University-Industry Research Partnerships

A research exploring the dynamics of university-industry interaction within mutual research projects

Björn A. Janßen

Gronau (Westf.), 9th August 2016

(This page was intentionally left blank)

University of Twente
School of Management and Governance
Research Management – Production and Transfer of Scientific Knowledge
Dr. Kasia Zalewska-Kurek

University of Twente
School of Management and Governance
Entrepreneurship – Innovation Management – Organization
Dr. Rainer Harms

Master Thesis

Master of Business Administration

Subject: **UNIVERSITY-INDUSTRY RESEARCH PARTNERSHIPS**

A research exploring the dynamics of university-industry interaction within mutual research projects: a qualitative semi-structured interview study

Submitted by: Björn A. Janßen
B.A.Janssen@student.utwente.nl

Supervisors: 1st Supervisor University of Twente
Dr. Kasia Zalewska-Kurek

2nd Supervisor University of Twente
Dr. Rainer Harms

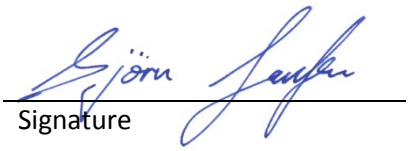
Number of words: 31,697
Number of pages: 82

Gronau (Westf.), 9th August 2016

Student declaration

With this declaration I, Björn A. Janßen, unequivocally declare that the following paper is my own and original work. There is no infringement of anyone else's copyright and all references or acknowledgements are made explicitly in the text. There is also no part in the text that has been written for me by another person.

Gronau (Westf.), 9-8-2016
Place, date



Signature

Acknowledgements

I would like to express my sincere gratitude to my two advising professors, Dr. Kasia Zalewska-Kurek and Dr. Rainer Harms. Both supported me in my Master's thesis with their insightful comments, their positive encouragements, but also critical remarks and hard questions. They offered me new perspectives and therefore have a significant stake in the quality of this research. In addition to this, they also provided me with the opportunity to participate in the development and writing of a conference paper, which was and still is a great honor for me. I could not have imagined having better advisors and I am not only grateful for their professional expertise and contributions but also for their personal attitude and passion. Hopefully, this research and also the empirical data that was collected can be of added value for their own research.
I wish both of them all the best for their bright professional and private future and similarly would like to support them by sending them positive energy for attaining their personal and professional goals.

In addition to this, I would like to thank all interviewees for their time, their openness, and also the offering of making additional contacts for supporting this research. They all contributed with valuable insights into the domain of university-industry interactions as an interesting emerging field of research as well as their own interesting insights into their personal field of research. I wish all of them good luck and lots of success with their research and hope for many promising research projects to come.

Last but not least, I would also like to thank my family, friends, and colleagues. They gave me support, motivation, and also the one or other positive distraction. As they are too many in number to name them here, they will know it. I also hope for them for a bright and marvelous future and the attainment of their goals.

Sincere thanks to all of you!!

Björn

Abstract

University-industry research collaborations become increasingly important in contemporary sustained university life, but the current literature lacks the consideration of a wider scope and the inclusion of distinguishable motives or objective pursuances within strategic partnerships that are dynamic in time and place. In order to understand these dynamics, postdoc researchers as well as doctoral candidates who are engaged in PhD projects that are executed in collaboration with organizations were interviewed in semi-structured interviews. This paper sheds light on the strategic behavior of researchers within university-industry research partnerships and provides the reader with a framework that supports value capture by identifying the predominant motives for engaging in such a collaboration as well as the exercised influence of organizations on the research direction, conduct, and publication together with the reaction of researchers to it. Results indicated that researchers possess high autonomy when setting research directions but are still dependent on the resources provided by the organization and its environment. Although organizations value the researcher`s competencies and its conceptual and abstract thinking for problems for which the organization is not able to easily solve it internally, the organization limits the researcher`s autonomy to a certain extent when it comes to the research conduct, which itself can be intended by the organization or simply due to feasibility reasons. Nonetheless, researchers are generally free in their choice for engaging in a mutual research project and are therefore in a more comfortable negotiation position and can act with foresight on what is demanded from them. As main conclusion one can state that the more transparent and coordinated the planning of the mutual research project, the more resource-saving (efficient) and successful (effective) the research project will be.

Table of contents

1. Introduction

In recent years the collaboration between universities and industry has become normal and has been a tangible development across all research fields (Bozeman et al., 2013). This development is additionally fostered by national governments to enhance the national competitiveness (Hagedoorn et al., 2000). For this reason, the contemporary university context as well as its internal tides change and this generates tensions to increasingly engage with external partners with the goal to generate knowledge. In this respect, the collaboration between universities and industry can be seen as a strategic alliance which purpose is to create value (Zalewska-Kurek et al., 2015) and also to exchange it. This value exchange can be defined as an intended interchange between partners of subjective as well as multifaceted benefits and previously agreed sacrifices (Ulaga, 2003).

However, value creation is based on perception and this varies due to the respective partner's context and its associated stakeholders to be satisfied. For this reason, each partner, namely the researcher and the firm or organization, follow their distinct strategies expressed in their respective strategic behavior. This strategic behavior can be therefore defined as a course of conscious action which supports the own long-term goal attainment but also taking account of other partners' courses of action.

The university-industry setting can be described as an increasingly dynamic setting. These dynamics are there for different reasons and can be defined as settings in which changes are commonplace without a static and unchanging status quo. As the academic field but also industries or their markets become increasingly globalized, these contexts contribute to implied dynamics. Additionally, also the university-industry collaboration itself causes dynamics as it connects two different arenas, including their own long-term goals. This is even reinforced as these mutual research collaborations last for longer time spans comprising dynamics in the internal development of those collaborations. The starting point for this development is the selection phase which is defined as the initial process of choosing a partner considering the potential value derived from this engagement. It is followed by the execution phase which is defined as the process of carrying out the actual tasks for the value realization or value capture.

In such a dynamic and heavily-influenced setting, the researcher's role can be targeted by the strategic behavior of the firm or organization. This cannot only be because of the peculiarities of the research collaboration in question but also due to the general engagement of the firm or organization with researchers. This can range from research partnerships to contract research to consulting (Perkmann & Walsh, 2007). For all these reasons, the mutual success of the research collaboration is dependent on the partner's commitment, the trust among partners, and the early clarification of research direction and objectives (Mora-Valentin et al., 2004).

Although literature in the field of university-industry interactions also increases in number, the literature particularly emphasizes factors influencing the knowledge transfer instead of discussing the strategic behavior of partners, the development of these collaborations and what the appropriate management is to generate mutually valuable and expected outcomes.

This is important as the mutual value and goal attainment are crucial points in each collaboration and serve as a basis for the intention to further engage with the partner.

An additional contribution of this paper is the research field involved. Business sciences, and social sciences in general, are not extensively studied by having a focus on university-industry interactions. However, the previously mentioned development in university-industry collaborations emerges across all research fields. Nonetheless, these usually defined soft sciences build on more intangible outcomes than natural sciences (Crossick, 2009). In addition to this, these research fields are targeting dynamic and informal social systems composed of individuals (D'Este & Patel, 2007; Olmos-Peñuela et al., 2014) as well as they are prone to an increased degree of confounding factors. All this makes social sciences in general and business sciences in particular a more uncertain research field for which analyzing and forecasting is far more complex.

By answering the question of what the strategic behaviors of partners in university-industry partnerships is, the goal is to enlighten these dynamics. This specifically means to clarify to what degree the researcher can act autonomous from the organization when it comes to directing and conducting the research as well as the predominant interdependence and the researcher's offered practitioner-oriented value to the organization.

The structure of the paper is as subsequently described.

Firstly, this paper begins with a literature review of relevant scientific papers from diverse domains. Secondly, it explains the method used as well as the concepts to be measured and the description of the sample. Thirdly, the interview findings and analysis of the interviews is shown. This is then followed by a discussion in which literature and findings are directly contrasted and integrated. Fourthly, there is a presentation of the framework as well as its development, and its contribution to the existent literature. Fifthly, the paper concludes from the interview findings followed by the managerial implications derived from it. Finally, the paper ends with the limitations and proposed future research direction section.

2. Research questions

The goal of this research is to enlighten the dynamics in university-industry collaborations and to provide a framework which enables to structurally analyze strategic behavior predominant in university-industry research partnerships

For this purpose, the following central research question and its sub-questions are stated, which are to be answered within this paper.

2.1. Central research question

What is the strategic behavior of partners and its development throughout the different phases in university-industry research partnerships?

2.2. Sub-questions

1. What is the strategic behavior of partners within the selection phase?

2. To what degree is the strategic behavior of partners changed during the development of the project and its execution phase?

3. What is the mutually agreed value exchange of the research partnership?

3. Theoretical background

In the following one can find a short literature review about the subjects of peculiarities in university-industry collaborations, strategic motives of partners in such partnerships as well as concepts which affect these collaborations and constitute the framework for analyzing these relationships. The resulting theoretical framework is to be found in the framework chapter in sub-chapter “7.1. Initial theoretical framework”.

3.1. The university-industry collaboration

In recent years the role of university-industry collaborations became an increasingly omnipresent, multifaceted, and disciplinary-dependent subject among researchers and it denotes as an important value driver for both universities and firms in their innovativeness (D’Este & Patel, 2007, p. 1309; Perkmann & Walsh, 2007, pp. 271-272; Perkmann & Walsh, 2008, p. 1884). This innovativeness is conceptually not only relevant for product respectively service offerings introduced to a market and associated production processes of these but can also take place in supporting organizational processes.

The first can be technical innovation and the second administrative innovation (Damanpour, 1991, p. 560; Han et al., 1998, p. 32). As this research has its focus on management researchers, technical innovation is a minor point. The term research collaboration pictures relationships between individuals and organizations or between organizations with the “objective of producing knowledge” and therefore indicates a sharing of human capital within social constructs defined by distinct behavioral patterns of humans (Bozeman et al., 2013, pp. 2-3). These relationships can represent different degrees of planned engagement and involve research partnerships, contract research as well as consulting (Perkmann & Walsh, 2007, p. 272). In terms of innovation as a value driver for firms, the manufacturing industries already demonstrated that the innovation process became faster and the significance of university-industry collaboration increased (Mansfield, 1998, pp. 774-776). Relating to this, the size of the firm is not a distinctive attribute as larger firms strive to become more agile (p. 775).

Particularly the interest of firms in more applied (and short-term) research seems to be meaningful. This type of collaboration is conceptualized as a property-focused collaboration as it involves the outcome of creating economic value (Bozeman et al., 2013, p. 1). On the contrary, one can find knowledge-focused collaborations. These collaborations have as their goal the generation of new knowledge and / or the expansion of current knowledge.

Universities are a paragon for this as it is their clear focus and objective to generate and disseminate knowledge. However, universities themselves pass through a transformation process in which their isolation diminishes and their embeddedness in networks increases. In addition to this, the majority of collaborations with the focus on economic value creation had at some point in time also a certain aspect focusing on knowledge generation (Bozeman et al., 2013, p. 4). An increasing number of universities seem to develop themselves as “knowledge businesses” with the goal of not only generating knowledge but rather the service provision through different channels to certain stakeholders (D’Este & Perkmann, 2011, p. 319). Those channels can be classified into collaborative (joint) research, contract research, and consulting.

Whereas collaborative research emphasizes primarily knowledge generation, contract research covers commercially relevant subjects, but both are research-related. On the contrary, the consulting channel is assumed to be a transactional knowledge transfer initiated by the firm and only for a shorter period of time and accentuates both research and commercialization (D'Este & Perkmann, 2011, p. 331). The motivation for the researcher can vary with each specific channel and by the associated engagement, which itself is also affected by the research subject in question Perkmann et al., 2013, p. 433) and also by the multiple stakeholders involved, like the university and its governance or other individuals (p. 429).

The impact of academic consulting can be also emphasized and is described in three categories, namely, research-driven, commercialization-driven, and opportunity-driven consulting (Perkmann & Walsh, 2008, pp. 1885-1887). The definition of consulting means the provision of services to an external organization on a commercial term and involves provision of advice, problem solving as well as idea generation and / or conceptual validation (p. 1885). Research-driven consulting indicates the researcher's plan to learn and validate assumptions within the industry, take the opportunity to access required resources, and extend the social capital with further contacts. The generated knowledge is aimed to offer strategic insights for the firm by means of the scholar. For this reason, it is assumed to be for the long term or even promotes continuous engagement between the respective partners.

Commercialization-driven consulting comprises knowledge tacitly hold by the researcher and / or parts of the academic community and its objective is technology development on a project basis (pp. 1886-1887). Opportunity-driven consulting shows income as main motive for the researcher and is characterized by the short term and builds on problem solving based on established openly accessible knowledge held within the academic community (Agrawal & Henderson, 2002; Gibbons & Johnston, 1974; Rosenberg, 1994; *all* in Perkmann & Walsh, 2008, p. 1885). It was found that consulting practiced by researchers has only limited influence on the researcher's directed choice for more applied subjects (p. 1889). However, the type of consulting is associated with the scholars' research productivity. In this respect, research-driven is the most productive, followed by commercialization-driven, and negatively associated with research productivity is opportunity-driven consulting (p. 1889).

It has to be additionally emphasized that the nature of published research is not affected by the industrial engagement itself (Van Looy et al., 2004, p. 425). The advancement in industrial engagement correlates with increased research productivity, showing evidence for a compound Matthew-effect (p. 439). This Matthew-effect involves disproportionally enhanced reputation for the researcher and the provision of more and diversified resources and therefore opportunities. These opportunities derived from those unlocked resources serve as a basis for further research. The evidence for the researcher's scientific excellence (high research productivity) and entrepreneurial performance (increased research budget), when engaging with industry, suggests that both reinforce each other. All this is in line with evidence which indicates that grants (research budget) and contracts with industry increase the researcher's tendency to engage with industry (Bozeman & Gaughan, 2007, p. 694).

In addition to this, there is also evidence which suggests that even research that is more applied in nature does not unavoidably compromise basic research (Van Looy et al., 2004, p.

429). This is of natural appeal as it is the researcher oneself who can conclude on preliminary findings by means of inductive reasoning and therefore identify basic patterns usable for theory or knowledge development. This previously mentioned nature of published research can be described as a continuum with the extremes of knowledge-focused nature and property-focused nature (Bozeman et al., 2013, pp. 4-5).

As an important contribution for the success in university-industry research partnerships social networks or the social embeddedness is noteworthy (Niedergassel and Leker, 2011 *in* Lee & Miozzo, 2015, pp. 298-299). Other research distinguishes by side between contributing factors to the mutual project success. For firms these contributing factors are previous linkages, the definition of objectives, expressed commitment, and conflict potential (Mora-Valentin et al., 2004, p. 17). The researcher focuses on reputation of the partner, its previous linkages, communications, expressed commitment, and existing trust (p. 17). Previous linkages or the partner's reputation are contextual factors which are important for the partner selection and for the initial agreement formation (p. 18). The other factors are organizational and relevant for the actual achievement of agreement (pp. 18-19). These organizational factors also directly affect the behavior among and towards partners. For this reason, well-defined agreements between reputable partners as well as the "accumulation of previous links" are the basis for the mutual succeeding (p. 32).

- *University-industry collaborations become more important for universities and firms.*
- *Value for the researcher is the insight into the real world and potential for publications but also the acquisition of funding.*
- *Value for the organization is that innovation is enhanced in pace and scope.*
- *The nature of collaborations and their research outcomes can differ from knowledge-focused (generation and dissemination of knowledge) to property-focused (creation of economic value).*
- *Strategic insights as well as socializing between partners can foster long-term research partnerships.*

3.2. The researcher and own strategic behavior

The objective of the university in general and the professor in specific can be summarized in the first place by the simple goal of valuable knowledge generation. Particularly in social sciences in general *(and management research in particular)*, where measurement is based on far more conceptualization of intangible and complex social subjects than in natural sciences, the research outcome can be quite fuzzy and uncertain (Dooley, 2001, p. 13). Reason for this is that social research involves "a scientific study of human action focusing on elements of thoughts and behavior that are in some degree social" and is therefore very individualistic and shaped by freedom of choice (Gerring, 2012, p. 1). Nonetheless, science strives not only to be descriptive about certain phenomena but also explanatory and therefore concluding with causal inference in order to predict outcomes. All this requires tremendous and continuous effort and is to be seen in networks in which researchers engage in an ongoing activity to

develop both knowledge for the research society and human capital inherent in themselves. The point of matter is that each assumption or hypothesis stated has to be checked against the real world which makes it absolutely necessary to collect data in the respective analyzed setting.

For this reason, universities in general and their researchers in their respective area of expertise strive for knowledge development and reasoning based on methodological practice and statistical evidence. Nonetheless, universities become more entrepreneurial nowadays (D'Este & Perkmann, 2011, p. 318) and researchers are not working in isolation anymore which can frame their research mode manifold (Zalewska-Kurek et al., 2015, p. 2) and makes it increasingly demand-driven. Reasons can be, for instance, the researcher's faculty quality and motives (Blumenthal et al., 1996, p. 1738; D'Este & Perkmann, 2011, p. 321; Etzkowitz, 2003a, pp. 119-120), the common best practice in respective research field (Perkmann et al., 2011, p. 550) or governmental initiatives (Etzkowitz, 2003b, p. 293).

Researchers are increasingly embedded in various social networks with different scopes and aims. This offers a theoretically great potential for high-quality and highly-efficient knowledge flows between involved nodes and contributes to the entire advancements in research quality and productivity (Ahuja, 2000, p. 448; Burt *in* Swedberg, 2000, p. 291-292). The direction of network development is probably affected by the latent identification and evaluation of the potential network partners available and the choice for the best and / or most appropriate one (Bozeman et al., 2013, p. 14). This is in line with research which declares that not the number of collaborations but the collaborative intensity and network embeddedness have a positive effect on research productivity (Liao, 2011, *in* Bozeman et al., 2013, p. 16). For this reason, larger universities with their internal networks (Bozeman et al., 2013, p. 22; Katz, 2000, p. 23) as well as their support in participating in the general development towards increasingly international research conferences is noteworthy (Carayannis & Laget, 2004; Nilsson et al., 2010, *in* Bozeman et al., 2013, p. 13). The researcher's ties with industry, in contrast, are characterized by a lesser number of strong, trustworthy, and informal ties (Johansson et al., 2005, p. 271). Reason for this is that previous experience and learning have an important impact on these relationships and even reinforce it (Bruneel et al., 2010, *in* Bozeman et al., 2013, p. 13).

The potential influence on the researcher's strategic behavior by the firm due to increased engagement also has to be considered. Life science researchers, although distinct from management researchers, differed in their academic productivity as well as relevance of publications, which was lower if the researcher was heavily engaged with industrial partners (Blumenthal et al., 1996, p. 1738). The reason for this correlation cannot only be attributed to more applied knowledge developed during a project. Additionally important is the firm`s efforts to constrain the researcher in free information sharing among colleagues in order to protect the developed knowledge and gain a sustainable competitive advantage. This isolation, however, is assumed to be less predominant for management researchers. In this respect one has to consider also that researchers can be active in different service provisions and research channels at the same time (D'Este & Perkmann, 2011, p. 319). These different service provisions can be distinct in level of engagement and, therefore, constraints imposed and motivations existent.

The motivations of researchers can be summarized by learning from industry, developing knowledge with relevant publications to increase their reputation, and, based on this, acquiring financial grants for their research (Bozeman et al., 2013, p. 26; Göktepe-Hulten & Mahagaonkar, 2009; Meyer-Krahmer & Schmoch, 1998; *both in* D'Este & Perkmann, 2011, p. 321). A clear priority for researchers in their academic engagement is that they are motivated by anything which can promote their own research and by the highest autonomy feasible (D'Este & Perkmann, 2011, p. 332; Perkmann et al., 2013, p. 423). Commercialization is rated on average as last and particularly followed by means of research forms and modes that clearly emphasize the commercialization objective (p. 330).

- *Researcher as part of the academic society strives primarily for knowledge generation.*
- *There reasons why researchers engage with organizations are:*
  (1) knowledge generation requires observation and data collection in the real world;
  (2) this new knowledge can lead to relevant publications, resulting in increased reputation and new financial grants;
  (3) universities themselves become more entrepreneurial as well as researchers become more demand-driven.
- *Researchers are embedded in various social networks and their ties with industry can be characterized by few but trustworthy and informal ties.*
- *The researcher's strategic behavior can be strategically-planned (following consciously a definite chosen direction) or opportunity-driven (having a wider scope in this direction).*

3.3. The firm and its strategic behavior

Firms are more complex in their peculiarities and have strategic objectives different from universities. In the first place, firms have as their main aim the generation of shareholder value and being more competitive and therefore more successful than their counterparts. This can make them also to very competitive places with various distinct stakeholders who would like to influence the firm and benefit from it. For this reason, competition and opportunism are omnipresent concepts in firms.

They value university-industry relationships not only for the short-term or as an initial ignition for innovation (Perkmann & Walsh, 2007, p. 272) but also as a source to enhance their general understanding of the customer (Kale & Singh, 2009, p. 56). And with customer one can also mean the entity which is to benefit from the firm`s offering. Firms are clearly attracted by the human capital of the researchers and seem to appreciate university's faculty quality in the relevant department, the provided university resources to the respective department, as well as the geographical proximity of other industrial members with regard to the university (Abramo et al., 2011, p. 98; Mansfield, 1995, p. 64; Mansfield & Lee, 1996, p. 1057). The offered resources by the university and the researcher can therefore be either complementary for the firm or not. However, the same can hold true for the researcher, who might be well-provided with resources or also funds (Perkmann et al., 2011, p. 550). The degree of complementarities

are therefore notably existent with a high degree in technology-oriented research disciplines, to a decreased degree in the medical and biological sciences, and an even less degree of complementarities in social sciences (p. 550). This can lead to the assumption that research disciplines with lower degrees of complementarities can be very competitive places in respect to the finding and attracting of the right partner. One can also state that "less prestigious universities may have a comparative advantage" as they focus on more tailored problem solving than major and prestigious universities (Mansfield & Lee, 1996, p. 1057, *see also* Abramo et al., 2011, p. 98). The enhancement of technology transfer and / or increased applicability potential due to tailoring is appealing to the firm.

This point leads to the cluster concept which highlights the importance of geographical proximity in order to obtain superior resources, generate valuable knowledge, ensure enhanced communications and productivity, and attain the overall goal of business success (Schiele, 2008). Extending this idea and continuing with the theory of strategic networks and knowledge spillovers, as those are not bounded on geographical proximity like clusters, the subject of the researcher's human capital as a means of achieving a competitive advantage becomes relevant. The researcher's human capital is based not only on the own human capital talent as well as on tacit and specialized knowledge, but also on the aggregate of social capital resulting from various and synergistic network ties developed through, for instance, job changes (Bozeman et al., 2001, p. 716; Bozeman et al., 2013, p. 10). The synergy effects cannot only comprise content-related opportunities resulting from new perspectives or new knowledge and therefore learning (Hagedoorn et al., 2000, p. 572) but principally also an increased degree of productivity in the research process (Dietz & Bozeman, 2005, p. 362; Audretsch et al., 2002, p. 181).

The researcher can be seen as an entity targeted and affected by its social context, including previously mentioned knowledge spillovers. Within the scope of the researcher's work, the researcher preprocesses information which can then be internalized by the firm for its purpose. For this reason, the determinateness of research partnerships and project outcomes is limited and the researcher's freedom granted by the firm is high (Perkmann & Walsh, 2007, p. 268).
There is also empirical evidence that firms engage with universities in closer geographical proximity. However, there is still an inefficiency in university choice on the side of the firm observable which means that there is an even better choice available in close geographical proximity the firm seems to be unaware of (Abramo et al., 2011, p. 98). Nonetheless, firms are constrained in their capacities to periodically search for other more promising partners and therefore the role of previous experience is also not to neglect. In this case, intergroup relations and a feeling of solidarity by means of socializing becomes important (Hogg & Hains, 1996).

Evidence that firms are interested in intermediate or long-term partnerships is based on different reasons (Bozeman et al., 2013, p. 24; Hagedoorn et al., 2000, pp. 582-583). For instance, firms are not only be able to internalize knowledge spillovers from networks hidden to them and develop a synergistic relationship involving increasing degrees of diverse and / or focused learning, commitment among partners, or resource and capability sharing. Firm can also decrease the related costs for an established research partnership by relying on a more

informal relationship in which trust is present. Regarding this, the size of both organizations and their deployed infrastructures are important as the incapability in overall structure and sub-structures can diminish the research partnership potential dramatically.

For this reason, the firm strives for two points in order to innovate and profit from this innovation. On the one hand, exploitation of developed internal capabilities and, on the other hand, exploration by means of knowledge sharing and learning within strategic alliances / partnerships and, concomitant with it, the transformation of this new knowledge into exploitable internal capabilities (Caloghirou et al., 2004, p. 37; O'Reilly & Tushman, 2004; Zahra & George, 2002). However, a firm also considers the exchange (academic benefit) to be offered to the researcher (Perkmann et al., 2013, p. 433).

- *The firm strives for a sustainable competitive advantage over its competitors.*
- *The knowledge that supports this sustainable competitive advantage can be of various forms but still needs to be applicable and transferable for the firm.*
- *For the firm, the researcher is a preprocessor of its exposed knowledge in its social network.*
- *The firm's strategic behavior comprises a long-term focus in almost everything it does and therefore can be best described as strategically-planned.*

3.4. Organizational autonomy

The term autonomy comprises the freedom to decide on research subjects, their research goals, and the directions (Kurek et al., 2007 in Zalewska-Kurek et al., 2015, p. 8). A high degree of organizational autonomy is granted if the researcher is able to conduct his / her research without external pressures or other influence from the inherent context (Zalewska-Kurek et al., 2015, p. 8) and provided with the resources required for the implementation of the work and therefore enhanced efficiency (Whitely, 1984, pp. 343-344). These resources can be, for instance, interdisciplinary knowledge, funds, time, (Varma, 1999, p. 24) and / or facilities for conducting the research. This increased self-governance is necessary for the following reason. Autonomy and role allocation demonstrate responsibilities and decrease the influence over the research project exercised by distinct stakeholders, which are embedded in each research partner's direct environment and have certain demands. This does not only apply to the autonomy granted to the researcher by the firm's manager, but also the autonomy granted through university or company policies.

For this reason, the researcher is able to set an enhanced focus on the research itself as distracting influence is limited. In addition to this enhanced focus, the researcher itself is also able to act more free within the mutual research project which contributes to an increased flexibility in the research outline and conduct.

Failures in this respect can contribute to a distracted research direction and possesses conflict potential which threatens the overall and mutual research success. The autonomy granted to

the researcher enables him / her to successfully contribute to the research project by focusing on the necessary as well as valuable project tasks and having the room for conducting research. For this purpose, the researcher can rely on the own attained knowledge and past experience, developed skills, and judgment (Varma, 1999, p. 29), which is all shaped by a wider scope of knowledge and in a context independent from the firm.

Contrary to firms, researchers are continuously and from all sides exposed to new knowledge or ideas and it is their profession and clear competence to absorb, analyze and apply this knowledge. For this reason, a researcher is valuable for the firm because of the own competence and the provision of externally-derived knowledge applicable to the firm and its context. Limiting the researcher's authority would have an adverse or detrimental effect on this value. An organization will not learn, if it already sets the course and also influences the research conduct.

For this reason, academic researchers active in the industry are provided with a high degree of autonomy (Varma, 1999, pp. 41-42). On the other hand, the firm itself offers previously mentioned context in which the researcher can operate and create new knowledge with the potential to increase the own reputation. All of this generates a synergistic relationship involving mutual interdependencies and an absence of opportunistic behavior if both partners are on a par with one another (Glaser, 1963, p. 387).

Autonomy itself can be divided into the dimensions of direction and involvement. Whereas high degrees of direction and involvement decrease autonomy, low degrees increase it (Trevelyan, 2001, p. 497). As a partnership involves mutual goals (at least research expectations) and a theoretical balance of power, it is assumed that both partners agree on the research direction and strategic objectives profoundly in the beginning of a collaboration or in the selection phase a project. This means that the subsequent direction occurring in the execution phase of the project is limited and only important for sub-goals and partners direct only on their home ground. The involvement comprises the monitoring of the project and provides mutual help and advice. As both partners are experts in their respective operational fields and most likely agreed on clear responsibilities in the selection phase, it is assumed that the advice is also limited and concerns only minor subjects within regular feedback communication.

However, these mutual processes of directing the research project and being involved in it can be very idiosyncratic, meaning character traits as well as other psychological or sociological effects influence the process. Examples for this are charisma of one partner (Glaser, 1963, p. 390) but also if one character is distrusting, extrovert, or curious and creative. Additionally, the age difference can also cause overly acceptance from the younger partner and therefore more directive power and higher autonomy for the older actor.

Autonomy can also be distinguished in terms of "strategic autonomy", which is the freedom in setting research goals, and "operational autonomy", which is the freedom in choosing the means to an end (Bailyn, 1985 in Varma, 1999, p. 26). Particularly over the operational autonomy, the firm usually exercises a certain degree of influence and, therefore, limiting the autonomy of the researcher. This operational autonomy becomes important in the research

conduct and therefore the execution phase of a mutual research project. However, researchers are aware of this and accept it as they can see it as "mutually reinforcing rather than antagonistic" (Varma, 1999, p. 27).

Another view to assess organizational autonomy is by considering autonomy in decision making as well as autonomy due to absence of constraints when it comes to make use of decision making (Verhoest et al., 2004, pp. 104-106). This classification emphasizes more the execution phase and is less important for the setting of strategic objectives and therefore the research direction. For the first point, it is of importance to what degree decision making within the firm can take place or to what degree formal instructions or approval has to be received in advance (p. 104). This becomes particularly important when the researcher acts autonomously in the firm's territory and without the continuous direct support of a company representative. In this case, a decision-making competence, in particular the managerial autonomy, has to be bestowed in the first place. The second point highlights the constraining of decision-making competencies of the researcher by various means of the firm (pp. 105-106). This involves, for instance, the researcher's formal place in the hierarchy and his / her accountability, the dependency on financial means for the project, or the requirements for project assessment and the applicable interventions in case of non-compliance or non-fulfillment.

- *Autonomy can be divided into direction (e.g. research direction, strategic objectives) and involvement (intensity of monitoring and feedback).*
- *Organizational autonomy is the freedom for the researcher in its decision making about research directions, subjects, and goals.*
- *The influence by the firm on the researcher during the research conduct also affects organizational autonomy.*
- *As the researcher is chosen due to its externally-derived knowledge and competence, higher influence by the firm would counteract this valuable contribution.*
- *Character traits as well as psychological or sociological factors can have an effect on the process of directing and conducting the research.*

3.5. Strategic interdependence

Strategic interdependence has as its defined theme resources, assets, and capabilities which usage are of strategic importance for task accomplishment but which are also unequally distributed among partners (Zalewska-Kurek et al., 2015, p. 8). Examples for strategically interdependent contributions can be manifold, like knowledge, experience, judgment, skills, social capital and access to networks, funds, research facilities, and / or simply a means to publish something (Haspeslagh & Jemison, 1991, p. 140; Varma, 1999, p. 29; Zalewska-Kurek et al., 2015, p. 8). The shortage of at least one crucial resource, asset, and / or capability, causes one partner to engage with suppliers' of this item, although, offering this provider a valuable item for exchange on a "quid pro quo" basis. Certainly, this is not meant in a solely transactional sense but rather the arising tensions and dependencies create a need for a

"symbiotic interaction between the firms' strategies" (Varadarajan et al., 2001 in Mahapatra, 2010, p. 550) with the mutual goal of generating advantageous results for both. As a result, one can regard this collaboration as a resource itself as it can contribute at least to experience and can, in case of a long-term partnership, also realize the development of comprehensive knowledge or the access to the partner's network. In the ideal situation, there is a perfect fit between the resources needed for the project to unleash prospective synergy effects but also an equally-rated contribution of both partners to prevent opportunistic behaviors from occurring (Glaser, 1963, p. 387). In cases in which one partner is in control of higher quantity or quality of demanded items than its counterpart, however, the organizational autonomy is in favor with this advantaged partner and opportunistic behavior can sooner or later occur (Mahapatra et al., 2010, p. 539).

Nonetheless, one has to consider the dynamics in the degree of strategic interdependence and organizational autonomy as both are not only context-specific but also based on situational evaluation of changing demands (p. 550). Those demands can vary in occurrence and are based on latent or apparent but also objective or subjective assessment.

The strategic interdependence can be assumed to increase in the following situations. Firstly, when emerging demands require both researcher and firm to engage in a reciprocal interaction which has as its result "collaborative capability building" (Mahapatra et al., 2010, p. 550). Secondly, the goals for the project in question are complementary for both and both partners' direct environment brings pressure to bear on them. Specifically this generates valued commitment and serves as a basis for long-term relationships with strategic interdependence (Wong et al., 2005, pp. 727-728). Finally, the relationship indicates business opportunities that makes the collaboration economically attracting to both. A decline in the presence of one or more of these conditions leads to a decreased strategic interdependence (Mahapatra et al., 2010, p. 550).

In addition to this, one has to consider also the macroeconomic changes, like in society and economy. Particularly in developed countries, these changes can affect both firms and universities (Gibbons et al., 1994; Stehr, 1994; *both* in Wilts, 2000, p. 768). Firstly, knowledge becomes an increasingly important subjects for firms. Reason for this is that in an increasingly globalized world the information exchange already accelerated tremendously and knowledge is easily diffused, which can affect market demands and increases competition. Additionally, knowledge can be seen as a long-term investment with varying demands for capital investment and it permeates the whole organization and can therefore have an extraordinary leverage effect. Secondly, as education improved and the sheer number of well-developed actors increases, this influences the supply of and demand for knowledge. All this besides governmental initiatives to enhance national competitive stimulated an emerging mode of knowledge, which can be described as very demand-driven and therefore applied in nature and transdisciplinary (Wilts, 2000, p. 768).

Nonetheless, this mode is not only to be found in innovative research fields but also in social sciences (Gibbons et al., 1994 in Wilts, 2000, p. 768). Considering the multidisciplinarity, particularly with an academic research focus, there exist indeed issues, like limited generalizability of the knowledge derived from one research field in respect of the applicability

in another research field (Linton et al., 2012, p. 232). Regarding this, also differences in research performance or the general quality of the faculty in the academic field is of importance (p. 233). However, it has to be remarked that all actors evaluate the outcome as well as the process that leads to the outcome. This evaluation produces either satisfactory results, which makes further collaboration or even a partnership feasible, or the results trigger the end of the collaboration. With the continuation of a partnership, it is likely that social interpersonal bonds are created. This gives rise to trust, less formalization (Mahapatra et al., 2010, pp. 539-540), and serves as an additional shield against the termination of the partnership. It is particularly assumed that the entire communication process is to be enhanced in terms of pace and quality if trust reduces the need for formalized bureaucratic constraints. This is a clear complementary and mutually valuable asset for both partners within a research collaboration or partnership.

- *Strategic interdependence describes the availability of resources, assets, and capabilities which are of strategic importance for the task accomplishment and which are unequally distributed among project partners.*
- *The shortage of one of these crucial resources, for instance, causes one partner to engage with the supplier of this item and, in the ideal case, to generate advantageous results for both partners.*
- *If one partner contributes excessively to the project, opportunistic behavior can emerge.*
- *All actors evaluate the project outcomes as well as the processes that led to these outcomes and this experience can itself contribute favorably to the collaboration.*

3.6. Opportunity capture

The term opportunity is defined as “a favorable juncture of circumstances” or “a good chance for advancement or progress”[1]. This clearly indicates that the advancement or progress cannot be achieved by a high degree of assurance. In respect to university-industry research partnerships it becomes recognizable that boundaries in both environments become increasingly blurred and traditional stability is replaced by growing interdisciplinarity (Bingham et al., 2014, p. 29; Etzkowitz & Leydesdorff, 2000 in Perkmann et al., 2011, p. 549). For this reason, it can be further stated that the advancement or progress is not fully controlled by one side of the research partnership and that value creation requires collaboration. Chances for opportunity identification will be higher, if partners with distinct scopes contribute mutually to an overall research goal in order to overcome strategic dependencies and benefit from synergy effects. This synergy effects also involve that the outcome generated by the researcher is of value for the firm and therefore can be more practitioner-oriented. This will be reinforced, if the firm’s expected research project outcome is less focused on the organizational learning.

[1] Merriam-Webster. (n.d.). *Opportunity | Definition of Opportunity by Merriam-Webster*. Retrieved December 30, 2015, from http://www.merriam-webster.com/dictionary/opportunity

The mutual contribution becomes more important within environments of high uncertainty and much dynamics as opportunities in these domains can occur more frequently and / or the time frame for exploitation or capture is constrained. Additionally, growth is a relevant logic (Bingham, Eisenhardt, and Furr, 2007, p. 29) and the competition is not only based on individual actors but rather networks of actors. The potential value creation and subsequent opportunity capture are therefore based on opportunity selection and opportunity execution (Bingham et al., 2014, p. 30). “Successful opportunity capture is the intended capture of the expected along with the emergent capture of the unexpected” (Bingham et al., 2014, p. 35).

3.6.1. Opportunity selection

Although opportunity describes are very dynamic phenomena, the selection of opportunities does not necessitate an accidental practice but rather can be performed in a focused and planned manner (Bingham et al., 2014).

The opportunity in the context of mutual research projects between university and industry can be described as the following. On side of the firm, the university-industry collaboration offers the opportunity to produce valuable knowledge or serves the firm with practitioner-oriented project deliverables so that a sustainable competitive advantage can be established. For the researcher, the opportunity lies in the chance to collect data for its field of research and for empirical analysis reasons. In addition to this, it provides the researcher with the chance to enhance the own reputation by publishing research, develop new possibilities for funding, and to build a prospering relationship with the respective firm as well as generally extending its social network.

The opportunity selection comprises the complete determination of the problem to be solved as well as the identification and chronology of contingent and causally-linked (sub-) problems to be solved. An effective performing and focus prevents later returning to the problem definition from occurring (p. 30). Learning, codification, and sequencing are crucial components for a well-performing opportunity selection and therefore long-term success of the project. For this reason, one can state that the value capture requires a good and focused planning in order to be successful. It can hinder ambiguity and confusion among actors from occurring as well as it constrains the impact of cognitive dissonance traps. This cognitive lock-in means that actors develop a high commitment to arguments and / or decisions made resulting from this confusion (even if this holds not true or is not applicable) only because they want to justify their initial view or decisions and keep up appearances (pp. 31-32), or to uphold responsibility to right a failure (p. 34). This means that the resource deployment for circumstantial or irrelevant tasks destroys potential and actual value within the mutual research project and therefore counteracts value capture.

By means of a focused and strategically planned opportunity selection, actors are able to agree beforehand on research objective and sub-goals as well as their (regular) measurement and tracking and, therefore, pave the way for a more flexible execution subsequently. In practical terms, the contribution of the university-industry research partnership offers synergies due to the methodological competence as well as the comprehensive and early identification of industrial trends and optimization of internal processes on side of the researcher. On side of

the firm, the pragmatic and real-life proven assessment of research scope as well as conceptual applicability and relevance are crucial contributions.

3.6.2. Opportunity execution

The opportunity execution phase represents the moment of truth as all planning and all assumptions have to proof their value in reality and within the dynamic nature of both environmental context and internal project management. During the opportunity execution phase, new opportunities can arise, selected opportunities can change. For this purpose, the execution phase should be shaped by flexibility and iterative learning, which itself is ensured by regular interactions between partners, process transparency, and openness to others' (potentially conflicting) perceptions (Bingham et al., 2014, pp. 34-35). This enhances the opportunity execution by being resource saving and geared to the overall research purpose. Bureaucracy, conflicts of jurisdiction and an inert management cannot only contradict intended outcomes for the mutual research project but also impair the entire research partnership. Nonetheless, the learning should be used to enhance the future opportunity selection. Within a research partnership, the learning, particularly the organizational learning, is a group effort affected by group dynamics and also hierarchical considerations (Bingham & Haleblian, 2012, p. 173). Within the mutual research project this opportunity means that all project partners learn from each other and should stimulate the learning for each other.

When it comes to learning and the development of capabilities, the pacing and sequencing is an important factor (Hayward, 2002 in Bingham et al., 2015, p. 1803). Considering pacing, the learner has to be provided with sufficient time in order to reflect on the experience collected and identify causal relationships. The sequencing involves the learning opportunity itself as well as the appropriate kind of learning process for this opportunity. Learning sequences can comprise different patterns, like indirect learning followed by direct learning as well as switching from one direct learning process to another one, or variations of this sequencing (Bingham & Davis, 2012, p. 630). For this reason, one can say that learning requires space, freedom, and feedback. And this space, freedom, and feedback is also enhancing the opportunity capture within mutual research projects.

All this contributes to the development of knowledge and dynamic capabilities, which are by definition "the capacity of an organization to purposefully create, extend, or modify its resource base" (Helfat et al., 2009, p. 4). Hence, this basic development applies to established firms as well as to smaller firms and to firms active in either stable or dynamic environments (Helfat & Winter, 2011, pp. 1248-1249). In each respective situation the one clear constant is the change itself (p. 1249) and the actor is embedded in an environment which affects by chance or with purpose. This is particularly true for firms which are affected by the macro environment and their industries.

The capability is based on the process of decision making and the learning is the antecedent and the consequence of it as it is attained through it and also the basis for future learning directions. The learning results in the development of heuristics, which are based on conscious well-understood experiences and the translation or encoding of these into simple semi-

structured logics for decision making with the purpose of flexible opportunity capture (Bingham, Eisenhardt, and Davis, 2007, p. 33; Bingham, Eisenhardt, and Furr, 2007, p. 28).

Nonetheless, all actors have to understand that an excessive codification of knowledge lacks the consideration of idiosyncrasies. For this reason, "codified knowledge alone as a necessary but insufficient condition for successful experience transfer" and tacit knowledge from different sources becomes crucial the more idiosyncrasies are present (Bingham et al, 2015, p. 1823).

All actors in the research partnership add their knowledge, which can provide all actors with new perspectives, direct validation, and an increased chance that the disseminated knowledge is logical, generally applicable, and therefore truer than knowledge attained through only one source or from one perspective. The resulting heuristics are crucial for both the firm and the researcher as these heuristics contribute to the research partnership process itself, like alliance management, but also to firm-specific processes, like internationalization, acquisition or product development (Bingham, Eisenhardt, and Furr, 2007, p. 40).

If these heuristics are high performing, they will be an essential part of an actor's capabilities as they enable the actor to recall collected sets of experiences in an accurate but simple and adaptive way (p. 41) and become a strategic asset (p. 42). Hence, heuristics represent "cognitive shortcuts" (Bingham & Haleblian, 2012, p. 152), particularly important in unpredictable environments (p. 170) fostered by "multiple individuals [who] jointly generate shared understandings and judgments in the same moment in time" (p. 171).

This knowledge in form of heuristics as well as the knowledge with a focus on practical relevance are of strategic nature for both the firm and the researcher. All knowledge derived from the mutual research project can be seen as an opportunity. For the firm this opportunity is based on the commercial potential. For the researcher this opportunity is based on the potential for data collection within an organization`s context and the provision with empirical evidence and therefore publications, knowledge dissemination, and enhanced reputation.

- *Opportunity can be described as a good chance for advancement or progress which is not fully controlled by one side; it stands for potential value creation which is to be achieved by means of collaboration and the resulting synergy effects.*
- *Opportunity (potential value) has to be captured in order to be a realized value for project partners; this opportunity capture therefore comprises opportunity selection as well as opportunity execution.*
- *Opportunity selection can take place in focused and planned which builds the basis for a more flexible execution and which therefore supports the value capture and the project's success.*
- *Opportunity execution gives proof of the quality of the planning and the execution (phase) can be characterized by iterative learning and required flexibility in the process.*
- *Within university-industry research collaborations, all partners add their knowledge and therefore enhance the knowledge base of all partners.*

3.7. Strategic alliance management

Strategic alliances are an omnipresent term nowadays and firms are challenged by increasing competition and discontinuous change in terms of developed and used technologies (Kale & Singh, 2009, p. 59) as well as continuous improvement of internal processes. In so doing, it is increasingly irrelevant if the firm is active in a dynamic or stable environment. The strategic management has a focus on long-range planning and involves integration management as well as comprehensive and long-sighted decision making with the overall goal of achieving objectives and attaining success (David, 2011, p. 37). For this reason firms, particularly established firms, engage in high numbers of alliances.

The university-industry research partnership can be an example for a strategic alliance. The motives can include obtaining new and / or required resources and competencies, reducing own costs resulting from in-house development, reducing the risk, and accomplishing learning targets (Child et al., 2005 in Solesvik & Westhead, 2010, pp. 843-844). The management in this respect is crucial as it affects all alliance or project partners and the outcome derived from it has to be of value for all partners so that justification of means and sustainability is ensured. Trust is therefore also an omnipresent key issue within all stages of a strategic partnership (Bierly III & Gallagher, 2007, pp. 138-139) and is assumed to be positively related to a successful alliance outcome as it mediates conflict emergence (Saxton, 1997 in Solesvik & Westhead, 2010, p. 846).

Although alliances are popular and recommended for many environments, the degree a firm chooses to engage in these strategic alliances can differ as well as the quality of its developed alliance capability. In line with the previously described opportunity capture and particularly opportunity selection, the alliance capability is stated as successful if “systematic action to develop processes and talent in support of alliance management” are taken (Kale & Singh, 2009, pp. 59-60). For this reason and considering the general framework conditions within the firm, the sophistication of experience exploitation, the deployed resources and working capacities (in terms of quantity and quality), and efforts for learning and integration are of importance (pp. 51-56). The alliance capability has to be actively supervised, refined, and managed (p. 60) as well as it should be seen as a whole (p. 46), including different and potentially competing strategic partnerships (p. 57). Each respective partnership is different and partnerships can change over time due to various reasons (Solesvik & Westhead, 2010, p. 856).

With the aim of successful goal attainment and mutual value creation, the partnership should involve the following key factors (Gulati, 1998, p. 293; Schreiner et al., 2009, pp. 1410-1413; Kale & Singh, 2009, p. 46).

Firstly, a formation stage in which the initiator of the partnership decides on which partner to select. In this stage the assessment of the partner in terms of complementarity (contribution of non-overlapping resources), commitment (fit between working style or culture), and compatibility (willingness to contribution and making sacrifices for achieving objectives) is

crucial (Kale & Singh, 2009, pp. 47-48). The aim is to identify a partner with aligned strategic objectives and operational compatibility (Medcof, 1997, p. 719).

Secondly, there has to be an agreement on the design of the alliance and its governance. In this respect of importance are agreed ownership of the alliance and resulting claim in outcomes, contractually determined obligations for each partner, and self-enforcing governance based on trust, reputation, and partner's goodwill (Kale & Singh, 2009, pp. 48-49). This second point emphasizes the degree of formalization within the strategic partnership and concludes that less formalization leads to increased alliance efficiency, as resources are released from the individual partner's protection to the disposition in project execution. In addition to this, less formalization leads to potentially developed trust which, conversely, increases information sharing between partners, lowers perceived relational risks, and cause partners to actively enhance the partnership (p. 51). Realized synergies in mutual value creation additionally protect the alliance, as opportunistic behavior results in loss of trust and presumptive reorientation of the exploited partner.

Finally, the actual alliance management for the value realization or opportunity capture is important. Relating to this, the managing of coordination and the maintaining or developing of mutual trust are of particular interest. For this purpose, the actual management in the opportunity execution phase, associated feedback mechanisms and conflict resolution means have to be considered (pp. 50-51).

Emphasizing the subject of formalization, one can assume that formalization has the advantage of determining responsibilities of partners and giving legal protection in terms of conflicts (Olmos-Peñuela et al., 2014, p. 503). It is an effective means, agreed on before the project is officially started, to protect significant resources to be deployed and also assures partners a certain stake in the research outcome (p. 502). As more resources or higher the commercial potential, as higher is the degree of formalization.

However, formalization constitutes artificial boundaries which can hinder collaboration in the phases of execution. For this reason, increasing occurrence of informality will be common in the execution phase, if sufficient trust is previously generated, and appreciated by both the firm and the researcher. This trust ensures an enhanced knowledge exchange and activity transfer (p. 493). Informality enhances project execution by reducing complexity as well as general efforts required, increasing pace, overall efficiency, and flexibility. In practical terms, it allows for direct approaching of only relevant problem owners concerning a specific issue in question, resulting in improved reaction time and limited need for appeasement considerations. Appeasement would involve the challenge of pleasing different stakeholders, which all have distinct views on value derived from suggested outputs driven by different goals and perspectives. All this affects the process of collaboration and its (perceived) effectiveness (Siegel et al., 2003b in Bozeman et al., 2013, p. 25).

- *The firm can be active in dynamic or stable environments and can strive for innovation or a continuous improvement of its internal processes.*
- *The firm's motives can involve obtaining new, required resources and competencies as well as cost reduction, risk minimization, and organizational learning.*
- *With the aim of successful goal attainment and mutual value creation, the partnership should include the following key factors:*
  (1) a formation stage in which a partner is selected that shows aligned strategic objectives and operational compatibility;
  (2) an agreement stage, which includes the alliance design and its governance, that supports mutual value creation by less necessary formalization, more released resources, lower perceived risk, and resulting trust;
  (3) an alliance management which supports mutual value creation and developed trust among partners by coordinated feedback and conflict resolution means.
- *Formalization involves artificial boundaries within partnerships as it defines responsibilities, gives legal protection to offered contributions, and is particularly present in projects with high commercial significance.*
- *Formalization will be decreased, if sufficient trust is developed and therefore limits implied complexity and enhances information sharing, which is appreciated by all partners.*

3.8. Integration management as source of value creation

Deciding on the partner for a strategic research partnership and subsequent agreement among partners are only the first steps in the realization of mutual value creation in mutual research collaborations or projects. The integration approach is the last step to pave the way for it. Strategic interdependence and organizational autonomy are in this respect the two key dimensions (Haspeslagh & Jemison, 1991, p. 139). In line with previously mentioned opportunity selection and opportunity execution, it is suggested that a comprehensive analysis precedes the careful selection and provides a basis for the subsequent flexible adaptive execution when the situation requires this. The goal is that synergistic value is created exclusively because the partners mutually engage in a partnership (p. 139) and when redundancy is removed (p. 140), focusing on the core capability transfer for value creation (pp. 141-142).

As the strategic capability transfer is the strategically interdependent resource within a research partnership and therefore antecedent for value creation, it becomes essential to preserve this transfer by means of high organizational autonomy (p. 142). If the partner is selected because of its capabilities, it will be not target-aimed to assimilate the partner (p. 143) but rather provide the partner with only that active support which is necessary for a successful mutual value creation (pp. 144-145). As the assumed need for organizational autonomy is high within a research partnership but the need for strategic interdependency can be moderate and focused on learning (although depending on the relevance of the project outcome for each partner), one can term it preservation integration (pp. 148-149). In case of high strategic interdependency and potential transfer of functional skills, one can name it symbiotic

integration, which challenges organizational autonomy as boundaries have to be both strong (for preserving partner identity) and permeable (for transferring and applying strategic capability) (p. 149; p. 154; p. 161).

This can also include more practitioner-oriented output or consulting activities. The challenges for integration in general are the balance of expectations, provision of adequate institutional leadership, and the ensuring an appropriate interface management (pp. 155-157). Firstly, the balance of expectations comprises the planned value to be created as well as the adjustment of it when reality impacts in the execution phase and relevance or feasibility become important subjects. Secondly, the leadership on each common ground of the partnership has to be appropriate and effective as it "counteract[s] the effects of uncertainty, insecurity, and value destruction" (Haspeslagh & Jemison, 1991, p. 156). Finally, the interface management has as its goal the development of a value-honoring and outcome-focused atmosphere which filters out all disturbances that have a detrimental effect on the successful mutual project outcome. It was found that when a shared understanding was missing, the integration management was characterized by determinism and even opportunism (p. 162). On the contrary, when there was agreement and objectives were strategic, the integration management was more adaptive.

- *Integration for the goal of mutual value creation requires the consideration of strategic interdependence and organizational autonomy.*
- *If the partner is selected because of its resources or capabilities, it will be not target-aimed to assimilate this partner; but rather to provide the partner with that active support that is necessary for a contribution to the mutual value realization.*
- *The challenges for integration are expectation management, provision of institutional leadership, and an appropriate interface management.*

3.9. The PhD student as young researcher

As this study primarily collects data on PhD projects, it is important to subject also the PhD student and its role within university-industry research collaborations.

The PhD student produces academic knowledge as well as the doctoral student is in training to develop own competencies in research (Lee & Miozzo, 2015, p. 299). The doctoral student is trained through an individually tailored research training and an associated research project, which indicates a well-defined environment for the intermediate term *(on average four years)*. This research project is executed under the supervision of a scholar or experienced researcher, who can exercise a certain influence over the doctoral student (p. 294). As this exertion of influence can vary among supervising scholars, the influence can also be affected by the presence of other project stakeholders, particularly when the PhD project is executed within an organization.

In either case, the doctoral student has already developed competencies and can function as

an individually-acting and intermediating force within the university-industry partnership and among its partners. The PhD can be directly responsible for the diminishing of expectation gaps between the supervising researcher(s), which is affected by the academic world and the overarching research setting, and the firm, which is driven by its own value creation.

A PhD project is therefore another connection in terms of a university-industry collaboration and through the deployment of a PhD student assumed to be more independent from university restrictions or bureaucracies. This would make the doctoral student a boundary spanner and therefore intermediating actor within the university-industry collaboration (Siegel et al., 2007, pp. 499-500). This is an important point to consider as bureaucracy has the potential to have a detrimental effect on the goal attainment in university-industry collaborations (Audretsch et al., 2002 in Bozeman et al., 2013, p. 24). For this reason, it can serve also as a probation and starting point for subsequent collaborations between the university and the organization.

On side of the PhD student itself, it is crucial to consider as well the personal attributes and inherent motives of this particular actor within the university-industry partnership (Bozeman et al., 2013, p. 7). For this purpose, the background of the PhD student, experience but also the career choice are assumed to have an effect on the mutual research collaboration. It is found, for instance, that research projects with industrial involvement result in less academic journal publications. Reasons for this is not that doctoral students engaging with industry can be less scientifically-oriented, the firm-specific problem can be of limited academic value or that the firm itself imposes preventive measures to protect their secrets and strategic position (Lee & Miozzo, 2015, p. 310). This demanded confidentiality or restrictions on academic transparency as well as an increased practitioner orientation of the research at hand can isolate both the researcher and the PhD student from other researchers. This adversely affects the development of a researcher's social capital in the academic field. For the PhD student, this also has consequences for the time after the graduation as the student probably did not have many opportunities to establish relationships.

On the contrary, the doctoral student builds a relationship and socializes with the firm (Lee & Miozzo, 2015, p. 295). This has an advantageous effect on a career outside the academic field, as firms actively and strategically search for talents sourced from universities (Lam, 2007; Lee & Miozzo, 2015, p. 312). The same can be true for other firms which are attracted by the PhD student's practitioner orientation. However, it is unclear to what degree PhD students are aware of this (Lee & Miozzo, 2015, p. 312). A planned career in an industrial setting can motivate the PhD student to focus rather on consulting and can make the student dependent due to continuous advice seeking within the firm than it would be the case, if the student plans for an academic career.

Another point to consider when it comes to the mediating role of the doctoral student within a mutual research project, is the relationship with the supervising scholar. This relationship can be permanently impaired due to a mismatch between student and advisor (Golde, 2005, pp. 686-688) and also characterized by a strictly instructing scholar who is driven by the own purpose of generating publications, takes advantage of the PhD project, and uses the doctoral student only as a means to an end (Bozeman et al., 2013, pp. 34-36). This means would imply

a PhD student who particularly acts as data collector instead of being supported to become a fully-developed researcher.

- *The PhD student is developed to become a full researcher.*
- *The doctoral student already developed competencies and can act individually.*
- *The PhD student can function as a connector between university and organization in mutual research projects and can also balance expectations.*
- *The doctoral student's intended career path might influence its behavior in university-industry collaborations with a bias for one side and therefore more practitioner-oriented deliverables or more scientific output.*

4. Methodology

This study is qualitative in nature and has at its focus the exploration of dynamics in university-industry relationships by answering the stated research question and the development of a theoretical framework, including indicators for the used concepts. The chosen approach for this is a deductive-inductive one (Fereday and Muir-Cochrane, 2006). This means that it is based on established theories and concepts, which are also borrowed from distinct research areas. Subsequently, the developed framework is tested in semi-structured interviews and also revised based on the interview findings.

In the following, one can read where the data was collected and what the underlying measurement is on which the results are based.

4.1. Sample and data collection

The data used for this research is collected at four universities in the Netherlands by means of semi-structured interviews with open-ended questions. As university-industry partnerships can have various forms and can differ in time and effort, a unifying context for the respondents was required. For this reason, PhD projects which are performed within organizations were chosen as they were assumed to enlighten university-industry collaborations in a sufficient way so that the strategic behavior among partners becomes observable. These collaborative projects exhibit a setting in which both researchers' interests and organizational interests are brought together and all this within a medium time frame and under the deployment of considerable project resources. The industry side involves commercial firms, associated firms, and large public organizations which are organized like firms as their environment requires competitive attributes from them. A further choice for sampling was that no projects with technology focus were chosen and the emphasis is on business management researchers as part of the social sciences field.

The respondents in this study are professors or research supervisors as well as supervised PhD students. At the moment of the interview, they were all involved in at least one university-industry project, although the reported research project might be already finalized. This serves the issue that all participants are active in the area of university-industry interactions. In cases where only a research supervisor was interviewed, the researcher was asked in advance to respond to the questions by thinking of an exemplary research project in the context of university-industry collaborations.

Both are researchers, although different in their experience and project roles, and indicate one side of these partnerships. Although the research strategy of profound triangulation would require organizational representatives to be interviewed as well, generally the limited willingness and therefore feasibility of interviewing organizational representatives was the reason to limit the scope on the research side. This scope limitation allows for more numerous in-depth insights that can be gathered, although only three projects could be approached with both PhD student and research supervisor. In these projects the two individuals could respond independently on the respective project and provide room to validate the response of the respective other project participant. In all but three cases, the interviews were conducted in face-to-face interviews with only one interviewee present. The remaining interviews were also

individual interviews conducted via a video conference tool. All interviews had been audio-recorded, upon approval by the interviewees, so that they could be completely transcribed and analyzed in-depth afterwards. The interview questions are to be found under Attachment "A.1: interview questions". The interview questions under point "8" were developed in the later stage of the paper writing. This means that ten interviewees were asked to answer these specific questions via email. The responses are attached subsequent to each respective interview.

In "Table 1: interview sample", one can see the roles of the interviewees within the projects as well as which interviewees are allocated to one mutual project.

Project	PhD student	Research supervisor	Conduct	University
1	Interview 1	Interview 11	both face to face	University of Twente
2	Interview 2	Interview 12	both face to face	University of Twente
3	Interview 10	Interview 3	both face to face	University of Twente
4		Interview 4	face to face	University of Twente
5	Interview 5		video conference	Tilburg University
6	Interview 6		video conference	Eindhoven University of Technology
7		Interview 7	face to face	Eindhoven University of Technology
8		Interview 8	face to face	Eindhoven University of Technology
9		Interview 9	face to face	Eindhoven University of Technology
10		Interview 13	video conference	University of Groningen
11		Interview 14	face to face	University of Twente

Table 1: interview sample

The corresponding and complete interview transcripts are to be excluded for confidentiality reasons. The interview duration was on average 43 minutes.

4.2. Measurement

The measurement in this study is primarily based on the concept of strategic choice (Bingham, 2014). The framework can be divided into the opportunity selection phase and the opportunity execution phase. Whereas the opportunity selection phase involves the partner selection and negotiations about research direction, the opportunity execution phase comprises the research realization. For this purpose, the first interview questions emphasize the starting of the project and includes indicative questions like who initiated the project, what was the reason for partner selection, and how agreement was achieved concerning the research

direction as well as its governance. This already gave indication if the project was based on "strategically-planned" or "opportunity-driven" behavior. Whereas strategic-planned behavior indicates a long-term focus on targeted goals to be attained, opportunity-driven behavior is more short term and subsists on the thinking that opportunities for goal attainment are embedded in complex and less predictable contexts. This means that some researchers will agree on research projects only, if those projects are in line with their current research program and promising enough to support the researcher in his / her planned future research direction. Others and more opportunity-driven researchers keep a wider scope and therefore accept projects based on their perceived competence and research interest, which might not be set in stone. They believe that opportunities are everywhere and that they are also developed.

Subsequent to these questions about the project's start, the remaining questions emphasize the development of the project within the opportunity execution phase and with consideration of the governance. The importance of this is based on the nature of research. Research itself explores something hidden and therefore can neither be planned in detail beforehand nor ensure a precise outcome. For this reason, the first stage is characterized by abstract conceptual thinking whereas the later stages can be characterized by more tangible findings. And increased conceivability can easily involve changes in strategic behavior of one or both partners. For this purpose, the interview questions covered indicators such as the communication and collaboration among partners, emergence of ambiguities or confusion, the impact of policies on the project, the influence of the organization on the research, but also the researchers' contribution.

Strategic-planned behavior and opportunity-driven behavior as well as the need for both strategic interdependence and organizational autonomy are therefore important subjects to be observed. The need for strategic interdependence involves the access to resources, assets, and capabilities which are of strategic importance for the researcher and which are out his / her reach if not engaging with the partner. For this reason, the strategic interdependence for the researcher is measured with the provision of internal data access, organizational funding, and facilities within the organization, but also access to networks, which can lead to further data access. The more of these indicators are provided by the organization, the higher is the strategic interdependence. The need for organizational autonomy for the researcher involves the own freedom or governance in managing the research project. This includes the research direction, the research conduct or how it is executed, and the authorization to decide how to use research results. The more decision making power the researcher has, the higher is the organizational autonomy. In this respect, indicators for high organizational autonomy are the influence of the researcher and organization on the bargaining power concerning the research direction and outline, how rigid and close-meshed project meetings are held, and how self-regulated the researcher can conduct the research. As a validating point three questions about general satisfaction of the project as well as goal attainment and focus were added. Those questions emphasize the performance assessment and serve as validation as otherwise the measured concepts might still lead to poor performance and there is no indication for a causal inference.

In "Table 2: code manual", one can find the code manual for the thematic analysis used when analyzing the interview transcripts, including the observed indicators.

Code 1	
Label	**Strategic-planned behavior** *(Bingham et al., 2015; David, 2011)*
Definition	Behavior which focuses on the long-term planning as well as long-sighted decision making of one partner with the goal of mutually enhancing the own resource base and achieving overall success for all partners.
Description	The chosen and retained focus that is chosen by a partner is characterized by a long-term perspective and the objective of mutual goal attainment. Formalization supports the strategic focus.
Indicators	Reason to choose the partner was a good fit with the own research program, low willingness to compromise in terms of research direction and outline, disagreements which indicate distinct goals and followed strategies among partners.
Code 2	
Label	**Opportunity-driven behavior** *(Bingham et al., 2014, David, 2011)*
Definition	Behavior which is more driven by the short-term capture of appearing opportunities and which focuses, besides mutual value creation, also on more direct valorization of project deliverables for either side of the partnership.
Description	The opportunity potential as a driver makes a partner acting more flexible and adaptive. Less formalization allows for maneuverability within the execution phase.
Indicators	Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables, high willingness to compromise in terms of research direction and outline.

Table 2: code manual

Code 3	
Label	**Strategic interdependence** (Varadarajan et al., 2001; Zalewska-Kurek et al., 2015)
Definition	The dependency of each partner on its counterpart's resources, assets, and capabilities with the goal of synergistic and mutually advantageous value creation.
Description	High degree: reciprocal relationship with mutual dependencies. Low degree: unilateral relationship with the highest benefit for one partner.
Indicators	The more access to resources, assets, and capabilities, which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence. Examples are: internal data access, organizational funding, access to organizational facilities, access to contacts and social networks.
Code 4	
Label	**Organizational autonomy** *(Zalewska-Kurek et al., 2015)*
Definition	The freedom of the researcher in deciding on the research direction and conducting the research, however, with the continuous support of the organization and the context.
Description	High degree: having full rein and support from the organization and the context in research direction and execution. Low degree: exposure to organization's management and influencing context resulting in research action taking place in formalized boundaries.
Indicators	The actual influence of the organization on the research direction and outline, confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project, the independence of the researcher in conducting the research, the impact of organizational and university policies on the project, the degree of practitioner-oriented deliverables the researcher offers.

Table 2: code manual - continued

5. Findings

In the following, one can find the findings derived from the conducted interviews. These findings are based on an in-depth analysis of the strategic behavior of researchers as well as organizations in their collaborative research projects. The projects differed in terms of content but also scale. Three collaborative research projects are part of consortium projects with several participants whereas the remaining eight projects are based on interactions between one organization and one university. Each project indicates its own peculiarities and different forms of strategic interdependence and organizational autonomy could be observed. In addition to this, also the researcher's behavior differed ranging from strategically planned to opportunity-driven behavior. The findings are presented based on the entire sample and illustrated with the most distinctive observations. The complete interview transcripts are excluded due to confidentiality reasons. The respective comprehensive and tabular interview findings are to be found under Attachments "A.2: interview finding sheets".

On this and the following page, one can find "Table 3: case findings", which includes all project cases and the previously determined indicators. Only in project case 2, in which both the PhD student and the research supervisor were interviewed, there is a discrepancy in the responses. If there is a differing response, the designation will be "{2}" for the PhD student and "(2)" for the research supervisor. However, the statements of the PhD student seemed to be more authentic and less contradictory than the responses of the research supervisor. This is based on the much more frequent and almost daily engagement with the firm, which itself is also pointed out by the research supervisor.

At the end of this chapter, one can find "Table 4: main results", which comprises a summary of the main results.

Strategic-planned behavior	present	non-present
Reason to choose the partner was a good fit with the own research program	1, (2), 3, 4, 5, 6, 7, 8, 9, 10, 11	{2}
Low willingness to compromise in terms of research direction and outline	1, 3, 8, 9, 10, 11	2, 4, 5, 6, 7
Disagreements which indicate distinct goals and followed strategies among partners	2, 5	1, 3, 4, 6, 7, 8, 9, 10, 11
Opportunity-driven behavior	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	1, (2), 3, 4, 5, 6, 7, 9, 11	{2}, 8, 10
High willingness to compromise in terms of research direction and outline	2, 4, 5, 6, 7	1, 3, 8, 9, 10, 11

Table 3: case findings

Strategic interdependence	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	{2}, 6	1, (2), 5, 7, 8, 9, 10, 11	3, 4
Organizational autonomy	low	medium	high
The actual influence of the organization on the research direction and outline	1, 3, 4, 8, 9	5, 6, 7, 10, 11	2
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	1, (2), 3, 4, 6, 7, 8, 9, 10, 11		{2}, 5
The independence of the researcher in conducting the research	2	1, 5, 6, 7	1, 3, 4, 8, 9, 10, 11
The impact of organizational and university policies on the project	1, (2), 4, 11	3, 9, 10	{2}, 5
The degree of practitioner-oriented deliverables the researcher offers	8, 10	1, 10, 11	2, 3, 4, 5, 6, 7, 9

Table 3: case findings - continued

In all but three projects, the partners in an engaged research collaboration had a certain connection with the partner already before actually starting the research project. This can be either based on a mutual history or a party that knows both the researcher and the organization and acts as a connecting body between the potential partners. This strengthens the assumed importance of the researcher's network embeddedness or its social capital. Only in one project, the contact was established by the firm itself without having a connection and this choice was based on the expertise of the researcher. In the two remaining projects, all consortium projects, the contact was established within the wider research consortium setting and based on the researcher.

Considering the researcher as the determining part in the selection phase, as it is the researcher who decides if the intended research fits the own research program, in ten out of eleven projects there was a reported fit between the subject to be researched and the researcher's expertise. In the one remaining project, it was still not exactly clear what the research will be about. When it comes to the researcher's willingness to compromise in terms of research direction and outline, the responses differed. As already mentioned, one project had no clear research direction. Among the remaining ten projects, the willingness to compromise was low in six cases for several reasons. Firstly, the firm has no say as there is no firm funding and the researcher also contributes with practitioner-oriented deliverables. Secondly, there is already an almost perfect fit in the researcher's expertise as well as its aimed project deliverables and the research direction and content the organization values. Thirdly, the researcher has a leading role as the organization trusts the researcher and its expertise and the organization itself has limited expertise to contribute. Lastly, the collaborating

organizations are only a part of a larger consortium project which research scope is clearly defined beforehand and therefore willingness is not decisive.

The following quotes indicate two distinctive notions about when to decide to engage with a firm for a mutual research project. Firstly, there is researcher 7 who is very opportunity-driven:

> *Quote 1: So I am always very open-minded. And sometimes people trigger me and people are triggered by me and then something might happen. (Researcher "7" – Project "7": 61-62)*

> *Quote 2: In 80 – 90% of the cases, I am being invited. And then it depends on your capacity and your real interest and on the energy that you feel with a person, whether you engage with that person on that project or not. (Researcher "7" – Project "7": 75-77)*

> *Quote 3: So these younger colleagues say to me "(…) is this going to lead to any publication?" and I said "I don`t know; I know we are going to do a survey which has a practitioner relevance; it is not very theory-driven, but it creates a lot of contacts" (Researcher "7" – Project "7": 89-91)*

> *Quote 4: It`s not always the case that you can do research that leads to publications. Sometimes you have to do other research which leads to money, to income, but doesn't necessarily satisfy the basic needs of an academic in terms of publication. (Researcher "7" – Project "7": 106-109)*

> *Quote 5: I decide about that in a very intuitive way. And it always builds on what you have done before. And it always builds and is related to problems that you see that are unsolved. So I don't have a roadmap where I see am here and from here I am going to this research project and then 10 years from now I will be there. No. After 10 years I would say I am totally somewhere else than where I thought that I would be 10 years ago. So there is a high degree of coincidence and also opportunism. Sometimes I used that contract research in an opportunistic way. (Researcher "7" – Project "7": 167-177)*

Secondly, there is researcher 8, who behaves in a strategically planned way and who highlights the risk that firms influence the research which has a detrimental effect on the integrity of the researcher:

> *Quote 6: (…) there are many many research opportunities out there. So if you really like sort of going after the opportunity, you probably end up with all kinds of research projects that are not really in line of what you actually want to do. So I am always very careful in what I do, in which projects I actually accept for companies. And if they don't fit my own research interest, my research lines, I am not going to do them. (Researcher "8" – Project "8": 392-396)*

> *Quote 7: (…) you should be very careful that the industry is not dictating what you research and how you do this, because then they will also get a say or an impact on what you are actually allowed to report and not to report. You should always maintain your academic integrity in this instance. (Researcher "8" – Project "8": 436-439)*

The early achievement of agreement and the generation of shared understanding among partners in the selection phase is therefore a crucial point. In only two projects ambiguities or frictions between the partners occurred. Reason for this was that the research direction

persisted to be vague and expectations are formed by the organization as well as the some organizational members demanded something in return for their project contribution. In all other projects, there was no reported disagreement but rather a shared understanding. Even in cases where the research itself was vague and there was potential for contention, the organization itself was either aware of its inability to criticize the researcher or the process of concretizing the research direction was seen as an organic path on which minor issues are certain, acceptable, and mutual sympathy as well as an outcome focus was present.

For this reason, one can say that in the vast majority of cases, the researcher's strategic behavior can be described as strategic-planned. For the organizations, on the other hand, the strategic behavior is either based on two aspirations. Firstly, having a solution to a tangible organizational problem. This involves the researcher itself being a problem solver or at least the researcher as being an initial ignition to the problem-solving process. Secondly, firms are keen on participating in projects in which organizational learning takes place or which are for other reasons promising enough to enhance the own strategic competitive advantage. This can be based on improving internal processes or identifying opportunities in the external environment due to organizational learning. In addition to this, participating in innovative projects that have the potential to shift industries or also collaborating with other and leading organizations, which can lead to promising business opportunities later on, can clearly serve the goal of establishing a sustainable competitive advantage.

On the contrary, a high willingness to compromise on side of the researcher in terms of research direction and outline was present in five projects, also in the one with the not clear research direction. In the latter case, one reason can be that the organization was in charge to determine the research direction and the researcher was not able to act very proactive which urged the researcher to capture an opportunity. A more deliberate and planned opportunity-driven strategic behavior was reported in the remaining four projects. In these cases, the research itself was practitioner-oriented as well as the researcher oneself was very open-minded to the practical relevance of the research.

However, practical implications or practitioner-oriented deliverables are not a certain indication for opportunity-driven behavior but also depend on the researchable subject itself. For this reason, one can say that four of the projects involve researchers that are more opportunity-driven. In addition to this, practical output can also be delivered by Master or even Bachelor projects. Those projects support both the organization in their practical as well as pragmatic effort and the mutual research project itself. For this reason, one can say that the boundaries between the actual mutual PhD research project and the associated Master or Bachelor projects can become blurred. This means that university-industry collaborations in general and the associated mutual research specifically can have multi-layered or multi-dimensional forms. Particularly in the execution phase of the mutual research project, this can contribute to the focus and research direction goal as well as to the flexibility and the research conduct.

The following quote describes a common practice for mutual research projects in order to ensure both practical value for the organization and scientific output for the researcher:

Quote 8: (…) if you have a good student, it catches some low-hanging fruits, yeah, companies are happy. And not everybody sees the difference between more consultancy-like work of a Master student and real scientific stuff. You know that most companies are short-term thinking. So if they get some short-term results they are happy. So if you make some kind of combination of Bachelor or Master students and a PhD student, who also take care that papers are written, that works pretty well so far. (Researcher "14" – Project "11": 97-102)

The strategic interdependence between project partners is the next point to consider. It involves the access to required resources that are under the influence of the project partner and which are unattainable without this respective partner. The strategic interdependence indicates the fruitfulness or richness of the project partner in contributing to the mutual research collaboration.

The researcher's project contribution in the field of business management but also innovation management research is focused on abstract and conceptual thinking and determination by means of the own attained knowledge, experience, and therefore expertise.

The organization`s contribution, on the other hand, can have several forms. These forms are data provision, insights into the practical relevance for the researcher as well as other and more general insights, further contacts valuable for the research at hand or future research, and organizational funding.

Throughout all the interviews, the most important organizational contribution was data provision, which represents data that can be collected by means of the organization's database and / or via data collection in interviews. In one case, this data provision was reported to be directly refused by the firm which ended with severe consequences for the researcher. In another case, this missing data provision was only observed passively with an associated research project, however, with the same adverse result for the research. The second contribution, the insights for the researcher derived from the organization's context, was reported in five out of eleven projects and was the least mentioned contribution by the organization. Logically, this contribution was only necessary if the analysis spectrum involved the organizational context itself, like in cases with business interactions of the respective organization or other external influence on the organization. Another point mentionable is the importance of practical relevance for the research which will be important if innovations or practical value is to be assessed by external stakeholders. In two of the three consortium projects, the organizational insights were of no importance for the overall research subject. For the third consortium project, which emphasizes innovation management, the practical relevance was indeed important. The third organizational contribution, namely the provision of further contact data which was valuable for the researcher, was reported in seven project cases. However, this can be particularly dedicated to the practical relevance needed for the research or the peculiarities of consortium projects, namely representativeness, networking, and actual collaboration.
The final contribution of the organization is organizational funding. Although funding was crucial in the vast majority of cases and differed from full funding to partial funding, researchers had different perceptions of and experience with organizational funding. Whereas some researchers needed the organizational funding because otherwise there would not have been any research, other researchers were more uncommitted to the funding. One reason was the researcher's perception that money can be also acquired from other sources or even is an

unneeded surplus. This was observable in five projects. In two of these cases, the researchers also explicitly reported that organizational funding causes the risk of higher influence by the firm and therefore funding has to be considered cautiously. In another project, which was also a consortium project, the researcher stated that organizational funding is sometimes a good motivation for organizations to be more involved. Although deviating from the norm, in this researcher's case one organization was very passive. Besides that case, there was only one case or project in which the researcher was clearly not satisfied with the organization`s contribution. Reason for this was clearly that the organization did not only deny the contribution necessary for the research part of the project but rather wanted the researcher to refocus on highly practical contributions non-valuable for the research at hand.

The last point for consideration is the organizational autonomy. It involves the independence of the researcher in directing the research and conducting it as well as the influence of the organization, the impact of organizational and university policies on the research project, and the degree of practitioner orientation in the researcher's project deliverables.

The degree of independence or freedom of the researcher in directing the research and the research conduct was high in seven mutual research projects. In all of these projects, there was only low active influence on the researcher by an organization. Only in one project there was passive influence on the researcher's work capacities. This was based on operational and practitioner-oriented work that needed to be completed within certain time constraints and which was not employed for the research project.

In addition to this, one can state that the influence of the organization was higher in the selection phase when the research direction was mutually agreed on and formalized. In the execution phase, researchers were quite independent. Reasons for this was that the organization, due to its own limited expertise, either trusted the researcher or it was convinced by the practical appeal of the expected research outcome.

In one case, the researcher's independence was high but the organization was also asked for more detailed research questions so that the research exhibits an increased practical relevance. In another case, in which the research was not funded by the firm, the researcher reported that the influence would have been higher, if the firm funded the research. In three other mutual research projects, there was a medium degree of researcher independence. In all of these cases, the researchers reported that research has to provide the organization with value in form of practical relevance and / or practitioner-oriented deliverables. This serves particularly as an exchange for the organization and its project contribution. One case was a continuation of a formerly non-finished research project, in which the former PhD student left due to a job offer. In the second case, the researcher was an advocate for research that has as its goal the provision of practical implications and even deliberately and heavily designed and implemented within the organization. The third case also involved a highly practitioner-oriented researcher that coped with the organizational wish for the direct applicability of the research. A low degree of independence for the researcher was only observable in the one project which had no clear research direction and where the researcher was heavily involved in the operational activities of the firm.

Nonetheless, even in cases in which there is no funding from the organization, the researcher can be the target of organizational influence:

> *Quote 9: What I know from my PhD student, in the beginning she really liked to be there. So she liked to have this both doing more practical things and doing the research. But after time, she got fed up with it, because she had this urgency of "okay now, I have to do a couple of things"… But it was also, for example, that she really wants to publish and the entrepreneur is not really interested in that … and wants more practical things. And of course the pressure increases of getting her scientific deliverables at a certain moment. That kind of diverted. But in the beginning, in fact, the entrepreneur was her objective study. So for her it was wonderful to be there. It is not only doing an interview, but she was there and she could observe what happened, etc. So she really liked that part for that reason, but at a certain moment, she knew how it was going. And there was always more practical work which also kept her from a couple of other things. (Researcher "11" – Project "1": 133-143)*

Nonetheless, the researcher rated the own independency as high because there is no contract that formalizes the researcher's tasks and therefore imposes restrictions:

> *Quote 10: We are independent and in that way not so closely connected to the firm. But of course my PhD student, in the beginning she did her Master thesis there, then I was only in the project, and then after that she also started to work on a more permanent basis with them. And then of course, because she was working there, questions came. (Researcher "11" – Project "1": 50-53)*

> *Quote 11: So of course we do things there, because, of course, we would like to keep the relationship going, but formally they cannot make anything. (Researcher "11" – Project "1": 337-338)*

This indicates also the researcher's focus on the overall research direction or the overall project goal. However, additionally the researcher also considers flexibility as an important point that contributes to the goal attainment.

The confidentiality demanded by the organization, was only an issue in two of the projects. One project case was the project which had no clear research direction, in which the researcher was heavily involved in organizational activities. The researcher reported already a high degree of influence by the firm in the research conduct and described the firm also as very bureaucratic and hierarchical with clear formalization for in-out communications. In addition to this, the firm had no experience with research publications which is assumed to reinforce the firm influence. The second project took place within a multinational corporation which has clear guidelines and which obtained a contractually-agreed entitlement to postpone the research publication for a certain period of time.

This last point of the contractual impact on the research leads directly to the next subject which is the impact of both organizational and university policies on the mutual research project. The responses concerning this subject were various and only in one case the impact of both university and firm policies was rated as low. In three other cases, on the contrary, the impact and consequences of policies were rated as high. Reason for this was that in two cases, also in one consortium project, particularly the process of developing the mutual contract was stolid. In the third case, which was the project without a clear research direction, the university

policies were quite constraining in the beginning whereas the firm policies are generally constraining. In two other mutual research projects, only the university and its policies affected the university-industry interaction. In one of these cases, the university policies was the reason that the preparation of the contract took almost as long as the project itself, which means that the researcher started and conducted the research without a clear contract. In the second case, the researcher reported as a general issue the university policy would have a detrimental effect on PhD research as it constrains the funding of PhD students and therefore the opportunity to engage in research. As PhD research is fundamental research which also contributes to the academic field, this is an adverse consequence at all. The issue with the non-funding of PhD students caused by the university policies was also present in the last reported case. However, in this project case an organization with its bureaucracy and hierarchy also had an adverse impact on the mutual research project. In the remaining cases, the question for this issue could not have been asked because of time issues.

The long time it takes for the preparation of the mutual research agreement or contract as well as the inertia of university bureaucracy is exemplarily depicted in the following quotes:

> *Quote 12: At the end, I think, within half a year, and that is pretty fast, it was arranged. There are projects where the collaboration agreement is just signed before the last PhD student defend his thesis. (Researcher "14" – Project "11": 437-439)*

> *Quote 13: Well, the university affected this collaboration in a way that it took enormous time to draft this stupid standard contract. So this is a big problem with the university that … in fact, it's very difficult to make industry collaborations with university lawyers being involved. But I think there was another project where they complained that the contract the firm sent to us was in German… that's a big problem if you want to collaborate with industry, we always have to adapt to their requirements and not ask a multinational company to change their corporate language, because the university's lawyer is unable to understand everything. So that is of course a handicap in such …. And the long time that everything takes at the university administration and to get any bills sent and things like that… it always takes enormous times. (Researcher "3" – Project "3": 299-308)*

> *Quote 14: the way the contract was created and the process of reassessing or reworking the contract was very troublesome. But it is something that I can say that is generally the problem … that university policy seems to be so much slower and so much more inflexible than company policy. Because I also had two other projects and in each project there were huge discussions on that goddamn contract … where you just thought "well, you just begin the project" … we even almost every time began the project before we had the contract. (Researcher "10" – Project "3": 566-572)*

The restrictions on the funding of PhD students by the university are to be found in the following quote:

> *Quote 15: You are limited in the choice of the topics. So, I have now a project that I would like to have somebody work on, but the university is not giving me money for the project. So, I think that is a very bad thing. So, it restricts your freedom in the choice (…). (Researcher "4" – Project "4": 330-332)*

The last indicator for organizational autonomy is the degree of practitioner orientation in the researcher's project deliverables. Throughout the mutual research projects it was observable

that in seven projects there was a high degree of deliverables that have a practitioner-oriented focus. Reasons for this was that the research itself was very practical or even consulting. It provided the organization with practical implications or also tools that the organization could directly use for its own operations. An exemption in one of these cases is the project in which no research direction was determined. In that case, the PhD student as principal researcher was engaged in activities that were mostly relevant for the firm. A medium degree of practitioner-oriented deliverables by the researcher was only present in two cases. On the one hand, this was the case in which the researcher was independent from the firm as well as its funding and provided the firm with limited general consulting, which, however, partially contributed to the research. In another research project, which was a consortium project, the researcher reported that practitioner-oriented deliverables are ensured by the deployment of Master or Bachelor students. Those students and their sub-projects deliver practical value and support the overall mutual research project, although the supervision is still an effort to be made. In yet another case, which was also a consortium project, the researcher responded that the overall agreed project deliverables had been those with a clear focus on knowledge generation. Nonetheless, the researcher also reported that the research has to have a practical relevance and serves with organizational learning. For this reason, the degree of practitioner-oriented project deliverables can be seen as low to medium as the focus on knowledge generation is clearly defined within the project but the researcher itself sees a certain need for practical research value. The last case shows a low degree of practitioner-oriented project deliverables. Reason for this was that the researcher unambiguously reported that the researcher should be only there for research and all practical efforts reside with the organization or a business consultancy. According to the researcher, the only responsibility was on the organizational learning in form of where and what the effect is and not what the specific reason for this effect was.

The research and its aim for practical relevance or practitioner orientation is exemplary depicted in the following quote:

> *Quote 16: I have a design background and I do design science, so I like to be useful for practice. So that has real influence on the type of projects I chose, yes. So I like projects where I can say for my Master thesis students but also for the PhD students that we solve problems or try to contribute to problems in practice and to be practically useful. And then the challenge is how to realize that … to have a PhD and a high level research and have this practical. But this is what I like. So this is the aim. This is what we also in our group [strive for], so I am not the only one (Researcher "9" – Project "9": 503-509)*

Finally, when it comes to the performance of the projects, only the performance of project with the missing research direction was reported to be unsatisfactory. In all other research projects, the researchers were satisfied with the overall project progress. Even though minor points for improvement were reported, like the general friction and subsequent tradeoff between requirements for academia and the organization, there was no significant or relevant adverse impact on the performance reported. Generally, each relevant project partner seem to know about and understand the other partner's motivation to engage in the collaboration.

	Selection	Execution
Goals	• The strategic behavior of the researcher was very strategically-planned • Opportunity-driven strategic behavior was less present; particularly due to researcher's own perception about more practitioner-oriented output or already determined project direction and deliverables; one has to remark that some research subjects or fields themselves involve practitioner-oriented deliverables, which minimizes this occurrence • In most cases, the contact was established due to the researcher`s network instead of a formal selection process • In the majority of cases, there was an agreement between project partners on the research direction and project deliverables, which sets a project focus and minimizes the occurrence of ambiguities or frictions	• The strategic behavior of the researcher remained the same throughout the project • If an agreement on the research direction was missing, there was room for ambiguities or frictions which intensified in the execution phase of the project • The goals are attained by focused (research direction) and flexible (research sub-goals and conduct) execution • University-industry projects can be multilayered, involving Bachelor or Master students to contribute with more practitioner-oriented deliverables to the firm`s value and therefore support the more scientific PhD project
Governance	• The strategic interdependence among all projects can be seen as medium to high with various valuable exchanges of resources and capabilities among project partners agreed on in the beginning of the project • The decision making and agreement finding was seen as an organic path on which minor issues are common but the mutual outcome focus of partners will resolve these issues along the way • The organizational autonomy for the researcher in the beginning was either medium or high (with equal shares among the vast majority of projects) • Organizational funding can be a crucial contribution as it might be necessary for the research project, but can also cause the organization to have more influence on the research direction and determination of project deliverables	• The strategic interdependence is maintained due to the agreement on the focused research direction, flexible research conduct and also the partners' general commitment to the project deliverables • Valuable outputs for all partners can be generated by means of both academically accepted and practitioner-oriented project deliverables within the scope of the particular research collaboration and supporting Bachelor- as well as Master-level projects • The practitioner-oriented output is also supported by associated Bachelor or Master students • The organizational autonomy for the researcher increased in the project's execution phase, particularly due to the trust earned from the organization • Organizational funding can cause the firm to more intensively influence the researcher in its activities, in so doing decreasing the researcher's organizational autonomy, with the goal of receiving more practitioner-oriented project deliverables

Table 4: main results

6. Discussion

There is an increasing importance of university-industry collaborations nowadays and it involves a potential for value creation for both organizations as well as industries and researchers as well as their academic domain (D'Este & Patel, 2007; Perkmann & Walsh, 2007; Perkmann & Walsh, 2008; Zalewska-Kurek et al., 2015). This value, however, is likely to be differently perceived by each partner. In addition to this, the university-industry setting can be described not only as an emerging setting but also as a dynamic and multifaceted one.

The reason for this is that all partners in university-industry collaborations have their own motivation to engage in these collaborations and those general motivations have to be identified in order to identify conflict potential. The importance of this is further reinforced after considering that universities and researchers as well as organizations are part of divergent external environments which all assert certain distinct pressure on each respective actor. Although the final outcome of these university-industry actions should be the mutual value capture for all partners, each partner is assumed to follow its own strategic goals and therefore has its own strategic behavior.

Taking into consideration all these points, there is an absence of a more comprehensive perspective on these relationships in the current scientific literature. This is particularly true for those relationships that are not established for the shorter-term and those that are connected to domains in which outcomes are fuzzier and less tangible than in technology research domains (Crossick, 2009). Most of the literature emphasizes only specific aspects of university-industry interactions, like the knowledge transfer, and there was no literature found that considers the development aspect.

This paper attempts to combine literature from different research domains in order to enlighten the dynamics of university-industry collaborations. In addition to this, the paper also describes the distinct strategic behaviors of partners in these collaborations as well as the value exchange. Finally, it provides the reader with a framework that supports the value capture resulting from these university-industry interactions by identifying the predominant motives for engaging in such a collaboration as well as the impediments for a mutual value capture.

The previously mentioned strategic behavior is based on the partner's strategic planning, the strategic position, and is to be maintained throughout the duration of the mutual research project or even the life of the long-term research partnership. This highlights also the importance of a mutually agreed value exchange and the management of different partner's expectations (Ulaga, 2003). During the interviews it became clear that researchers mostly engage with partners with whom they already have a certain connection with, be it a direct connection or a connection established by another direct contact. This was surprising as a more formalized and objective selection was assumed and also because the researcher is generally free in the choice with which partner it will engage with. However, as the literature also emphasizes the researcher's striving to engage in fewer but stronger ties with industry and the researcher values trustworthy and informal ties, this indicates the importance of interpersonal socializing (Johansson et al., 2005). One can say that both the researcher and the firm are clearly interested in intermediate or long-term partnerships (Bozeman et al., 2013; Hagedoorn et al., 2000). And this does not only involve social reasons but also economic

benefits (Hagedoorn et al., 2000; Wong et al., 2005). One has to emphasize as well that the researcher with its free choice also has an advantage in the negotiations about the research direction and therefore shows a strong initial strategic position.

This negotiation in the beginning of a project clearly involves the research direction as well as the previously mentioned agreed value exchange. The findings imply that this agreement finding between partners is an important point of matter as it requires all partners to reveal their expectations and therefore also indicate their strategic behavior. If there was agreement on research direction, research conduct and project deliverables, researchers did not perceive a deviating behavior of the organization. In addition to this, also the researchers themselves did not alter their strategic behavior throughout the project. One clarifying but assumed insight was that organizations act very strategically-planned, whereas researchers act mostly strategically-planned but also opportunity-driven, which is, however, particularly based on the researcher's personal attitude of doing research.

This is an important point as it indicates the long-term focus of all partners and therefore decreases the first perceived dynamics predominant in the planning of a mutual research project. Although there can be various influences on the negotiation process and therefore the agreement finding, one can state that an open, transparent, and coordinated planning limits the occurrence of disagreements or frictions between partners. Reason for this is that such a planning discloses all partners' intentions and expectations and the agreement serves with as a kind of mental contract, resulting in increased commitment to the project and trust among project partners. This was a critical conclusion from the interviews and it unveils the importance for a mutually set focus among project partners. All this contributes to a more resource-saving (efficient) and successful (effective) research project (Mora-Valentin et al., 2004).

As the one major matter of argument, one can name the degree of practitioner-oriented project deliverables demanded by the organization. As the organization, and particularly a firm, is mostly interested in supportive and easily-applicable insights, this can counteract the researcher's striving for scientifically-relevant knowledge generation. Research which offers by nature practitioner-oriented deliverables had shown less tensions whereas more conceptual research with a decreased need for practical relevance had shown more potential for tensions. All this requires an early expectation management for all project partners and agreement on what and how to proceed in the mutual research project. Within the interviews it became clear that openness and transparency in communications as well as coordinated mutual efforts enhance not only the agreement finding and therefore project planning but also the project management in the execution phase.

Additionally, although particularly firms attempt to protect the generated knowledge, their demanding for confidentiality was not found to matter much. The vast majority of firms understands that the researcher has to publish studies and the researcher itself is experienced enough to disguise any proprietary organizational data.

Another important point of matter is not only the intention to generate and exchange value with the partner, but also what this exchanged value involves. In this paper, this value is described as resources, assets, and capabilities which are of strategic importance for the involved partners, but which are only accessed by means of the mutual research project (Zalewska-Kurek et al., 2015). This represents the strategic interdependence between project

partners. This simple indicator of commonly exchanged items boils down the complexity of exchanged value and indicates clearly the power balance between partners.

On the one hand, there is the researcher who would like to learn from industry and strives to develop as well as disseminate the developed knowledge in order to build up reputation and also to open up new financing possibilities for future research projects (Bozeman et al., 2013; Göktepe-Hulten & Mahagaonkar, 2009; Meyer-Krahmer & Schmoch, 1998; *both in* D'Este & Perkmann, 2011). On the other hand, there is the organization which was unable to solve an issue internally or lacks the abstract thinking, knowledge or wide perspective of a researcher and which would like benefit from this collaboration with a scholar (Siegel et al., 2007; Hagedoorn et al., 2000).

Within the interviews it became clear that in the vast majority of project cases the partners contributed sufficiently to the project by use of their resources, assets, and capabilities. However, organizational funding is for some organizations a critical resource to be contributed to the project and it can raise expectations on more practitioner-oriented deliverables. Additionally, if the organization is not that dependent on the researcher and its expertise, the power balance is in favor with the organization and therefore opportunistic behavior can occur. This opportunistic behavior can also constrains the researcher's freedom and therefore affects the organizational autonomy of the researcher. This was clearly shown in one case.

However, the organizational autonomy is not only affected by the opportunistic behavior of an organization or firm. The organizational autonomy comprises the researcher's overall independence in directing and conducting the research (Kurek et al., 2007 in Zalewska-Kurek et al., 2015). Any active or passive influence by the organization or firm can decrease the researcher's organizational autonomy. This is also a crucial point to consider as the researcher's contribution is based on its abstract thinking, accumulated knowledge or the wide and differentiated perspective. Constraining the scholar would have a detrimental effect on the researcher's contributed and realized value exchange. Researchers are found to be provided with a high degree of autonomy (Varma, 1999, pp. 41-42) and it will be not wise to assimilate the researcher (Haspeslagh & Jemison, 1991, p. 143). And indeed exactly this is also in line with the findings from the interviews. The majority of researchers rated themselves as independent or highly independent. It was also reported that this was also because of the mutual trust that was present among the project partners. On the contrary, the influence of the organization on the research direction and outline was rated also low to medium in the majority of cases.

An interesting point is that one can assume organizations to generally accept the role allocation with the researcher directing the research, but still are aware of their resources contributed to the research project and therefore mostly act with a quid-pro-quo attitude. This is even intensified in the execution phase when first results open up new and for the organization valuable insights. Organizations, and particularly firms, can be inclined to demand more practitioner-oriented deliverables from the researcher as the value is more graspable to them. For this reason, flexibility becomes a very important factor in the execution phase of a university-industry research project that one should not overlook.

When it comes to the different phases, namely the selection phase and the execution phase, one can see that focus and flexibility are important points to be considered. In most of the cases, there was a focus on an agreement finding in the selection phase, which discusses a substantial research direction, subgoals, and the general research project outline. During the

execution phase, there was still focus on the research direction but also flexibility in substantiating research subgoals as well as project deliverables, and the actual research conduct. This need for flexibility was based on potentially different perspectives among project partners, mutual discussions between them, and the learning that takes place due to all this (Bingham et al., 2014). For this reason, the early focus and the flexible execution is a promising basis for value capture or a well-performing mutual research project as "successful opportunity capture is the intended capture of the expected along with the emergent capture of the unexpected" (Bingham et al., 2014, p. 35). This is clearly in line what was found in the well-performing mutual research projects.

All in all, this paper links different concepts from various domains in order to enlighten the dynamics and dependencies in university-industry collaborations and to offer a simple framework for the analysis of those. The paper combines the separation of phases, the plain identification of distinct motives as well as the partners' strategic behavior, and the determination of potentially realized value exchange. All this allows for a concise and profound analysis of university-industry research collaborations and serves with a knowledgeable basis to enhance university-industry partnerships.

7. Framework

In the following, one can read about the initial framework, the framework development, and how the framework contributes to the existent literature.

7.1. Initial theoretical framework

The initial theoretical framework is based on the literature review in chapter "3. Theoretical background" and is to be found at the end of this sub-chapter in "Figure 1: initial theoretical framework".

From the literature it became clear that university-industry research collaborations are distinct due to different reasons. These collaborations combine two different arenas with their own characteristics and individual set and expected goals. The goals comprise the research direction as well as the research objectives. Moreover, it involves an exchange which might not be well-definable and it can remain highly uncertain. In addition to this, the mutual collaboration requires an appropriate governance to offer valuable output for all partners. Governance involves the accompanying decision making process and emphasizes the followed research conduct as well as the general research project management.

For this reason, it is crucial to assess the goals as well as the governance within the mutual research collaboration. Particularly for the researcher the goals and therefore the strategic behavior can differ with two extremes, like very strategically-planned and with self-centered forethought or dedicated also to the partner's advantage and driven by various opportunities that can arise from this mutual research collaboration.

In this respect, both the deployed resources for the research *(strategic interdependence)* and the freedom in steering and conducting the research on side of the researcher *(organizational autonomy)* are important. The strategic interdependence ensures both the resources required for the goal attainment and commitment among partners if both can contribute equally. The organizational autonomy is important for the researcher as it indicates to what degree the researcher is safeguarded from influences that can adversely affect its task accomplishment or the general research direction.

As the mutual research collaboration is not a transactional one-time event, the different phases of the mutual research collaboration has to be taken into account. In this respect, the separation of the selection phase and the execution phase is chosen. As quoted in the literature, the selection phase is assumed to show a high degree of focus among project partners as they are focusing on what is targeted to be achieved. In the execution phase a flexible execution becomes relevant and, therefore, focus is replaced by flexibility. Reason for this is that there is most likely a discrepancy between what was targeted and what can be actually achieved within the scopes of the mutual research project.

	Selection ⇒ Execution	
	Focus	**Flexibility**
Goals	Strategically-planned *or* Opportunity-driven	Strategically-planned *or* Opportunity-driven
Governance	Strategic Interdependence (high / low) Organizational Autonomy (high / low)	Strategic Interdependence (high / low) Organizational Autonomy (high / low)

Figure 1: initial theoretical framework

7.2. Development of a revised framework

The revised framework is developed by means of a deductive-inductive method which is based on the literature review and on the findings in the semi-structured interviews. This means that established theories, promising subjects, and concepts were used to build the previously described initial framework and the interview responses concretized it subsequently to the revised framework. All this contributed to the overall aim of answering the research questions and enlightening the domain of university-industry interactions.

One comment can be given on the strategically-planned and opportunity-driven behavior. In the course of the interviews it became clear that the basis for this behavior is taken in the selection phase and therefore remains also in the execution phase. Even when there was only oral agreement on the goals, this agreement was in large part adhered to by all project partners.

Another important point is that focus and flexibility can be present in each phase and for each subject within the mutual research collaboration. For this reason, focus and flexibility are no longer seen as the associated concepts for the two phases but rather as more omnipresent concepts in these mutual collaborations.

The resulting framework can be seen in the following as “Figure 2: revised framework”.

	Selection ⟹	Execution
Goals	Strategically-planned *or* Opportunity-driven Focus / Flexibility	Strategically-planned *or* Opportunity-driven Focus / Flexibility
Governance	Strategic Interdependence (high / low) Organizational Autonomy (high / low) Focus / Flexibility	Strategic Interdependence (high / low) Organizational Autonomy (high / low) Focus / Flexibility

Figure 2: revised framework

7.3. Literature contribution

This framework is developed for two reasons. Firstly, it serves as a structured basis for answering the research questions and enlightening the dynamic and developing domain of university-industry collaborations and the partners' predominant strategic behavior.
Secondly, the framework is a tool that assists in the value capture within research collaborations and therefore has practical appeal.

Contemporary literature in the field of university-industry interactions particularly emphasizes the knowledge transfer or the strategic cooperation itself and does not consider the multifaceted development of these interactions throughout time or the overall intended value capture that is striven for by project partners. This study discusses the development of these collaborations and the factors that make the collaboration management assumingly appropriate so that mutually valuable and expected outcomes are generated from the research project at the end. As the framework involves a phase dimension, the analysis of the dynamics emerging in university-industry collaborations is improved. This allows for differentiating between planned behavior as well as coordinated project execution and coincidental behavior as well as deviating tendencies in the project execution. For this reason, the researcher's goals and the governance of these goals are critical. In addition to this, focus and flexibility serve as a continuum for the strategic behavior in terms of both goals and governance and all this throughout the entire life span of the mutual research project.

Another contribution of this study is the research field. As most other studies on university-industry collaborations approach technology sciences, this paper focuses on projects involving business science as part of social sciences. These research projects are of particular interest as the final outcome of the mutual research project can be fuzzier and more intangible. This can generate tensions on side of the researcher if the organization demands more practitioner-

oriented output and it makes the strategic behavior clearer visible or observable. For this reason, this paper contributes with insights into an under-researched domain.

8. Main conclusions and managerial implications

In this chapter, one can find the main conclusions that can be drawn from this research as well as the managerial implications. The goal is to enhance the understanding of university-industry research collaborations and the enablement for potential project partners to establish a well-performing and mutually valuable research project for researchers and industry.

8.1. Main conclusions

Although the scope of the mutual research projects differed, the conclusions that can be drawn from it appear to be still generalizable. The main conclusions are that the researchers are quite dependent on the organization when it comes to the researchable subject but particularly also the support given by the organization. This means that there has to be an observable issue or a field of action first so that the organization is willing to engage with and provide resources to the researcher. Organizations are problem owners and researchers are problem solvers or at least the initiators for an improvement process.

Nonetheless, the researchers are also generally free in their overall choice for a research project and if it fits their expertise. This provides the researchers with a significant degree of autonomy when it comes to directing the research. For a final and committed mutual engagement of both the organization and the researcher, however, there has to be an achieved agreement not only on the research direction but also on how the research is to be conducted. This is indicated with focus on goals in the framework. However, it does not mean that the research and its conduct is fine-grained formalized or “cast in stone” but that the general direction and the general means to an expected end are agreed on. In the framework, this is meant with flexibility in goals.

Without such an agreement divergent expectations can be formed and even opportunistic behavior can emerge, particularly on side of the organization. This lack of mutual governance and the associated exploitative behavior can comprise high expectations by the organization on the researcher concerning practitioner-oriented deliverables or even consulting activities besides the actual research project. Within the framework, this is understood as decreased strategic interdependence and restricted organizational autonomy as it can intensify the binding of the researcher`s resources to activities that are not necessary for the production of knowledge the researcher is aiming at. This expectation for practitioner-oriented project deliverables can be prevalent directly from the beginning and in the selection phase or developed throughout the execution phase of the project. Particularly if the organization offers funding, it will be likely that these expectations are developed at least in the execution phase, which constrains the researcher in the own autonomy.

For this reason, transparency for all project partners as well as clear communication among them, the preservation of commitment, and also general socializing efforts are crucial points in the execution phase of the project. Without these points, the chance for mutual and coordinated efforts diminish and the adaptive solving of continuously emerging issues in the execution phase can become troublesome. All this has a detrimental effect on the project performance.

Considering the external influences on the research project and particularly on the researcher,

one can mention organizational as well as university policies, and the influence of organizational impact on the dissemination of the generated knowledge. As the knowledge is generated within the organization or by means of the organization`s data, confidentiality can become an issue. This is because of the partners' divergent motivation for the engagement in a mutual research project. Whereas the researcher's motivation is the knowledge generation and also dissemination to the public, the organization itself expects new knowledge or tailored organizational learning and likewise strives to protect this knowledge in order to profit from it in the future. This friction is even further intensified if the research approaches practical research subjects.

For this reason, one can say that the strategic behavior of organizations is based on strategic thinking and therefore strategically-planned. This is particularly based on the fact that organizations will only engage in university-industry collaborations, if the solving of the problem at hand benefits from an abstract thinking researcher and / or cannot be solved internally, and therefore justifies the resource allocation to an external researcher. On the contrary, the strategic behavior of the researcher can be of various forms. Researchers can behave very strategically-planned or opportunity-driven. This is either based on the personal perception of the researcher or its area of expertise, which can be also very opportunity-driven or characterized by practitioner-oriented deliverables.

However, to prevent those frictions from occurring and to balance expectations, the researcher can request, already within the agreement finding, the general ability to focus on scientific research and also to publish the research. Regarding this last point, one has to remark that researchers are aware of the sensitivity of organizational data. For this reason they anonymize or aggregate data so that there is no uncontrolled or harming disclosure of internal data for the organization.

Nonetheless, one has to consider that the university-industry collaboration develops itself throughout time and therefore within the execution phase. However, once there was a strong agreement between the project partners on the research direction, its conduct, and transparent coordinating efforts to balance expectations, the strategic behavior of project partners did not alter significantly from what was agreed on in the selection phase.

As long as there is mutual value for both partners, unjustified deviations in the strategic behavior can harm the entire research project's performance and can even wipe out all valuable resources allocated to the project when the collaboration is stopped. For this reason, the contributions can be clearly assigned. The organization can contribute with the presence of a researchable problem at hand, its setting, and more tangible project resources (e.g. access to data and organizational facilities, organizational funding, and generation of further contacts as well as extension of the researcher's social network). The researcher can contribute with its expert knowledge in the questioned problem context, its personal experience, and therefore a solution to an abstract and complex problem. Taken together, these contributions enable both the organization and the researcher to generate a synergistic win-win situation in terms of value exchange at the end of the mutual research project.

The developed theoretical framework in this study provides research partners with a structured approach for analyzing the strategic behavior of researchers. The framework

combines effective opportunity capture with the theory of strategic positioning, which involves strategic interdependence and organizational autonomy. All this should enable the analyzing person to predict the performance of mutual research projects within the university-industry setting under the dynamic impact of the same environment. Additionally, one can use this for developing guidelines or as recommendations so that adverse influence on the project performance is limited. Particularly due to the recent developments on side of the university, when it comes to the increasing university-industry collaborations, this systematic evaluation of the collaboration becomes relevant and is a crucial point.

8.2. Managerial implications

There are some basic guidelines, one can consider when deciding about the engagement in university-industry collaborations and particularly the management of such partnerships.

The first priority should be to engage with a partner that have the potential to contribute to the own intended plans and therefore shows a good fit. For researchers this is clearly the data provision and / or the organizational context. For firms or organizations in general, an appropriate researcher lends its expertise and capabilities so that arisen issues can be solved. This is a necessary point for a value capture and is crucial in the selection phase.

Another high priority has the achievement of agreement in terms of research direction, research conduct, and the project deliverables. Naturally, there has to be a valuable outcome for both in order to achieve this agreement. Whereas the negotiations of this agreement take place in the selection phase, the compliance with and referring to this agreement usually becomes relevant in the execution phase.

Non-compliance or even the failure to find this agreement can result in severe consequences. It can result in disagreements between project partners as well as the emergence of opportunistic behavior which can all destroy significant value. Ultimately, it can also result in the termination of the university-industry collaboration if the project partners' expectations are or become too different from one another. This is the ultimate value destruction involving additional severe consequences for each of the project partners. The examples for these adverse consequences can be manifold. For the organization it can involve, for instance, the loss of access to critical and valuable knowledge but also the backfiring on other potential ties with the researcher's university. For the researcher it can involve, for instance, the loss of an empirical basis for a required publication or even the possibility to lose an organizationally-funded PhD student, if there is no other funding source available.

The managerial implications that can be drawn from the interviews is that a solid agreement finding in the selection phase is a bedrock for a mutually valuable university-industry research project. It comprises clear and transparent communication among project partners. A communication deficiency particularly involves too open, vague, and unclear communications. This can easily result in divergent expectations generated and goals to be established between project partners throughout the project time.

In addition to this, a transparent and clear communication builds a basis for a trustworthy and target-oriented negotiation about the research direction, research content, and research

project deliverables. This negotiation is more likely to result in an agreement achievement for the long term instead of a short-term pacification by means of cloudy communications. This ensures a focused goal designation and therefore alignment among project partners' goals. And as this focus is crucial in the selection phase, it can additionally serve with an appropriate governance in the execution phase as it still leaves room for necessary future adjustments on the research project. These adjustments become necessary as the research topic is in most cases abstract and might not be clearly outlined in the beginning. For this reason, flexibility is required in the subsequent execution phase, particularly highlighting the associated research sub-directions as well as the research conduct itself.

Additionally, there should be a regular involvement of project partners in the mutual research project. This provides all project partners with as mutual project tracking and performance evaluation, a supportive feedback mechanism, and a coordinated and agreed project execution. Another side effect is that an involved project partner is also more committed and focused. This commitment also contributes to the ability of more flexible project execution and additionally reinforces trust.

Another crucial point for consideration is the awareness that the researcher is likely to be chosen for researching an abstract or complex issue. It is the researcher who possesses the experience, competencies, and therefore expertise to address this issue. For this reason, it would be not target-oriented for an organization to overly limit the researcher's independence or organizational autonomy. This does not mean that an organization should completely keep the hands off the mutual research project. Instead, the organization should provide the researcher with enough sufficient support in terms of organizational resources offered for conducting the research but also comments given on the research so that the research validity is ensured or even enhanced.

Finally, the degree of practitioner-oriented deliverables the researcher offers throughout the project becomes important. As research subjects can be manifold and show a different degree of practitioner orientation, this point should be also part of the agreement finding in terms of project deliverables. However, the identification of potential practitioner-oriented deliverables can be in the selection phase as well as in the execution phase. Reason for this is that some deliverables are identified or become attainable when more tangible outputs are observed and ideas, particularly on the side of the organization, are formed. Emphasizing this point, the organization as well as the researcher should be aware of the partner's need for value capture in form of added value by means of project deliverables.

If the organization`s aim is on organizational learning or more general insights, it will be also more easy to satisfy the researcher concerning its targeted publication. On the contrary, if the organization`s aim is more on applied knowledge, the value derived from it for the researcher and its publication can be limited and therefore the organization is advantaged to a higher degree.

9. Limitations & future research

The first issue concerns the generalizability of the results. As this paper reports about findings derived from business researchers, the generalizability in other contexts can be problematic as more as one diverges from the original context. The same holds for making statements in other national and particular cultural settings. The data collection was based on the Netherlands. Researchers or organizations in other countries or cultural settings and with other culturally desired behavior might differ from the responding researchers in this study. For this reason, future studies should observe more research disciplines or involve culturally different study participants. The second point is particularly important if one considers that strategic behavior is based on individuals, involving their inherent psychological traits that are formed within a wider social context among their life. All this supports to attain a more comprehensive picture of the strategic behavior predominant in university-industry interactions.

Another issue emphasizes the fact that, within the scope of university-industry interactions, only researchers were interviewed. Although for three projects both the researcher supervisor and the PhD student responded to the questions, profound triangulation would make it a necessity to include organizational representatives to be interviewed. Future studies can therefore focus on collaborative research projects in which those partners participate that have relevant influence on the research project with their strategic behavior.

The next issue approaches the potential incompleteness of the indicator list which represents a threat caused by confounding factors affecting the strategic behavior. This is particularly true for a fuzzy field like business sciences or social sciences. Future studies can empirically test these indicators as well as they can extend this list in order to see if measures are reliable and valid. Another approach would be to also include collaborative research projects that were cancelled or that are deficient in their expected overall performance and see which indicators matter.

A general issue in this kind of research which focuses on project performance is that respondents are free to participate or not and might not participate if the project's performance is questionable. And in case of participation, respondents can exaggerate in their statements about outcomes and performance of the project, be it for psychological self-serving reasons or due to their constrained or unrealistic view when it comes to the value of the outcomes for the organization. To minimize the impact of self-reporting biases or self-selection biases, the intention of the study can be disguised. This would also include a more subtle interrogation of the interviewees concerning the indicators. However, it has to be mentioned that most of the researchers directly accepted the invitation to the interview and there were no contradicting statements observed. This opposes and minimizes this specific limitation. Triangulation would also serve this purpose.

The last issue emphasizes the time dimension. All responses were gathered at some unique point in time without the chance to repeat the interview at another point in time. Firstly, this limits the ability to assess the performance and therefore validate the responses of the interviewees. Expectations are adapted and the acceptance of partial goal attainment might shift the overall assessment of the project performance. For this reason, longitudinal studies of these mutual research projects between researchers and organizations would contribute

with a clearer picture of both the general development of the partnership and the more accurate and reliable statement about the project performance.

References

Abramo, G., D'Angelo, C. A., Di Costa, F., & Solazzi, M. (2011). The role of information asymmetry in the market for university–industry research collaboration. *The Journal of Technology Transfer, 36*(1), 84-100.

Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative science quarterly, 45*(3), 425-455.

Audretsch, D. B., Bozeman, B., Combs, K. L., Feldman, M., Link, A. N., Siegel, D. S., Stephan, P., Tassey, G., & Wessner, C. (2002). The economics of science and technology. *The Journal of Technology Transfer, 27*(2), 155-203.

Bierly, P. E., & Gallagher, S. (2007). Explaining alliance partner selection: fit, trust and strategic expediency. *Long Range Planning, 40*(2), 134-153.

Bingham, C. B., & Davis, J. P. (2012). Learning sequences: their existence, effect, and evolution. *Academy of Management Journal, 55*(3), 611-641.

Bingham, C. B., Eisenhardt, K. M., & Davis, J. P. (2007). *Opening the black box of organizational expertise: understanding what firms learn from their process experience and how that learning unfolds over time* (pp. 1-58). Working Paper.

Bingham, C. B., Eisenhardt, K. M., & Furr, N. R. (2007). What makes a process a capability? Heuristics, strategy, and effective capture of opportunities. *Strategic Entrepreneurship Journal, 1*(1-2), 27-47.

Bingham, C. B., Furr, N. R., & Eisenhardt, K. M. (2014). The Opportunity Paradox. *MIT Sloan Management Review, 56*(1), 29-35.

Bingham, C. B., & Haleblian, J. J. (2012). How firms learn heuristics: Uncovering missing components of organizational learning. *Strategic Entrepreneurship Journal, 6*(2), 152-177.

Bingham, C. B., Heimeriks, K. H., Schijven, M., & Gates, S. (2015). Concurrent learning: How firms develop multiple dynamic capabilities in parallel. *Strategic Management Journal 36*, 1802-1825.

Blumenthal, D., Campbell, E. G., Causino, N., & Louis, K. S. (1996). Participation of life-science faculty in research relationships with industry. *New England journal of medicine, 335*(23), 1734-1739.

Bozeman, B., Fay, D., & Slade, C. P. (2013). Research collaboration in universities and academic entrepreneurship: the-state-of-the-art. *The Journal of Technology Transfer, 38*(1), 1-67.

Bozeman, B., & Gaughan, M. (2007). Impacts of grants and contracts on academic researchers' interactions with industry. *Research policy, 36*(5), 694-707.

Burt, R. S. & Swedberg, R. (2000). The Network Entrepreneur. In *Entrepreneurship: The social science view*. Oxford: Oxford University Press.

Caloghirou, Y., Kastelli, I., & Tsakanikas, A. (2004). Internal capabilities and external knowledge sources: complements or substitutes for innovative performance?. *Technovation, 24*(1), 29-39.

Carayannis, E. G., & Laget, P. (2004). Transatlantic innovation infrastructure networks: public-private, EU-US R&D partnerships. *R&D Management, 34*(1), 17-31.

Crossick, G. (2009). *So who now believes in the transfer of widgets?*. Paper presented at Knowledge Futures Conference, Warden of Goldsmiths, University of London.

Cummings, J. N., & Kiesler, S. (2005). Collaborative research across disciplinary and organizational boundaries. *Social Studies of Science, 35*(5), 703-722.

D'Este, P., & Patel, P. (2007). University–industry linkages in the UK: What are the factors underlying the variety of interactions with industry?. *Research policy, 36*(9), 1295-1313.

D'este, P., & Perkmann, M. (2011). Why do academics engage with industry? The entrepreneurial university and individual motivations. *The Journal of Technology Transfer, 36*(3), 316-339.

Damanpour, Fariborz (1991), "Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators," *Academy of Management Journal, 34*(3), 555-590.

David, F. R. (2011). Strategic management: Concepts and cases. Upper Saddle River, N.J: Pearson Education

Dietz, J. S., & Bozeman, B. (2005). Academic careers, patents, and productivity: industry experience as scientific and technical human capital. *Research policy, 34*(3), 349-367.

Dooley, D., & Vos, H. J. (2008). *Social research methods*. Harlow: Pearson Custom Publications.

Etzkowitz, H. (2003a). Research groups as 'quasi-firms': the invention of the entrepreneurial university. *Research policy, 32*(1), 109-121.

Etzkowitz, H. (2003b). Innovation in innovation: The triple helix of university-industry-government relations. *Social science information, 42*(3), 293-337.

Fereday, J., Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods, 5*(1), 80-92.

Gerring, J. (2012). *Social science methodology: A unified framework*. Cambridge: Cambridge University Press.

Glaser, B. G. (1963). Attraction, autonomy, and reciprocity in the scientist-supervisor relationship. *Administrative Science Quarterly 8*(3), 379-398.

Golde, C. M. (2005). The role of the department and discipline in doctoral student attrition: Lessons from four departments. *The Journal of Higher Education, 76*(6), 669-700.

Gulati, R. (1998). Alliances and networks. *Strategic Management Journal, 19*(4), 293-317.

Hagedoorn, J., Link, A. N., & Vonortas, N. S. (2000). Research partnerships. *Research Policy, 29*(4), 567-586.

Han, J. K., Kim, N., & Srivastava, R. K. (1998). Market orientation and organizational performance: is innovation a missing link?. *The Journal of marketing, 62*, 30-45.

Haspeslagh, P. C., & Jemison, D. B. (1991). *Managing acquisitions: Creating value through corporate renewal*. New York: Free Press.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., & Winter, S. G. (2009). *Dynamic capabilities: Understanding strategic change in organizations*. John Wiley & Sons.

Helfat, C. E., & Winter, S. G. (2011). Untangling dynamic and operational capabilities: Strategy for the (N) ever-changing world. *Strategic Management Journal, 32*(11), 1243-1250.

Hogg, M. A., & Hains, S. C. (1996). Intergroup relations and group solidarity: Effects of group identification and social beliefs on depersonalized attraction. *Journal of Personality and Social Psychology, 70*(2), 295-309.

Johansson, M., Jacob, M., & Hellström, T. (2005). The strength of strong ties: University spin-offs and the significance of historical relations. *The Journal of Technology Transfer, 30*(3), 271-286.

Kale, P., & Singh, H. (2009). Managing strategic alliances: What do we know now, and where do we go from here?. *Academy of management perspectives, 23*(3), 45-62.

Katz, J. S. (2000). Scale-independent indicators and research evaluation. *Science and Public Policy, 27*(1), 23-36.

Lam, A. (2007). Knowledge networks and careers: Academic scientists in industry–university links*. *Journal of management studies, 44*(6), 993-1016.

Lee, H. F., & Miozzo, M. (2015). How does working on university–industry collaborative projects affect science and engineering doctorates' careers? Evidence from a UK research-based university. *The Journal of Technology Transfer, 40*(2), 293-317.

Linton, J. D., Tierney, R., & Walsh, S. T. (2012). What are research expectations? A comparative study of different academic disciplines. *Serials review, 38*(4), 228-234.

Mahapatra, S. K., Narasimhan, R., & Barbieri, P. (2010). Strategic interdependence, governance effectiveness and supplier performance: A dyadic case study investigation and theory development. *Journal of Operations Management, 28*(6), 537-552.

Mansfield, E. (1995). Academic research underlying industrial innovations: sources, characteristics, and financing. *The review of Economics and Statistics*, 55-65.

Mansfield, E., & Lee, J. Y. (1996). The modern university: contributor to industrial innovation and recipient of industrial R&D support. *Research policy, 25*(7), 1047-1058.

Mansfield, E. (1998). Academic research and industrial innovation: An update of empirical findings. *Research policy, 26*(7), 773-776.

Medcof, J. W. (1997). Why too many alliances end in divorce. *Long Range Planning, 30*(5), 718-732.

Melin, G. (2000). Pragmatism and self-organization: Research collaboration on the individual level. *Research policy, 29*(1), 31-40.

Mora-Valentin, E. M., Montoro-Sanchez, A., & Guerras-Martin, L. A. (2004). Determining factors in the success of R&D cooperative agreements between firms and research organizations. *Research Policy, 33*(1), 17-40.

O'Reilly, C. A., & Tushman, M. L. (2004). The ambidextrous organization. *Harvard business review, 82*(4), 74-83.

Olmos-Peñuela, J., Molas-Gallart, J., & Castro-Martínez, E. (2014). Informal collaborations between social sciences and humanities researchers and non-academic partners. *Science and Public Policy, 41*(4), 493-506.

Perkmann, M., King, Z., & Pavelin, S. (2011). Engaging excellence? Effects of faculty quality on university engagement with industry. *Research Policy, 40*(4), 539-552.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., & Sobrero, M. (2013). Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy, 42*(2), 423-442.

Perkmann, M., & Walsh, K. (2007). University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews, 9*(4), 259-280.

Perkmann, M., & Walsh, K. (2008). Engaging the scholar: Three types of academic consulting and their impact on universities and industry. *Research Policy, 37*(10), 1884-1891.

Schiele, H. (2008). Location, location: the geography of industry clusters. *Journal of Business Strategy, 29*(3), 29-36.

Schreiner, M., Kale, P., & Corsten, D. (2009). What really is alliance management capability and how does it impact alliance outcomes and success?. *Strategic Management Journal, 30*(13), 1395-1419.

Siegel, D. S., Wright, M., & Lockett, A. (2007). The rise of entrepreneurial activity at universities: organizational and societal implications. *Industrial and Corporate Change, 16*(4), 489-504.

Solesvik, M. Z., & Westhead, P. (2010). Partner selection for strategic alliances: case study insights from the maritime industry. *Industrial Management & Data Systems, 110*(6), 841-860.

Trevelyan, R. (2001). The paradox of autonomy: A case of academic research scientists. *Human Relations, 54*(4), 495-525.

Ulaga, W. (2003). Capturing value creation in business relationships: A customer perspective. *Industrial marketing management, 32*(8), 677-693.

Van Looy, B., Ranga, M., Callaert, J., Debackere, K., & Zimmermann, E. (2004). Combining entrepreneurial and scientific performance in academia: towards a compounded and reciprocal Matthew-effect?. *Research Policy, 33*(3), 425-441.

Varma, R. (1999). Professional autonomy vs industrial control?. *Science as Culture, 8*(1), 23-45.

Verhoest, K., Peters, B. G., Bouckaert, G., & Verschuere, B. (2004). The study of organisational autonomy: a conceptual review. *Public administration and development, 24*(2), 101-118.

Whitley, R. (1984). The fragmented state of management studies: reasons and consequences. *Journal of management studies, 21*(3), 331-348.

Wilts, A. (2000). Forms of research organisation and their responsiveness to external goal setting. *Research Policy, 29*(6), 767-781.

Wong, A., Tjosvold, D., & Zhang, P. (2005). Developing relationships in strategic alliances: Commitment to quality and cooperative interdependence. *Industrial Marketing Management, 34*(7), 722-731.

Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of management review, 27*(2), 185-203.

Zalewska-Kurek, K., Egedova, K., Geurts P.A.Th.M., & Roosendaal, H.E. (2015). *Knowledge Transfer Activities of Scientists in Nanotechnology* (pp. 1-18). Working Paper.

Attachments

A.1: interview questions

1. Could you tell me how this project started?
   - 1.1. Who was the initiator of the project?
   - 1.2. What could you tell me about the partner selection process?
     - 1.2.1. Was it a stable well-defined selection process or rather led by informal choice?
     - 1.2.2. Did you know the partner already from other collaborations?
     - 1.2.3. If it had been a stable-well-defined selection process, was the partner your first choice?
   - 1.3. How was agreement on research outcome and process achieved between partners?
     - 1.3.1. What was each partner's influence on research subjects, goals, and directions?
     - 1.3.2. Was there a shared understanding of the project outcome and the process leading to it?
2. What could you tell me about the project contribution of the selected partner?
   - 2.1. Did they provide you with funding?
   - 2.2. How was the access to data or the firm's context?
   - 2.3. Did they provide you with access to other resources, like further contacts?
3. How would you describe your own project contribution?
   - 3.1. Was it focused on knowledge development?
   - 3.2. Were there outcomes for the firm besides organizational learning?
4. What could you say about the project collaboration between partners?
   - 4.1. What could you say about the fit of working styles?
   - 4.2. How would you describe the partner's commitment to the project?
   - 4.3. Have there been (well-)defined responsibilities and codification?
   - 4.4. How was the project's progress measurement arranged?
     - 4.4.1. Was there a regular contact?
     - 4.4.2. Were there physical meetings or other contact means?
     - 4.4.3. How would you describe the appropriateness of the used communication?
   - 4.5. What could you tell me about ambiguities and confusion throughout the project?
     - 4.5.1. If there had been disagreement, how was it handled?
   - 4.6. What could you say about the degree of informality among partners?
5. How would you describe the influence of university policies or firm policies on the project collaboration?
6. What was the role of the PhD in the project?
7. What could you tell me about the confidentiality of the project?
   - 7.1. What does the firm demand from you when it comes to confidentiality?
   - 7.2. Have there been any firm efforts to affect the publication?
8. Are you satisfied with the progress of your project and with the collaboration?
   - 8.1. Could you achieve all objectives until now, also considering the timeliness?
   - 8.2. Could you give examples what could have been improved in the project concerning these points?

A.2: interview finding sheets

Project 1 (PhD student – Interview 1)

Duration: 31:24 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-8, 9-10, 12-16, 33, 76-77	Yes, although fluent initiation	
Low willingness to compromise in terms of research direction and outline	66, 70-71, 358-361	Yes, as the firm has no say and researcher is not funded	
Disagreements which indicate distinct goals and followed strategies among partners	66, 70-71, 192-195, 225		No, not at all
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	12-16, 76-79	The research subject was interesting to the researcher and has practical relevance for the firm	
High willingness to compromise in terms of research direction and outline	66, 70-71, 358-361		Due to own funding, the researcher was independent and the firm has no say

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	48, 56-57, 133-137		Data provision, insights, interviews, no firm funding	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	66, 70-71, 229-230	No influence		
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	176-178 324-332	Low impact; confidentiality more concerns practitioner-oriented output		
The independence of the researcher in conducting the research	156-158, 160-164, 229-230, 358-361		Practitioner-oriented work sometimes intrudes	Generally there was much freedom; funding would have decreased it
The impact of organizational and university policies on the project	142-143, 164-166, 176-178, 254-257	Low for firm and university		
the degree of practitioner-oriented deliverables the researcher offers	58-61, 156-158, 160-164, 273, 277-282		Organizational learning as practitioner-oriented output and exchange; not always related	

Project 1 (Research supervisor – Interview 11)

Duration: 36:50 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-9, 19-23, 35-36	The initiation was by a third party and there was a fit	
Low willingness to compromise in terms of research direction and outline	42-46	No firm funding and therefore free to decide	
Disagreements which indicate distinct goals and followed strategies among partners	42-46, 277-279, 285-291, 320-325, 329-332		There were no disagreements as there was no dependence; only disagreement on working capacity, which was not critical
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	133-134, 188-191, 195	The research and the practical relevance was appealing to the researcher	
High willingness to compromise in terms of research direction and outline	42-46		Due to own funding, the researcher was independent

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	114-115, 119-121		Data provision, insights into firm's context, no funding by firm but public body, for which the firm was important	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	42, 94-99, 245-248, 253-254	There was no influence and the overall project is clearly formalized		
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	413-415, 419-421	No problem with confidentiality		
The independence of the researcher in conducting the research	42-46, 50-53, 64-66, 121-124, 133-143, 163-166, 170-174, 181-182, 188-191, 195		The student's practical preference initiated engagement in more practitioner-oriented subjects	Generally and due to own funding, there was much freedom
The impact of organizational and university policies on the project	337-338, 376, 380, 384-385, 389	Low for firm and university		
the degree of practitioner-oriented deliverables the researcher offers	19-21, 42-46, 61-62, 72-77, 362-370, 420-421		Organizational learning as practitioner-oriented output and exchange, even not demanded	

Project 2 (PhD student – Interview 2)

Duration: 33:52 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-9, 22-23, 27, 32-35		No, the firm was in charge to agree on the collaboration and direction is still not clear
Low willingness to compromise in terms of research direction and outline	32-35, 39, 128-130, 134-136, 210-212, 360-361, 365-368		No, as research direction is still not clear, too vague and decision making process is non-transparent
Disagreements which indicate distinct goals and followed strategies among partners	62-69, 78-81, 144-145, 182-186, 210-215	Yes, there are fundamental contentious points due to lack of agreement	
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	6-9, 22-23, 27		No, the firm was in charge to agree on the collaboration
High willingness to compromise in terms of research direction and outline	22-23, 32-35	Yes, as firm was given free hands on the subject	

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	62-69, 73-74, 78-81, 105-108, 121-122	Not many resources given, firm has no experience with PhD students; firm funding constrains and increases firm expectations		
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	44-48, 62-69			Firm influences heavily
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	373-380			High bureaucracy is assumed to impact publishing
The independence of the researcher in conducting the research	52-58, 62-69, 122-124, 219-225	Practitioner-oriented work contradicts research		
The impact of organizational and university policies on the project	265-268, 272-279, 294-299, 312, 316			The firm and university policies are quite constraining
the degree of practitioner-oriented deliverables the researcher offers	53-58, 122-124, 219-225, 385			It is high; there is no intersection with the research and only commercial

Project 2 (Research supervisor – Interview 12)

Duration: 23:04 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-11, 19, 52-55	Initiation by researcher who was part of the firm; "to some extent pretty well fit"	
Low willingness to compromise in terms of research direction and outline	98-102		Research was not "cast in stone"
Disagreements which indicate distinct goals and followed strategies among partners	98-102, 194-197, 258-260, 273-275	To a certain extent there was a shared understanding; there are ambiguities and minor frictions; no real disagreements	
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	52-57	The researcher should do tasks that are beneficial to the firm and to the research	
High willingness to compromise in terms of research direction and outline	98-102, 111-112, 134-136	High willingness, also where the researcher could be of help was determined by third parties	

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	121-124		Data provision, empirical context, further contacts, firm funding	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	141-146, 165-166, 178-185, 214-216, 226-230, 235-237			3 of 5 days are for firm work, not directly beneficial to the project, firm influences research direction
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	312-320, 333-334	It is not assumed to be problematic to publish		
The independence of the researcher in conducting the research	141-146, 165-166, 214-216, 226-230	The PhD is quite bound to general work and there is limited support from research supervisor		
The impact of organizational and university policies on the project	292-293, 298-301, 305-307	No awareness of policy application to the project; employment contract for PhD is only due to formality		
the degree of practitioner-oriented deliverables the researcher offers	11-15, 52-57, 68-70, 76, 82-86, 141-146			Organizational learning, consulting / advising

Project 3 (Research supervisor – Interview 3)

Duration: 32:59 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-15, 19-20, 24, 28	Yes, the firm initiated the project and is not based on mutual history	
Low willingness to compromise in terms of research direction and outline	6-15, 19-20, 24	The researcher was chosen due to expertise and agreed on it	
Disagreements which indicate distinct goals and followed strategies among partners	33-36, 40-41, 45, 50-51, 189-190, 346-347		No, not at all
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	6-15, 19-20, 24, 252-257	The research subject was interesting to the researcher and has practical relevance for the firm	
High willingness to compromise in terms of research direction and outline	6-15, 19-20, 24, 290-292		No, as there was no need and the research project was also consulting

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	111, 113, 117, 126, 201, 284-285			Data provision, insights, further contacts for interviews, firm funding
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	56-57	No influence and executed as mutually agreed on		
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	363, 370, 385-387	Low impact; confidentiality more concerns firm data which is anonymized		
The independence of the researcher in conducting the research	10-13, 56-57, 252-257, 290-292			There was much freedom, as it was consulting for the firm
The impact of organizational and university policies on the project	299-308, 312-314, 316, 318-324		Low for firm; high for university	
the degree of practitioner-oriented deliverables the researcher offers	178-181, 252-257, 290			The research itself was already practitioner-oriented

Project 3 (PhD student – Interview 10)

Duration: 62:21 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-10, 74-81, 112-115	The firm initiated the project and there was a mutual interest and shared understanding	
Low willingness to compromise in terms of research direction and outline	8-9, 74-81, 112-115	The researcher was chosen due to expertise and there was a mutual interest and agreement	
Disagreements which indicate distinct goals and followed strategies among partners	276-286, 473-476, 480-483, 488-492		Good planning, good communication but also research outcome prevents disagreements from occurring
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	8-9, 37-40, 74-81	The research subject was interesting to the researcher and has practical relevance for the firm	
High willingness to compromise in terms of research direction and outline	8-9, 74-81, 112-115		There was mutual interest and the research project was also consulting

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	9-13, 17, 146-153, 162-166, 207-208			Data provision, insights, internal information, further contacts, office, firm funding
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	112-115, 186-187, 269-272, 349-353, 360-363, 372-379, 414-416, 420-431	There was trust, a shared understanding and the firm saw value in it		
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	174-175, 179, 725-726, 759-770, 775-790	Low impact; confidentiality more concerns firm data		
The independence of the researcher in conducting the research	74-81, 112-115, 372-379, 406-407, 414-416, 420-431			The mutual, practical value, and object of exchange ensured high independency
The impact of organizational and university policies on the project	48-49, 51-65, 214-218, 447-453, 566-575		Low for firm, high for university	
the degree of practitioner-oriented deliverables the researcher offers	11-12, 13, 112-115, 131-135, 139-141, 249, 488-492, 515-517, 524-531, 556-561			The research itself was already practitioner-oriented and the outcome was clear; consulting and workshops

Project 4 (Research supervisor – Interview 4)
Duration: 34:51 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	1-14, 23-31, 37-38, 202-203	Yes, and there was also a mutual history	
Low willingness to compromise in terms of research direction and outline	28-31, 37-38, 101-102, 110-111, 198-208		No, it was firstly a rough generic idea and there was mutual interest
Disagreements which indicate distinct goals and followed strategies among partners	110-111, 138-140, 144-148, 186-190		Not really, as it was organic (accepting ambiguity) and there were only minor issues
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	1-14, 23-31	The researcher had a research idea and the firm was interested in practical outcome and insights	
High willingness to compromise in terms of research direction and outline	28-31, 37-38, 101-102, 110-111, 198-208	Yes, as it was not "set in stone" and there was mutual interest	

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	16-18, 43-48, 79-80, 217-219			Data provision, research context, further contacts, firm funding for tool development
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	23-31, 44-48, 198, 212, 236	The influence was more based on support		
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	261, 265-266, 352-356	There was no confidentiality agreed on, but research ethics are ensured		
The independence of the researcher in conducting the research	85-88, 93-96, 169, 212, 236			There was much freedom and power to direct
The impact of organizational and university policies on the project	288-290, 330-339	As it was a Master's project, no significant impact from university or firm		
the degree of practitioner-oriented deliverables the researcher offers	44-48, 198-208			The research itself was very practitioner-oriented

Project 5 (PhD student – Interview 5)
Duration: 41:58 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-13, 19-22	Yes, the firm and the university have a strategic partnership; firm had clear expectations	
Low willingness to compromise in terms of research direction and outline	19-25		The firm already established direction
Disagreements which indicate distinct goals and followed strategies among partners	131-139, 143-145, 149, 193-196	Stakeholder and expectation management issues in firm	
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	19-20, 35-37, 280-281	Personal interest in project and practitioner-oriented outcomes is seen as normal and firm ensures credibility	
High willingness to compromise in terms of research direction and outline	36-37	Research for organizations involves practical implications	

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	34-35		Data provision, firm funding, freedom in research next to operational tasks	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	23-25, 41, 44-46, 131-139, 143-145, 205		Established research questions and medium influence on research outline	
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	297-302, 307			Strict confidentiality and firm can delay publication
The independence of the researcher in conducting the research	41, 44-46, 76-78, 118-120, 205		Firm tried to steer a bit but also offers freedom and support	
The impact of organizational and university policies on the project	227-233			There was a high influence by both policies
the degree of practitioner-oriented deliverables the researcher offers	36-37, 97-100, 107, 255, 280-282			Practical implications are part of the research; side projects and consulting

Project 6 (PhD student – Interview 6)
Duration: 70:23 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	23-28, 36-39	The organization contacted the research supervisor because of a problem they could not solve	
Low willingness to compromise in terms of research direction and outline	26-28, 37-39		The researcher was chosen due to expertise and agreed on it
Disagreements which indicate distinct goals and followed strategies among partners	44-46, 104-106, 388-391		Balancing of both sides and a shared understanding
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	15-17, 540-544	The researcher would like to solve this problem and for this being practitioner-oriented	
High willingness to compromise in terms of research direction and outline	15-17, 44-52, 558-560, 566-570, 578-579	Research has to be practical with roots in academia; there was a good fit	

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	162, 167	Data via direct employee feedback, organizational context, organizational funding		
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	81-85, 349-351, 376-378		Proactive researcher bought himself time with practitioner-oriented output; organization keeps him close and co-steers	
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	473-477; 482-492	There is no confidentiality issue; contextualization ensures confidentiality		
The independence of the researcher in conducting the research	104-107, 298-299, 339-342, 518-526		The researcher got freedom and time to do research but was heavily engaged in the organization, which was beneficial for his project	
The impact of organizational and university policies on the project	*Interview ended before this could be asked*			
the degree of practitioner-oriented deliverables the researcher offers	11-12, 51-52, 59-64, 74-81, 308-310, 382-385, 420-439			The researcher is convinced that practitioner-orientation is crucial; consulting and being the service designer

Project 7 (Research supervisor – Interview 7)

Duration: 56:44 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	44, 48-52, 58-62, 75-77, 156-158	Knowing partners before and being confident that project will succeed, there has to be always a fit, even for contract research	
Low willingness to compromise in terms of research direction and outline	44-49, 61-62		Opportunities emerge and either trigger or not; generally open-minded
Disagreements which indicate distinct goals and followed strategies among partners	329-332		It is hard for the organization to criticize
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	75-77, 90-91, 107-109, 156-158, 167-173	There has to be a real interest and an opportunity	
High willingness to compromise in terms of research direction and outline	44-49, 61-62	Interpersonal contact and triggering of an opportunity is very important	

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	205-206, 266-274		Data provision, further contacts, partial funding by organization	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	245-258, 295-300, 310-315, 319-320, 326-332		The organization deployed a supervisor exercising certain influence	
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	126-128, 139-140, 144-151	PhD research paper has to be publishable		
The independence of the researcher in conducting the research	32-34, 237-241, 295-300, 310-315, 319-320, 326-332, 337-345		Researcher accepts roles and tries to safeguard independency	
The impact of organizational and university policies on the project	*Interview ended before this could be asked*			
the degree of practitioner-oriented deliverables the researcher offers	27-32, 90-91, 102-109, 258-262			There is a high degree of practitioner-oriented deliverables

Project 8 (Research supervisor – Interview 8)

Duration: 33:06 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	21-28, 50-60, 64, 68	Partner knew each other before and there was a mutual interest	
Low willingness to compromise in terms of research direction and outline	268-273, 392-396, 407-409, 411-413, 436-441	Yes, although mutual interest was necessary	
Disagreements which indicate distinct goals and followed strategies among partners	250-255, 260-261, 293-299		Lower formalization in the beginning and general consent
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	151-166		No, there was no interest in practitioner-oriented deliverables
High willingness to compromise in terms of research direction and outline	268-273, 392-396, 407-409, 411-413, 436-441		No, although mutual interest was necessary

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	13-15, 72, 77-78, 82-85, 93-99, 104-109		Data provision, contacts, firm funding	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	40-43, 268-277, 281-288, 401, 407-409, 411-413, 436-441	There was mutual interest and consent		
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	15-16, 354-362, 401	Approval before starting; discussions only about description, not content		
The independence of the researcher in conducting the research	124-134, 268-277, 281-288			The PhD was not employed (relief) and conduct was the researcher's responsibility
The impact of organizational and university policies on the project	*Interview ended before this could be asked*			
the degree of practitioner-oriented deliverables the researcher offers	40-43, 113-119, 151-166, 313-330	Focus on research (for organizational learning); no implementation		

Project 9 (Research supervisor – Interview 9)

Duration: 48:31 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	20-22, 32-42, 46-47, 156-157	Initiation by third party both partners had in common; mutual agreement based on research proposal	
Low willingness to compromise in terms of research direction and outline	95-97, 112-117,	It fits the researcher and it was quite open and up to the researcher	
Disagreements which indicate distinct goals and followed strategies among partners	112-117, 123-127		The researcher has free hands
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	95-97, 292-293	The research subject was interesting to the researcher and has practical relevance for the firm	
High willingness to compromise in terms of research direction and outline	95-97, 112-117, 337-347		It fits the researcher and the researcher stays open-minded, but still steers

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	7, 136-137, 427		Data provision, further contacts, organizational funding	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	112-117, 123-127, 131-132, 188, 192, 196-204, 216-218, 275	Due to limited expertise, they trust the researchers; even defended them		
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	488-490, 495-498	No confidentiality issues are expected		
The independence of the researcher in conducting the research	112-117, 123-127, 131-132, 216-218, 275, 302-305			The researcher was independent
The impact of organizational and university policies on the project	170, 323-330, 457, 462-471, 475-478		Organization was bureaucratic and hierarchical; university adversely affects PhD deployment	
the degree of practitioner-oriented deliverables the researcher offers	66-72, 292-293, 106-108, 438-443, 447-453, 503-515			Organizational learning and problem-solving deliverables, like guideline advice or tool

Project 10 (Research supervisor – Interview 13)

Duration: 65:00 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	22-26, 30-47, 61-62, 66-69, 73-78, 137-138, 142-147	Public announcement initiated the research idea generation and it was approved, organizations have clear responsibilities	
Low willingness to compromise in terms of research direction and outline	84-86, 160-182, 190, 195-197	The project is planned and roles are allocated by the researchers	
Disagreements which indicate distinct goals and followed strategies among partners	84-86, 124, 355-367, 377-381, 385-387, 433-441		The research and work packages were predetermined and there was shared understanding; minor conflict/confusion due to lack of practical relevance
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	176-179, 190, 195-197		It was clear that knowledge is the primary deliverable
High willingness to compromise in terms of research direction and outline	84-86, 160-182, 190, 195-197		The project is planned and roles are allocated by the researchers

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	68-69, 77-78, 96-98, 160-182, 212-216		Working hours, further contacts, organizational funding → depending on type of partner	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	106-119, 160-182, 280-283, 303-306, 313-316, 323-325, 355-367, 377-381, 392, 433-441, 505-508, 521-525		One organization determined other organizations that should be on board; almost no influence on execution; businesses are sometimes busy with their affairs	
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	453-459, 464-471, 475-477, 481-482	It's public knowledge and there should be no abuse of partners' knowledge		
The independence of the researcher in conducting the research	84-86, 212-216, 232-236, 242-249, 355-367, 377-381, 392, 505-508, 521-525			Organizational contribution was predetermined and researchers work independently, sometimes with adverse output
The impact of organizational and university policies on the project	420-433		Struggle in the beginning with consortium agreement	
the degree of practitioner-oriented deliverables the researcher offers	84-86, 176-179, 190, 195-197, 288-289, 293, 505-508	The overall focus is on knowledge generation	Research for organizational learning with practical relevance	

Project 11 (Research supervisor – Interview 14)

Duration: 44:23 minutes

Strategic-planned behavior *(Code 1)*	Ref.	present	non-present
Reason to choose the partner was a good fit with the own research program	6-21	Initiation by familiar consultant and clarification in organic way and engagement with organizations at forum	
Low willingness to compromise in terms of research direction and outline	58-65	The research direction was what the researcher proposed, research questions came from firm	
Disagreements which indicate distinct goals and followed strategies among partners	250, 254-261, 265-269, 285-287, 341, 345-346		Regular meetings & constructive discussions, no ambiguities
Opportunity-driven behavior *(Code 2)*	Ref.	present	non-present
Reason to choose the partner was not only a fit with the own expertise but also personal interest in more practitioner-oriented project deliverables	97-102, 174-175	Practical relevance is important and practitioner-oriented deliverables are provided through Bachelor / Master projects	
High willingness to compromise in terms of research direction and outline	58-66, 87-93		The research direction was what the researcher proposed, Bachelor / Master students apply research

Strategic interdependence *(Code 3)*	Ref.	low	medium	high
The more access to resources, assets, and capabilities (e.g. internal data access, organizational funding, access to organizational facilities, access to contacts and social networks), which are of strategic importance for the researcher's goal attainment and which are out of reach if not engaging with the partner, the higher the need for strategic interdependence	14-16, 21-23, 35-53, 160-161, 165-170, 174-175, 180-189		Indication of practical relevance, data, organizational know how, further contacts, partial funding	
Organizational autonomy *(Code 4)*	Ref.	low	medium	high
The actual influence of the organization on the research direction and outline	273-287, 504-507		The influence is limited on skeptical assessment of feasibility but still constructive	
Confidentiality clauses and other influence on an intended publication, the frequency and content of progress meetings for the project	445, 449-445, 460-468	No problem with confidentiality		
The independence of the researcher in conducting the research	133-136, 141-142, 150-155, 478-483, 488			The researcher works with different organizations and was independent
The impact of organizational and university policies on the project	423-429, 433-439	Low impact as research emphasizes mathematical modeling and no intellectual property; good experience of project manager		
the degree of practitioner-oriented deliverables the researcher offers	87-93, 97-102, 141-144, 211-231, 235-238, 371-380, 384		Practitioner-oriented deliverables through Bachelor / Master students who apply theory / consult and are supervised by the researcher; also organizational learning	