships

Abbreviation			
	pers.: Person (of staff) Inst.: Institutions PrAs.: Producer association PD: Product developer Diss.: Disseminator	LO: Industry liaison office PC: Project coordination team EC: European Commission WG PCM: Working group pork chain management	WG Sust.: Working group sustainability aspects in pig production WG Market.: Working group marketing

Figure 6.3: Relevant actors and offered management support services during resource procurement and resource combination in case study 1

After the producer association turned to the Liaison Office with its concerns the first matchmaking began on this level. Hereby the Liaison Office scanned the project content in order to find solution methods to the problems described by the producer association (*MSSE P2: Matchmaking between described problem and problem solution*). Individual groups in the research consortium worked in the topic area relevant to this case study of "sustainability aspects in regional pork production chains". In this area competences on different sustainability aspects were found. Aspects of sustainability are covered in pig and pork production by the following aspects: animal health, animal welfare, economical performance, environmental issues, genetics, human working conditions, carcass and meat quality, social conformity (Edwards, 2008). In addition marketing expertise and competence for designing sustainable pork chain management was identified.

In addition to a positive assessment of the expected solution methods regarding the described problem, at the time of analysis the formal possibility existed (in the form of a public competitive call) to take on new partners in the existing research consortium.

The first matchmaking helped the company in two ways: Firstly the company's expectations of the multilateral cooperation became more tangible. Secondly the application for acceptance as a project partner could be formulated more precisely through more detailed explanations of project content.

The application phase as well as the formal integration[18] of new partners was prepared, accompanied and coordinated by the Liaison Office. For this the contract signing of numerous forms and documents was prepared as integral parts of the contract[19]. Contract signings took place between the new partners and subsidy providers as well as between the new partners and the existing project consortium (represented by the project coordination team). The arrangement of the documents occurred in part directly through the Liaison Office in cooperation with the project coordination team. In part the new project partners had to supply information for this. They were hereby supported by the Liaison Office (*MSSE P5: Support during the application for subsidies*). Furthermore, the Liaison Office acted in the name of the new project partner as a representative negotiating partner with the subsidy provider (European Commission). Last but not least the Liaison Office represented the interests of the project consortium by introducing the new partner to the policies of the consortium (*MSSE P6: Obtain consent of new partners regarding consortium agreement*). The consortium agreement is comprised of agreements on internal cooperation (for example agreements regarding governing bodies, roles and responsibilities; intellectual property and access rights).

There was also a need for support during the implementation of the innovation activity within the cooperation consortium. This was in part due to the complex structure of the

[18] Competition situation during the call: 29 proposers submitted proposals for joining the project. Finally 13 new partners were formally integrated. The selection of new partners was made by an evaluation panel (consisting of the project coordination committee and two project external evaluators).

[19] Integral parts of the contract were:

- Information (about the economic situation, among other things) about the new project partner;
- Content description of the planned activity including a description of how the new content is to be embedded in the entire project;
- Consortium agreement between project partners

consortium. The consortium consisted of a large number of partners and work groups from ca. 20 different countries. Because of this it was especially difficult for new partners to get an overview (see Figure 6.3). The Liaison Office identified three work groups within the entire consortium that could offer problem-solving concepts in cooperation with the producer association. These work groups united competence in different sustainability aspects in the area of agricultural production, marketing expertise as well as expertise in the development of sustainable pork chain management. But not only did the company experience additional advantages from working together; the scientists were able to validate their research results through a user-oriented approach thereby developing it further. By pointing out potential synergistic effects, representatives were won from the individual work groups who were available for interdisciplinary cooperation with the company (*MSSE P3: Matchmaking of competences resulting synergistic effects*).

However it should be noted that the availability of individual competence is not enough to create a successful multilateral cooperation. In order to exhaust synergies, efficient communication and operating sequences need to be established. The combination of existing competence began with bringing together the individual actors. To accomplish this, the Liaison Office organised and moderated the first meetings between the actors (*MSSE: N1: Organisation of direct contact possibilities; N2: Initiation and chairing of meetings*). Within this frame it was initially of great importance to create a positive and constructive work atmosphere. An indicator for the first foundation of trust was the exchange of initial ideas for problem solving approaches between the actors (*MSSE P1: Facilitating idea generation process*). Thus the innovation process, which had already begun on the individual operation level, was continued. An implementation plan was compiled, based on the prioritised ideas, which explained the cooperation between the actors from the core work groups as well as those responsible in more detail (*MSSE P4: Development of consistent project plan*). The Liaison Office worked closely with the scientists hereby. The implementation plan presented a combination of the company's innovation project strengthened by research estimates and results from the scientific work groups. Thus the competence extended by multilateral cooperation was noted.

During the transition between the evaluation phase and the actual project implementation the Liaison Office pulled out of the content work. Such a pulling out, when the interaction between the actors in the innovation process is running successfully, is also described by Caputo et al. (2002). The Liaison Office thus acts as an innovation broker as defined by Winch and Courtney (2007) (see 3.1). The Liaison Office followed the aim of taking over transaction and coordination tasks to enable other actors to concentrate on the content of the innovation process. The scientists then took over chaperoning the content.

Since the innovation activities were partially funded by the public sector, project specific management and administration requirements (project controlling regarding budget, time and task compliance; project documentation) had to be followed. Here the Liaison Office in cooperation with the project coordination team of the entire consortium took over relevant transactions and coordination tasks. Hereby the project coordination team was responsible for aspects, which affected the entire consortium. The Liaison Office offered more intensive support especially for the economic partners of the consortium (for old and

new economic partners). It informed the economic partners as necessary about the documentation and report requirements of the support programme. Depending on experience in relation to third party funded projects there were additional advisory needs beyond the need for basic information (*MSSE R1: Controlling regarding budget, time and tasks compliance; R2: Coordination of project documentation*[20]). Within this frame these two actors took on innovation broker functions by communicating the demands of the fund providers to the new partners in a way which was suitable to the target groups (*MSSE R3: Translation of financier's requirement*).

In addition to support in project management it became clear in this case study there was a need for support for communication and network activities (both project internal as well as external). Because of existing structures in the project consortium, an international exchange of experiences between project internal economic actors (actors of regional production chains) was possible. Furthermore, the need to seek the exchange of ideas outside the consortium was formulated. Here the Liaison Office, being a neutral and supervisory institution, was able to create contacts to external actors and initiate workshops for exchanging experiences (*MSSE N1: Organisation of direct contact possibilities; N3: Supporting international relationships*).

Interim conclusion

In summary it can be said that the producer association opened the boundaries of its institution based on resource analysis in two respects: It decided on bilateral as well as multilateral innovation cooperation in order to balance missing resources. Within the framework of the multilateral cooperation the producer association used the management support services of the Liaison Office in an existing research project. This created a pivotal issue for the economic partners participating in the project. Through this device the complex structure of the consortium could be simplified for new economic actors entering into the current project. Furthermore, the research project had an increased amount of resources at its disposal through the establishment of the Liaison Office, in order to conciliate the numerous demands of the fund providers in ways suitable to the target groups and thus shape the integration of the economic actors efficiently.

Through the establishment of such an institution in a large research consortium the barriers described in sub-chapter 2.5 are taken into account.

[20] The Liaison Office was supported, in regard to the content of the report, by scientists who are integrated in the core work group.

6.2 Case study 2: R&D on innovative measuring technologies in the meat industry

6.2.1 Initial situation

In the second case study the focus is on a small company active in the branch of bioanalytics. It is a start-up company, which has emerged as a spin-off from a research centre. The company develops, produces and distributes sensor technology. The core competence is the combination of innovative detection technology with biomolecular analysis techniques. Interactions between biomolecules are analysed using this technology. Furthermore, the technology makes qualitative and quantitative analysis of volumes from a diffuse matrix (for example blood serum or saliva) possible. Thus knowledge and a deeper understanding of the processes are made possible on a molecular level. The main clients are universities that are active in research and development, research institutions and industrial companies (especially in the field of biotechnology, pharmacy, medicine and diagnostics). The products are well suited to small biotech and academic laboratories.

The company strives towards an expansion on the market where new technological fields of application are sought after (**Factor$_a$**: Content of the innovation activity, see Figure 6.4). Hereby it is necessary to adjust the products at the request of the branch by carrying out product adaptation (product innovation). The market focus for the adaptation is in the agrifood sector. The company assumes that the branch has a need for innovative diagnostic methods in the field of food safety and quality management. This assumption results from the initial contact with a university in the agrifood sector. Within this framework the potential application of technology in quality management in the meat industry was discussed. Possible testing methods to detect occurrence of substances (for example; proteins, germs, contaminants) were discussed. The sensor technology is suitable for the detection and identification of the smallest amounts of molecules. A decisive advantage to this technology is the selective and highly sensitive characterisation of a broad spectrum of different substances. With help from individual sensor chips a sample can be tested for different analytes at the same time. This allows for high performance with low consumption of samples, which are often expensive.

Figure 6.4 lists all the factors for this case study that are relevant in the concept of identification of the need for support associated with the category system for the description of the starting position (non-relevant factors are shown in grey).

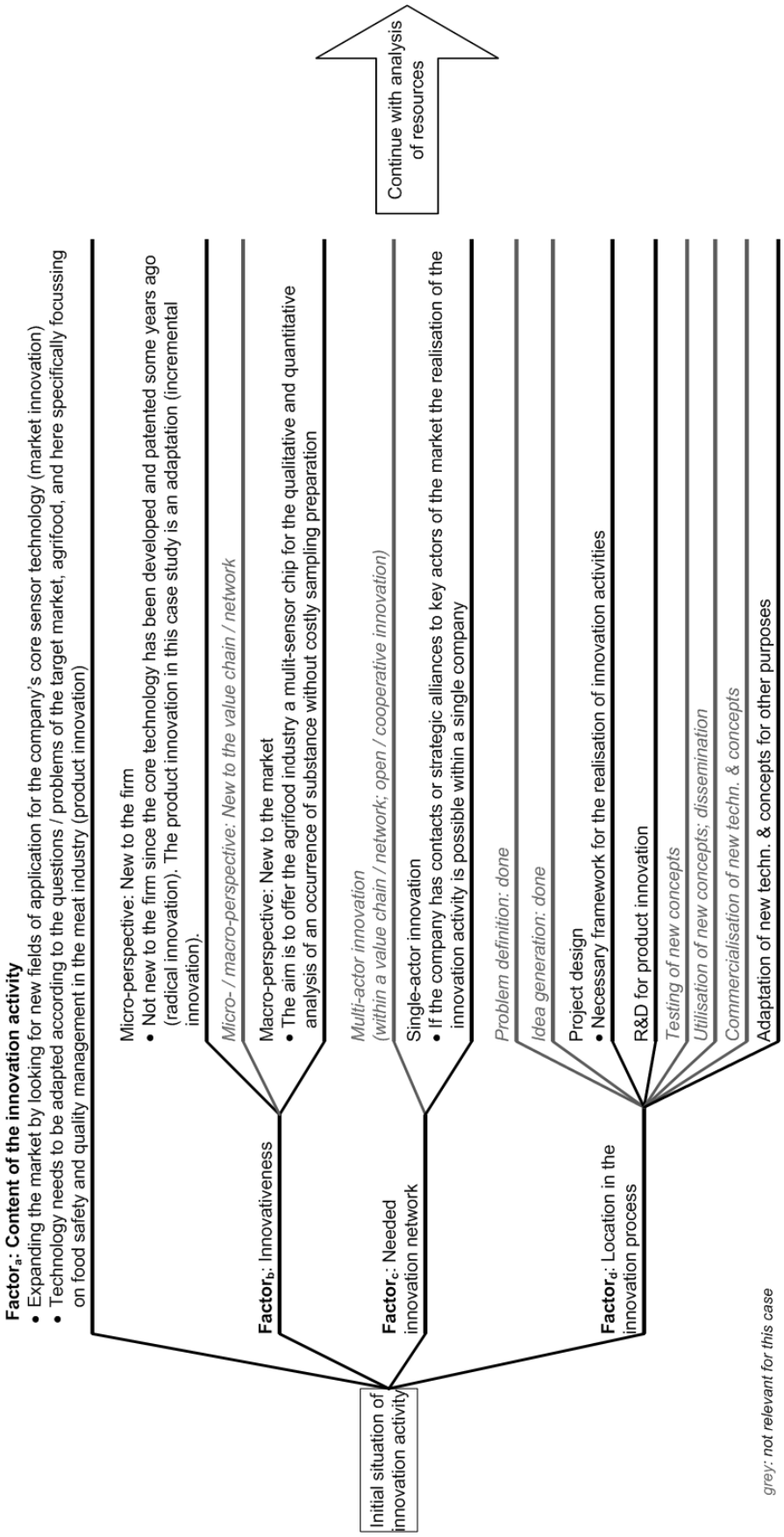


Figure 6.4: Initial situation of the innovation activity in the second case study

The aim of the innovation project, in the form of product adaptation, is to offer innovation to the agrifood sector through qualitative and quantitative analysis of substance occurrence without elaborate sample preparations using multi-sensor chips (**Factor$_b$**: Innovativeness – new to the market). Whether it will actually be an innovation for the market has yet to be seen. At the moment parallel research and development activities for similar products (multi-sensor chips) can be observed. Even though it may be a market innovation based on the target market, the innovation has an incremental character (it is not a radical innovation). It will create a new technological field of application in the agrifood sector. The radical innovation in the form of newly developed sensor technology has already been developed and patented by the company a few years ago (see sub-chapter 6.2.2). Thus technology diffusion occurs with the planned innovation activity (see also sub-chapter 2.1).

For technology adaptation branch-specific knowledge is necessary in order to be able to define questions and problems in new fields of application and then to implement them while targeting product development.

Through the integrative observation of factors$_{a,b}$ “content of the innovation activity” and “innovativeness” it is recognisable that a new market needs to be served. First of all the sensor technology needs to be adjusted to specific market questions in order to enter into the new market of the agricultural and nutritional economy. For this, additional R&D work is necessary. In addition, further market knowledge and possible initial contacts to reference clients in the new market are advantageous for raising the probability that the newly developed technology gets introduced to the market later. Should the company have contacts or strategic alliances to key actors at its disposal, then an implementation of the innovation activity is possible as an individual company (**Factor$_c$**: Needed innovation network – single actor innovation). Whether the company should open the boundaries of its institution for further actors and requires management support to do so can only be decided after considering the available resources.

Furthermore, the need for management support depends on which phase of the innovation process the innovation activity is in (**Factor$_d$**: Location in the innovation process): The initiating company (sensor technology developer) has the first step of the innovation process: the problem analysis, the description of the innovation needs (product adaptation for new fields of application as well as the creation of new markets) as well as the initial generating of ideas with the aforementioned university for potential fields of application for sensor technology. Within the framework of the upcoming innovation activity the focus of the innovation activity is on the project planning phase and the implementation of R&D work for product adaptation.

6.2.2 Available resources

Resources$_I$: Human

Based on the formulated content of the planned innovation activities (see above) human resources are available for the implementation of the product innovation (new

applications): They are in the form of experience as well as competent problem solving personnel[21]. Experience and knowledge of the new target market is not discernible (see Figure 6.5).

For the founding of the company the decisive company capital presents a patent on the sensor technology, which becomes the basis for numerous applications. Thus the employees have experience in the main features of patent procedures and patent strategies. In this area the company works together with patent consultants and patent strategists. The patent lawyers take over the patent research and the application process.

Experience with the implementation of research cooperation in the area of soft skills is present. These experiences are in regard to research cooperation with international companies (business-to-business). Through cooperation of this sort, as well as the high educational level of employees, it can be assumed that there are foreign language skills (at least in terms of the English language). Experience with third party funded projects is not present.

Resources$_{II}$: Intangible

Aside from human resources the company has intangible resources at its disposal in the form of patents (as mentioned above). Also the company's internal innovation culture and innovation management are to be mentioned here: Reference clients (for example from biotech companies and the academic milieu) can test the technology and so have influence on modifications and future developments. Not only are the clients included, the suppliers are also asked to bring in ideas.

However two decisive resources are missing within the framework of intangible resources – contacts to the market being aimed at (agrifood market) as well as knowledge about it. On the one hand contacts are necessary to be able to process branch specific problems with already developed technology through new applications. On the other hand contact to key clients could minimise market entry barriers.

Although efficient work structures (like project management and communication flow) are important factors that influence the success of innovation projects, they are not relevant at the current time of analysis. Efficient structures are to be established after the number of actors has been decided upon that are necessary for the implementation of the innovation activity.

Resources$_{III}$: Tangible

In the area of tangible resources the start-up company has been dependent on external investors since its founding. In order to expand company activity to new markets thereby securing numerous sources of revenue, the young company is dependent on additional budgeting for the innovation activities.

[21] Personnel in product development hold mainly a master or a doctor degree of engineering.

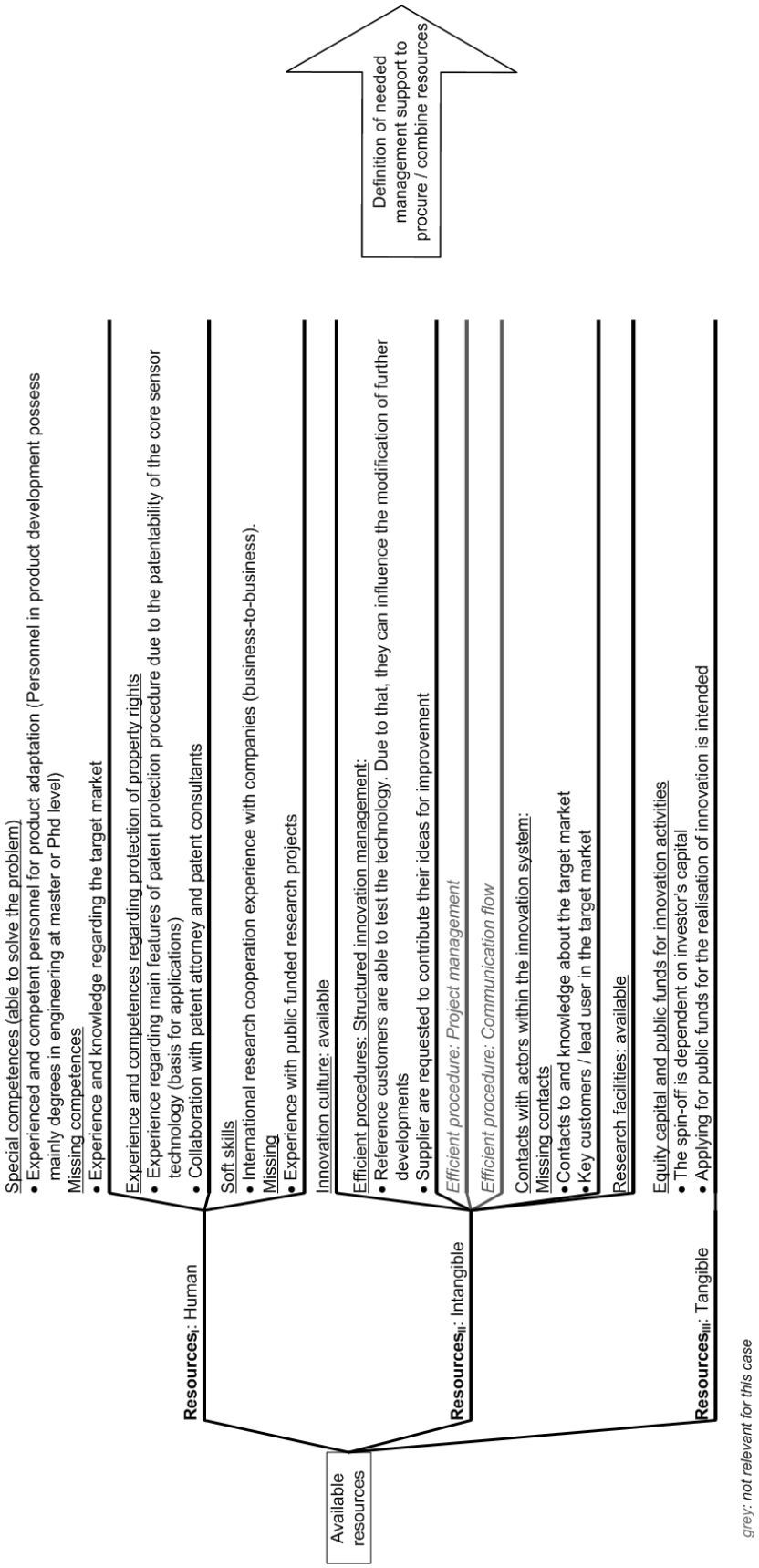


Figure 6.5: Available resources regarding innovation activity in the second case study

Interim conclusion

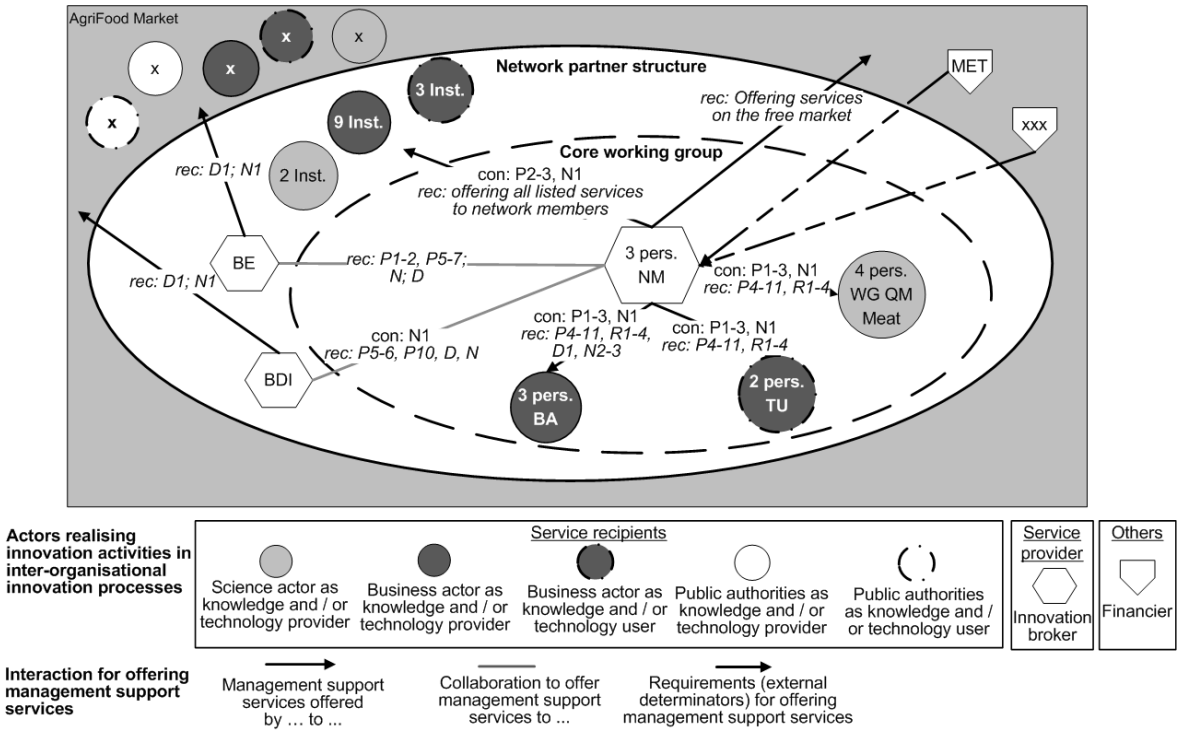
The interim result of the analysis of available resources on the company levels shows that the company is dependent on the procurement of additional resources for the described innovation activity (see 6.2.1):

- Experience and knowledge of the new target market to be able to process the branch specific questions with already developed technology through new applications (branch requirements for detection and sensor technology are not known)
- Contact to key customers and lead users in order to minimise market entry barriers

6.2.3 Organisation of management support services for the resource procurement

In order to procure the missing resources the company decided to join a technology and innovation network in the agrifood sector. In this network companies and research establishments come together with the goal of developing innovative technologies in the area of online and offline measurements for the agrifood market. Another focus is on the combination of measurement technologies with information and communication systems in order to make measurement results comprehensive to all stages of production. Hereby advancements in operational and especially in inter-organisational quality management and in quality communication in the value chain of the agrifood industry is striven for. The network is currently in development, therefore support services are not being offered in full at the moment. Figure 6.6 differentiates between the support service already being offered (conducted, in black) and the recommended support services (recommended, in grey).

The technology provider in focus (bioanalytics company) learned about the network through the department of urban business development. The department itself participates in the development of the network. It created the direct contact between the company and the network management (*MSSE N1: Organisation of direct contact possibilities*). The network management functions as an innovation broker by offering management support services for the planning and implementation of innovation activities. The network management takes on a mediating and integrative bridging function between the internal network partners as well as between network partners and external actors (among others; fund providers, further market actors as potential technology users etc.) The following figure illustrates the relevant actors for resource procurement and resource combination process including the indication of used management support service elements (MSSE).



Offered management support service elements (MSSE)		
P: in the frame of the preparation of innovation activities	P1: Facilitating idea generation process P2: Foresight / trend analysis P3: Competence mapping of internal available resources and competences P4: Supporting in working out criteria for the procurement of external resources (if needed) P5: Competence mapping of external available resources and competences (if needed)	P6: Acquisition of new partners by a formal integration (if needed) P7: Looking for experts that can be linked to consortia to give advice P8: Development of consistent project plan P9: Coordination of consortium during designing process P10: Looking and applying for subsidies P11: Supporting in setting up consortium agreement
R: in the frame of the realisation of innovation activities	R1: Controlling regarding budget, time and tasks compliance R2: Coordination of project documentation	R3: Translation of financier's requirements R4: Facilitating communication structures and procedures between partners
D: in the frame of dissemination	D1: Facilitating the flow of information – Public Relation	
N: in the frame of networking	N1: Organisation of direct contact possibilities	N2: Initiation and chairing of meetings N3: Supporting international relationships

Abbreviation			
	pers.: Person (of staff) Inst.: Institutions BA: Bioanalytic technology provider WG QM Meat: Scientific working group in the field of quality management in the meat industry	TU: Technology user NM: Network management BE: Branch expert assessing quality assurance concepts MET: Ministry of economics and technology	BDI: Business development institution xxx: other financial supporting programmes con: Services already conducted in the frame of the case study *rec: Recommendation that services should be offered in the future*

Figure 6.6: Relevant actors and offered management support services during resource procurement and resource combination in case study 2

As already mentioned the network is currently in the stage of development. At the time of analysis the network consists of 16 partners. The partner structure combines business actors as providers of measuring and testing technologies (five institutions), business actors as providers of information and communication technologies (four institutions) as well as business actors as technology users (three institutions). Technology providers are partly located in the agrifood market. Some of them are not yet active in this market (like the investigated bioanalytics company). Future R&D cooperation projects can be supported by scientific institutions (as well as members of the network; two institutions).

For the realisation of R&D projects according to market requirements, the network partner structure additionally contains a branch expert institution in the field of quality assurance systems. This branch expert also collaborates on an international level. Because of this a fit to international demands and trends can be assured. In addition the network management itself has given an international orientation in R&D. The institution, in charge of managing the network, has core competence in planning and realising R&D cooperation projects on the European level. According to the actual need for R&D the partner structure might be adapted throughout the course of time. For the integration of potential new members, the network can make use of contacts especially with technology providers from other branches by an office for business development (member of the network). Furthermore, contacts to branch experts and the network management are valuable. These three institutions collaborate to offer innovation broker services focusing especially on networking and dissemination.

The focus of further observation is on the investigated bioanalytics company. The following described services relate first and only to this company and / or the core work group. The same services will be offered to the technology user as well as the scientific establishment of the core work group.

Coming back to the investigated bioanalytics company: With help from the department of urban business development and in the presence of the network management the first contact has made between the company and a university work group in the area of quality management in the meat industry (*MSSE N1: Organisation of direct contact possibilities*). In this first meeting ideas for potential applications were exchanged (*MSSE P1: Facilitating idea generation process*). The first concrete development trials have taken place.

Parallel to this the network management performed management and organisation services for the development of the network. The services were performed for all network partners with the goal of developing a strategic direction. Within this framework a network internal strength and weakness analysis was carried out and combined with an external chance and risk analysis. By doing this a further perspective trend analysis was developed for the market to be serviced. The results of the steps of analysis support the network internal resource management whereby competence mapping offers clarity on the resources and competences available in the network. (*MSSE P2: Foresight / trend analysis of the external environment and the surrounding; P3: Competence mapping of internal available resources and competences*).

Furthermore, the network partners were brought together for the first network meeting (*MSSE N1: Organisation of direct contact possibilities*). Such network meetings make it possible for the investigated bioanalytics company (technology provider), which is foreign to the sector, to contact actors from the new target market (actors being potential R&D cooperation partners or potential key customers). In such meetings the core work group was formed (see Figure 6.6).

To be able to close the company's identified resource gap, the initiation of a R&D cooperation project is being striven towards in order to develop technology applications. Within this framework there is need for support for the initiation as well as implementation of concrete projects. The technology provider was brought together with branch experts, potential technology users and branch scientists for the project design. In creative sessions ideas for possible applications were developed and worked out (*MSSE P1: Facilitating idea generation process*). The result of generating ideas will be a concrete requirement catalogue that contains objectives and criteria for development. Furthermore, with the help of this catalogue it is possible to track down further specific competences in the network or beyond it if necessary[22] (*MSSE P4: Supporting in working out criteria for the procurement of external resources needed for the realisation of an innovation activity; P5: Competence mapping of external available resources and competences; P6: Acquisition of new partners by a formal integration*). It is recommended to work closely with the department of urban business development integrated in the network, and branch experts, using their contacts, for external competence mapping as well as the integration of additional network partners (if the competences required for the innovation project being striven for are missing). In addition it is recommended to draft an advisory board to avoid undesirable development (*MSSE P7: Looking for experts that can be linked to consortia to give advice*).

In order to be able to carry out concrete R&D projects a consistent project plan needs to be developed that defines the objectives, division of labour and responsibilities. This project plan should also contain clear time and budget guidelines (*MSSE P8: Development of a consistent project plan incl. defining responsibilities*). In this concrete case cooperation at least between the technology provider and a scientific establishment as well as a technology user should be striven for. This would create the need to coordinate the composition of the project plan between the participants (*MSSE P9: If the innovation activity will be implemented in an inter-organisational cooperation: Coordination of consortium during the designing process*). The project plan provides clarity on the content of the project work and responsibilities, nonetheless it is important to contractually regulate the responsibilities and ownership rights of the new knowledge in cooperation projects. The network management can hereby offer support by formulating cooperation contracts and coordinating among the participants (*MSSE P11: Supporting in setting up consortium agreement*).

[22] Should resources and competences be unavailable within the network, they should be externally procured.

Parallel to compiling the project plan, the network management, in cooperation with the department of urban business development, can keep an eye out for funding possibilities and apply for them (*MSSE P10: Looking for subsidies and applying for subsidies*).

Provided that the initiation of a cooperation project has been successfully concluded, it is recommended that the network management take on organisation and administrative tasks within the framework of the project processing. Hereby it should be ensured that the project plan and / or the compulsory documentation in publicly funded projects are kept (*MSSE R1: Controlling regarding budget, time and tasks compliance; R2: Coordination of project documentation; R3: Support in public funded projects by translation of financier's requirements into specific project guide lines*). In addition it is also recommended to create communication structures for a continuous exchange of information both within the core work group and beyond on the network level (*MSSE R4: Facilitating communication structures and procedures between partners*).

In the area of public relations (PR) further services can be offered by the network management. PR serves to enhance the reputation of the network partner and the network in general[23] as well as passing on information to the interested professional public (*MSSE D1: Facilitating the flow of information – Public relations*). For the technology company being investigated, which is foreign to the sector, such PR services are of fundamental importance for achieving prominence in the new market. Furthermore, this can be supported through active networking whereby the network management brings specific actors together and includes the international market if necessary (*MSSE N1-3: Bringing actors of the innovation system together*). Close cooperation in the area of dissemination and networking is recommended between the network management and the department of urban business development as well as with branch experts.

Though this case study focuses on the core work group it should be mentioned that the described services should be offered to all network partners.

Interim conclusion

In summary it can be said that the technology provider that is foreign to the sector seeks access to the internal missing resources by joining a technology network of the agrifood market. The network targets the development of new measurement technologies in combination with innovative information and communication systems in inter-organisational quality management for the agrifood market. Among other things a sector spanning technology diffusion takes place in which applications from technologies foreign to the sector are offered to the market. In relation to the company being investigated, in this case study market entry barriers can be minimised through network membership. Entry into the market is made easier through the offer of organisation and coordination services for the initiation and realisation of innovation cooperation, as well as services in the area of dissemination and networking. In this way the barriers described in sub-chapter 2.5 are taken into account.

[23] External actors can be made aware of the network through PR and participation interest can be awakened. Thus further key competences can be won for the network.

6.3 Case study 3: Standard for data collection to detect animal health status in piglet farms

6.3.1 Initial situation

Germany is one of the most significant pork producers within the European Union. But Dutch, Danish and German producers compete on the piglet market for market shares. The prognosis says that the import of piglets to Germany will increase (Hortmann-Scholten, 2009). The reasons for this are on one hand the production requirements of neighbouring countries that favour the level of piglet production over the level of fattening (for example through strict environmental regulations). Thus the surplus of piglets is available for export. Furthermore, the neighbouring countries offer uniform product related quality information on animal health status. Although product related information on the health status of animals is also offered for German pigs, many different regional programs have formed in Germany. Because of the large number the information leads to more uncertainty rather than transparency.

In order to counteract the trend on the piglet market of importing piglets from neighbouring countries and to strengthen German piglet production, there needs to be a reaction to the demand from fatteners and livestock marketers for a uniformly defined and transparent standard for the enquiry and documentation of animal health information. A prerequisite for evaluating the health status of animal groups and stock is the standardisation of existing monitoring programmes. A uniform procedure when it comes to samples and sample analysis makes it possible to compare between piglet suppliers. A procedure coordinated in this way should create transparency and trust among the German piglet producers. Furthermore, they should be motivated to participate in a voluntary monitoring and certification process of enquiry and communication of animal health status. A systematic procedure here does not only serve communication among buyers. Furthermore, it is a necessary requisite for effective animal health management within the framework of operational quality management of production and therefore a basis for steady improvement. Through such quality relevant information and the communication thereof, the livestock marketers as well as the fatteners have the possibility of classifying the risks of batch purchases. Thus it can be decided which measures are to be taken when stabling.

A permanent, improved creation of value in connection with market-oriented marketing will only be possible with transparent assurances and communication of additional quality relevant information in the future (for example information on animal health status and the communication thereof using neutral data banks). Following the already existing systems[24], standardised diagnostics for evaluating the risks in relation to economically significant causes should be carried out in Germany as well. Hereby it should be emphasised that the competitiveness of German piglet production can only be guaranteed

[24] For example, like the SPF-system in Denmark: The system connects commercial interests with health requirements. A cornerstone for the SPF-system is the declaration of health status in the attached stock (Danish Agriculture and Food Council, 2008).

when regional initiatives join together and face the European competition as a national unity. In this context it becomes clear that collective achievement, consensus and criticism are important for a successful value chain. Of course the competitiveness of the individual, as well as unique, fast and tangential innovations, are also essential contributions. However these are always included more strongly in a creative, constructive and above all pragmatic cooperation (Petersen et al., 2010).

In the innovation activity of this case study the following is being striven for: to operate under a nationwide uniform label in order to make the entire German marketing of piglet more competitive against the systems of neighbouring countries (Bruns et al., 2009). The innovation activity hereby concentrates on the development of a proposal for a national standard for enquiry and documentation of animal health information. The pig health monitoring and its documentation as well as its image (supported by database-driven systems) serve the purpose of:

- Offering piglet producers a constant improvement process through continuous monitoring.
- To deliver enquiry results to fatteners on the health status of production units from which piglet batches are purchased. This offers fatteners the opportunity to make a quality selection when purchasing. The fattener is put in a position to purchase piglets from producers where there is no suspicion of germs being investigated.
- Piglet marketers also receive information about animal health status which helps optimise marketing.

In this case study there are two phases in the focus of observation (**Factor$_a$**: Content of the innovation activity) (see Figure 6.7):

1. The process of building consensus in a core work group in order to develop a proposal for a national monitoring standard for enquiry and documentation of animal health information with the goal of assessing the animal health status at piglet producing units.
2. Formulation of the Germany-wide implementation of the monitoring standard.

Figure 6.7 lists all the factors to this case study that are relevant for the concept of identification of the demand for support in relation to the category system for the description of the initial situation (non-relevant factors are written in grey).

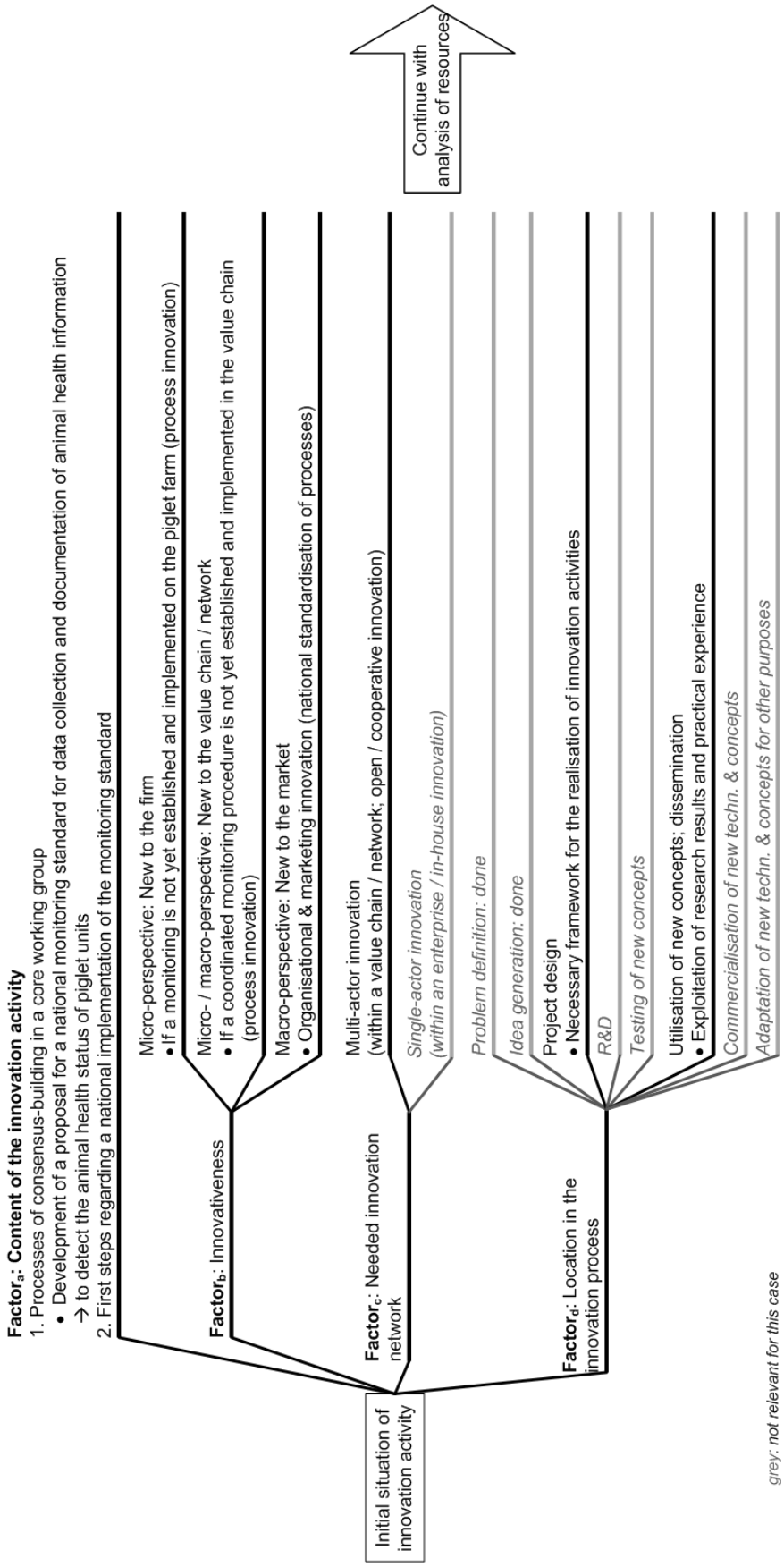


Figure 6.7: Initial situation of the innovation activity in the third case study

The monitoring standard for enquiry into animal health data being striven for is a marketing tool, which makes additional quality relevant information available to customers. The result of the innovation activity can be classified as a marketing innovation in this function. In terms of originality it is an incremental innovation, since piglets are already being marketed on the German market with additional quality relevant information in accordance with a standardised procedure (for example Danish SPF-piglets). Thus the marketing tool being striven for (marketing of piglets with a health certificate or a health status retrievable on the internet) is not new to the market. Fatteners already orient themselves according to corresponding labels like “SPF”, using the Danish example. Initiatives can be seen and systems have already been established on the German regional level. However in the development and implementation of a Germany-wide standard it is a matter of standardising the process of enquiry and communication of health relevant information in relation to the production of the product “German piglet”. The innovative character focuses mainly on organisational innovation. Firstly a group from primary production sets the challenge of making procedures uniform by standardising them. On the one hand regional initiatives in Germany are to be united hereby (because the standard presents a unified basis) and on the other hand regional characteristics are to be preserved (because additional enquiries for assessing animal health status can continue to be depicted) (**Factor$_b$**: Innovativeness – new to the market).

Furthermore, the innovation activity can prove to be an innovation in relation to specific value chains. This is valid when there is a coordinated procedure between piglet producers, veterinarians, marketers and fatteners, which was previously not established in the value chain (**Factor$_b$**: Innovativeness – new to the value chain / network).

On the level of individual companies, actors encourage participation in the standard where systematic monitoring and / or adaptation of the existing monitor system in relation to the suggested range of pathogens is performed. Up to now mostly salmonella monitoring has been known on the fattening level. If the company has not yet introduced monitoring systems on the piglet level, then a company internal process innovation will be initiated through participation in the standard; strict proposed (standardised) monitoring will be carried out and on this basis structured animal health management can take place (**Factor$_b$**: Innovativeness – new to the firm). These individual operational implementations of an innovation are in turn a requirement for a value creation related innovation, since activities on the individual company level have an impact on the value chain. If animal health information is available, the marketer can, for example, express recommendations for stabling in order to avoid performance loss (for example if there is a conspicuous animal batch it can be stabled separately or vaccines can be arranged).

By integrative observation of the factors$_{a,\ b}$ “content of the innovation activity” and “innovativeness” it is clear that the companies must join together in order to develop and implement a Germany-wide standard in regard to the enquiry and documentation of animal health information (**Factor$_c$**: Needed innovation network – multi actor innovation). Because a standard can only be spoken of when it is widely accepted in practice. In order to develop a proposal for the systematic execution of a programme for the continuous monitoring of market relevant pathogens in piglet production, a core consortium of four

livestock marketing organisations joined together as the main initiator, even before the time of analysis.

This core consortium had already concluded the sample analysis as well as idea generation (**Factor$_d$**: Location in the innovation process). Solution approaches to the problem of Germany's dwindling competitiveness in piglet production were generated. Based on this, the core consortium in this innovation activity decided on the solution approach of "development and introduction of national standards for enquiry into animal health data in piglets". Because this question of standardising deals with already tested monitoring processes, no further R&D activities are necessary at the moment.

The development of a proposal for introducing a monitoring standard is defined as an independent project within the framework of the innovation process. In accordance with this a project design with cornerstones (like milestones, time and budget planning etc.) is to be developed. The drafting of a project plan refers to the conversion phase of already available and tested research results. Hereby the core consortium mainly sets an organisational challenge of offering regional initiatives a uniform basis and making a consolidated summary of it (with the addition of preserving regional characteristics)[25].

6.3.2 Available resources

Members of the core consortium have agreed to take the first step to develop a proposal for standardised sampling and analysis systematics in consensus, in order to then present it to the broader professional public and relevant market actors for discussion. In the second step the monitoring standard agreed upon is to be introduced to the market. A target is formulated for the introduction to the market: within the first three years at least 10% of piglet marketing organisations are to be won for the implementation. Since a vertical cooperation was created from the very beginning for both steps and the actors decided mutually to take initiative, the analysis concentrates on the core consortium's available resources; in order to identify missing resources, and building upon this to deduce the need for support in procuring resources (see Figure 6.8).

Resources$_i$: Human

Based on the formulated content of the planned innovation activities (see above) the competences are available in the form of many years of experience in the development of animal health management systems. Experience and knowledge of such systems is the result of their practical implementation. Furthermore, the members of the core consortium participate actively in research projects. Here the focus is on development and continuous improvement of animal health management systems as a component of quality management. Based on systematically ascertained data, information and communication

[25] Despite the large number of questions on the theme of "Competitiveness in German piglet production", this case study focuses on the innovation activity of preparing a national monitoring standard for enquiry of animal health data of pigs. The preparation (and implementation) of a standard is certainly merely a building block in the entire structure. Nonetheless a restriction of the focus of analysis is necessary in order to make a detailed analysis within the defined frame. Only a brief perspective beyond the focus of analysis will be made.

systems have been built in the research projects. With the help thereof, health data on information relevant for decisions is prepared and made available to decision makers. Thus consulting based on data is possible in agricultural operations.

Furthermore, because of their experiences in livestock marketing the actors have a good sense in regard to pathogens relevant to the market, which should be integrated in a proposed sampling systematic. Knowledge and consideration of geographical characteristics in the selection of pathogens is guaranteed through the geographical division of members in the core consortium. Existing regional initiatives and programmes will be compared in the drafting of the selection of pathogens in order to establish the largest common denominator.

Despite the competences described, the need for the integration of specific expertise could be ascertained. This includes, for example, the professional and statistical knowledge for the evaluation of sample sizes in order to emphasise the significance and thus the credibility of the proposed sampling systematics. Furthermore, the professional ability to assess is missing in regard to the selection of laboratory technical analysis procedures for the standardised testing of samples.

Last but not least, diplomatic skills are necessary in the area of soft skills in order to motivate market actors to participate at a later point in time. The actors of the core work group within the frame of their means have brought in such skills. Beyond this the actors of the core work group are dependent on the political support as well as presentation competence, for example from lobbies and professional associations.

Resources$_{II}$: Intangible

Within the framework of intangible resources efficient structures need to be created to implement the planned innovation activities. For the creation of the consensus for drafting the standard proposal it is recommended to integrate a neutral actor with moderating and coordination skills into the core work group. This actor can ensure that competitors perceive common interests as opposed to individual interests through cooperation. Furthermore, it is recommended to employ an actor for efficient handling of the project with focus on time and task control so that the innovation activity is processed quickly.

For phase 2 of implementation there are contacts in the core work group to relevant market actors; however in order to motivate to participate and thus win a critical crowd, the corresponding communication channels and tools are missing.

Resources$_{III}$: Tangible

The drafting and introduction of a national standard is a common initiative that addresses an entire branch. The financing of such a project would therefore come from public funding or common private sector financing of branch actors in order to implement it. The core consortium chooses common private sector financing through the core work group for the implementation of phase 1. The core consortium thus goes into advance financial performance. For phase 2 the acquisition of public funding is striven for.

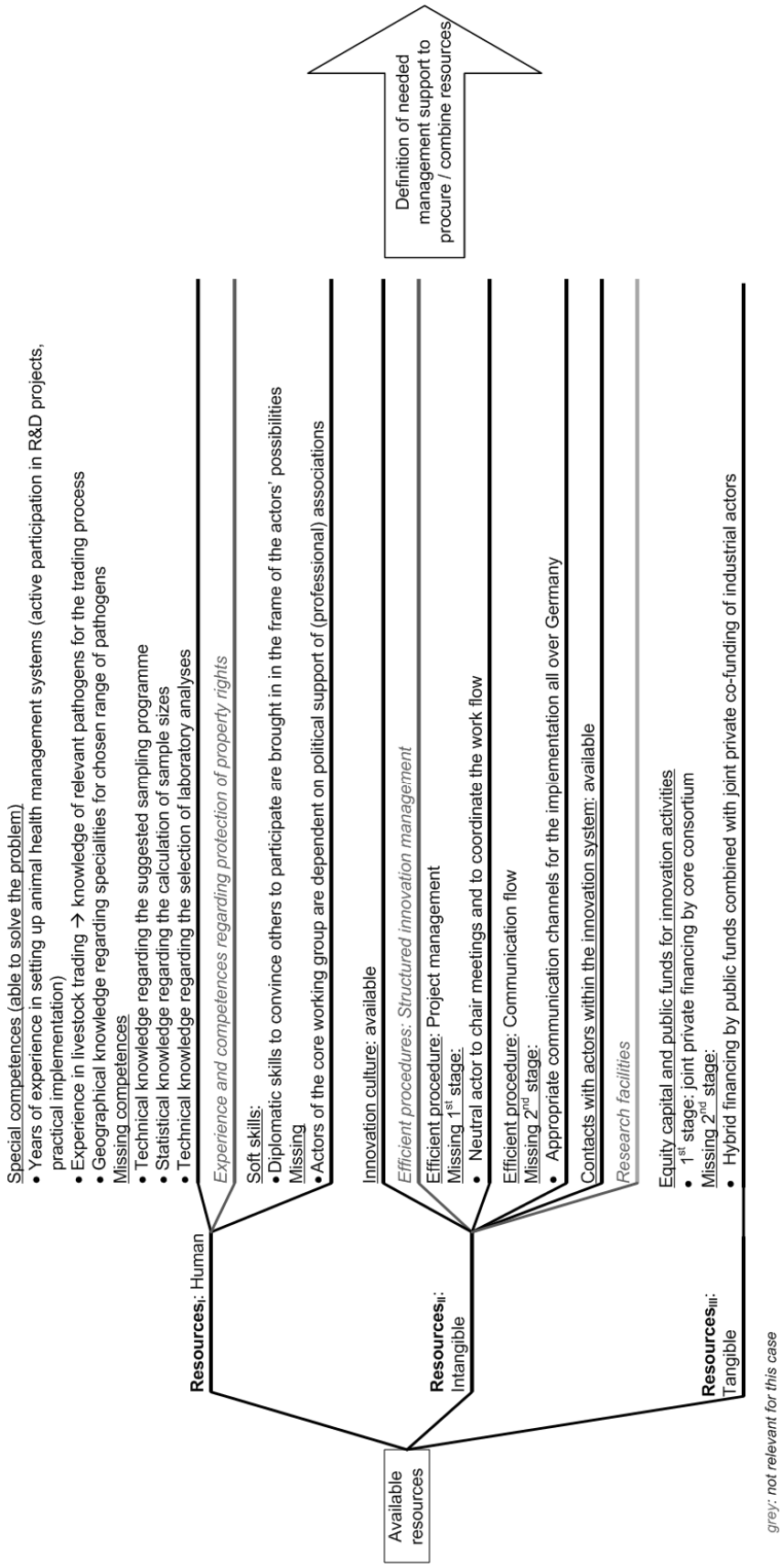


Figure 6.8: Available resources regarding innovation activity in the third case study

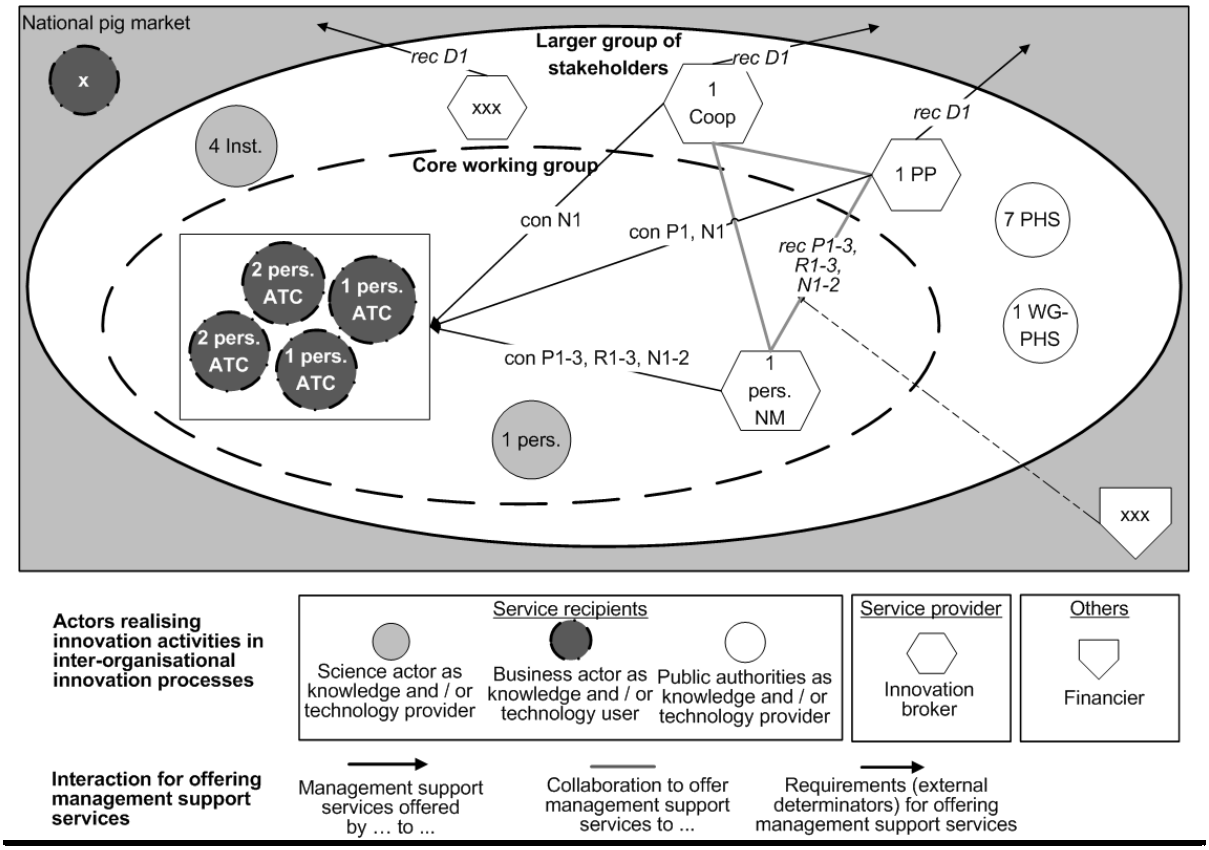
Interim conclusion

The interim result of the analysis of available resources on the consortium level shows that the core work group is dependent on the procurement of additional resources for the innovation activity described (see 6.3.1):

- A moderating and coordinating position is to be set up or designated which coordinates both the drafting of the proposal of a national monitoring standard (phase 1) as well as the first introductory steps onto the market (phase 2).
- Veterinary knowledge for the professional assessment of the selection of pathogens and determining the sample size is to be included.
- Professional knowledge for the selection of laboratory technical analysis procedures for standardised sample tests is to be included.
- Communication channels and tools are missing for the introduction onto the market (phase 2) in order to make the national standard known to the public at large and to motivate actors thus winning the acceptance of a critical majority.

6.3.3 Organisation of management support services for the resource procurement

The following diagram illustrates the organisational structure for the implementation of the innovation activity with the focus on the first phase – already conducted at the time of the analysis (inner circle of the core work group) and the focus on the second phase – recommendations for the future (outer circle with impact on the market. Recommendations for the selection of management support service elements in phase 2 are written in grey.



Offered management support service elements (MSSE)

P: in the frame of the preparation of innovation activities	P1: Looking for experts that can be linked to consortia to give advice P2: Development of a consistent project plan incl. defining responsibilities	P3: Looking and applying for subsidies
R: in the frame of the realisation of innovation activities	R1: Controlling regarding budget, time and tasks compliance R2: Coordination of project documentation	R3: Facilitating communication structures and procedures
D: in the frame of dissemination	D1: Facilitating the flow of information - Public Relation	
N: in the frame of networking	N1: Initiation and / or chairing technical meetings	N2: Lobbying

Abbreviation			
	ATC: Animal trading company NM: Network manager pers.: Person (of staff) Inst.: Institutions Coop: Association of cooperative organised companies in the agrifood market	PP: Association of pig production PHS: Pig health service WG-PHS: Working group of 3 pig health service organisations working on standardisation of laboratory testing methods	xxx: potential financial supporting programmes con: Services already conducted in the frame of the case study (1st phase) *rec: Recommendation that services should be offered for the 2nd phase*

Figure 6.9: Relevant actors and offered management support services during resource procurement and resource combination in case study 3

Phase 1 of innovation activity: Drafting a proposal for a national standard (already conducted at the time of the analysis)

The core consortium covers the need for a moderating and coordinating authority for the first phase through the integration of a neutral actor in the core work group. This institution regards itself as a network manager of an innovation network of the agrifood industry. The companies of the core work group are active in this network through their membership and other project activities. The network manager acts as a mediator between the actors of the core work group as well as between the core work group and external actors. The mediator took on the role of presenting by developing a consensus between the companies of the core work groups for shaping a standard between them. (*MSSE N1: Initiation and / or chairing technical meetings*). Within this frame the network manager defined the short and medium-term tasks as well as allocating responsibilities in order to attain the goals[26] set by the consortium within the defined timeframe (*MSSE P2: Development of a consistent project plan incl. defining responsibilities*). Furthermore, the network manager took on coordinating tasks wherein keeping deadlines when executing defined tasks needed to be adhered to (*MSSE R1: Controlling regarding budget, time and tasks compliance; R2: Coordination of project documentation*). To lighten the project work for the economic actors apart from their daily business the network manager pays attention to individual distribution of information. Thus it can be ensured that the participating actors in the work group are on the same information level (*MSSE R3: Facilitating communication structures and procedures*). Thanks to the support services the progress of the project could be ensured without the daily business of the participating actors suffering.

Furthermore, the competences that were identified as missing (see chapter 6.3.2) were counterbalanced by the integration of external expertise (*MSSE P1: Looking for experts that can be linked to consortia to give advice*). A professional assessment of the pathogen selection and the chosen sample size occurred in three ways:

1. For one thing an actor from the company consortium brought a scientific establishment from the veterinary field into the core work group (there was no need for support services here).
2. Besides the scientific accompaniment during the drafting of the proposal for a national standard, the first draft of the position paper underwent a further professional detailed evaluation. For this professors from different disciplines (a larger group of stakeholders) were asked for a written report (within this framework no support services were needed since contacts already existed).

[26] The goal is the drafting of a position paper which presents a recommendation for the shaping of a national monitoring standard.

3. In the third round the position paper underwent a professional test by animal health services (a larger group of shareholders). For this the institution, which also acted as an intermediary outside the core work group[27], invited actors from the pig health service (*MSSE P1: Looking for experts that can be linked to consortia to give advice; N1: Initiating and / or chairing technical meetings*).

The professional comments were discussed in the core work group. The work group faced the challenge here of finding balance between the requirements of the market[28] and the professional correctness and thus the credibility of the standard.

On the one hand the selection of laboratory technical analysis procedures was evaluated and discussed among the panel of experts named above. On the other hand the network manager of the core work group undertook its own research by contacting and consulting laboratories (*MSSE P1: Looking for experts that can be linked to consortia to give advice*). In this framework an external work group will be found in the near future (the beginning of phase 2 is sufficient) which will handle the standardising of laboratory technical analysis procedures and the corresponding ring tests. It is recommended that such experts (with veterinary knowledge as well as technical knowledge of laboratory analytical procedures) are integrated and linked in the framework of committees for the further development of the standard.

When gathering professional expertise, the core work group did not only concentrate on veterinary specific questions. In addition an assessment was taken by scientific experts in order to test the necessity of a standard as a market tool. Hereby a scientific work group was approached which deals with preventive animal health management within the framework of quality management.

In preparation for the second phase of the innovation activity the network manager endeavoured to acquire public subsidies. Within this framework a subsidy application was filed and lobbying on the ministerial and political associations levels[29] was done (*MSSE P3: Looking and applying for subsidies; MSSE N2: Lobbying*). These activities reach into the second phase and eventually beyond it (to ease further development).

[27] The intermediary institution named in point 3 acts as a professional association and interest representative of pork production in the innovation system and thus has relevant contacts not only for the first phase but especially for the second phase of the innovation activity.
[28] Requirements of the market are, among other things, affordable and easy management of the monitoring programme as well as focusing on marketing-relevant pathogens.
[29] Actors on this level have partial influence on the use of public subsidies.

Phase 2 of the innovation activity: Approaches for a Germany-wide implementation (recommendations for the future)

As a part of the first introduction of the drafted position paper for a national standard but most of all for a comprehensive entry onto the market there is a necessity for political support. The introduction onto the market can move between two extremes:

1. Based on increasing European competitive pressure (as perceived by the core work group) it is conceivable that the core work group will decide on a quick introduction onto the market. Hereby it is possible that the necessary lead-time for the information campaigns has not been sufficiently calculated. Information campaigns should serve to gain multipliers and participants. Hereby it should be considered that possible fixed general expenses (for example operation of databases) may be difficult to cover if the number of participants is too low. On the other hand a “national standard” cannot be talked of if only a small percentage of the market actors participate in the programme.
2. Through successful lobbying and sufficient information campaigns the probability of political support increases. Such activities can be time and cost intensive so that the threat of the loss of the competitive advantage being striven for in relation to neighbouring countries exists. They can use the time to adapt their already established systems and improve them. Furthermore, gaining professional support as well as a sufficient number of market actors through further rounds of discussion is aimed at. However the danger is evident of “talking the initiative to death” and losing sight of the actual goal of ensuring competitiveness.

It is recommended to find a balance between these two extremes: the utopian goal of professional unanimity on the shaping of a standard should not be the focus. The first round of discussion with the market actors showed that the emphasis should be on confirming a general need for establishing a nationwide standardised health monitoring of German piglets. There is a chance herein to improve the health quality level and image of German piglets. In addition positive effects related to the complaint rate and efficiency of piglet production and fattening are expected. The participants in the discussion rounds are aware of the difficulty of defining a significant, veterinary medical, comparable health status. Nonetheless, the prevailing opinion is to take the first step in order to gather experiences and build upon them with improvements and / or further developments. There is agreement to take the first steps in the direction of entering the market in order to start a continuous improvement process (see Figure 6.10). Such discussion rounds were initiated by two supporting professional associations and lobbies (*MSSE N1: Initiation and / or chairing technical meetings*).

Besides the already integrated associations, in phase 2 further ones are to be gained which support the initiative and make it known (*MSSE D1: Facilitating the flow of information – Public Relation*). Further actors can be won as participants through the communication channels of the associations as well as speaking directly to market actors through the companies of the core work groups.

The distribution of information through the associations as well as by directly addressing contacts should run parallel to each other since a mutual exertion of influence is probable: should enough market actors be won for participation, it would show the necessity of such a market tool so that professional associations would also support it. If professional associations support the initiative they can have a motivating effect on their members. In this process the key is to use available channels efficiently and ideally to allow the distribution of information to be coordinated by a central institution. It has already become clear that different innovation mediators are to be integrated in the second phase.

With a large number of actors it is strongly recommended (similar to in the first phase) to name an institution that would take over project management and coordinate the processes (MSSE *P2: Development of a consistent project plan incl. defining responsibilities; R1: Controlling regarding budget, time and tasks compliance; R3: Facilitating communication structures and procedure among all involved actors*). The acquisition of subsidies should also continue to be carried out (*MSSE P3: Looking for subsidies and applying for subsidies; N2: Lobbying*). In order to maintain conversation during the introduction to the market, regular meetings need to be arranged (*MSSE: P1: Looking for experts that can be linked to consortia to give advice; N1: Initiation and / or chairing technical meetings*). Actors that take on such tasks should have diplomatic and organisational skills. They should be accepted by the majority of the market actors and possess persuasive qualities[30]. It is conceivable that several institutions that are active as intermediaries take on this coordinating task of clearly dividing responsibilities with their specific competences and contacts (see Figure 6.9).

Outlook

Should the prognosis of the development of a monitoring standard based on development tendencies of already established standards be ventured, it is conceivable that the standard establishes itself in a third phase on the market. Through a continuous improvement process the monitoring standard can develop further to a national standard procedure. In the fourth phase any possibly resulting trade barriers could be remedied through nationally organised standards, where coordination and the mutual recognition of standards is undertaken on the international level (Bahlmann and Spiller, 2009). In order to initiate discussions in this phase with organisations in Denmark and the Netherlands on equal terms on an international standard, for example “Animal Health and Safety (AHS)”, the following is necessary (Petersen et al., 2010):

- Coordination and implementation of a procedure standard as quickly as possible,
- The fulfilment of organisational requirements for the establishment of a standardising committee with its body of institutions,
- A nationwide certification platform.

[30] Persuasive qualities consist of expert knowledge, ability to present a strong argument and charisma.

For further development of this kind it is recommended to introduce a continuous improvement process (see Figure 6.10).

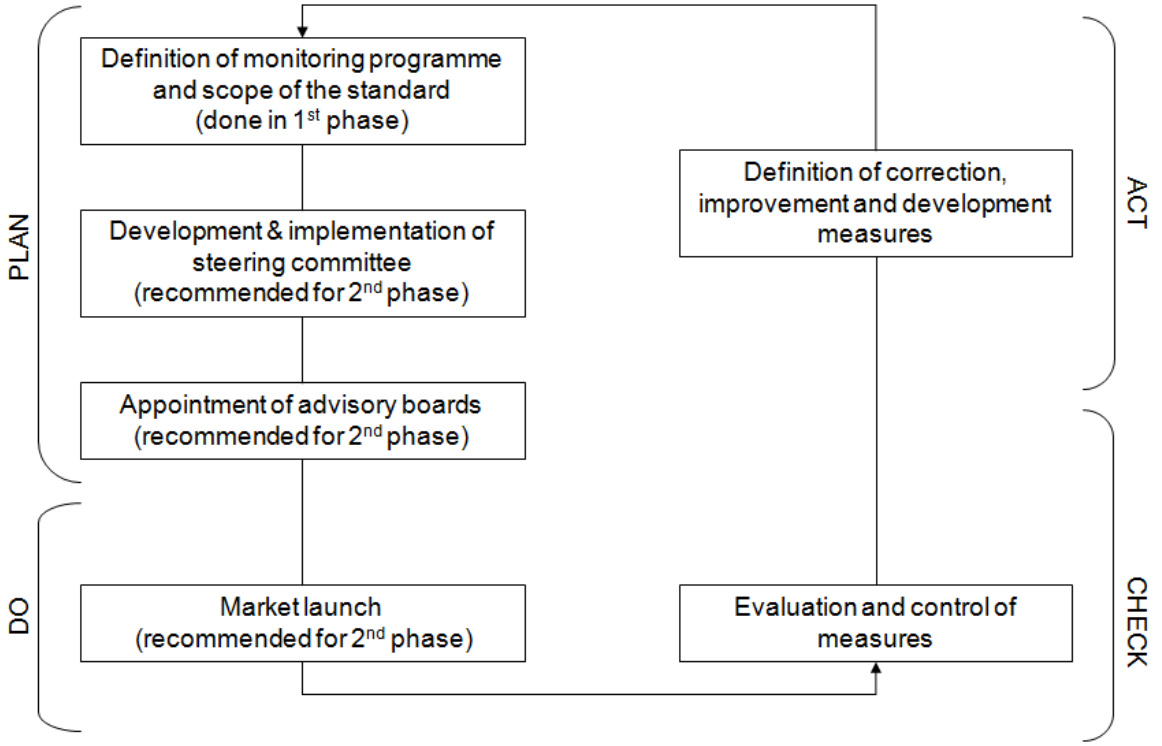


Figure 6.10: Continuous improvement process following the principles of the PDCA cycle (Plan-Do-Check-Act)

The improvement process could concentrate, for example, on the development and application of new measuring technologies modelled on the newest scientific breakthroughs as well as the changing demands of the market. Procedures can be designed more efficiently thereby. For the continuous further development of a standard it is recommended to establish committees (for example an advisory council and a strategic advisory board). Experts should accompany and guide this continuous improvement process in the committees.

Furthermore, it is recommended to test the adherence to the prescribed sampling and analysis systematic as well as the laboratory technical analysis methods through an independent third party. The credibility of the standard is increased by an independent audit. At a later point in time certifying institutions are to be integrated. Hereby care should be taken that agricultural companies are not burdened by additional third party audits, but that the inspection of the criteria prescribed in this standard be integrated into existing audits. Through such measures the monitoring standard can develop further into a national standard procedure.

Last but not least it should be mentioned that the standard is merely a measure to counteract dwindling competitiveness. Yet it cannot be assumed that the problem will be solved through this measure. It is more a matter of the start of a recurring innovation or

improvement process that should run parallel. Besides the enquiry into, and the provision of, animal health data it is necessary to follow up the monitoring with internal animal health management in order to remedy identified problem areas thus improving the animal health status of an operation in the long term.

A further competitive advantage of neighbouring countries is certainly also the size and homogeneity of the delivered animal batches. Since the delivery of larger, unified batches (as opposed to mixed batches) reduce the risk of sickness from entering the mast.

6.4 Interim discussion

The goal of the multi-dimensional analysis based on the case study is to identify missing resources for the implementation of innovation activities; and based on that to show how the procurement of these missing resources can be organised. Within this framework the following questions were dealt with:

> *Sub-question 1.b: How to identify the demand for management support based on a multi-dimensional approach?*
>
> *Sub-question 2.a: How to organise management support in inter-organisational innovation processes?*

Sub-question 1.b: How to identify the demand for management support based on a multi-dimensional approach?

The multi-dimensional procedure model allows the demand for support of different actors in inter-organisational innovation processes to be identified. Through the findings from using the model in the case study the assumption is strengthened that the need for support from actors in inter-organisational innovation processes is determined by the interplay of several company features (see also 4.3). The following factors have been highlighted which influence the degree of need for support:

- Size of the cooperation consortium
  In the case study it is clear that the need for support of individual actors is not only dependent on the extent of the missing resources. Also the structure of the consortia in which the actors are integrated is decisive for the need for support (see case study 1): The larger and more heterogeneous the consortium is (based on the partner structure, the number of participating nations etc.), the higher the cost of coordination. This is based on how transaction and coordination failures accrue especially at interfaces between participating actors (see 3.1). In order to neutralise such losses, coordination costs are to be operated. Since the availability of individual competences on its own does not lead directly to a successful cooperation. In order to be able to use the synergies on the consortium level, efficient communication and work procedures need to be established.

- Rate of appropriate personnel with educational backgrounds and experience in the area of innovation / R&D

  The number of (scientific) employees on a company level is decisive for the need for support; the more (scientific) employees are integrated in the innovation process, the better the company can concentrate on the implementation of innovation activities. Daily business suffers less under the project work through such specialisation. This becomes clear in case study 3: it is mainly managing directors that are integrated in this innovation activity. A section of their work is surely also the further development of business activity and thus the generation of innovations. Yet it is the managing directors who experience the most stress in daily business dealings (see also 2.5) and the project work can suffer from this. In case study 3 this is very clear. The actors are aware of this problem and have formulated the need for support for the coordination of innovation activities.

- Lack of knowledge and no access to the new target markets

  Companies who are foreign to the sector who strive for an expansion of their business activity into the agrifood industry have a higher need for support than actors who are already active in the target market. Case study 2 exemplifies this: The technology provider in focus strives for applications of its basic technology for problems in the agrifood industry. In order to make the entry into the new market easier and to come into contact with potential customers and cooperation partners, targeted support services in an agrifood network will be requested.

- Existence of strategic alliances and of integration forms within value chains

  Existing strategic alliances make the search for partners in inter-organisational innovation processes easier because cooperation already exists. Support in bringing together complex consortiums is usually not necessary. Particular missing resources are to be procured at the most. This is, for example, the case in case study 3. Here the cooperation partners have already come together for the implementation of an innovation activity. The initiation of an innovation activity has been implemented without any need for support. Support services can be started directly with the development of the project design.

  When forms of integration already exist (for example horizontal integration of agricultural operations assembled under the producer association as in case study 1 or vertical integration), then developed innovations can be introduced more easily and comprehensively. Production chain innovations (like, for example, traceability systems, product information and communication systems for all stages, allocation of labels through participation in inter-organisational quality programmes etc.) are easier to develop and comprehensively introduce when forms of integration already exist, since the actors are formally integrated and do not act independently from one another (see as well Theuvsen, 2007; Voss et al., 2009). As an alternative to formal integration, trusting business relationships with previous and subsequent value chain production steps can also encourage the introduction of innovations (see as well Spiller et al., 2006).

- Experiences in initiating, applying for and implementing publicly funded projects
  In case study 1 it is evident that business actors that do not have any experiences with publicly funded projects have difficulties complying with the requirements of subsidy providers. This statement is also supported by the empirical quantitative study carried out in this work (see chapter 4). Depending on experience with none, one, or various subsidy programmes, there are individual advisory needs resulting from the different requirements of the report.

Sub-question 2.a: How to organise management support in inter-organisational innovation processes?

In the case study it was shown, for example, how management support in inter-organisational innovation processes can be organised. Hereby the participating actors (or service recipients) are integrated in core work groups and these in turn in innovation networks. Innovation brokers act as service providers (see also 3.1). Hereby the interaction between service recipients and service providers is relevant in order to be able to offer customer oriented services. For the procurement of missing resources for implementing innovation activities the innovation broker can fall back on the catalogue of management support service elements for resource procurement (see sub-chapter 7.1). This catalogue is based on the findings from the described case studies. The catalogue with 37 specific support services classifies the following four aspects of inter-organisational innovation processes:

1. ***P****reparation of innovation activities*
   Management support within the framework of the initiation and preparation of innovation activities described by eighteen individual service elements
2. ***R****ealisation of innovation activities*
   Management support within the framework of the implementation of innovation activities described by six individual service elements
3. ***D****issemination*
   Management support within the framework of the dissemination of knowledge described by nine individual service elements
4. ***N****etworking*
   Management support within the framework of the networks described by four individual service elements

As the literature shows it is evident that one should differentiate between different types of innovation brokers (see 3.1). The work at hand concentrates on innovation brokers that act exclusively as such and depicts their core business, the support of participating actors in the initiation and implementation of innovation activities. Klerkx and Leeuwis (2008b) describe them as a “pure innovation intermediary”: “A pure innovation intermediary would then have facilitation of innovation as its core business, rather than being also a source or carrier of innovation”. Other institutions besides the exclusive innovation brokers also offer

individual innovation broker functions in addition to their core business. This includes, for example, professional associations and lobbies as well as universities and research establishments. As is evident in the case studies it may be necessary that the main acting innovation broker enter into cooperation with other institutions in order to be able to completely service the identified need for support. In case study 1 the innovation broker cooperates, for example, with the project coordination team. The members of the project coordination team originate from a university establishment, which acts as a lead partner in the research project introduced in case study 1. The project management in the research consortia does not apply as a core business of universities. However the university took on innovation broker functions when acting as a lead partner. Yet the university has little experience in cooperating with economic actors. An exclusive innovation broker was brought into the project consortia for this area to support the economic partners with project execution. Aspects of project management were given over to the project management from the project coordination team.

In case studies 2 and 3 it is evident that the main acting innovation broker was missing resources in order to be able to completely cover the identified need for support; for example contacts to a broader group of market actors. In case study 3 the existing association communication channels were primarily used. Associations, as political or professional representatives of interest usually have a large member network of market actors. To support the innovation brokers such channels of communication for the distribution of information and dissemination activities are to be used. These activities will be especially relevant at the end of an innovation process (for further information on the innovation process see sub-chapter 2.2).

In all three case studies presented the main acting innovation broker cooperates with, for example, professional associations and lobbies that take on innovation broker functions in addition to their core business.

7 The provision of management support services

In the case studies it has been shown, in form of an example, how the procurement of identified missing resources for the initiation and implementation of innovation activities can be organised. This is done by offering customer oriented management support services individually for the different target groups. These kinds of services are offered for example by organisations that function as innovation brokers. Based on the case study findings, the further development of the preliminary catalogue of management support service elements (see chapter 3) will take place in sub-chapter 7.1. And further on, in sub-chapter 7.2 the analysis of development of a branch-specific innovation broker with the associated network is shown over time. This is done with the help of key performance indicators for characterising the development of such networks. For this, the network, from which the case studies have been selected, has been chosen (see 5.3).

7.1 Catalogue of management support service elements

Management support services are services to support actors within an innovation network to initiate and implement innovation activities. The service portfolio of supporting a network oriented innovation management may contain the entire spectrum (see Table 7.1). Management support services can be offered as single service elements or as a combination of these. The single service elements are individually numbered (P1-18; R1-6; D1-9; N1-4, see Table 7.1). The numbering structure of the catalogue comprises four parts:

1. **P**: Management support service elements within the framework of the ***p****reparation of innovation activities*
2. **R**: Management support service elements in the framework of the ***r****ealisation of innovation activities*
3. **D**: Management support service elements within the framework of ***d****issemination*
4. **N**: Management support service elements within the framework of ***n****etworking*

Each part lists service elements. Some of them are characterised by a central theme. If this is the case it does not mean that all elements under this theme need to be offered in combination. The elements can be combined as needed. In addition, the catalogue contains information on the objectives of use of service elements (aim) and a range of potential instruments and methods, how to offer the service. In this context, possibilities of combining elements are indicated as well.

However, before offering a service, an innovation broker needs to make a decision regarding the target group. Does the innovation broker offer services to:

- A single actor (as a member of an innovation network or looking for collaboration)?
- A production chain?
- All network members or a cooperation consortium that already exist?

Table 7.1: Catalogue of management support service elements provided in inter-organisational innovation processes

P	***Management support service elements in the frame of the Preparation of innovation activities***
P1	Supporting the innovation demand articulation incl. the identification of innovation demand and the articulation of the innovation needs and requirements *Aim:* • Defining the problem that needs to be solved • The problem description should be clear for external knowledge and / or technology provider without presenting sensitive client information *Range of potential instruments:* • Company inspections • Making use of service elements listed under „Supporting resource management" • Use network internal experts to implement this service • Discussions, talks and chairing of team meetings

P2-4	Supporting the idea generation and idea evaluation process
	Aim:
	• After the description of a problem, it is a creative task to generate and identify ideas that have the potential to solve it
	• The next step is to switch again into the analytical mode to select potential ideas (according to defined criteria) to solve the problem
	Range of potential instruments:
	• Chairing of team meetings
	• Making use of service elements listed under "*Bringing actors of the innovation system together*"
	• Potential instruments for idea generation:
	  • Creativity techniques
	  • (Customer) workshops
	  • Visiting conferences and trade fair exhibitions
	  • Idea award competitions
	• Potential instruments for idea evaluation:
	  • Comparison of the potential innovation and the defined strategy → does the new idea fit with the strategy?
	  • Interviewing R&D staff and researchers to get a feeling as to whether the implementation of the idea is feasible or not.
	  • Interviewing market experts to try to a feeling whether the market is ready for the potential innovation or not.
	  • Customer / user workshops to get a feeling as to whether there is a need for the potential innovation

P2	Facilitation of the idea generation process
P3	Facilitation of the idea evaluation process
P4	Matchmaking between the described problem (production, user of knowledge / technologies) and problem solution (science, developer of knowledge / technology)

P5-6 Collecting external market information for innovation decisions

Aim:

- External market information is the foundation for strategic decision; potential areas of innovation can be worked out
- For strategic decisions this market information needs to be combined with internal information about available competences and resources

Range of potential instruments:

- SWOT-Analysis (Strengths, Weaknesses, Opportunities and Threats analysis)
- PEST-Analysis (Political, Economic, Social, and Technological analysis)
- Trend analysis
- Market expert interviews
- Using network internal experts to implement this service
- Group discussions with market experts
- Making use of service elements listed under "*Bringing actors of the innovation system together*"
- Making use of service elements listed under "*Lobbying*"

P5 Preparation of market studies

P6 Foresight / trend analysis: Scan and analysis of the environment and surrounding

Potential focus of trend analyses:

- Legislative initiatives and draft laws as potential innovation driver
- New development of technologies
- Changes and trends of the society as potential innovation drivers (→ changes in demand)
- Changes and trends of public funding programmes

P7-14 Supporting resource management

Aim:

- Identification of missing resources needed to implement an innovation activity
- Identification and listing of external resources that might be needed for the realisation of an innovation activity
- For strategic decisions this internal information need to be combined with external market information in order to work out potential areas of innovation

Range of potential instruments:

- Surveying members (of a network, production chain, consortium etc.)
- Interviews
- Making use of service elements listed under "*Bringing actors of the innovation system together*"

P7 Competence mapping of internal available resources and competences

P8 Network internal knowledge management (might be supported by a knowledge database)

P9 Support for the creation of criteria for the procurement of external resources needed for the realisation of an innovation activity

P10 Competence mapping of external available resources and competences

P11 Acquisition of new partners undertaken using formal integration

P12 Facilitating temporarily exchange of competences (knowledge / technology transfer), e.g. internships between science and business

P13 Matchmaking of competences resulting in synergistic effects

P14 Looking for experts who can be linked to consortia and who can give advice

P15-16 Initiation and designing of innovation projects

Aim:

- The initiation and designing of an innovation project by delivering a project plan. This is needed for the project management during the realisation of an innovation activity
- The innovation project plan can as well be used for applying for funds

Range of potential instruments:

- Making use of service elements listed under "*Supporting the innovation demand articulation*"
- Making use of service elements listed under "*Supporting the idea generation and evaluation process*"
- Making use of service elements listed under "*Supporting resource management*"
- Making use of service elements listed under "*Facilitating communication structure and procedures*"
- Making use of service elements listed under "*Looking for subsidies and applying for subsidies*"
- Making use of service elements listed under "*Supporting in setting up consortium agreement*"
- Making use of service elements listed under "*Lobbying*"
- Making use of service elements listed under "*Bringing actors of the innovation system together*"
- Charing of team meetings and conflict mediation (if needed)

P15 Development of a consistent project plan including defining responsibilities

P16 If the innovation activity will be implemented as part of in an inter-organisational cooperation: Coordination of the consortium during the designing process

P17 Looking for subsidies and applying for subsidies

Aim:

- Innovations are needed to stay competitive; not only for single companies, but as well for regions (like the EU).

Therefore regions and nations set up funding programmes as political instruments to minimise the risks involved in innovations. These can be used to increase the budget to implement innovation activities

Range of potential instruments:

- Making use of service elements listed under "*Collecting external market information for innovation decisions*" with focus on funding programmes
- Making use of service elements listed under "*Lobbying*"

P18 Supporting in setting up consortium agreement

Aim:

- Setting up and tuning a consortium agreement as a basis for a confident and trusting collaboration
- Formalising informal collaborations

Range of potential instruments:

- Making use of service elements listed under "*Supporting regarding protection of results / new knowledge*"
- Conflict mediation (if needed)

R	***Management support service elements in the frame of the <u>R</u>ealisation of innovation activities***
R1-3	Offering project management tasks *Aim:* • Ensuring compliance as to the requirements defined in the project plan • If a third party is in charge of the overall project - coordination and -management, so the other actors can concentrate on the content of the innovation activity. *Range of potential instruments:* • Making use of service elements listed under "*Facilitating communication structure and procedures*" • Making use of service elements listed under "*Initiation and designing of innovation projects*" • Conflict mediation (if needed) • Making use of service elements listed under "*Bringing actors of the innovation system together*"
R1	Monitoring regarding budget, time and task compliance
R2	Coordination of project documentation
R3	Support in public funded projects by translation of financier's requirements into specific project guidelines
R4	Facilitating communication structures and procedures *Aim:* • Ensuring internal information flow *Range of potential instruments:* • Exchange of status-quo information by short minutes / memos • Supported by a protected web area • Making use of service elements listed under "*Facilitating the flow of information – Public relations*"
R5	Supporting regarding protection of results / new knowledge *Aim:* • Securing intellectual property rights • Protecting the outcomes of innovation activities *Range of potential instruments:* • Legal advice services • Making use of service elements listed under "*Supporting in setting up consortium agreement*"
R6	Supporting the implementation of new technologies, products and new concepts into daily business *Aim:* • Commercialisation of "something new" • Concepts developed in (public funded) R&D projects needs to be adapted for final use (according to user requirements) • It might be that a new innovation project needs to follow focussing on the implementation of concepts (after the generation of new knowledge) *Range of potential instruments:* • Identify market opportunities • Developing business plans • Making use of service elements listed under "*Supporting resource management*" • Making use of service elements listed under "*Supporting the innovation demand articulation*" • Making use of service elements listed under "*Initiation and designing of innovation projects*" • Making use of service elements listed under "*Looking for subsidies and applying for subsidies*" • Making use of service elements listed under "*Offering project management tasks*" • Making use of service elements listed under "*Offering trainings*" • Making use of service elements listed under "*Bringing actors of the innovation system together*"

D	***Management support service elements in the frame of <u>D</u>issemination***
D1-7	Facilitating the flow of information – Public relations

Aim:

- Disseminating project results and new knowledge
- Facilitating the exchange of information to the external innovation system and in specific to those producing the innovation
- Promoting reputation of participating actors / project partners

Range of potential instruments:

- Making use of service elements listed under *"Project documentation (R2)"*
- Using network internal experts to implement this service
- Making use of service elements listed under "*Bringing actors of the innovation system together*"
- Making use of service elements listed under "*Supporting international relationships*"
- Making use of service elements listed under "*Organising a small return of investments*"

D1	Website
D2	Newsletter
D3	Print media
D4	Conferences
D5	Trade fair presentations
D6	Information campaigns
D7	Lobbying and dissemination at a political level so as to influence critical decision making processes
D8	Offering trainings – Development of curricula for different target groups including the organisation and implementation of training schemes based on project results / new knowledge

Aim:

- Disseminating project results and new knowledge
- Providing certified training and further education
- Facilitating the exchange of information to the external innovation system and in specific to those producing the innovation

Range of potential instruments:

- Using network internal experts to implement this service
- Making use of service elements listed under "*Facilitating the flow of information – Public relations*"
- Making use of service elements listed under "Bringing actors of the innovation system together"

D9	Organising a small return of investments

Aim:

- Giving incentives for innovations
- Promoting the reputation of participating actors / project partners

Range of potential instruments:

- Making use of service elements listed under "*Facilitating the flow of information – Public relations*"
- Innovation award competition

N	***Management support service elements in the frame Networking***		
N1	Lobbying		
	Aim: • Looking for support on policy level regarding the use of new results • Influencing funding programmes • Listening to the political trends	*Range of potential instruments:* • Making use of service elements listed under "*Facilitating the flow of information – Public relations*"	• Making use of service elements listed under "*Collecting external market information for innovation decisions*" with a focus on funding programmes
N2-4	Bringing actors within the innovation system together		
	Aim: • Helping to link and transform relations within an innovation network or system or between national innovation systems • Actors of the innovation system should come together to exchange ideas and / or results and to find synergies by collaborating • Getting to know other markets	*Range of potential instruments:* • Informal social events combined with technical or professional presentations • Arranging visits for delegates • Arranging of (international) contacts • Chairing of team meetings • Making use of service elements listed under "*Facilitating the flow of information – Public relations*"	• Making use of service elements listed under "*Supporting the idea generation and evaluation process*" • Making use of service elements listed under "*Supporting the innovation demand articulation*" • Making use of service elements listed under "*Supporting resource management*"
N2	Organisation of direct contact possibilities between enterprises, universities / research centres and public authorities. Building linkages with external knowledge providers. And matchmaking between unknown partners		
N3	Initiation and/or chairing technical meetings to discuss upcoming trends, problems and potential solutions		
N4	Supporting international relationships		

7.2 Key performance indicators for service providers offering management support services

Long-term development perspectives and economic sustainability are goals to be pursued by the network management in the best interest of all members (Meier zu Köcker and Buhl, 2008). This also applies to the network from which the case studies were chosen within the framework of this work. If one observes this network at the time of its establishment, it can be classified as an endogenous top down network[31]. During the course of time, elements from a bottom up network were integrated in order to meet the wishes of all the network actors and the increasing need for support services (customer orientation) thereby making sustainable development possible.

A few actors from the scientific field initiated the innovation network. They acted and act with the motivation of initiating research cooperation projects with businesses in order to generate a win-win situation for everyone involved. At the beginning the network

[31] Meier zu Köcker and Buhl (2008) differentiate between bottom up, exogenous top down and endogenous top down nets (see 2.3).

management was taken over by one of the initiating research institutions. This happened in the form of voluntary activities and the exemption of individual employees. Because of the research institutions' commitment it was possible in the course of time to establish a self-supporting network management with human resources (see also Figure 7.3).

The themes and actions of the network were mainly decided by the research institution in the growth and maturation phase (for more information on the characterisation of individual phases of development, see sub-chapter 2.3). Hereby the cooperation projects oriented themselves towards a mutual, defined strategy between business, science and public authorities (see as well 5.3). It was primarily oriented on the thematic focus of national and European research programmes. Interactions and cooperation between network partners were mainly in relation to projects. Membership in the network was mainly decided by participating in projects as well as through co-determination in the network bodies. The decision structure is characterised by the following bodies: committee, a member meeting which occurs annually as well as through professional advisory boards related to the respective research projects.

In relation to the time of analysis, throughout the course of nine years the members are divisible in two groups: regular members as well as changing members. A large number of members link and / or linked themselves to the network over the phase of the continuous sequence of projects. Aside from these the membership of some network actors ended with the end of a project and began again in part with the delayed initiation of a new project. If such actors are not active members for a while they are still network actors in a broader sense. They are still in the network and active in collective research when they recognise a direct individual benefit.

Despite the fact that the network in focus has been directed, from its founding until today, by research related institutions represented in the committee, the respective topics of the joint projects which are chosen are oriented on the problem areas in the economy. Through extensive network participation of company based institutions (oriented on the different steps of the value chain in the agrifood sector with strong focus on the meat value chain), a quick and consistent implementation of scientific research results has been realised in economic practice. The research themes achieved and achieve practical relevance and user-oriented components.

The analysis of the development phase of the network which is the focus of this study showed that it is future-oriented. This can be especially deduced from the development of four success factors:

- Financial development,
- Development in member numbers and contributions,
- Human resources (measured by person month) in network management,
- Increase in interaction between the network's main target group as well as organisations outside the network.

As already shown in sub-chapter 5.3 the network focuses on the initiation and implementation of research cooperation as well as securing the transfer of knowledge. These activities were and are made possible through mixed financing from European and national subsidies as well as individual contributions from project partners from business, science and public authorities (Figure 7.1). The constantly increasing flow of financial resources per year since the establishment of the network is proof of a sustainable economic success.

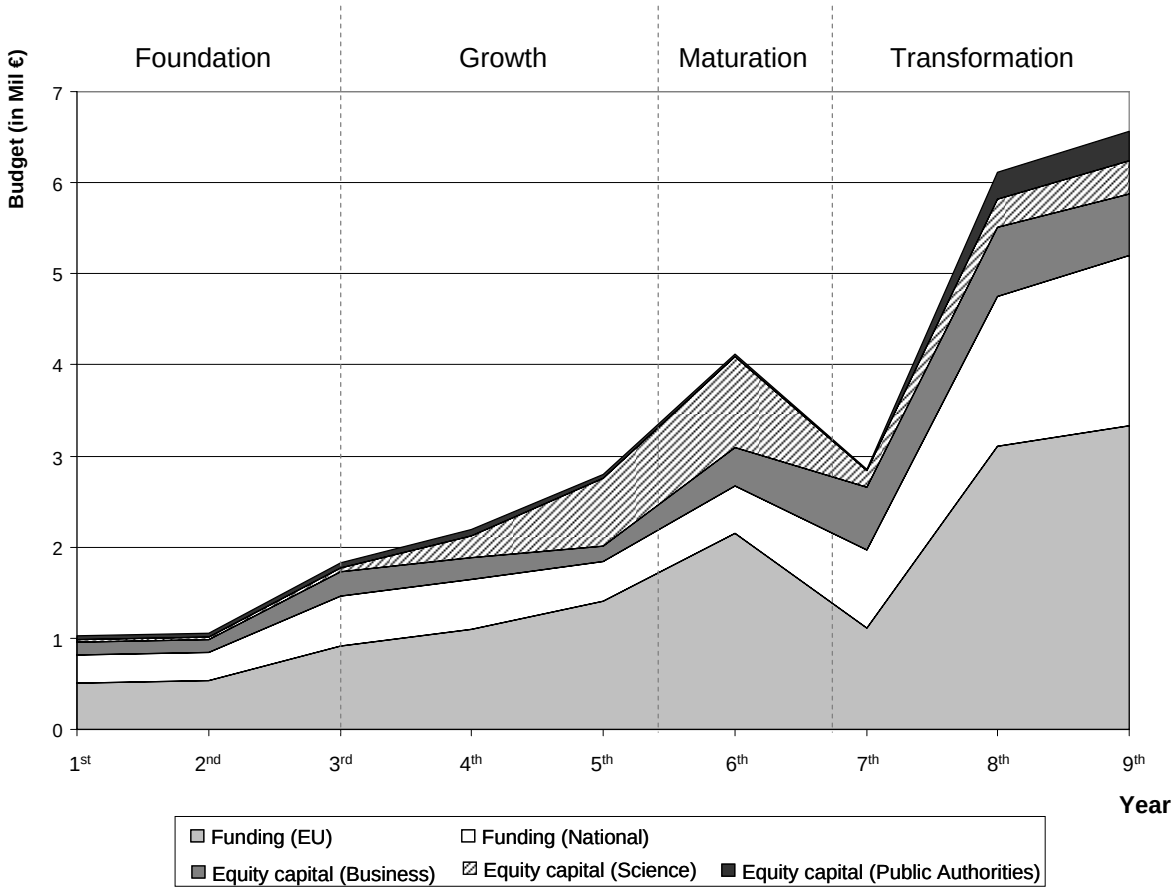


Figure 7.1: Transit project budget over time from network foundation to transformation (of studied network)

The financial resources in the network are used to implement research cooperation projects. Since the network management, in the name of network members, is mainly involved in the proposal requests of European support programmes, the main part of project resources is provided by the European Union. Some of these support programmes require co-financing from the participating nations. For example, national financing plays an important role with EFRE resources for the strengthening of regional economies or resources from the European Social Fund. Most of the projects from this programme receive only one subsidy when national and regional levels of government ensure co-financing. Full financing for projects and measures is an exception for EU support programmes. Financing on a national or regional level offers additional security and control for the EU grant-awarding agency because it is assumed that the applicant and

projects can be judged better on location. Furthermore, the national funding depicted in Figure 7.1 is also the result of involvement in national support programmes.

A percentage of equity capital, which must come from the project partners, can be prescribed as obligatory co-financing. Depending on the nature of the project partner (whether, for instance, it is a private, commercial or public institution), the funding rate and thus also the required equity capital can differ. Public institutions like universities often receive a higher funding rate and therefore only need to take on a small amount of equity capital.

Because of the higher funding rate which scientific institutions receive, the majority of project funds for these institutions is assumed by the EU. Companies, on the other hand, usually receive a lower funding rate and have to come up with a proportionally higher amount of equity capital. If the proportion of equity capital rendered by sciences is higher than the equity capital rendered by companies (for example, in the sixth year, Figure 7.1), then the scientific network members were integrated into the joint project with a higher approved overall project budget. This also means that they took on a larger part of the tasks in the joint projects.

The graphic depiction of financial development corresponds with the standard curve of the development phase according to Meier zu Köcker and Buhl (2008) and Lorleberg et al. (2010) (see 2.3). Sustainable development regarding the success factor “financing of network activities” can be read from the characteristic curve shape. Figure 7.1 only shows the budget available per year for the financing of previous core business of the “implementation of research and development projects” network. From the change of shares of the five budget positions a monetary assessment of support services offered by the network management cannot be deduced. All activities for initiating innovation projects are, for example, not recorded in these numbers. The reason is that as a rule, all measures taken before the start of the project are not eligible for funding through research funding programmes. However, before the final approval of a joint project a preparation phase of over one year (in some cases up to three years) can be expected. During this time, in addition to preparing work and time schedules, negotiations with investors are conducted. Until now only the annual member contributions were available for these activities. Although the financial reserve has developed positively over the years through the increasing number of members (Figure 7.2), nonetheless the costs for the acquisition of project funds cannot be covered by member contributions alone. For services relating to the acquisition of project funds the network management falls back on intangible resources, in particular from the scientific institutions. During the content development of new projects, the scientific institutions contribute human resources and work closely with the network management in the project design phase. The network’s decision-making committee has clearly recognised that, in the future, a broader service portfolio can only be offered with a changed financing model.

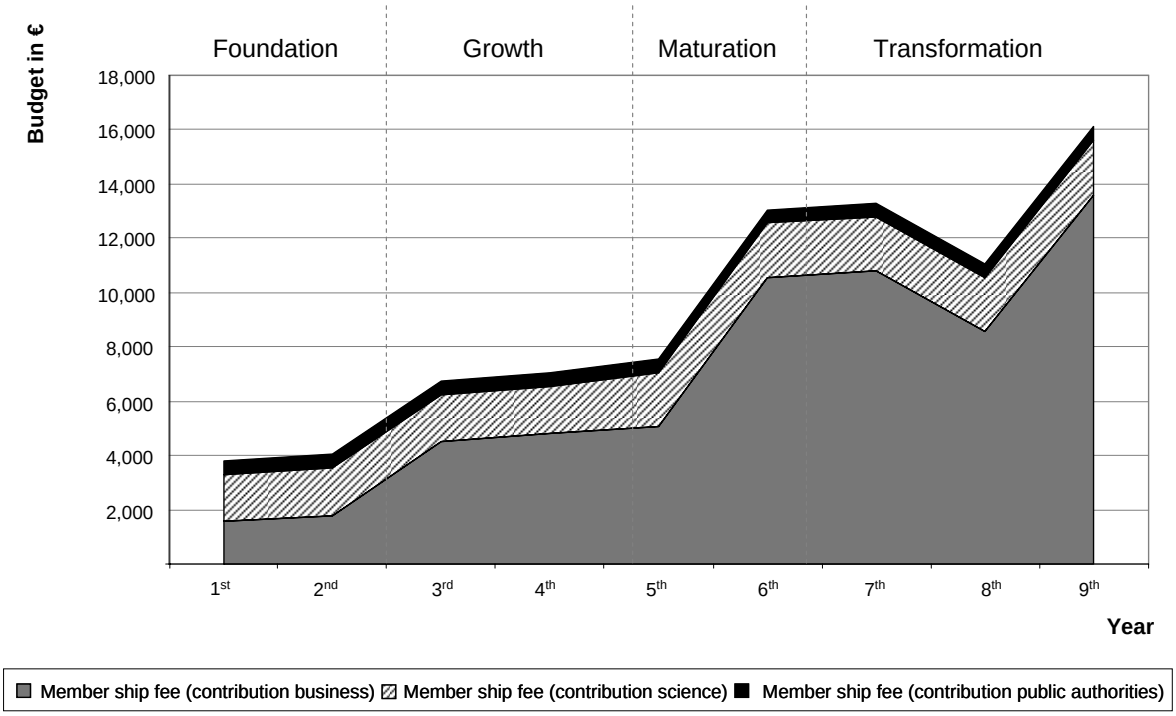


Figure 7.2: Contributions of members over time from network foundation to transformation (of studied network)

The budget of member contributions is also growing steadily. The graphic depiction of progress in Figure 7.2 also correlates with the standard curve of the development phases described for future-oriented networks (see 2.3).

A decisive factor for the network being analysed here is the positive progress of personnel resources (measured by person month) for network management. In the ninth year of being established, five full-time equivalent positions as network manager and project manager can be registered in this case study (Figure 7.3). These persons, aside from project management (including project-specific knowledge transfer and project-specific administration tasks) during the implementation of innovation activities, are trusted with tasks in the area of initiating new innovation activities.

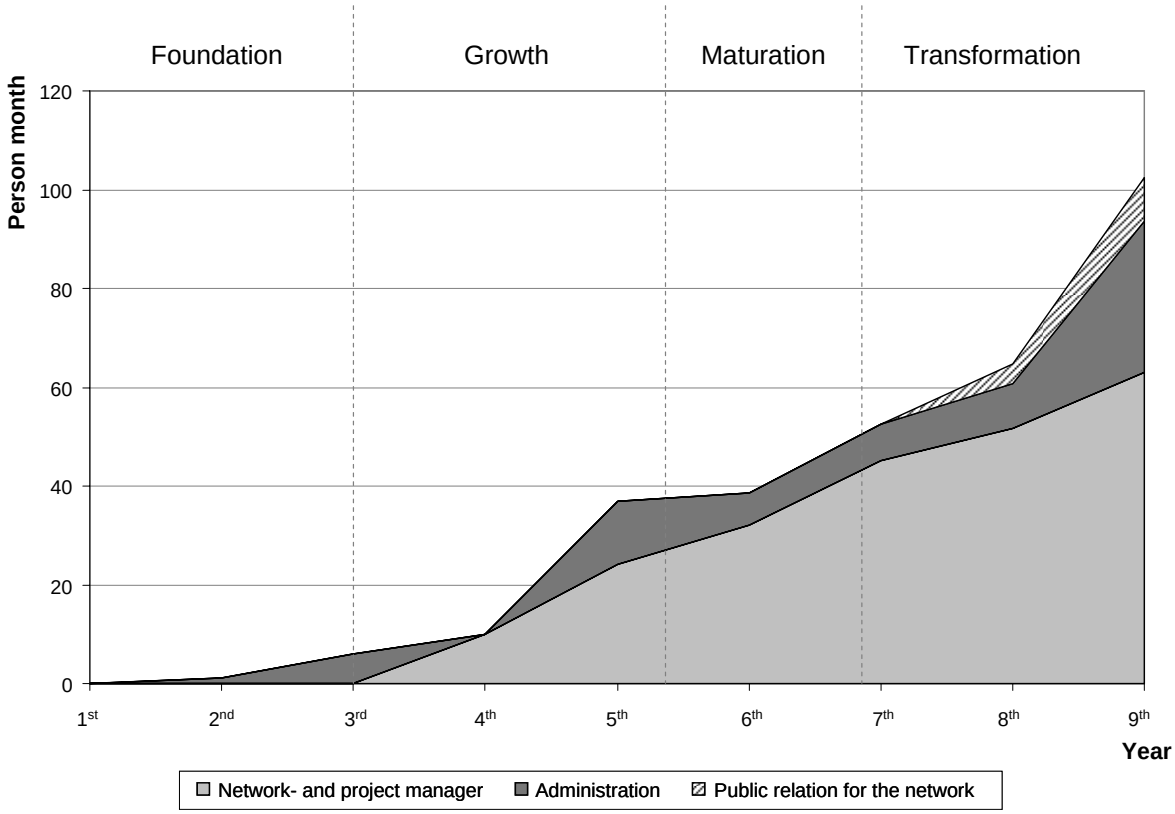


Figure 7.3: Increasing network management staff over time from network foundation to transformation (of studied network)

Furthermore, as of the seventh year responsibilities and fields of work were determined anew. In particular, a specialisation in the areas of administration and public relations took place. With this specialisation an increase in the perception of knowledge transfer measures is being aimed for. In the last two years it was possible for the network management to establish a (0.5 to 0.75) part-time equivalent employment position for network oriented public relations. Elements of the part-time position are in the areas of internet presence, event planning and communication with the professional press. The network has an internet site that reports network activities, talks about its members etc. Besides that, websites with additional functionalities and goal settings for a target group-specific knowledge transfer will be created for some joint projects and attended to over the duration of the project. At the end of the individual projects, the content of the respective websites will be transferred to the network website, making it available beyond the term of the project. The person responsible for public relations within the framework of organising public events works closely with the respective project managers (to implement project-specific trainings, conferences, workshops etc.).

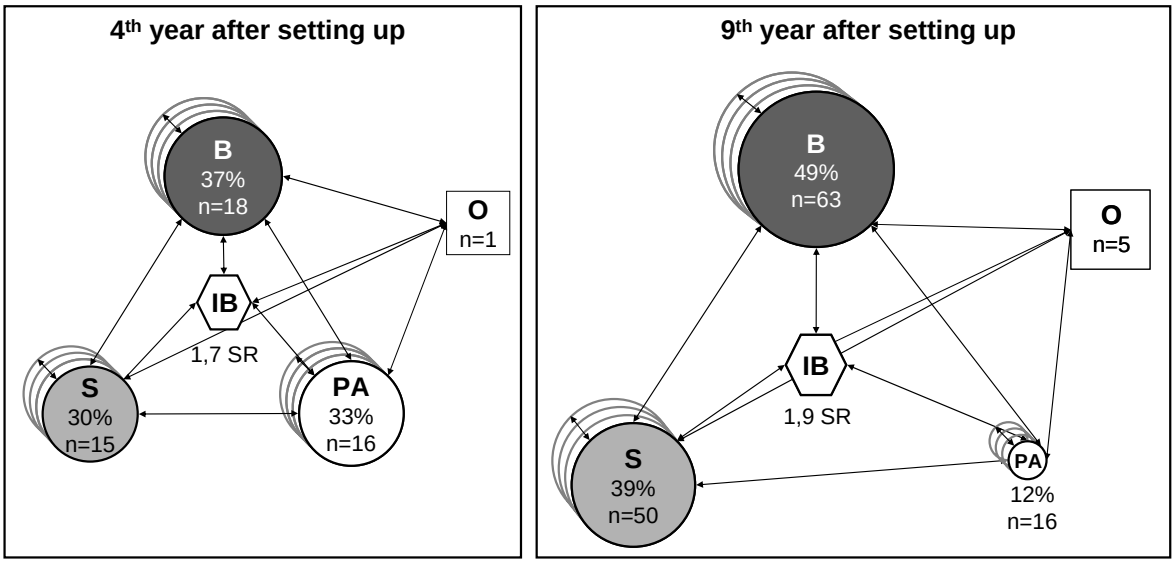
In addition, the number of personnel and thereby professionalisation in the area of administration is increasing. An increase in personnel from 9 to 30 person months is found from the eighth to the ninth year. Aside from accounting for the network itself, the administration is also responsible for managing project funds which are made available by different financial supporters for collective research (see Figure 7.1). Since the network management often acts as a lead partner in the projects, an internal division of funds will

be carried out from it to the project partners. Furthermore, together with the administration personnel, the project managers supervise the partners in the respective projects in terms of fulfilling the requirements within the framework of the funds requested. The eligible costs arising within the framework of the project must be verified with invoices and / or corresponding receipts from fund recipients. Only then can funds be requested from the paying office.

Through specialisation and the increasing number of personnel in the area of public relations as well as administration, the networks and project managers will be unburdened. They receive support in the area of project-specific knowledge transfer (organisation of publicity events) and project-specific administration (funding requests, project budget controlling) through qualified support.

As of the seventh year a work group was formed to actively design the further development of the network. Herewith the network entered the transformation phase. This work group consists of the board of directors of the network management, the committee, and a number of long-standing network and project managers. The general member meeting ensures transparency in the discussions and the decisions of this work group. Suggestions for the development of the network are included in this framework. Within the focus of regular strategy discussions, the question came up of how the network can prepare itself for future challenges and remain competitive in the innovation system in the long-term. The strategic decision of increasing service orientation was formulated. The network members should be offered support services, according to demand and target group, for the initiation and implementation of innovation activities through network and project managers.

The transition in the transformation process and the strategic decision of service orientation results from increasing interaction and communication paths over the years with partners within the network. Hereby the innovation broker supports the cooperation within the centre of communication between the individual partners within a group (for example, business to business) and between the network partners and third parties (for example, business to others). Furthermore, cooperation and interaction takes place between the network partners and the innovation broker (for example, business to innovation broker). This is the case, for instance, when the innovation broker focuses his services directly on the network partner (see Figure 7.4). In order to be able to quantify the change in the range of activities, a support key (support ratio, SR) has been calculated as a dimensionless benchmark. It is the relationship between the intensity of interaction and the support time made available through the innovation broker.



Collaboration / interaction / communication	Collaboration / interaction intensity		
	Collaboration / interaction intensity 4th year after setting up	Collaboration / interaction intensity 9th year after setting up	Increase of collaboration / interaction intensity from 4th to 9th year after setting up
StB	2.7	31.5	+12%
StPA	2.4	8.0	+3%
BtPA	2.9	10.1	+4%
StS	2.3	25.0	+11%
BtB	3.2	39.7	+12%
PAtPA	2.6	2.6	+1%
StO	0.2	1.0	+7%
BtO	0.2	1.3	+7%
PAtO	0.2	0.3	+2%
IBtO	0.0	0.1	+5%
IBtS	0.2	0.5	+3%
IBtPA	0.2	0.2	+1%
IBtB	0.2	0.6	+4%

B Business actor; S Science actor; PA Public authorities; IB Innovation broker; O Others (network external; here: carrier of funding programme); Collaboration / interaction / communication

x%: Percentage of this actor group in the network

n: Total number of actors

t: to (e.g. BtB: business to business interaction)

SR: Support ratio (Ratio of collaboration and support time, IB person month)

Figure 7.4: Increase of collaboration, interaction and communication intensity (of studied network)

In Figure 7.4 the percentage shares of the individual actor groups in the growing network and the two snapshots of the fourth and ninth year since the establishment of the network are compared. It becomes clear that the network has grown, especially in the number of

business partners. For example, in the fourth year 18 business actors were active in the network. In comparison there were already 63 in the ninth year. The relationship between the actor groups also changed. For example, in the fourth year 37% of network actors came from business; this number rose to 49% by the ninth year. However the total number of public authorities remained constant over the years. This actor group became proportionally smaller. The diagram also shows that the network activities (joint projects) were partially funded by only one funding programmes whereas in the ninth year five different funding programmes were used.

Due to the increase in actors and thereby the interactions in the network (up to twelve percent points in the case of interaction between business and science) the support key (support ratio) also changed. The innovation broker has also grown over the years (see Figure 7.3); however, this did not occur at the same rate as the growth of the entire network. The support key changes by 13 percent points (from 1.7 to 1.9). This means that the innovation broker's project and network managers spend less time per individual contact. The innovation broker has become more efficient under the condition that the quality of support services has remained the same. The thesis can also be postulated that this efficiency is the result of collective experience gathered over the years in combination with increasing specialisation.

The transformation process gains advantages from the increase in personnel numbers and specialisation at the level of network management, since the network and project managers can use part of their working time for the development and expansion of the service portfolio (see sub-chapter 7.1). Consequently, for example, the increasing development of marketable and customer-oriented services for the support of innovation processes within the network is facilitated (as in the three case studies described in chapter 6).

At the current time it is not possible to predict whether the transformation process can be successfully concluded or not. A continuation of the successful development is assumed, - under the presumption that the network management is changing (advantageously) from having a project orientation to that of having a service orientation. As a result, management support services offered by the innovation broker can contribute to customer oriented benefits for all actor groups in the network.

8 Conclusion

The procedure model methodically developed in this study and validated in practice is an approach with which network actors' demand for support in inter-organisational innovation processes can be systematically identified in the future. As an example, a case study was illustrated showing in which way an innovation broker can develop and offer customer oriented services. Both should ensure the long-term success of innovation networks. The fact that the use of these methods in the three case studies was based on specific endogenous top-down networks does not exclude them from being transferable to other network types. A requirement for this however, just as for the pilot organisations analysed here, is that the network management be taken over by a centrally operating innovation broker. Considering the experiences and results of this study, the management of an innovation network has a decisive influence on the success of a network. Sydow and Zeichhardt (2009) also support this statement. The authors prove that the development of a network and network management are mutually dependent since the network management influences the development of the network, for example, through the range of services offered to network members. At the same time, the development level of a particular network influences the specific opportunities and boundaries of the network management (see also Sydow, 2006). Meier zu Köcker (2008) emphasises that the task of network management is to offer a range of specialised and demand oriented services to network members. Network management is to be considered a central element for the control of networks and in this case takes on the role of service provider. Knowing the network members' demand for support and orienting the range of services to meet them is thus an elementary task of a characteristic service recipient-service provider relationship (see also Mack, 2007; Schütz, 2009).

In contrast, Klerkx and Leeuwis (2008a, 2009) believe that innovation brokers are only necessary when certain market failures and failure of the innovation system occur (i.e. information and managerial gaps). The present study also used this assumption as the range of support services was substantiated by transaction and coordination costs that were too high in inter-organisational innovation processes. To counter this problem, Klerkx and Leeuwis (2008a) suggest a process of institutional learning. In this process, knowledge and technology providers are to be integrated on the one hand and knowledge and technology users on the other hand. The task of the innovation broker in this process according to Klerkx and Leeuwis (2009) is to enable network members to cooperate independently within the framework of innovation processes. In accordance with this the innovation broker is a temporary phenomenon and unnecessary after the successful run of the institutional learning process.

Contrary to Klerkx and Leeuwis (2008a, 2009), the insights from the present study do not correspond to the statements made by these authors. In the investigated pilot organisation, the role of the innovation broker is not only in demand in the case of market failures or failure of the innovation system. Rather, the support services can be seen as a kind of outsourcing of innovation management tasks from the point of view of network members. They will be in demand in the future.

A generalisation that all types of networks are more successful with a centrally operating innovation broker cannot be derived from the analysis carried out. However, based on the innovation network analysed as an example, with its specific characteristics, central network control by the innovation broker proved its worth. This mainly results from the complexity of innovation activities and the large number of interaction opportunities and paths of communication in the investigated network (see Figure 7.4). The complexity of the investigated network can be observed with regard to five aspects:

- The large number of interaction possibilities and paths of communication based on the given **constellation of actors**. Aside from typical network actors from science and business, actors from public authorities are also included.
- The business actors participating in the innovation activities, which stem from the producing **value chain** (mostly SMEs without own R&D department as well as a few large global corporations with own R&D departments).
- The number of other actors integrated in the innovation activities that stem from the **extended value chain network**. These are usually SMEs that in part operate own R&D (knowledge / technology provider in the area of ICT systems, measuring and testing technologies). Furthermore the innovation network unites knowledge / technology providers from science and research. Last but not least, a few public authorities are integrated. These are relevant for innovation activities when food safety as well as consumer protection are in focus. The participation of public authorities is also significant, since the legal requirements coming from these actors, as well as verification as to whether these requirements are complied with, often represent innovation triggers. If there are interactions between public authorities and business actors, legal and business requirements can be coordinated.
- Innovation activities that have a strong focus on **organisational innovations** in order to improve the cooperation of actors within the value chain and the value network.
- The type of implementation of organisational innovations that are supported by **technological innovations** (for example, technologies[32] for efficient elevation and communication of quality data along the value chain).

The complexity described above and the interaction opportunities are a distinctive feature of the agrifood market. This applies especially to meat production value chains that produce highly sensitive products (for example, in relation to microbiological features). The intensive control measures and the large number of legal requirements characterise the value chain; for example, in the following areas (European Union, 2010):

- Official controls on products of animal origin intended for human consumption; e.g. Regulation (EC) No 854/2004,
- General principles of food law (establishing the European Food Safety Authority and laying down procedures in matters of food safety); e.g. Regulation (EC) No 178/2002,

[32] For example, information and communication technologies as well as measurement and testing technologies.

- Official feed and food controls; e.g. Regulation (EC) No 882/2004,
- Animal health rules governing the production, processing, distribution and introduction of products of animal origin for human consumption; e.g. Council Directive 2002/99/EC.

In relation to the actor constellation within the innovation network and the possible interactions resulting from them, the role of the innovation broker is always being defined anew. They are faced with the challenge of moderating the resulting triangular relationship between science, business and public authorities (Hamer and Petersen, 2008). Batterink et al. (2010) support this result, whereby the authors highlight that the centrally operating innovation broker in such network features is especially valuable for an innovation network.

The success of networks with the specific characteristics described above can be influenced through the following factors:

- through customer oriented operation by the innovation broker,
- through sufficient personnel working for the innovation broker,
- through sustainably secured financing,
- through the introduction of a continual improvement process.

Network success through customer oriented operation by the innovation broker

As depicted in sub-chapter 7.2, the investigated network distinguishes itself through positive development. Hereby it can be determined that the network management, within the framework of a transformation process, takes on elements in the interactions between the actors, which characterise bottom-up networks. The acquisition of characteristics of bottom-up networks is supported by empirical tests. Meier zu Köcker (2008), for example, shows that bottom-up networks are more successful in their performance (for the definition of performance and success factors see sub-chapter 2.3). 75% of all investigated bottom-up networks had a performance rate of a good and very good. In contrast the endogenous top-down networks only had a sufficient performance rate. Only 10% of these networks were classified as successful.

The investigated network is becoming increasingly oriented towards the demand for support of all members. At the beginning, the topics of the mutual projects that applied for funding were strongly oriented towards research questions of an entire sector defined by science. The selected research programmes of the respective subsidy providers also did not allow individual funding for individual company problems. In accordance with this, it has so far not always been possible to give equal consideration to the interests of all network members. Yet the tendency can be observed that over the years, different funding programmes for partial financing of joint projects within the network were used. In the ninth year, for example, five different funding programmes were used, whereas in the fourth year the innovation broker concentrated on only one funding programme with

regional emphasis (see Figure 7.4). Hereby funding programmes for the business target group (innovation programme for SMEs) were used in addition to the classic research funding programmes (EU and national). This development suggests that benefits are created for the different actors in the network.

The rescission of the one-sided focus towards scientific actors is also supported by Klerkx and Leeuwis (2008a). The authors argue with regard to the original function of an innovation broker: “An innovation intermediary may be seen as partial because of supposed interwovenness with shareholding R&D providers. Other studies have made similar observations to the effect that, when an innovation intermediary is linked to a ‘content providing’ R&D or KIBS[33] organisation, it is not seen as sufficiently impartial” (see also Isaksen and Remøe, 2001).

In contrast to Klerkx and Leeuwis (2008a), Meier zu Köcker (2008) argues for service provision oriented towards all network members in order to ensure solid and satisfactory financing of network management and thus of the network itself: “Cluster organisations which are able to offer added values and demand-oriented services that are of worth for the members, may receive sustainable fee based financing more easily than those not able to provide appropriate services”.

Network success through sufficient personnel working for the innovation broker

To be able to offer the desired support services and generate added value for the members, the network management is dependent on a sufficient number of employees. As is shown in Figure 7.3, the network described here has created a respective number of personnel over the years. In the ninth year the innovation broker has over five full-time equivalent network and project managers at their disposal. With this figure the investigated innovation broker is above average. For German network organisations being investigated, Meier zu Köcker (2008) has found an average of 3.1 employees. Beside the activities taken on by the employees in network management, the work of the network of almost all of the investigated organisations survives mainly through voluntary support (for example by the board). This also applies to the network described here.

Aside from the five full-time equivalent positions for network and project manager, the investigated network also has 2.5 positions for administration in the ninth year, as well as 0.75 positions for PR activities (see 7.2). These are good starting conditions for the transformation process that has begun, up to a strong service oriented alignment for the support of numerous interactions (see Figure 7.4).

From his studies, Meier zu Köcker (2008) deduces that the personnel (especially the network and project manager) of network organisations which have a secured source of financing are usually professional networkers[34] rather than experts in the respective field

[33] Knowledge intensive business services (KIBS) can be defined as private companies or organisations relying heavily on professional knowledge (i.e., knowledge or expertise about a specific discipline or functional domain) supplying intermediate products and services that are knowledge based (Klerkx and Leeuwis, 2008a).
[34] Networkers with and / or without knowledge of the respective field in which the network operates.

in which the network operates. Iking (2004) came to similar results. In the innovation broker organisation investigated, the project and network manager combine professional expertise and network competences. The project and network manager of the network investigated have highly qualified professional training (mostly with an academic doctorate) in the respective field of the network. Skills in networking were obtained through on the job learning. In order to deepen the skills of networking, project management and innovation management, the project and network manager use targeted continuing education measures.

Network success through sustainably secured financing

Within the framework of the transformation process, approaches are to be developed on how the very different support services offered by the multi-headed team to internal and external network actors can be monetarily assessed. Only in this way can a long-term financing model for a highly qualified team be developed. The first attempt at this is supplied by the procedural model introduced here, in which the demand for support services along the innovation process is identified as being customer oriented in structure. An essential aspect hereby is for the future to define the indicators for service quality (see also Blunck, 1998; Meyer and Mattmüller, 1987).

Following the characterisation of networks (see 2.3), typical endogenous top-down established networks are dependent on basic financing from the public sector. The network being investigated in this study is also classified in its foundation stage as an endogenous top-down network. However the network never received institutional funding, from the public sector for example. Solid basic financing has been missing since the foundation. This starting position is, however, also beneficial to the network in terms of its development. Because of the lack of institutional funding, it was possible for the network to maintain strong independence and neutrality. The dilemma of the lack of neutrality of innovation brokers is frequently discussed (Klerkx and Leeuwis, 2008b, 2009). As a neutral actor within the innovation system and innovation networks, the innovation broker supports the participating actors in cooperative inter-organisational innovation activities. It thus takes on a systematic contribution. The neutrality and / or objectivity of innovation brokers can be endangered by dependence of individual financers. Absolute neutrality, however, is a condition that prevails only in an ideal world. Even if the network investigated has received no institutional funding so far, it was and is dependent on the thematic orientation of the subsidy programme, because based on the lack of basic financing, third-party funded joint projects have been and will be initiated and implemented together (see Figure 7.1). Such a financing model was sufficient for the foundation and growth phase of the network.

The question remains to be answered as to how the expected costs of stronger service orientation by network management can be covered. Klerkx and Leeuwis (2008a) point out that scientific establishments cannot cover them. The suspected reason is that scientific establishments are hesitant about integrating such procurement costs (for example, for the acquisition of research funding) in their budget. However, it should be mentioned that innovation brokers generate advantages for business actors as well as for

scientific establishments. The scientific establishments profit from lower procurement costs in applying for third party funding for research projects (Klerkx and Leeuwis, 2008a). This results from the innovation broker having, if applicable, specialised in the services of third party funding acquisition. Furthermore scientists profit within a network through simplified access to business actors. Research questions can thereby be formulated in a practice oriented fashion. In addition, the success of participation in funding programmes which require participation of business actors increases. Business actors profit from lower search costs for the finding and integration of adequate external resources (knowledge, technological expertise etc.) (see also sub-chapter 3.1). Through participation in networks, business actors have easier access to knowledge, information and technology sources (Klerkx and Leeuwis, 2008a).

Meier zu Köcker (2008) finds that increased financing through business can only be realised when customer and demand oriented services are offered or the creation of added value (also outside possible joint projects) is made possible. Without such a change in direction, the readiness of businesses to pay remains low. The discussions within the pilot organisations in focus support the statements of Meier zu Köcker (2008) and Klerkx and Leeuwis (2008a) since scientific establishments and public authorities usually do not have cost positions that depict the utilisation of such services. Business actors must increasingly take over the financing of support services for inter-organisational innovation processes. Therefore, the present study concentrates on the interactions and cooperations that are most likely to be monetarily covered (BtB, BtS, BtPA, BtO, BtIB; see Figure 7.4). In supporting these interactions and this cooperation, a financing basis for the provision of services is seen by an innovation broker. Further research demands exist in observing interactions in which public authorities as well as scientists are in focus. Hereby the question arises of how the range of services can be financially refunded to these actor groups.

Continuous improvement process in innovation networks

For the offer of monetary services, concrete indicators are to be defined by which the service performance and service impact can be measured. In quality management, the objective measurement of the impact of improvement measures creates the basis for further improvements. In accordance with this, the product and process quality of individually rendered services or whole service bundles should continuously be improved on the basis of measuring success.

However, within the improvement processes of management support services, an objective success measurement of intermediary achievements is difficult. The measurement of “added value of innovation intermediation services, such as diagnosing, needs articulation, and network brokerage, is complicated, due to their intangibility and their ‘invisibility’ in the end-result of the innovation process” (Klerkx and Leeuwis, 2008a). On the one hand, success surely depends on whether the range of services offered by the innovation broker corresponds with the service recipients’ demand for support. This is ensured by the suggested procedure of identifying demand within the framework of this thesis. Yet success is also largely dependent on the basic conditions (like, for example,

innovation friendly culture and politics, the financial and content facilities of research and innovation funding programmes, the quality of cooperation partners etc.). Should evaluation be chosen as an instrument of quality assurance of support service in inter-organisational innovation processes, the identification of adequate evaluation criteria is an issue that can be resolved only with difficulty. This is based on the variety of tasks, the variety of modes of action and the often very indirect effects of intermediaries (Czarnitzki et al., 2001). At the same time Czarnitzki et al. (2001) suggest comparatively presenting the work of innovation brokers based on quantitative and qualitative indicators. Herewith an assessment of the structure of establishments, process procedures and the impact of innovation brokers can be made possible. The results can serve as a basis for the increase of efficiency and transparency for customers as well as an instrument for strengthening competition oriented approaches to improvement.

The Kompetenznetze Deutschland initiative has developed such an evaluation instrument in regard to networks and the associated network management. Within the Kompetenznetze Deutschland initiative, the Federal Ministry of Economy and Technology bundles the outstanding innovation networks in the country. At the moment approximately 115 of the most innovative and high-performance national expertise networks and / or clusters with technological orientation are bundled by the initiative. Kompetenznetze Deutschland offers benchmarking of networks as a comparative analysis of structures, processes, developments, methods and services. As opposed to ranking, benchmarking offers above all else the opportunity of learning from one another. In the first step, an analysis of the current position is carried out for an individual network to give an illustration of the present situation. Using benchmarking as a comparative analysis with other networks, the target situation can then be determined. Thus benchmarking offers a goal-oriented approach for optimising one’s own actions. Benchmarking represents an instrument for the continuous improvement of one’s own work. An extensive set of key figures was developed for the benchmarking of networks, which are based on the following areas (Kompetenznetze Deutschland, 2009):

- The existence of network structures and formation of internal network cooperation
- Financing
- Network typologies and control
- Task, goals, and strategies
- Network services and added values
- Internationalisation
- External perception and output of network work

Furthermore, the authors Kaufmann and Tödtling (2002) as well as Vos (2005) suggest making an assessment of innovation brokers in terms of the benefits they create as perceived by the network actors. The benefits of innovation brokers are also determined by the increasing number of organisations which are taking on intermediary functions in

the innovation system (Howells, 2006). This shows the demand for such organisations and their services.

The network investigated in this study has taken advantage of the benchmarking process offered by the Kompetenznetze Deutschland initiative. Within this framework it was compared with other networks from the same field of innovation, which, however, did not have the same specifics. A comparison with networks from other fields of innovation, as planned by Kompetenznetze Deutschland, can also reveal improvement potential. Furthermore, benchmarking with other networks (for example from other countries) that have similar specifics as those of the network investigated in this study, would be helpful (for the specific features see page 121 f.).

9 Summary

The aim of this thesis was to develop an approach whereby the service portfolio of innovation brokers can be adjusted to become customer-oriented. In this context the role of the innovation broker was defined as a service provider who is focused on supporting the other network actors in the innovation process within a network. Thus the other network actors are considered to be service recipients who make use of the support services.

The concept development was made on the basis of analysis data stemming from a research and development platform for value chains in the agrifood industry established nine years ago. Hereby the development steps of the concept concentrate on the meat value chain as an example. Essentially three steps took place hereby:

1. The structuring of a procedural model to **determine the demand for support** of network actors when initiating and implementing inter-organisational innovation processes.
2. The definition of a **catalogue of specific support services**, the elements of which can be individually combined and offered by innovation brokers to their network actors.
3. The establishment of **key performance indicators to characterise the development of networks** with branch-specific features as a basis for a continuous improvement process.

Even when exemplary value chains in meat production were observed, the approaches listed in this thesis can be carried over to other value chains with similar characteristics (see p. 130).

Determining the demand for support

As an introduction, the results of a literary study on the strengths and weakness in the innovation process in regard to individual companies and networks were presented. From this, possible support services in a general form were deduced with which the problems that were pointed out could be overcome. Hereby support services were highlighted that minimise the transaction and coordination costs in inter-organisational innovation processes for network actors. Through the insights gained within the framework of this study, thesis 1, which was formulated at the beginning, that support services are in particular in demand when the innovation activity proves to be especially complex (see page 130) and a high degree of interaction is necessary between the actors, could be validated.

Through the resulting interface between the participating actors the transaction and coordination costs increased. To investigate the thesis formulated at the start, a written survey took place aimed towards approximately 700 companies in the meat industry. This

quantitative analysis of the demand for support was supplemented by a qualitative analysis in the form of three case studies. Based on missing resources in individual innovation activities (described in the case studies) the need for support from the point of view of the service-recipient can be deduced for equalisation of resources. The scope of support for companies integrated in the innovation process grew considerably depending on the following five factors:

1. the size of the cooperation consortium,
2. the lack of appropriate personnel with educational backgrounds and experience in the area of innovation / R&D,
3. lack of knowledge and no access to the new target markets being aimed at (based on the markets of the agrifood industry),
4. lack of strategic alliances between steps in the value chain,
5. lack of experience in initiating, applying for and implementing publicly funded projects.

Catalogue of specific support services

From the point of view of the service provider, a definition of the fields of support can be made from the developed procedure in which services are to be offered. A catalogue with 37 specific support services resulted from it, which classifies the following four aspects of inter-organisational innovation processes:

1. ***P****reparation of innovation activities*
   Management support within the framework of the initiation and preparation of innovation activities described by eighteen individual service elements
2. ***R****ealisation of innovation activities*
   Management support within the framework of the implementation of innovation activities described by six individual service elements
3. ***D****issemination*
   Management support within the framework of the dissemination of knowledge described by nine individual service elements
4. ***N****etworking*
   Management support within the framework of the networks described by four individual service elements

Key performance indicators to characterise the development of networks

As an example, the development of a specific network of a research and development platform was analysed for over a decade. Hereby key performance indicators were defined to characterise the development of networks as well as branch-specific features as unique characteristics. A continuous improvement process in the pilot organisation was determined in both assessment categories.

The branch-specific characteristics were summarised under a multifaceted definition of complexity as follows:

- Variety of interaction opportunities and communication paths due to the given **actor constellation**[35] in the innovation network.
- The business actors participating in the innovation activities stem from the producing **value chain** (mostly SME without own R&D department as well as a few large global corporations with own R&D department).
- Additional actors integrated in the innovation activities stem from the **extended value chain network** (universities, research institutions and SME as knowledge and technology providers[36]).
- Innovation activities are focused strongly on **organisational innovations** in order to improve the cooperation of actors within the value chain and the network.
- The implementation of organisational innovations is supported by **technological innovations**[37].

It was shown by example that especially for networks with similar characteristics, it has been tried and tested for networks to be continuously assisted by an innovation broker with a central coordinating position. The innovation broker has a decisive influence on the success of the network. Thesis 2, which was formulated at the start, is hereby validated. The following key performance indicators for characterisation of development as the basis for a continuous improvement process of the investigated pilot organisation could be identified:

- Financial ability to implement the planned innovation activity in the innovation network (stated in Euros),
- Number of members in the network and member contributions for (partial) financing of the services offered by the innovation broker,
- Personnel available to the innovation broker as the central acting actor in the network (statement in person months),
- Support key as a dimensionless number for quantifying the scope of support in interactions (between the network actors on the one hand and with organisations outside the network on the other).

[35] The analysed innovation broker supports, for example, 13 interaction and communication paths between the network actors from science, business and public authorities as well as between external partners.
[36] The investigated network also shows the unique characteristic that aside from the actors named, other actors from public authorities are also integrated. This is especially the case when the focus is on food safety and consumer protection.
[37] In the investigated network, the technological innovations are technologies for efficient surveying and communication of quality data along the value chain (like, for example, information and communication technologies as well as measuring and testing technologies).

Based on the key performance indicators described above, the analysis of the investigated network showed an ideal-typical process in relation to the phases of establishment, growth, maturation as well as transformation. In addition, it was shown how the networks, including network management, could continue to undergo a continuous improvement process. For this purpose, choosing the tool of benchmarking with other networks is recommended. Based on quantitative and qualitative indicators, a comparison analysis of this kind serves to define the location. Furthermore, it offers a goal-oriented approach for optimising personal action. It was shown hereby that aside from general indicators[38], key performance indicators for networks with branch-specific characteristics are to be integrated. This applies in particular when benchmarking takes place with networks (possibly also from other countries) which are characterised by similar features.

[38] Like, for example, existing network structures and characteristics of internal network cooperation, network management, network services, internationalisation, external perception etc.

10 Zusammenfassung

Ziel dieser Arbeit war es, einen Ansatz zu entwickeln, in welcher Weise sich das Dienstleistungsportfolio von Innovationsbrokern kundenorientiert ausrichten lässt. Die Rolle des Innovationsbrokers wurde in diesem Zusammenhang als Dienstleistungsgeber definiert, der in einem Netzwerk darauf fokussiert ist, die übrigen Netzwerkakteure im Innovationsprozess zu unterstützen. Diese gelten demnach als Dienstleistungsnehmer, die Unterstützungsleistungen in Anspruch nehmen.

Die Konzeptentwicklung erfolgte auf der Grundlage von Analysedaten einer vor neun Jahren etablierten Forschungs- und Entwicklungsplattform für Wertschöpfungsketten der Agrar- und Ernährungswirtschaft. Die Entwicklungsschritte des Konzeptes konzentrierten sich dabei exemplarisch auf die Wertschöpfungskette Fleisch. Dabei wurden im Wesentlichen drei Schritte vollzogen:

1. Die Strukturierung eines Vorgehensmodells zur **Ermittlung des Unterstützungsbedarfs** von Netzwerkakteuren bei der Initiierung und Realisierung überbetrieblicher Innovationsprozesse.
2. Die Definition eines **Katalogs spezifischer Unterstützungsleistungen**, dessen Elemente Innovationsbroker ihren Netzwerkakteuren individuell kombiniert anbieten können.
3. Die Ermittlung von **Kennzahlen zur Charakterisierung der Entwicklung von Netzwerken** mit branchenspezifischen Eigenschaften als Grundlage für einen kontinuierlichen Verbesserungsprozess.

Auch wenn exemplarisch Wertschöpfungsketten der Fleischerzeugung betrachtet wurden, lassen sich die in dieser Arbeit aufgeführten Ansätze auf überbetriebliche Innovationsprozesse anderer Wertschöpfungsketten mit ähnlichen Eigenschaften (siehe S. 134) übertragen.

Ermittlung des Unterstützungsbedarfs

Einleitend wurden die Ergebnisse einer Literaturstudie zu Stärken und Schwächen in Innovationsprozessen bezogen auf Einzelunternehmen und Netzwerke dargestellt. Hieraus wurden in allgemeiner Form mögliche Unterstützungsleistungen abgeleitet, mit denen sich aufgezeigte Probleme überwinden lassen. Hervorgehoben wurden dabei Unterstützungsleistungen, die den Transaktions- und Koordinationsaufwand in überbetrieblichen Innovationsprozessen für Netzwerkakteure minimieren. Durch die gewonnenen Erkenntnisse im Rahmen dieser Arbeit konnte die zu Beginn formulierte These 1, dass Unterstützungsleistungen insbesondere dann nachgefragt werden, wenn sich Innovationsaktivitäten als besonders komplex (siehe hierzu S. 134) erweisen und ein hohes Maß an Interaktion zwischen den Akteuren notwendig ist, bestätigt werden. Durch die entstehenden Nahtstellen zwischen den beteiligten Akteuren erhöht sich der Transaktions- und Koordinationsaufwand. Zur Untersuchung der zu Beginn formulierten

These erfolgte eine schriftliche Befragung, die sich an etwa 700 Unternehmen der Fleischwirtschaft richtete. Diese quantitative Analyse des Unterstützungsbedarfs wurde ergänzt durch eine qualitative Analyse in Form von drei Fallstudien. Aufgrund fehlender Ressourcen in einzelnen Innovationsaktivitäten (beschrieben in den Fallstudien) lässt sich aus Sicht der Dienstleistungsnehmer der Unterstützungsbedarf für einen Ressourcenausgleich ableiten. Der Unterstützungsumfang, für in überbetriebliche Innovationsprozesse eingebundene Unternehmen, wuchs deutlich in Abhängigkeit von den folgenden fünf Faktoren:

1. der Größe des Kooperationskonsortiums,
2. dem Fehlen von eigenem Personal mit Ausbildungshintergrund und Erfahrungen im Bereich Innovationen / Forschung & Entwicklung (F&E),
3. den fehlenden Kenntnissen über und dem fehlenden Zugang zu neu angestrebten Zielmärkten (bezogen auf die Märkte der Agrar- und Ernährungswirtschaft),
4. dem Fehlen von strategischen Allianzen zwischen Stufen der Wertschöpfungskette,
5. den fehlenden Erfahrungen bei der Initiierung, Beantragung und Durchführung von öffentlich geförderten Projekten.

Katalog spezifischer Unterstützungsleistungen

Aus Sicht des Dienstleistungsgebers lässt sich durch das entwickelte Vorgehen eine Bestimmung der Unterstützungsfelder vornehmen, in denen Dienstleistungen anzubieten sind. Hieraus entstand ein Katalog von 37 spezifischen Unterstützungsleistungen, die sich den folgenden vier Aspekten überbetrieblicher Innovationprozesse zuordnen lassen:

1. ***P****reparation of innovation activities*
   Managementunterstützung im Rahmen der Initiierung und Vorbereitung von Innovationsaktivitäten beschrieben durch 18 einzelne Dienstleistungselemente
2. ***R****ealisation of innovation activities*
   Managementunterstützung im Rahmen der Realisierung von Innovationsaktivitäten beschrieben durch sechs einzelne Dienstleistungselemente
3. ***D****issemination*
   Managementunterstützung im Rahmen der Wissensverbreitung beschrieben durch neun einzelne Dienstleistungselemente
4. ***N****etworking*
   Managementunterstützung im Rahmen des Netzwerken beschrieben durch vier einzelne Dienstleistungselemente

Kennzahlen zur Charakterisierung der Entwicklung branchenspezifischer Netzwerke

Exemplarisch wurde an einem spezifischen Netzwerk einer Forschungs- und Entwicklungsplattform die Entwicklung über eine Dekade analysiert. Dabei wurden Kennzahlen zur Charakterisierung der Entwicklung von Netzwerken sowie branchenspezifischen Eigenschaften als Alleinstellungsmerkmale definiert. An beiden Bewertungskategorien ließ sich ein kontinuierlicher Verbesserungsprozess in der Pilotorganisation festmachen.

Die branchenspezifischen Eigenschaften wurden unter einem facettenreichen Begriff der Komplexität wie folgt zusammengefasst:

- Vielzahl an Interaktionsmöglichkeiten und Kommunikationspfade aufgrund der gegebenen **Akteurskonstellation**[39] im Innovationsnetzwerk.
- An Innovationsaktivitäten beteiligte Wirtschaftsakteure stammen aus der produzierenden **Wertschöpfungskette** (zum größten Teil KMU ohne eigene F&E-Abteilung sowie einige wenige großunternehmerische Weltkonzerne mit eigener F&E-Abteilung).
- Weitere Akteure eingebunden in Innovationsaktivitäten stammen aus dem **erweiterten Wertschöfpungsnetzwerk** (Universitäten, Forschungsinstitutionen und KMU als Wissens- und Technologieanbieter[40]).
- Innovationsaktivitäten haben einen starken Fokus auf **organisatorische Innovationen**, um die Zusammenarbeit von Akteuren innerhalb der Wertschöpfungskette und des -netzwerkes zu verbessern.
- Die Implementierung organisatorischer Innovationen wird durch **technologische Innovationen** unterstützt[41].

Es konnte exemplarisch gezeigt werden, dass es sich insbesondere bei Netzwerken mit ähnlichen Eigenschaften bewährt hat, das Netzwerk von einem Innovationsbroker mit zentraler Koordinationsfunktion kontinuierlich unterstützen zu lassen. Dieser hat einen entscheidenden Einfluss auf den Erfolg des Netzwerkes. Damit wurde die zu eingangs formulierte These 2 bestätigt. Bei der untersuchten Pilotorganisation konnten die folgenden Kennzahlen zur Charakterisierung der Entwicklung als Grundlage für einen kontinuierlichen Verbesserungsprozess ermittel werden:

[39] Der analysierte Innovationsbroker unterstützt z.B. 13 Interaktions- und Kommunikationspfade zwischen den Netzwerkakteuren aus der Wissenschaft, der Wirtschaft, der öffentlichen Verwaltung sowie zu netzwerkexternen Akteuren.

[40] Das untersuchte Netzwerk weist zudem das Alleinstellungsmerkmal aus, dass neben den genannten Akteuren weitere Akteure der öffentlichen Verwaltung eingebunden werden. Dieses ist insbesondere der Fall, wenn Inhalte der Lebensmittelsicherheit sowie des Verbraucherschutzes im Mittelpunkt stehen.

[41] Im untersuchten Netzwerk handelt es sich bei den technologischen Innovationen um Technologien zur effizienten Erhebung und Kommunikation von Qualitätsdaten entlang der Wertschöpfungskette (wie z.B. Informations- und Kommunikationstechnologien sowie Mess- und Prüftechnologien).

- Finanzielle Ausstattung zur Realisierung geplanter Innovationsaktivitäten im Innovationsnetzwerk (Angabe in EUR)
- Mitgliederzahlen im Netzwerk und Mitgliederbeiträge zur (Teil-) Finanzierung der vom Innovationsbroker angebotenen Dienstleistungen,
- Personelle Ausstattung des Innovationsbrokers als zentral agierender Akteur im Netzwerk (Angabe in Personenmonate),
- Unterstützungsschlüssel als dimensionslose Zahl zur Quantifizierung des Unterstützungsumfangs bei Interaktionen (zum einen zwischen den Netzwerkakteuren und zum anderen zu Organisationen außerhalb des Netzwerkes).

Die Analyse des untersuchten Netzwerkes ergab basierend auf den oben beschriebenen Kennzahlen einen idealtypischen Verlauf bezogen auf die Phasen der Gründung, des Wachstums, der Reifung sowie der Transformation. Zudem wurde aufgezeigt, wie sich Netzwerke inklusive des Netzwerkmanagements weiterhin einem ständigen Verbesserungsprozess unterziehen können. Hierzu wird vorgeschlagen, das Instrument des Benchmarking mit anderen Netzwerken zu wählen. Auf der Grundlage quantitativer und qualitativer Indikatoren dient eine derartige Vergleichsanalyse der Standortbestimmung. Des Weiteren bietet es einen zielorientierten Ansatz, das eigene Agieren zu optimieren. Dabei wurde aufgezeigt, dass neben allgemeinen Indikatoren[42] Kennzahlen für Netzwerke mit branchenspezifischen Eigenschaften zu integrieren sind. Dieses gilt insbesondere, wenn ein Benchmarking mit Netzwerken (evtl. auch aus anderer Länder), charakterisiert durch ähnliche Eigenschaften, erfolgt.

[42] Wie z.B. vorhandene Netzwerkstrukturen und Ausprägung interner Netzwerkkooperationen, Netzwerksteuerung, Netzwerkservices, Internationalisierung, externe Wahrnehmung etc.

References

Aslesen, H.W.; Braadland, T.E.; Jensen, L.H.; Isaksen, A. and F. Ørstavik (1999): Innovation, knowledge bases and clustering in selected industries in the Oslo region. Stiftelsen STEP Report 4. Oslo.

Baer, D. and M. Wermke (2000): Duden – das große Fremdwörterbuch. Herkunft und Bedeutung der Fremdwörter. 2. revision. Mannheim.

Bahlmann, J. and A. Spiller (2009): Inter-organizational information systems in meat chains: The linkage between supply chain organization and system requirements. Journal on Chain and Network Science, 9 (1), pp. 59–69.

Barney, J. (1986): Organizational culture: Can it be a source of sustained competitive advantage?. The Academy of Management Review, 11 (3), pp. 656–665.

Barney, J. (1991): Firm resources and sustained competitive advantage. Journal of Management, 17 (1), pp. 99–120.

Batterink, M. (2009): Profiting from external knowledge. How companies use different knowledge acquisition strategies to improve their innovation performance. Dissertation. Supervised by Omta, S.W.F and E.F.M. Wubben. Wageningen University. Wageningen.

Batterink, M.; Wubben, E.F.M.; Klerkx, L. and S.W.F. Omta (2010): Orchestrating innovation networks: The case of innovation brokers in the agri-food sector. Entrepreneurship & Regional Development: An International Journal, 22 (1), pp. 47–76.

Batterink, M.; Wubben, E.F.M. and S.W.F. Omta (2006): Factors related to innovative output in the Dutch agrifood industry. Journal on Chain and Network Science, 6 (1), pp. 31–44.

Beckeman, M. and C. Skjöldebrand (2007): Clusters / networks promote food innovations. Journal of Food Engineering, 79, pp. 1418–1425.

Bessant, J. and H. Rush (1995): Building bridges for innovation. The role of consultants in technology transfer. Research Policy, 24 (1), pp. 97–114.

Bierfelder, W. (1994): Innovationsmanagement. Prozessorientierte Einführung. 3. revision. München et al.

Blunck, E. (1998): Beurteilung der Dienstleistungsqualität von Wirtschaftsverbänden – Analysiert am Beispiel eines genossenschaftlichen Regionalverbandes. Schriftenreihe der Forschungsstelle für Genossenschaftswesen, 17. Stuttgart.

Boon, W.P.C (2008): Demanding dynamics. Demand articulation of intermediary organisations in emerging pharmaceutical innovations. Dissertation. Supervised by Smits, R.E.H.M. and S. Kuhlmann. Utrecht University. Utrecht.

Borchert, J.E. (2006): Operatives Innovationsmanagement in Unternehmensnetzwerken. Gestaltung von Instrumenten für Innovationsprojekte. Dissertation. Supervised by Biethahn, J. and M. Schumann. Hochschule St. Gallen. St. Gallen.

Brinkmeyer, D. (1996): Transaktionskosten der öffentlichen Projektförderung in der deutschen Agrarforschung. Dissertation. Supervised by Müller, R.A.E. and K. Brockhoff. Christian-Albrechts-Universität zu Kiel. Kiel.

Breuer, O.; Saatkamp, H.; Schütz, V.; Brinkmann, D. and B. Petersen (2008): Cross border classical swine fever control: Improving Dutch and German crisis management systems by an integrated public-private approach. Journal für Verbraucherschutz und Lebensmittelsicherheit, 3 (4), pp. 455–465.

Bröring, S.; Leker, J. and S. Rühmer (2006): Radical or not? Assessing innovativeness and its organisatonal implications for established firms. International Journal of Product Develpment, 3 (2), pp. 152–166.

Bruns, M.; Festag, R.; Otto, M.; Münster, A. and B. Kollmer (2009): Deutscher Tiergesundheitsstatus Ferkel. Positionspapier zu einem nationalen Standard bei der Erhebung von Tiergesundheitsdaten von Mastferkeln. Revised version of 06 November 2009. Restricted available document produced in the frame of this initiative.

Bruns, M.; Mack, A. and M. Hamer (2010): Allianzen zwischen Wirtschaft und Wissenschaft als Innovationsmotoren. In: Petersen, B.; Spiller, A. and L. Theuvsen (Eds.): Vom Viehvermarkter zum Dienstleistungsprofi. Rheinbreitbach, pp. 223–235.

Bruns, M.; Petersen, B. and W. Maijers (2008): Intermediary act as research-industry liaison office. Support in structuring the innovation process especially for small and medium sized enterprises of the pork chain. Proceedings of the 8th International Conference on Management in AgriFood Chains and Networks. 28-30 May 2008. Ede.

Buhl, C.M. (2009): Erhöhung der Innovationskraft durch Kooperationen in Netzwerken und Clustern. In: Bundesministerium für Wirtschaft und Technologie (Eds.): Innovative Netzwerkservices. Netzwerk- und Clusterentwicklung durch maßgeschneiderte Dienstleistungen. Berlin, pp. 13–20.

Caputo, A.C.; Cucchiella, F.; Fratocchi, L.; Pelagagge, P.M. and F. Scacchia (2002): A methodological framework for innovation transfer to SMEs. Industrial Management & Data Systems, 102 (5), pp. 271–283.

Chesbrough, H. (2003): Open Innovation. The new imperative for creating and profiting from technology. Boston.

Chesbrough, H. (2006): Open Business Models. How to thrive in the new innovation landscape. Boston.

CIAA AISBL (2007): Data & trends of the European Food and Drink Industry. Brussels.

CIAA AISBL (2010): Data & trends of the European Food and Drink Industry 2009. Brussels.

Clipson, C. (1991): Innovation by design. In: Henry, J. and D. Walker (Eds.): Managing innovation. London et al., pp. 97–105.

Coase, R.H. (1999): The nature of the firm. In: Williamson, O.E. and S.E. Masten (Eds.): The economics of transaction costs. Cheltenham et al., pp. 3–22.

Cooke-Davies, T. (2002): The "real" success factors on projects. International Journal of Project Management, 20, pp. 185–190.

Cooper, R.G. (1999): From experience – The invisible success factors in product innovation. Journal of Product Innovation Management, 16 (2), pp. 115–133.

Cooper, R.G.; Edgett, S.J. and E.J. Kleinschmidt (1999): New product portfolio management: Practices and performance. Journal of Product Innovation Management, 16 (4), pp. 333–351.

Costa, A.I.A. and W.M.F. Jongen (2006): New insights into consumer-led food product development. Trends in Food Science & Technology, 17, pp. 457–465.

Czarnitzki, D.; Licht, G.; Rammer, C. and A. Spielkamp (2001): Rolle und Bedeutung von Intermediären im Wissens- und Technologietransfer. ifo Schnelldienst, 54 (4), pp. 40–49.

Danish Agriculture and Food Council (2008): Geschichte und Aufbau des dänischen SPF-Systems. http://www.spf-sus.dk/sus/de-DE/Info/, retrieval date: 09 August 2010.

Deimel, M.; Plumeyer, C.-H.; Theuvsen, L. and J. Bahlmann (2009): Unternehmerische Netzwerkpartizipation in der Nahrungsmittelproduktion: Ergebnisse einer empirischen Studie am Beispiel des

Tiergesundheitsmanagements. 49. Jahrestagung der GEWISOLA „Agrar- und Ernährungsmärkte nach dem Boom“. Kiel. http://ideas.repec.org/p/ags/gaae09/53270.html, retrieval date: 25 October 2010.

DGQ – Deutsche Gesellschaft für Qualität (2000): Qualitäts- und Effektivitätssteigerung bei F&E-Projekten durch methodenunterstütztes Projektmanagement. FQS-DGQ-Band 86-01. Frankfurt am Main.

Edwards, S. (2008): Combined review of the available tools for assessment of sustainability. Restricted available document produced in the frame of the FP6-036245-2 project Q-PorkChains (Deliverable II.1.1).

Eisenhardt, K.M. (1989): Building theories from case study research. Academy of Management Review, 14 (4), pp. 535–550.

Ekvall, G. (1991): The organizational culture of idea management: A creative climate for the management of ideas. In: Henry, J. and D. Walker (Eds.): Managing Innovation. London et al., pp. 73–88.

Ellebrecht, A. (2008): Nutzenbetrachtung internetbasierter Informationssysteme im einzel- und überbetrieblichen Gesundheitsmanagement. Dissertation. Supervised by Petersen, B. and W. Büscher. Rheinische Friedrich-Wilhelms-Universität zu Bonn. Bonn.

Erlei, M.; Leschke, M. and D. Sauerland (2007): Neue Institutionenökonomik. Stuttgart.

European Commission (2004): Innovation in Europe. Results for the EU, Iceland and Norway. Data 1998-2001. European Commission. Luxembourg.

European Communities (2008): Insights on innovation management in Europe. Tangible results from IMP3rove. European Communities and Europe Innova. Luxembourg.

European Foundation for the Improvement of Living and Working Conditions (2004): Sector futures. The future of the food and drink sector. http://www.eurofound.europa.eu/emcc/publications/2004/sf_fd_1.pdf, retrieval date: 29 January 2010.

European Union (2010): Veterinary checks, animal health rules, food hygiene. http://europa.eu/legislation_summaries/food_safety/veterinary_checks_and_food_hygiene/index_en.htm#, retrieval date: 25 November 2010.

Eurostat (2010): Community Innovation Statistics (CIS). Description of dataset. http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/cis, retrieval date: 21 September 2010.

Eurostat (2010b): NACE backgrounds. http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/NACE_backgrounds, retrieval date: 21 September 2010.

Evanschitzky, H. (2003): Erfolg von Dienstleistungsnetzwerken – Ein Netzwerkmarketingansatz. Wiesbaden.

Fortuin, F.; Omta, S.W.F. and M. Batterink (2007): Key success factors of innovation in multinational agrifood prospector companies. International Food and Agribusiness Management Review, 10 (4). http://ageconsearch.umn.edu/bitstream/44898/2/20071012_formatted.pdf, retrieval date: 11 April 2010.

Freel, M. and J.P.J. de Jong (2009): Market novelty, competence-seeking and innovation networking. Technovation, 29, pp. 873–884.

Freeman, C. (2002): Continental, national and sub-national innovation systems – complementarity and economic growth. Research Policy, 31 (2), pp. 191–211.

Garcia, R. and R. Calantone (2002): A critical look at technological innovation typology and innovativeness terminology: A literature review. Journal of Product Innovation Management, 19 (2), pp. 110-132.

Gärtner, C. (2007): Innovationsmanagement als soziale Praxis. Grundlagentheoretische Vorarbeiten zu einer Organisationstheorie des Neuen. München, Mering.

Geiger, W. and W. Kotte (2008): Handbuch Qualität. Grundlagen und Elemente des Qualitätsmanagements: Systeme – Perspektiven. 5. revision. Wiesbaden.

Gemünden, H.G.; Ritter, T. and P. Heydebreck (1996): Network configuration and innovation success: An empirical analysis in German high-tech industries. International Journal of Research in Marketing, 13, pp. 449–462.

Gold, E.R; Herder, M. and M. Trommetter (2007): The role of biotechnology intellectual property rights in the bioeconomy of 2030. OECD international futures project on “The bioeconomy to 2030: Designing a policy agenda”. http://www.oecd.org/dataoecd/11/58/40925999.pdf, retrieval date: 26 November 2010.

Grant, R. and M. Nippa (2006): Strategisches Management. Analyse, Entwicklung und Implementierung von Unternehmensstrategien. 5. revision. München.

Grunert, K.G; Harmsen, H.; Meulenberg, M.; Kuiper, E.; Ottowitz, T.; Declerk, F.; Traill, B. and G. Göransson (1995): A framework for analysing innovation in the food sector. MAPP Working paper 38. Aarhus.

Hagedoorn, J. (2003): Sharing intellectual property rights – an exploratory study of joint patenting amongst companies. In: Industrial and Corporate Change, 12 (5), pp. 1035–1050.

Hamdouch, A. (2010): Conceptualising innovation networks and clusters. In: Laperche, B.; Sommers, P. and D. Uzunidis (Eds.): Innovation networks and clusters. The knowledge backbone. Bruxelles, pp. 21–63.

Hamel, G. (1991): Competition for competence and inter-partner learning within international strategic alliances. Strategic Management Journal, 12, pp. 83–103.

Hamer, M. and B. Petersen (2008): Preface. In: Jaeger, F. and M. Hamer (Eds.): Food safety and quality in international food chains. Technical reports of the Interreg IIIC initiative PromSTAP (Promoting the stable to table approach). Düsseldorf, Bonn.

Hargadon, A.B. and R.I. Sutton (1997): Technology brokering and innovation in a product development firm. Administrative Science Quarterly, 42, pp. 716–749.

Hauschildt, J. (2004): Innovationsmanagement. 3. revision. München.

Henry, J. and D. Walker (Eds.) (1991): Managing Innovation. London et al.

Hertog, P. den (2000): Knowledge-intensive business services as co-producers of innovation. International Journal of Innovation Management, 4 (4), pp. 491–528.

Hertog, P. den and T.J.A. Roelandt (1999): Cluster analysis and cluster-based policy making: The state of the art. In: OECD – Organisation for Economic, Co-operation and Development: Boosting innovation. The cluster approach. Paris,, pp. 413–427.

Hollanders, H. and A. Arundel (2005): European Innovation Scoreboard – European Sector Innovation Scoreboards. European Commission, DG Enterprise. Brussels.

Hortmann-Scholten, A. (2009): Tendenzielle Entwicklungen bis 2020. Fleischwirtschaft, 3, pp. 21–23.

Howells, J. (2006): Intermediation and the role of intermediaries in innovation. Research Policy, 35, pp. 715–728.

Iking, B. (2004): Erfolgreiche Netzwerkarbeit. Vorbedingungen und Erfolgsfaktoren. ZENIT GmbH. Mühlheim an der Ruhr.

Injac, N. (2007): Die Entwicklung des Qualitätsmanagements im 20. / 21. Jahrhundert. In: Pfeifer, T. and R. Schmitt (Eds.): Handbuch Qualitätsmanagement. Bad Langensalza, pp. 17–33.

Isaksen, A. and S.O. Remøe (2001): New approaches to innovation policy: Some Norwegian examples. European planning studies, 9 (3), pp. 285–302.

Kaufmann, A. and F. Tödtling (2002): How effective is innovation support for SMEs? An analysis of the region of Upper Austria. Technovation, 22 (3), pp. 147–159.

Kausch, C. (2007): A risk-benefit perspective on early customer integration. Dissertation. Supervised by Gassmann, O. and T. Sommerlatte. Universita t St. Gallen. St. Gallen.

Klerkx, L. (2008): Matching demand and supply in the Dutch agricultural knowledge infrastructure. The emergence and embedding of new intermediaries in an agricultural innovation system in transition. Dissertation. Supervised by Leeuwis, C. Wageningen University. Wageningen.

Klerkx, L. and C. Leeuwis (2008a): Balancing multiple interests: Embedding innovation intermediation in the agricultural knowledge infrastructure. Technovation, 28, pp. 364–378.

Klerkx, L. and C. Leeuwis (2008b): Matching demand and supply in the agricultural knowledge infrastructure: Experiences with innovation intermediaries. Food Policy, 33, pp. 260–276.

Klerkx, L. and C. Leeuwis (2009): Establishment and embedding of innovation brokers at different innovation system levels. Insights from the Dutch agricultural sector. Technological Forecasting & Social Change, 76, pp. 849–860.

Kompetenznetze Deutschland (2009): Benchmarking eines Kompetenznetzes. Interner Bericht eines Kompetenznetzes. Restricted available document.

Ladeur, K.H. and T. Vesting (2008): Geistiges Eigentum im Netzwerk – Anforderungen und Entwicklungslinien. In: Eifert, M. and W. Hoffmann-Riem (Eds.): Geistiges Eigentum und Innovation. Berlin, pp. 123–144.

Lambert, D.M. and M.C. Cooper (2000): Issues in supply chain management. Industrial marketing management, 29, pp. 65–83.

Lazzarini, S.G.; Chaddad, F.R. and M.L. Cook (2001): Integrating supply chains and network analyses: The study of netchains. Journal on Chain and Network Science, 1 (1), pp. 7–22.

Lienemann, K. and S. Lehnert (2005): Agrar- und Ernährungsforschung in Deutschland. Kooperationschancen erkennen – Innovationen nutzen. Ein Handbuch für Politik und Praxis. Bergen / Dumme.

Lorleberg, W.; Hensche, H.U.; Schleyer, A. and C. Wildraut (2010): Standortsicherung durch Clustermanagement und Netzwerkentwicklung – Eine Perspektive für die Agrarwirtschaft in NRW. Forschungsberichte des Fachbereichs Agrarwirtschaft Soest, 26. Soest.

Lundvall, B.Å. (Eds.) (1992): National systems of innovation. Towards a theory of innovation and interactive learning. London.

Mack, A. (2007): Konzeption für die Anwendung computergestützter Techniken im Gesundheitsmanagement fleischerzeugender Ketten. Dissertation. Supervised by Petersen, B. and W. Büscher. Rheinische Friedrich-Wilhelms-Universität zu Bonn. Bonn.

Madu, C.N. and K. Chu-hua (1993): Introducing strategic quality management. Long range planning, 26 (6), pp. 121–131.

Mahoney, J.T. and J.R. Pandian (1992): The resource-based view within the conversation of strategic management. Strategic Management Journal, 13 (5), pp. 363–380.

Meier zu Köcker, G. (2008): Clusters in Germany. An empirical based insight view on emergence, financing, management and competitiveness of the most innovative clusters in Germany. Institute for Innovation and Technology. Berlin.

Meier zu Köcker, G. and C.M. Buhl (2008): Kompetenznetze initiieren und weiterentwickeln. Netzwerke als Instrument der Innovationsförderung, des Wirtschaftswachstums und Standortmarketings. Bundesministerium für Wirtschaft und Technologie. Berlin.

Menrad, K. (2004): Innovations in the food industry in Germany. Research Policy, 33, 845–878.

Meyer, A. and R. Mattmüller (1987): Qualität von Dienstleistungen – Entwurf eines praxisorientierten Qualitätsmodells. Marketing Zeitschrift für Forschung und Praxis, 3, pp. 187–195.

Nijhoff-Savvaki, R.; Trienekens, J.H. and S.W.F. Omta (2008): Netchain innovation for sustainable pork supply chains in an EU context. Contributed Paper presented at IAMO Forum 2008. http://www.iamo.de/uploads/media/2_nijhoff-savvaki_CD.pdf, retrieval date: 11 April 2010.

NRLO – De Nationale Raad voor Landbouwkundig Onderzoek (1999): Innoveren met ambitie, kansen voor de agrosector, groene ruimte en vissector. NRLO-rapport 99 (17). Den Haag.

OECD – Organisation for Economic Co-operation and Development (2002): Frascati manual. Proposed standard practice for surveys on research and experimental development. Paris.

OECD – Organisation for Economic, Co-operation and Development (2010): ANBERD (Analytical Business Enterprise Research and Development) database 2009. http://www.oecd.org/document/17/0,3343,en_2649_34451_1822033_1_1_1_1,00.html, retrieval date: 21 September 2010.

OECD – Organisation for Economic, Co-operation and Development (2010b): STAN (STructural Analysis) database. http://www.oecd.org/document/62/0,3343,en_2649_34445_40696318_1_1_1_1,00.html, retrieval date: 21 September 2010.

OECD – Organisation for Economic Co-operation and Development and Eurostat – Statistical Office of the European Communities (2005): Oslo manual. Guidelines for collecting and interpreting innovation data. A joint publication of OECD and Eurostat. 3. revision, Paris.

Orihata, M. and C. Watanabe (2000): The interaction between product concept and institutional inducement: A new driver of product innovation. Technovation, 20, pp. 11–23.

Pannekoek, L.; Kooten, O. van; Kemp, R.G.M. and S.W.F. Omta (2005): Entrepreneurial innovation in chains and networks in Dutch greenhouse horticulture. Journal on Chain and Network Science, 5 (1), pp. 39–50.

Pappas, P.A. and V. DePuy (2004): An overview of non-parametric tests in SAS®: When, why, and how. Paper TU04, Duke Clinical Research Institute Durham, North Carolina. http://analytics.ncsu.edu/sesug/2004/TU04-Pappas.pdf, retrieval date: 04 February 2010.

Penrose, E.T. (1959): The theory of the growth of the firm. New York.

Perez-Freije, J. and E. Enkel (2007): Creative tension in the innovation process: How to support the right capabilities. European Management Journal, 25 (1), pp. 11–24.

Petersen, B. (2003): Überbetriebliches Qualitätsmanagement in Wertschöpfungsketten der Agrar- und Ernährungswirtschaft. In: Pfeifer, T. (Eds.): Prozessorientiertes Qualitätsmanagement – Gestalten, Umsetzen, Bewerten. Berichte zum Qualitätsmanagement, 5. Aachen, pp. 67-78.

Petersen, B.; Brinkmann, D.; Slütter, S.; Bruns, M.; Kollmer, B.; Festag, R.; Münster, A. and M. Otto (2010): Kommunikationskonzepte zwischen regionalen und bundesweiten Dienstleistungsagenturen. In: Petersen, B.; Spiller, A. and L. Theuvsen (Eds.): Vom Viehvermarkter zum Dienstleistungsprofi. Rheinbreitbach, pp. 287–298.

Petersen, B.; Knura-Deszczka, S.; Pönsgen-Schmidt, E. and S. Gymnich (2002): Computerised food safety monitoring in animal production. Livestock Production Science, 76, pp. 207–213.

Petersen, B.; Schulze Althoff, G. and A. Ellebrecht (2008): Qualitäts- und Gesundheitsmanagement in der Fleischwirtschaft – eine grenzüberschreitende Aufgabe: Überbetriebliche Informationsverarbeitung in Wertschöpfungsketten der Fleischerzeugung. In: Spiller, A. and B. Schulze (Eds.): Zukunftsperspektiven der Fleischwirtschaft. Verbraucher, Märkte, Geschäftsbeziehungen. Göttingen, pp. 183–198.

Pettigrew, A. (1988): Longitudinal field research on change: Theory and practice. Paper presented at the National Science Foundation Conference on Longitudinal Research Methods in Organizations. Austin.

Pfeifer, T. (2001): Qualitätsmanagement. Strategien, Methoden, Techniken. 3. revision. München, Wien.

Pleschak, F. and H. Sabisch (1996): Innovationsmanagement. Stuttgart.

Plumeyer, C.-H.; Deimel, M. and L. Theuvsen (2009): Netzwerkbeziehungen und betriebliches Qualitätsmanagement: Ergebnisse einer empirischen Untersuchung. In: Theuvsen, L. and M. Deimel (Eds.): Qualitätsmanagement in Wertschöpfungsnetzwerken. Berichte zum Qualitätsmanagement, 11. Aachen, pp. 167–184.

Pollard, D. (2006): Innovation and technology transfer intermediaries: a systemic international study. Advances in Interdisciplinary Studies of Work Teams, 12, 137–174.

Porter, M.E. (1980): Competitive Strategy. New York.

Porter, M.E. (1985): Competitive advantage. Creating and sustaining superior performance. New York.

Porter, M.E. (1990): The competitive advantage of nations. London.

Porter, M.E. (1998): Clusters and the New Economics of Competition. Harvard Business Review, 76 (6), pp. 77–90.

Rammer, C.; Zimmermann, V.; Müller, E.; Heger, D.; Aschhoff, B. and F. Reize (2006): Innovationspotenziale von kleinen und mittleren Unternehmen. ZEW Wirtschaftsanalysen, 79. Baden-Baden.

Raueiser, M. (2005): Das Biotechnologie-Cluster im nordeuropäischen Wachstumsraum Øresundregion. Köln.

Richter, R. and E. Furubotn (2003): Neue Institutionenökonomik. Eine Einführung und kritische Würdigung. Tübingen.

Ritter, T and H.G. Gemünden (2003): Network competence: Its impact on innovation success and its antecedents. Journal of Business Research, 56 (9), pp. 745–755.

Robinson, C.J. and M.K. Malhotra (2005): Defining the concept of supply chain quality management and its relevance to academic and industrial practice. International Journal of Production Economics, 96, pp. 315–337.

Rogers, E.M. (1983): Diffusion of Innovations. New York.

Rogers, M. (1998): The definition and measurement of innovation. Melbourne Institute of Applied Economic and Social Research. Melbourne institute working paper, 10. Melbourne.

Rosenfeld, R. and J.C. Servo (1991): Facilitating innovation in large organizations. In: Henry, J. and D. Walker (Eds.): Managing innovation. London et al., pp. 28–39.

Rothwell, R. (1994): Towards the fifth-generation innovation process. International Marketing Review, 11 (1), pp. 7–31.

Schlicksupp, H. (1992): Innovation, Kreativität und Ideenfindung. Würzburg.

Schoenheit, I.; Grünewald, M. and M. Bruns (2007): Corporate Social Responsibility als Verbraucherinformation. imug Arbeitspapier 17. Hannover.

Schroeder, R.; Ven, A. van de; Scudder, G. and D. Polley (1986): Managing innovation and change processes: Findings from the Minnesota innovation research program. Agribusiness, 2 (4), pp. 501–523.

Schülin, P. (1995): Strategisches Innovationsmanagement. Ein konzeptioneller Ansatz zur strategischen Steuerung der betrieblichen Innovationstätigkeit – dargestellt am Beispiel pharmazeutischer Unternehmen. Dissertation. Supervised by C. Pümpin and H.P. Wehrli. Hochschule St. Gallen. St. Gallen.

Schulze Althoff, G. (2006): Stufenkonzept zum Aufbau überbetrieblicher Informationssysteme für das Qualitäts- und Gesundheitsmanagement in Wertschöpfungsketten der Fleischwirtschaft. Dissertation. Supervised by Petersen, B. and G. Schiefer. Rheinische Friedrich-Wilhelms-Universität zu Bonn. Bonn.

Schulze Althoff, G.; Ellebrecht, A. and B. Petersen (2005): Chain quality information management: Development of a reference model for quality information requirements in pork chains. Journal on Chain and Network Science, 5, pp. 27–38.

Schumpeter, J.A (1934): The theory of economic development. Cambridge.

Schütz, V. (2009): Modell zur Planung von Dienstleistungen für das überbetriebliche Gesundheitsmanagement in der Fleischwirtschaft. Dissertation. Supervised by Petersen, B. and W. Büscher. Rheinische Friedrich-Wilhelms-Universität zu Bonn. Bonn.

SMEs-NET (2006): Ten theses on food and drink SMEs and innovation in Europe. Evidence on needs and policy recommendations. Vision paper. http://smes-net.ciaa.be/docs/others$/Vision%20Paper%20-%20Ten%20theses%20on%20Food%20and%20Drink%20SMEs%20and%20Innovation%20in%20Europe.pdf , retrieval date: 13 October 2010.

Spiller, A.; Theuvsen, L. and B. Schulze (2006): Entwicklungsperspektiven der Schweineproduktion in Deutschland. In: Deutschen Landwirtschafts-Gesellschaft (Eds.): Zukunftsstandort Deutschland: Strategien für die Landwirtschaft. Frankfurt a. Main, pp. 97–109.

Sydow, J. (2001): Management von Unternehmungsnetzwerke – Auf dem Weg zu einer reflexiven Netzwerkentwicklung? In: Howaldt, J.; Kopp, R. and P. Flocken (Eds.): Kooperationsverbünde und regionale Modernisierung. Wiesbaden, pp. 79–101.

Sydow, J. (2006): Management von Netzwerkorganisationen – Zum Stand der Forschung. In: Sydow, J. (Eds.): Management von Netzwerkorganisationen. Beiträge aus der Managementforschung. 4. revision. Wiesbaden, pp. 387–472.

Sydow, J. and R. Zeichhardt (2009): Bedeutung von Netzwerkservices für den Erfolg von Netzwerken. In: Bundesministerium für Wirtschaft und Technologie (Eds.): Innovative Netzwerkservices. Netzwerk- und Clusterentwicklung durch maßgeschneiderte Dienstleistungen. Berlin, pp. 21–29.

Theuvsen, L. (1997): Interne Organisation und Transaktionskostenansatz. Entwicklungsstand – weiterführende Überlegungen – Perspektive. In: Zeitschrift für Betriebswirtschaft, 67 (9), p. 971-996.

Theuvsen, L. (2004): Transparency in netchains as an organizational phenomenon: Exploring the role of interdependencies. In: Journal on Chain and Network Science, 4, pp. 125–138.

Theuvsen, L. (2009): Vorwort. In: Theuvsen, L. and M. Deimel (Eds.): Qualitätsmanagement in Wertschöpfungsnetzwerken. Berichte zum Qualitätsmanagement, 11. Aachen, p. 3.

Theuvsen, L.; Plumeyer, C.H. and J.C. Gawron (2007): Certification systems in the meat industry: Overview and consequences for chain-wide communication. In: Polish Journal of Food and Nutrition Sciences, 57 (4), pp. 563-569.

Trienekens, J.H.; Petersen, B.; Wognum, N. and D. Brinkmann (2009): European pork chains. Diversity and quality challenges in consumer-oriented production and distribution. Wageningen.

Trienekens, J.H.; Uffelen, R. van; Debaire, J. and S.W.F. Omta (2008): Assessment of innovation and performance in the fruit chain. The innovation-performance matrix. In: British Food Journal, 110 (1), pp. 98–127.

Trommsdorff, V. (1990): Innovationsmanagement in kleinen und mittleren Unternehmen. Grundzüge und Fälle – Ein Arbeitsergebnis des Modellversuchs Innovationsmanagements. München.

Tunzelmann, N. von and V. Acha (2005): Innovation in low tech industries. In: Fagerberg, D.M. and R.R. Nelson (Eds.): The Oxford handbook of innovation. Oxford, pp. 407–432.

UCLA – Academic Technology Services (2010): Introduction to SAS. http://www.ats.ucla.edu/stat/sas/whatstat/whatstat.htm, retrieval date: 04 February 2010.

United Nations General Assembly (1987): Report of the world commission on environment and development: Our common future. Transmitted to the general assembly as an annex to document A/42/427 – Development and international co-operation: Environment. Revised version of 15 February 2009.

United Nations General Assembly (2005): 2005 World Summit Outcome. Document A/60/L.1, 15 September 2005.

Vahs, D. and R. Burmester (2005): Innovationsmanagement. Von der Produktidee zur erfolgreichen Vermarktung. 3. revision. Stuttgart.

Ven, A.H. van de (1986): Central problems in the management of innovation. Management Science, 32 (5), pp. 590–607.

Voigt, S. (2002): Institutionenökonomik. München.

Vos, J.P. (2005): Developing strategic self-descriptions of SMEs. Technovation, 25 (9), pp. 989–999.

Voss, J.; Schaper, C.; Spiller, A. and L. Theuvsen (2009): Innovationsverhalten in der deutschen Landwirtschaft – Empirische Ergebnisse am Beispiel der Biogasproduktion. In: Berg, E.; Hartmann, M.; Heckelei, T.; Holm-Müller, K. and G. Schiefer (Eds.): Risiken in der Agrar- und Ernährungswirtschaft und ihre Bewältigung. Münster-Hiltrup, pp. 379–391.

Vrande, V. van de; Jong, J.P.J. de; Vanhaverbeke, W. and M. de Rochemont (2009): Open innovation in SMEs: Trends, motives and management challenges. Technovation, 29, pp. 423–437.

Walker, D. and D. Weber (1984): A transaction cost approach to make-or-buy decisions. Administrative science quarterly, 29 (3), pp. 373–391.

Wernerfelt, B. (1984): A resource-based view of the firm. Strategic Management Journal, 5, pp. 171–180.

Williamson, O.E. (1985): The economic institutions of capitalism. New York, London.

Williamson, O.E. (2005): Transaction cost economics. In: Menard, C. and M.M. Shirly (Eds.): Handbook of New Institutional Economics. Dordrecht, pp. 41–65.

Winch, G.M. and R. Courtney (2007): The organization of innovation brokers: An international review. Technology Analysis & Strategic Management, 19 (6), pp. 747–763.

Windeler, A. (2001): Unternehmungsnetzwerke. Konstitution und Strukturation. Wiesbaden.

Windsperger, J. (1996): Transaktionskostenansatz der Entstehung der Unternehmensorganisation. Heidelberg.

Yin, R. (1984): Case study research. Beverly Hills: Sage.

List of figures

List of tables