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Inter-firm cooperation: Empirical analyses of how to set up and maintain successful R&D outsourcing relationships

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List of acronyms

AVE	Average variance extracted
β	Path coefficient
ed.	Editor
edn.	Edition
eds.	Editors
e.g.	For example (exempli gratia)
et al.	And others (et alii)
etc.	And so forth (et cetera)
H	Hypothesis
HR	Human Resources
i.e.	That is (id est)
n.s.	Not significant
p.	Page
PAT	Principal-agent theory
PLS	Partial least squares
Q^2	Redundancy
R&D	Research and development
R^2	Coefficient of determination
SEM	Structural equation modeling
TCT	Transaction cost theory
VIF	Variance inflation factors
vs.	Versus
w/	With
w/o	Without

1. Introduction

Driven by globalization processes, the business environment of the 21st century has turned into a highly complex and constantly changing landscape. Intensified competition, increased cost-pressure, and rapid technological change are the challenges today's companies have to face. In order to survive in such an increasing global market-place, firms are required to respond effectively to these challenges (Jones/George 2003; Narula/Duysters 2004; Segal-Horn/Faulkner 1999). In their quest to always be one step ahead of their competitors, many firms have realized that they lack either the capacities or competences necessary to do so by themselves. As a result, organizations have shown a growing propensity to team up with other firms, turning cooperative arrangements into a popular means of conducting business (Das 2006; Das/Rahman 2010; Kale/Singh 2009).

It is a fallacy to believe that inter-firm partnerships primarily take place at the final stages of the value chain, where companies jointly produce or market final products. The changing nature of competition has forced organizations to ally in various activities across all value-added steps, even involving crucial areas, such as research and development (R&D) (Hagedoorn 2002; Quinn/Hilmer 1994). In order to cope with the continuing pressure of rapidly developing and commercializing innovations, organizations have turned more and more to external sources of knowledge (Arora et al. 2001; Chatterji 1996; Grimpe/Kaiser 2010; Quinn 2000) by integrating R&D supplier firms into the innovation process. The prevailing need to pursue innovation through external R&D activities is met by a market of specific technical and scientific services that is constantly growing in width and depth (Chiesa et al. 2004).

Despite its increasing prevalence (Arora/Gambardella 2010; Calantone/Stanko 2007; Grimpe/Kaiser 2010; Huang et al. 2009), the outsourcing of R&D activities must, however, be considered a double-edged sword. On the one hand, leveraging the advantages of specialization by using the "market" for the generation of valuable knowledge inputs enables firms to keep pace with the consequences of operating in a fast-moving business environment. On the other hand, engaging external providers to perform certain R&D activities opens doors to another unknown: the R&D supplier firm's behavior.

While idealists may believe in the "happily-ever-after" of outsourcing partnerships, realists should always consider that supplier firms are driven by their own motives and agendas and are thus prone to opportunism (e.g., Gooroochurn/Hanley 2007; Kloyer 2011; Kloyer/Scholderer 2012; Sampson 2007). Having its roots in transaction cost theory (TCT), opportunism describes: "... a lack of candor or honesty in transactions, to include self-interest

seeking with guile” (Williamson 1975, p. 26). Based on its definition, opportunism goes further than just pursuing own goals. Opportunism embraces the entire spectrum of behavior, such as lying, stealing, cheating, and other forms of deceit (Williamson 1985), in order to enforce own interests, regardless of the consequences such behavior may have for the partner firm.

Due to its devious nature, opportunism is a major threat to inter-firm collaboration in general (e.g., Caniëls/Gelderman 2010; Das/Rahman 2010; Gassenheimer et al. 1996; Parkhe 1993). It must, however, be considered especially hazardous to partnerships that involve R&D activities as knowledge assets drive firms’ competitive advantage (Fey/Birkinshaw 2005; O’Regan et al. 2008). An opportunistic R&D supplier could not only hold back parts of the generated knowledge but could use it for own competitive activities or sell it to third parties (Kloyer/Scholderer 2012). For the outsourcing firm, any of the scenarios would be disastrous, to say the least. Against this background, it is not surprising that the opportunism phenomenon has equally attracted the attention of research and practice. While managers are primarily interested in how to prevent or effectively restrain unethical behavior in exchange relationships, the research interest in opportunism is threefold. After, first, determining the factors that cause such unethical partner behavior (e.g., Katsikeas et al. 2009; Morgan et al. 2007; Ting et al. 2007; Yaqub 2009), research seeks, second, to identify effective mechanisms to safeguard against opportunism (e.g., Brown et al. 2000; Cavusgil et al. 2004; Helm/Kloyer 2004; Jap/Anderson 2003; Yaqub 2009) and finally, third, examines the consequences of partner misbehavior for the success of the exchange relationship (e.g., Luo et al. 2009; Morgan et al. 2007; Parkhe 1993; Ting et al. 2007).

While prior work has certainly provided relevant insights, the opportunism phenomenon has not yet been captured in its entirety (Das/Rahman 2010; Hawkins et al. 2008). Through three research papers, this dissertation treats and contributes to each of the three aforementioned areas of opportunism research and aims at answering the overarching research question of what is needed to set up and maintain successful R&D outsourcing relationships.

Paper 1, the first pillar of this dissertation, is dedicated to identifying the factors that provoke supplier opportunism and thus contributes to the first area of opportunism research. Gaining knowledge about the opportunism drivers is crucial for the anticipation of unethical partner behavior. Despite the large body of empirical evidence, there is still wide disagreement on the role some factors play in driving partner opportunism (e.g., partner dependence; Hawkins et al. 2009). Furthermore, some variables have received either comparably limited empirical

attention (e.g., information asymmetries; Steinle et al. 2014) or have been completely overlooked in the past (e.g., internal uncertainty). Paper 1 addresses these issues. By combining transaction cost- and principal-agent theory (PAT), it is, to the best of the author's knowledge, the first study that simultaneously considers the whole range of opportunism drivers in an R&D supply context.

As the second pillar of this dissertation, Paper 2 seeks to examine the mechanisms that are effective in deterring opportunism and spurring supplier knowledge sharing, thus contributing to the second area of opportunism research. Even though the economic literature presents numerous measures to deter partner misbehavior (e.g., Brown et al. 2000; Helm/Kloyer 2004; Vázquez et al. 2007), there is no consensus on their effectiveness (e.g., Achrol/Gundlach 1999; Caniëls/Gelderman 2010). Furthermore, and most importantly, prior work has mainly focused on hard mechanisms, while little is known about the role soft, human-related measures play in curbing partner opportunism (Kloyer 2011, Kloyer/Scholderer 2012). By placing a special focus on the "human element" in exchange relationships, Paper 2 addresses the shortcomings of prior empirical studies. Besides considering several hard factors, Paper 2 takes into account soft factors such as supplier trust, intrinsic motivation, and organizational culture and examines their influence on supplier knowledge sharing.

Also covering the second area of opportunism research, the third and last pillar of this dissertation, Paper 3, takes up a determinant of opportunism discussed in Paper 2: the R&D supplier's trust in the buyer firm. Trust has widely been recognized in the academic literature as being crucial for designing effective exchange relationships. However, opinions diverge on whether trust is non-calculative and trustee-specific or calculative and transaction-specific in nature (e.g., Dietz/Den Hartog 2006; Noteboom 2002). Paper 3 combines these views and examines trust in R&D supply relations as the consequence of both calculative and non-calculative reasons. Besides exploring several sources of supplier trust, Paper 3 examines whether trust can provide fertile soil for the supplier's intrinsic motivation to flourish. Intrinsic motivation is assumed to be crucial for knowledge sharing (Ko et al. 2005; Lin 2007) and considered to evolve more easily in a positive and friendly atmosphere (Frey/Bohnet 1995; Ryan/Deci 2000b). As this issue has somehow managed to remain under the radar of researchers, Paper 3 taps novel ground by investigating the influence trust has on intrinsic motivation.

The third area of opportunism research, which deals with the consequences of partner misbehavior, is covered in both Papers 1 and 2. While much effort has been put into determining

the effects unethical partner behavior has for either the party affected by opportunism (e.g., Morgan et al. 2007; White/Lui 2005) or the cooperation as a whole (e.g., Luo et al. 2009; Parkhe 1993), there is no study to date that explores the consequences opportunism may have for the success of the alleged opportunist, the R&D supplier firm. This dissertation contributes to narrowing this gap by examining the influence of supplier opportunism (Paper 1) and supplier knowledge sharing (Paper 2) on the supplier firm's success.

The rest of this dissertation will proceed as follows. Chapter 2 expands on this introduction, delving somewhat deeper into the nature of inter-firm cooperation. After providing some depth and clarity on definitions and categorization attempts in Section 2.1, the reader is then introduced to the phenomenon of R&D outsourcing, which represents the object of observation in this dissertation. A brief outline of the term "research and development" in Section 2.2.1 is followed by a presentation of the concept of R&D outsourcing in Section 2.2.2 and an examination of its advantages and drawbacks in the subsequent two sections. Chapter 3 takes up the most critical drawback of R&D outsourcing and thus focuses on making the reader familiar with the opportunism phenomenon. After a brief introduction on the types and definitions of opportunism in Section 3.1, Section 3.2 sheds light on the central areas of opportunism research and the existing research gaps. It concludes with a short outline of the three research papers that form the Chapters 4, 5 and 6 of this dissertation. Finally, Chapter 7 summarizes the main findings of each paper, highlights the research contributions and the managerial implications of this dissertation, and concludes with the limitations and avenues for further research.

2. Inter-firm-cooperation: The case of R&D outsourcing

2.1 Definition and classification of inter-firm cooperation

The prominence of the cooperation phenomenon in business practice has attracted research interests and, thus, led to a huge amount of literature on this topic. Even though prior research may have certainly illuminated the cooperation phenomenon and its variety of manifestations, the multitude of definition- and systematization attempts has created some confusion as well (Peters 2012). To date, for example, there is no commonly agreed definition of the term "cooperation" (Nooteboom 1999). This is due to the fact that the cooperation phenomenon is used in various disciplines, thus leading to conceptual differences in its meaning. However, even within the economic domain, finding a clear-cut definition is difficult. This situation is aggravated by the fact that the term "cooperation" is not commonly used in English language

(Etter 2003). Instead, similar notions such as “collaboration,” “alliance,” or “strategic alliance” are applied to refer to the very same phenomenon (see Table 1).

Table 1. Overview of selected definitions of the cooperation phenomenon

Author(s)	Notion	Definition
Contractor/Lorange (2002: 486)	Alliance	“... is defined here as any interfirm cooperation that falls between the extremes of discrete, short-term contracts and the complete merger of two or more organizations.”
Das/Teng (2000a: 33)	Strategic alliances	“... are voluntary cooperative inter-firm agreements aimed at achieving competitive advantage for the partners.”
Gulati/Singh (1998: 781)	Alliance	“... is commonly defined as any voluntarily initiated cooperative agreement between firms that involves exchange, sharing, or co-development, and it can include contributions by partners of capital, technology, or firm-specific assets.”
Inkpen (1998: 69)	Alliances	“... are generally formed for the joint accomplishment of individual firm goals linked to the strategic mission of each partner firm. Strategic alliances can have a variety of organizational arrangements, such as joint ventures (JVs), licensing agreements, distribution and supply agreements, research and development partnerships, and technical exchanges.”
Morris/Hergert (1987: 16)	Collaborative agreement	is “... defined as a linkage between companies to jointly pursue a common goal.”
Parkhe (1993: 794)	Strategic alliances	“... are voluntary interfirm cooperative agreements, often characterized by inherent instability arising from uncertainty regarding a partner’s future behaviour and the absence of a higher authority to ensure compliance.”
Schermerhorn (1975: 847)	Cooperation	is “...the presence of deliberate relations between otherwise autonomous organizations for the joint accomplishment of individual operating goals.”

Against this background, it is advisable to first cast a glance at the etymological roots of the term “cooperation.” According to the Oxford Learner’s Dictionaries (2016), the term “cooperation” is derived from the Latin verb “cooperari,” with “co” meaning “together” and “operari” meaning “to work,” describing “*the fact of doing something together or of working together towards a shared aim.*” When taking a closer look at the definitions presented in Table 1, it becomes obvious that despite their different facets, every definition transports the core message of “*doing something together.*” Combining this core message with additional aspects of the above-mentioned definitions allows the derivation of a working definition that serves as the foundation for the remainder of this dissertation.

According to this working definition, an inter-firm cooperation shall be understood as a voluntarily initiated agreement between two or more separate organizations aimed at achieving

competitive advantage for the partners by joint execution of certain tasks or functions with the entities remaining legally independent.

While the heterogeneity and complexity of different manifestations of inter-firm arrangements can certainly not be captured in their entirety, there are several criteria used for characterizing inter-firm alliances (see Table 2). Their application allows a further specification of the type of inter-firm arrangement considered in this dissertation.

Table 2. Overview of the characteristics of inter-firm arrangements

Dimensions	Characteristics			
Intensity	Informal agreements		Contractual Agreements	
			w/o equity	w/ equity
Direction	Horizontal	Vertical		Diagonal
Functional area	Procurement	R&D	Production	Marketing
Type of bonding	Bi-lateral	Tri-lateral	Simple network	Complex network
Relation of partners	Equal		Subordinative	
Duration	Temporal		Enduring	
	Short-term	Middle-term		Long-term

While all cooperative arrangements fall between “markets” and “hierarchies” (Williamson 1991), they differ in their intensity of cooperation. The intensity of cooperation reflects the extent and type of statutory specifications of an inter-firm collaboration. Inter-firm arrangements can be grounded on rather informal agreements based on a handshake or declarations of intent, or they can be more formal in nature, backed up by a broad range of contractual agreements (Hennart 1988) and/or (cross) equity participations of the partnering firms (Baur 1975; Peters 2012; Rupperecht-Däullary 1994).

Different forms of inter-firm arrangements can, furthermore, be classified according to the direction of cooperation (Baur 1975; Rupperecht-Däullary 1994). Horizontal partnerships are alliances between firms in the same position in the value chain that step forward simultaneously as competitors and cooperation partners (Baur 1975; Peters 2012; Rupperecht-Däullary 1994). Vertical alliances, in contrast, represent partnerships between firms that operate within the same industry but occupy successive positions in the value chain (Baur 1975; Peters 2012; Rupperecht-Däullary 1994). If the collaborating firms neither reside in the same industry nor can be assigned to the same value chain, the collaboration is called a diagonal alliance (Baur 1975; Peters 2012; Rupperecht-Däullary 1994).

The partnering firms do not necessarily cooperate throughout the entire sphere of the value chain but rather only in selective areas (Doz/Hamel 1998): areas they have either significant

shortcomings in or that allow a more efficient outcome when teaming up with external partners. Those areas can include, amongst others, procurement, R&D, production, or marketing (Abel 1992; Rupprecht-Däullary 1994).

The number of partners in an inter-firm cooperation can vary depending on the availability of appropriate firms to team up with and the cooperation's primary purpose (Engels 2007). Apart from bilateral (dyadic) relationships, inter-firm arrangements can involve multiple actors being variously connected with each other, e.g., networks (Kutschker 1994). The firms' relationship can be characterized by either equality or by one or more partners being subordinated to the other partner(s) of the inter-firm arrangement (Pausenberger 1989).

As a last classification criterion, the duration of inter-firm partnerships has to be mentioned. Cooperative relationships can be either limited or unlimited in time (Abel 1992; Baur 1975; Eisele 1995). Temporal arrangements are partnerships that are dissolved once the objectives that formed the foundation for cooperation have been achieved (Baur 1975). Depending on the time interval, inter-firm arrangements can be classified as being short-, medium- or long-term oriented. While project collaborations or license agreements are rather temporal in nature, equity joint ventures are usually long-term-oriented forms of cooperation (Peters 2012).

Although all forms and types of inter-firm arrangements certainly represent exciting research objects, the focus of this dissertation has to be narrowed down to one specific type: the outsourcing of R&D activities. Following the characterization criteria presented in Table 2, it can be described as a vertical cooperation between two parties involving the knowledge-intensive area of R&D. Instead of being equal partners, the collaborating firms maintain a typical principal-agent-relationship, with the R&D buyer being the principal and the supplier being the agent. The "horizon" of their relationship is limited to one or a series of projects. With some exceptions that may also involve equity links between buyer and supplier firm, R&D outsourcing relationships are usually based on contractual agreements. According to German law, the R&D contract can either be a work contract ("Werkvertrag", §§631ff BGB) or a service contract ("Dienstvertrag", §§611ff BGB), depending on whether the supplier firm owes a specific R&D outcome to the buyer (typical for development activities) or just its efforts with no guarantee of success (typical for research activities).

In order to provide the reader with a better understanding of the phenomenon of R&D outsourcing, which is dealt with in detail in Section 2.2.2, the reader is first introduced to the area of "research and development" (R&D) in Section 2.2.1.

2.2 The outsourcing of R&D

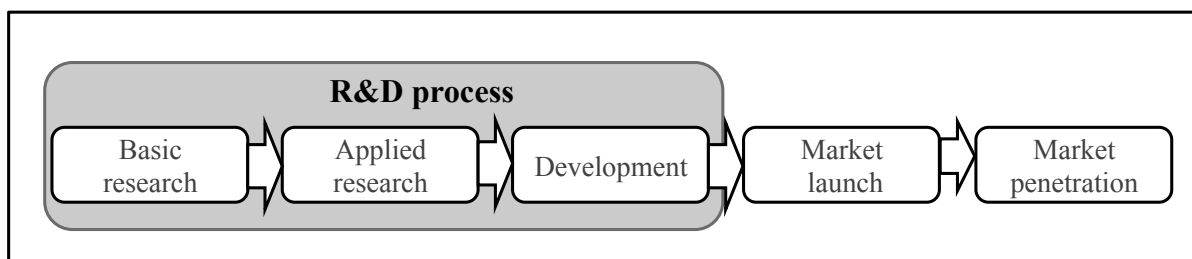
2.2.1 Definition of research and development (R&D)

Research and development plays a crucial role in the innovation process since the manufacturing of new products and services relies on the creation and application of new knowledge (Madhavan/Grover 1998). As a critical component of innovation and the development of new technologies, R&D provides the basis for a firm's competitive advantage and, thus, heavily contributes to a firm's overall performance and growth (Akhilesch 2014). While there is, to date, no unique definition of the term "R&D," researchers usually turn to the OECD's (2015, p. 30) definition presented in the Frascati Manual, which enjoys broad international acceptance:

"Research and development comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications."

As the definition implies, research activities comprise the extension of the knowledge base, whereas development describes the translation of that knowledge into new applications. Further classified along a spectrum that highlights the cause-effect and time relationships (Roussel et al. 1991), R&D can, more precisely, be split up into three interdependent activities: basic research, applied research, and development (OECD 2015, Wetter 2011). Figure 1 depicts these closely interlinked activities that constitute the R&D process and thus assume a central position in the innovation process¹.

Figure 1. The R&D process as a part of the innovation process following Gerpott (2005: 50)



Highly theoretical in nature, *basic research* has the primary aim of systematically extending scientific knowledge, usually without being directed towards any specific practical aim or

¹ For reasons of illustration and simplification, the innovation process is depicted as a linear model. In practice, the innovation process often follows non-linear patterns involving spiral and overlapping stages (e.g., Hauser et al. 2006; Koen et al. 2002; Roy/Cross 1983). Moreover, the impetus for innovation can emerge from sources other than the R&D department, just as ideas and improvements can occur at any stage of the innovation process (see, e.g., Roy/Cross 1983). However, the simplicity and the structured nature of linear models has led to them still being widely applied in research and practice (Godin 2006).

application (OECD 2015; Wetter 2011). Many basic research projects do not lead to the desired outcome as they either produce inconclusive findings or only marginally enhance the existing knowledge base (Hartmann 2004; Wetter 2011). Given its high risks and costs and the generally low chances of commercial application, basic research is usually not funded privately but by governments, universities, or non-profit organizations (Bund 2000; Hartmann 2004; Specht/Beckmann 1996; Wetter 2011). However, the results of basic research are usually made accessible to the public through publication in academic journals (OECD 2015; Schweitzer 2007).

Like basic research, *applied research* is undertaken in order to generate new or refined scientific or technical knowledge. However, in building the link between science and practice (Wetter 2011), applied research is typically aimed at solving some general or particular practical problem (Hartmann 2004; OECD 2015). Unlike the results of basic research, those of applied research are of direct value to the research organization as they can usually be applied to commercial ends. Hence, private organizations are more than willing to conduct applied research but normally keep their research findings strictly under lock and key (Schweitzer 2007). While the distinction between basic and applied research is a meaningful one, both types of research should, however, be viewed as mutually interdependent. This is simply due to the fact that applied research often draws on earlier basic research results and that basic research results, if not applied to a practical problem, would vanish into oblivion without having any impact other than satisfying humanity's curiosity (Nickerson 1999).

Development, or more precisely experimental development, describes the activity of systematically applying new knowledge derived from research and/or practical experience in order to produce improved or totally new materials, devices or products, and systems or methods, and improve prototypes and processes to meet desired requirements (Hartmann 2004; OECD 2015; Wetter 2011). Whereas basic research is often conducted by the public sector, most of the development is undertaken by the private sector (Bund 2000; Düttmann 1989), which is certainly due to development activities having greater market proximity and, thus, increased chances of economic exploitation.

Table 3 summarizes the central characteristics of the three R&D activities that were described in detail above.

Table 3. Main characteristics of the three R&D categories

Characteristics	Basic research	Applied research	Development
Primary aim	extend scientific knowledge	extend knowledge to solve practical problem	use knowledge to devise new applications
Commercial focus	none/very low	medium/high	high
Time horizon	long-term	medium-term	short-term
Degree of uncertainty	high	medium/high	comparably low
Funded (primarily) by	public sector	private sector	private sector

Intense competition and the accelerated pace of technological change have led to new products, services, and processes only having a short economic half-life (Piachaud 2002; Veugelers/Cassiman 1999). This circumstance forces firms to innovate, develop, reap the returns, and start all over again within ever-shortening time intervals (Huang et al. 2009). In order to meet the challenges associated with competing in a highly volatile business environment, it is likely that, at least from time to time, firms tap into external sources of knowledge (Grimpe/Kaiser 2010). Due to its role as a core “high-value function” of a firm (Grimpe/Kaiser 2010; Leiblein et al. 2002), R&D is probably one of the last areas one would think of being subject to outsourcing. However, the “market for technology” is constantly growing, both in size and importance. More and more firms offer R&D services, and an increasing number of companies make use of these services (Arora et al. 2001; Chiesa et al. 2004; Sampson 2007).

But what is actually meant by outsourcing? The following sections are aimed at illuminating the reader’s understanding of the outsourcing phenomenon by first, presenting a definition and taking a look at its development over time and second, discussing its advantages and disadvantages.

2.2.2 Definition and development of the outsourcing phenomenon

Due to its increasing popularity in recent times (e.g., Arora et al. 2001; Sampson 2007), it may be tempting to believe that outsourcing is a new concept. While it may have certainly changed in shape over time, the concept of outsourcing is centuries old (Jenster et al. 2005). However, it was not until the late 1980s that management consultant Peter Drucker publicly addressed the outsourcing phenomenon in his widely received 1989 Wall Street Journal article “Sell the Mailroom.” Subsumed under the slogan “*Do what you do best, outsource the rest,*” Drucker (1989) advised companies to contract out in-house activities such as clerical, maintenance, and support work in order to improve productivity. With the increasing manage-

rial attention in the 1980s, outsourcing had begun to be tentatively adopted in organizations (Hätönen/Eriksson 2009) and has developed over time into a viable business strategy that assists firms in coping with the challenges provided by a dynamic and fast-paced business environment (Espino-Rodríguez/Padrón-Robaina 2006; McCarthy et al. 2013; McIvor 2005). Instead of creating large organizations that gather all value adding activities under one roof, firms' managers have increasingly recognized and favored the potential value of using external capabilities (Howells et al. 2008; McCarthy et al. 2013). Outsourcing has, furthermore, progressed over time from involving only peripheral business activities towards encompassing more critical ones as well (McIvor 2005). Even sensitive activities such as R&D have been handed over to external providers in recent times. Tapping into external sources of knowledge allows manufacturing firms, which must constantly develop new and often highly complex products, to address market demands more quickly and thus to encounter successfully the challenges of a fast-moving business environment (Sampson 2007).

A look at the term “outsourcing” shows that it is an acronym combining the notions “outside,” “resource,” and “using,” thus describing a move beyond company boundaries to acquire specific resources or activities not possessed by the firm (Grimpe/Kaiser 2010). R&D outsourcing can therefore be understood as a firm's decision to contract out certain R&D activities required for the production of final products or the provision of services to independent companies and institutions specializing in the respective fields by means of contractual agreements (Grimpe/Kaiser 2010; Howells 1999). Specialized companies and institutions can—according to Bund (2000)—belong to one of the following four groups:

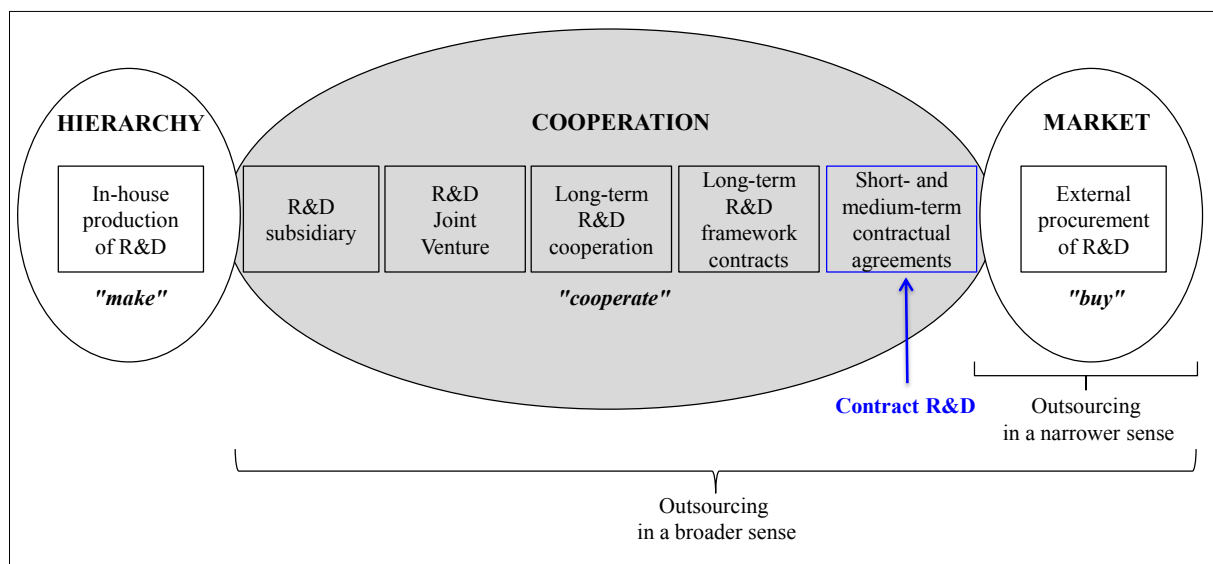
- *R&D departments of other firms:* In recent years, there has been a trend amongst leading technological firms to make their knowledge available to third parties by selling those R&D results on the market they do not need themselves.
- *Existing suppliers:* The increasing cooperation between manufactures and their suppliers leads to supplier firms carrying out certain R&D activities on behalf of the manufacturers without the parties being aware this being some kind of outsourcing, which is why it is referred to as “hidden outsourcing.” Typical examples are found in large-scale project business, IT-project business, or special machinery manufacturing, where technical solutions are either customized or newly developed (Nuhn 1987).
- *Specialized R&D providers:* There is an increase in specialized providers such as independent freelancers, engineering offices, and R&D firms that perform R&D activities on behalf of the contracting firm.

- *Other R&D institutions:* Universities and public research institutes such as Max-Planck, Helmholtz, and Fraunhofer often provide R&D services, particularly in basic or applied research.

In this dissertation, the focus is on cooperation with firms that clearly present themselves as R&D suppliers, which excludes cases of so-called “hidden outsourcing.” Furthermore, this thesis concentrates on the provision of R&D services that include either the contract-specific development of new knowledge or the application of existing knowledge in a given context, which also excludes firms that only sell their R&D results. Lastly, the focus is not on cooperation with universities and public research institutes but private, legally, and (usually) economically independent supplier firms. It is therefore the collaboration with the third group of specialized firms and institutions mentioned above that is the object of interest in this dissertation.

A closer look at the externalization of R&D activities illustrates that the traditional view on R&D outsourcing has changed remarkably in literature and practice over time. As Figure 2 visualizes, the outsourcing concept has developed from being a typical “buy”-decision towards including a vast array of hybrid R&D arrangements that fall in between the two extremes “market” and “hierarchy” (Bund 2000).

Figure 2. Forms of coordination between “make” R&D and “buy” R&D according to Bund (2000: 57)



According to Bund (2000), the variety of arrangements can be characterized by the influence the outsourcing firm has on its external partner. A decrease in the degree of hierarchical coordination causes this influence to decrease from the left to the right side of the figure.

Relations with external partners that are founded exclusively on contractual ties mark the traditional understanding of outsourcing (“buy”) and can therefore be referred to as “*outsourcing in a narrower sense*” (Bund 2000). Relationships that are more cooperative in nature and thus go beyond the traditional understanding of the outsourcing phenomenon (Cunningham/Fröschl 1995) can be described as “*outsourcing in a broader sense*” (Bund 2000).

Particularly highly hierarchical arrangements such as R&D subsidiaries or joint ventures may, however, call in question the general idea of outsourcing. In a strict sense, neither subsidiaries nor joint ventures can be considered “external partners” or “independent companies,” as they are—at least partially—under the control of the outsourcing firm (Odenthal 1999). This perceived “contradiction” is, according to the prevailing view in the literature, approached by distinguishing between internal and external outsourcing (Arnold 2000; Oertel/Abraham 1996; Riedl/Kepler 2003), depending on the legal and economic status of the contracting parties (Riedl/Kepler 2003). External outsourcing refers to contract-based transactions with outside suppliers, where the interacting firms are both legally and economically independent. Internal outsourcing, on the contrary, refers to higher degrees of hierarchical coordination. Rather than involving an outside organization, existing internal resources and business activities are turned into a separate entity. This separate entity is either legally dependent on the outsourcing firm (e.g., a so-called profit center) or legally independent (e.g., a subsidiary) but still under the influence of the outsourcing firm through equity participation. Either way, the outsourced activity can be influenced by the outsourcing firm (Riedl/Kepler 2003; Wrase 2010; Zahn et al. 1998).

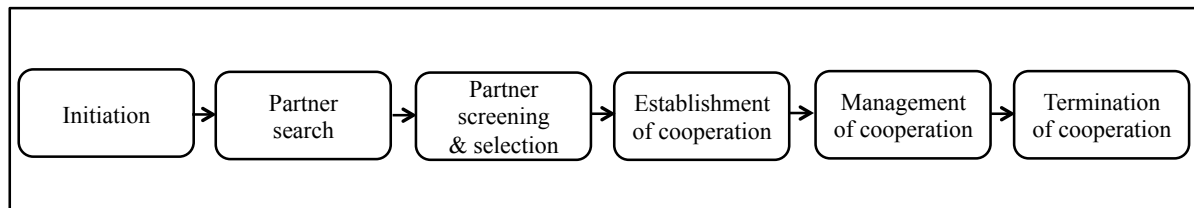
In line with the definition of R&D outsourcing presented earlier, this dissertation concentrates on external outsourcing. In particular, it focuses on contract R&D², which due to its short- or medium-term orientation can be perceived as a special case of “*outsourcing in the broader sense*” (Figure 2). While opinions may diverge on whether contract R&D is cooperative in nature (see, e.g., Gerpott 2005, who classifies contract R&D as typical “buy” decision), the author of this dissertation follows Hartmann (2004) and Zißler (2011), who consider contract R&D to mark the transition from pure market-based transactions to cooperative arrangements. This is in line with Kloyer (2005), who also emphasizes the cooperative character of contract R&D.

² Note that the terms R&D outsourcing, contract R&D, and R&D supply are used interchangeably throughout this dissertation.

That the relationship between the partners engaging in contract R&D goes beyond purely contractual ties is mirrored in the fact that their interaction is a mutual process of exchange, with the buyer providing the R&D supplier firm with all necessary information concerning the buyer's specific R&D needs and the R&D supplier transferring the corresponding technological knowledge results to the buyer firm for commercial exploitation. In practice, this relationship can be assumed to be even more intense as the partners have close contact and constantly exchange relevant information and data (Ziler 2011). Thus, in order to achieve a competitive advantage, both parties depend on the cooperative behavior of their exchange partner, at least for the time of service provision (Hartmann 2004; Ziler 2011). The understanding of contract R&D as a cooperative phenomenon corresponds to the definition of inter-firm cooperation presented in Section 2.1.

Setting up an R&D outsourcing relationship usually follows a standardized process (see Figure 3), as is typical for any other cooperative arrangement (e.g., Helm/Peter 1999; Mellewigt 2003).

Figure 3. The process of cooperation in R&D following Mellewigt (2003: 75)



It starts with the initiation, which involves the buyer firm's decision to tap into external sources of knowledge, and continues with partner search, screening, and selection. Having found a supplier firm to team up, negotiations begin aimed at designing an outsourcing contract that specifies the R&D task, the activities necessary for its fulfillment, the time required for its execution as well as the fees to be paid. The following stage involves monitoring and managing the outsourcing relationship, with the partners striving to fulfill their contractual duties and exchanging information, services, and goods. The cooperative arrangement usually ends with the completion of the present R&D project unless the partners agree to extend their relationship for another project (Mellewigt 2003; Tallman/Phene 2006).

As already indicated, outsourcing allows managers to create flatter, more flexible, and responsive organizations (McIvor 2005). The decision to adopt outsourcing strategies is usually driven by the potential gains from tapping into external sources. However, the advantages of outsourcing are countered by certain disadvantages. Both "gains and pains" from R&D out-

sourcing are described in the following two sections. They demonstrate that outsourcing can be an efficient undertaking, but only when planned and managed properly (Huang et al. 2009).

2.2.3 Motives for and benefits from R&D outsourcing

From the perspective of the resource-based view, outsourcing provides access to resources and capabilities beneficial to but not possessed by the outsourcing firm itself (Dolgui/Proth 2013; Lavie 2006; Weigelt 2009; Zhao/Calantone 2003). Whereas resources include all assets controlled by a firm (Barney 1991) and are, thus, viewed as being more generic in nature, capabilities refer to firm-specific abilities (Makadok 2001) to make use of the possessed resources in order to achieve organizational goals (Amit/Schoemaker 1993). By delegating the provision of R&D to external supplier firms, buyer firms are able to overcome intra-organizational knowledge shortcomings (Meyer/Leuppi 1992; Piachaud 2002), especially when constraints on time, money, and/or competence prevent the buyer firms from establishing the required skills and capabilities in-house (Caudy 2001). The external assignment of R&D tasks ensures, furthermore, the rapid deployment of know-how and related capacities without adding any additional personnel to the payroll, which, on the whole, may help outsourcing firms to move ahead of their competitors (Caudy 2001).

Saving costs is one of the most frequently mentioned reasons for outsourcing endeavors (McIvor 2005), and the external acquisition of knowledge may indeed result in cost savings (Dolgui/Proth 2013). Researchers such as Quinn (1992, 2000) have argued that R&D outsourcing would decrease new product development costs. It is the R&D supplier firm's specialization that allows the whole process of creating R&D outputs to be handled more efficiently. The supplier firm usually applies the latest technology and knows exactly how to deploy resources most economically (Piachaud 2002; Quinn 1992, 2000). Additionally, supplier firms may be able to realize economies of scale (Love/Roper 2002; Veugelers/Cassiman 1999) as similar services are provided to several customers. Hence, costs for training personnel and upgrading technology can be spread across the supplier firm's customer base (Belcourt 2006; McIvor 2005). If the R&D supplier is willing to pass on such cost-digression effects, this can result in tremendous cost-savings for the buyer firm (Bund 2000; Rommel/Püschel 1994). Furthermore, outsourcing R&D allows manufacturing firms to reduce risks by turning fixed costs into variable costs. Instead of establishing or maintaining in-house R&D activities, manufacturers can draw on external help when needed and as long as it is needed (Bund 2000; McIvor 2005; Piachaud 2002). This automatically implies that it is the

supplier firm that has to deal with hiring, training, and maintaining staff and with overcapacities in times of adverse business conditions (McIvor 2005; Piachaud 2002).

While Grimpe and Kaiser (2010) consider the potential cost savings to be of minor relevance, they highlight the quality advantages R&D outsourcing can provide. Quality improvement is an often-mentioned benefit of outsourcing (Blumberg 1998; Dolgui/Proth 2013; Hubbard 1993). More experience or exposure to certain problems and issues and, thus, specialized know-how and equipment usually enable the supplier firm to deliver high-level R&D solutions (Barthelémy 2001; Grimpe/Kaiser 2010). Additionally, quality and performance standards can be embedded in the outsourcing contract more tightly than in regular employee contracts (Belcourt 2006; McIvor 2005), thus binding the supplier firm to deliver high-class R&D outputs.³

In contrast to in-house R&D, the acquisition of R&D provides the outsourcing firm with flexibility. First, outsourcing enables help to be hired only when needed and only as long as it is needed. This, in turn, allows buyer firms to redeploy internal resources to improve the quality and speed of accomplishment of other tasks (Zhao/Calantone 2003). By no longer bothering with the outsourced activity, buyer firms are able to concentrate more deeply on the development of their core activities (Caudy 2001; Dolgui/Proth 2013; McIvor 2005). Second, by outsourcing, firms are given the chance to quickly adjust to changing circumstances and to pursue different opportunities (Cao/Leggio 2006; Caudy 2001). As a firm may decide to hire more than one supplier firm to address a specific business issue (single- vs. multi-sourcing (Söbbing 2002)), parallel work can result in R&D solutions being found more rapidly (Cao/Leggio).⁴

Ever-shortening product- and technology life cycles as well as a rapid shift in customer preferences have made timing issues a major concern for manufacturing firms (Fine 1998). Constant innovation and the “speed to market” seem to be the key to differentiating from competitors and remaining competitive (Piachaud 2002). Sourcing R&D externally cannot only help in meeting temporary customer needs but, in fact, speeds up product development and, thus, hastens product-market entry (Caudy 2001; Grimpe/Kaiser 2010; Piachaud 2002). This may be due not only to the supplier firm’s specialized expertise and equipment but also the undivided attention the R&D project receives from the supplier firm (Grimpe/Kaiser 2010).

³ There are serious doubts as to the validity of this argument given that sometimes even the supplier firm does not know where the “journey” is headed. This, in turn, makes a precise contractual specification very difficult.

⁴ It is questionable whether reflections on single- vs. multi-sourcing strategies really go beyond mere theoretical considerations, given the expenses and dangers connected with the disclosure of internal information and data to more than one R&D supplier firm.

The external acquisition of R&D can also be used to help stimulate internal R&D (Grimpe/Kaiser 2010) by exposing the internal staff to new technology and know-how (Ernst 2000). By constantly confronting them with the newest approaches, the internal R&D staff is implicitly forced to measure up, possibly resulting in “growing beyond themselves” and removing internal resistances to innovation (Tapon/Cadsby 1996; Tapon/Thong 1999).

While the outsourcing of R&D may certainly provide several benefits, it is, however, indispensable to also look at potential downsides of the external acquisition of knowledge. Some of the arguments in favor of outsourcing presented in this section may, under certain circumstances, also be arguments against outsourcing. The following section will outline some of the potential drawbacks of R&D outsourcing.

2.2.4 Drawbacks from and potential risks of R&D outsourcing

Expectations of cost savings through outsourcing are often not met by the costs incurred in establishing and maintaining the outsourcing relationship itself (Bryce/Useem 1998; Kern et al. 2002; McIvor 2005). Apart from the expenses involved in finding an appropriate supplier firm and drafting a contract, manufacturing firms may underestimate the time and management resources needed to govern the supply relationship (Barthelémy 2001; McIvor 2005; Veugelers/Cassiman 1999). Particularly in the case of critical business activities, such as R&D, the financial benefits of outsourcing can easily be eaten away by the costs incurred in ensuring the transfer of tacit knowledge (Love/Roper 2002). Furthermore, the supplier firm’s performance can hardly be ensured over time. While a supplier firm is likely to perform better in the beginning in order to make good first impressions, this performance may decline over time, thus offsetting some of the cost benefits expected by the buyer firms (Schwyn 1999). To sum up, it becomes apparent that the effects of outsourcing on an outsourcing firm’s costs are not yet completely understood. While financial benefits can be the result of outsourcing, they are not a matter of course at all (Kremic et al. 2006).

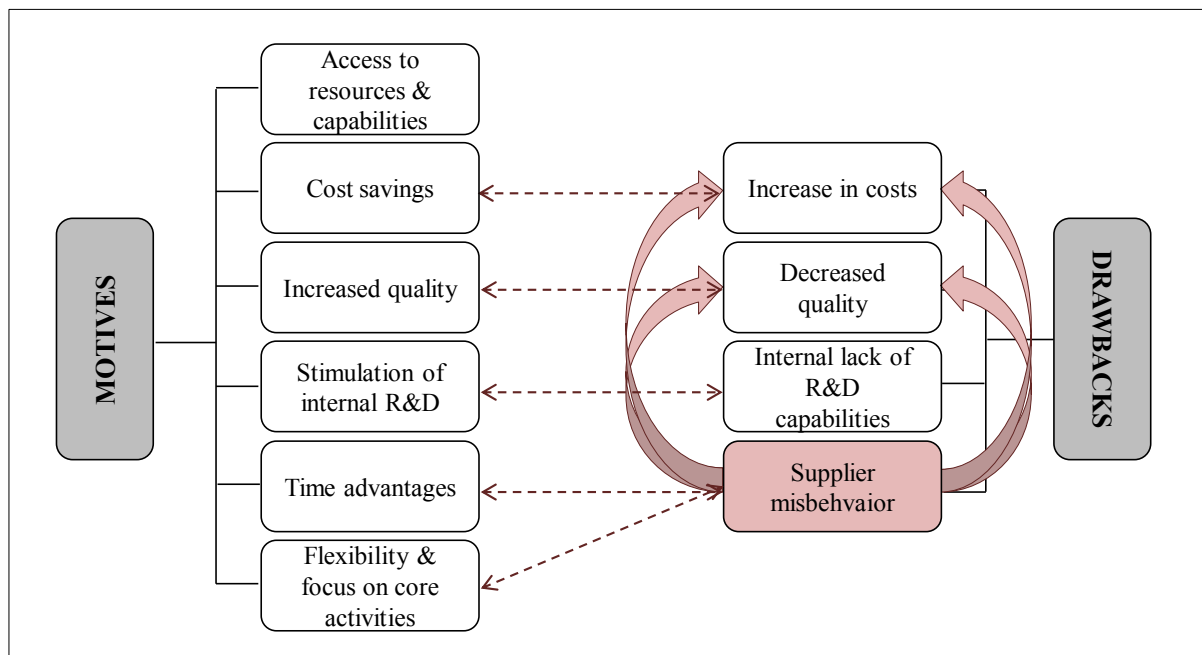
As according to the resource based view valuable skills and capabilities are firm-specific and evolve within the firm over time (Barney 1991), researchers warn that outsourcing could lead to the buyer firm being progressively “hollowed out” (Bettis et al. 1992; Hamel 1991; Schniederjans et al. 2005), thus losing the potential for innovation in the future (Kern et al. 2002). By relying too much on the external provision of R&D, buyer firms may in fact miss out on developing and appreciating internal skills and capabilities and, thus, become overly dependent on external sources of knowledge. Outsourcing firms should not underrate this

shift in power to the supplier firm (Quinn 1999; Tapon/Thong 1999) as it may open doors to unethical supplier behavior.

The saying “*Do what you do best—outsource the rest*” (Drucker 1989) may imply the output to be of higher quality when delivered by a specialized firm with unique skills. There are, however, serious doubts about whether improvements in quality are a logical consequence of outsourcing. Given the uncertainties that surround the collaboration with external partners, researchers suggest that outsourcing may actually cause quality issues (Caudy 2001; Howells et al. 2008; Love/Roper 2002; Piachaud 2002). To begin with, there is the risk of choosing a supplier firm that actually lacks the skills it claims to possess (problem of “hidden characteristics,” Love/Roper 2002; see Section 3.1), leading, at best, to delivering R&D outputs of minor quality. Furthermore, buyer firms can often not determine the quality of the knowledge outputs they receive (problem of “hidden information,” see, Section 3.1), which provides the supplier with ample leeway to intentionally withhold efforts and to deliver knowledge results of inferior quality (Howells et al. 2008). Lastly, even supplier firms sometimes do not know a priori what quality they are able to deliver (Howells et al. 2008), causing R&D contracts to remain incomplete (Aghion/Tirole 1994; Klein 1980, Liebeskind 1996). This weakens the argument provided in Section 2.2.3 that because of predefined performance standards in the contract, the supplier will deliver R&D results of higher quality.

A great unknown and thus a potential concern in any collaborative relationship is the cooperation partner’s behavior. While fully cooperative behavior is desirable, it is not the normal state. Economic exchange relationships are usually characterized by equally cooperative and self-seeking behavior. While self-seeking itself is not reprehensible, it is the seeking of self-interests at any price that is morally objectionable as it implies one partner growing rich at the other partner’s expense (Williamson 1975; see Section 3.1). Unethical supplier behavior, which is referred to academically as “supplier opportunism” and will be explained in more detail in Chapter 3, can include fraudulent representation of skills and competences (Love/Roper 2002), withholding relevant knowledge from the buyer (Kloyer 2011; Kloyer/Scholderer 2012), or using and modifying the generated knowledge inadequately (Martinez-Noya et al. 2013), for example, utilizing it for own competitive activities or simply selling it off to competitors of the buyer (Howells et al. 2008; Kogut 1988; Oxley 1997).

Figure 4 depicts the aforementioned motives and drawbacks of R&D outsourcing and highlights the crucial role the supplier’s behavior plays in the success of R&D outsourcing.

Figure 4. Motives and drawbacks of R&D outsourcing

As visualized in Figure 4, unethical supplier behavior can easily reverse potential advantages of R&D outsourcing into disadvantages. Increased costs and serious quality issues can arise when employing an R&D supplier that only claims to possess the necessary R&D skills (Love/Roper 2002) or that does not adequately share its R&D competence with the buyer firm (Kloyer 2011; Kloyer/Scholderer 2012). Cost benefits may, furthermore, be offset by the resources needed to control supplier (mis-)behavior. The same applies to the potential advantages such as focusing on core activities that can hardly be realized when substantial management resources are needed to govern the relationship with a somewhat dubious supplier. Moreover, the supplier selling the generated knowledge to the buyer's competitors might also offset any time advantages associated with R&D outsourcing.

In light of the above, supplier misbehavior poses a serious threat to the effectiveness and success of R&D outsourcing relationships. Therefore, it is indispensable to understand what actually triggers this type of behavior and how it can be effectively curtailed for R&D outsourcing to meet its intended objectives. As the danger of opportunism in R&D supply relations represents the central field of research in this dissertation, the following chapter will contribute to sharpening the reader's understanding of the opportunism phenomenon and clarify what specific type of opportunism this dissertation concentrates on. Moreover, it will shed more light on the research questions addressed in this dissertation and explain the research papers' purposes.

3. Opportunism as a serious threat in R&D outsourcing relationships

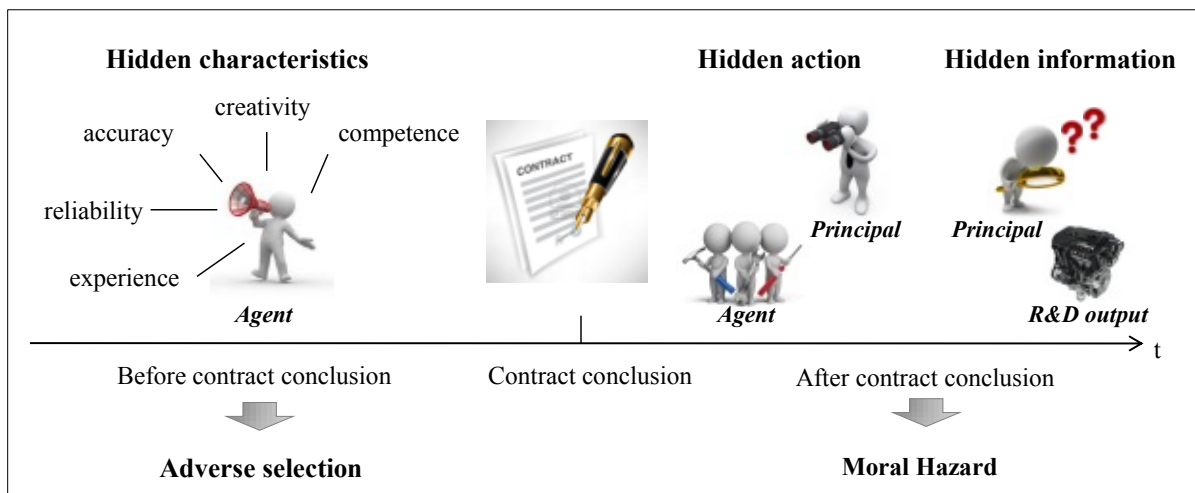
3.1 Definition and types of the opportunism phenomenon

Economic actors are driven by their own professional and personal objectives, which can, however, lead to a divergence of views in exchange relationships regarding the benefits of certain types of actions. An exchange partner that unscrupulously pursues its self-interest no matter what the consequences for the partner firm can be considered to be behaving opportunistically (Hawkins et al. 2009). The previous chapter has already highlighted that partner opportunism is a major threat to R&D outsourcing-relationships. As a central behavioral assumption of new institutional economics, opportunism can be understood as “*self-interest seeking with guile*” (Williamson 1975, p. 26). It is important to note that it is not the self-interestedness but the combination with guile that renders the opportunism phenomenon its devious touch. According to Williamson (1985, p. 17), guile encompasses activities such as “*incomplete or distorted disclosure of information, especially to calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse.*”

Although TCT does not necessarily assume that all economic actors are prone to opportunism, it is the possibility of unethical behavior that raises the need to create a governance structure that ensures uncertain behavioral patterns, such as opportunism, are dealt with effectively (Hill 1990; Williamson 1985; Williamson/Ouchi 1981).

While opportunism may occur on both sides of the dyad (Cavusgil et al. 2004; Jap/Anderson 2003), it is the potential risk of supplier opportunism that builds the thematic core of this dissertation.⁵ Supplier opportunism can occur before or after contract conclusion (Williamson 1985) and can thus—according to the point of time of its occurrence—either be called ex-ante or ex-post opportunism. Bridging to PAT, ex-ante opportunism refers to the problem of adverse selection (Akerlof 1970), whereas ex-post opportunism captures situations of moral hazard (e.g., Arrow 1963; Spence/Zeckhauser 1971). Both aspects are depicted in Figure 5.

⁵ Opportunism exerted by the buyer firm (i.e., hold-up) will only be considered insofar as its anticipation increases the R&D supplier's motivation to behave unethically.

Figure 5. Ex-ante vs. ex-post opportunism

Adverse selection occurs when an agent (i.e., the supplier) claims to have certain skills and abilities but the principal (i.e., the buyer) cannot completely verify before contract conclusion whether this is the case or not. The underlying information asymmetry is that of “hidden characteristics” (Eisenhardt 1989; Furubotn/Richter 2000). Although the danger of “adverse selection” should not be disregarded in R&D outsourcing relationships, this dissertation assumes the information asymmetry of “hidden characteristics” to have already been sufficiently reduced ex-ante by credible signals (Spence 1973). The focus of this dissertation is, therefore, only on the moral hazard danger.

Moral hazard refers to situations in which an agent does not put forward the contractually agreed-upon effort (Eisenhardt 1989). Problems of moral hazard rest on the information asymmetries of “hidden action” and “hidden information.” “Hidden action” describes the fact that the principal can only observe the agent’s behavior with great difficulty or at extremely high costs (Arrow 1985; Furubotn/Richter 2000). Given the opacity of the innovation process, especially in the early R&D stages, it is not difficult to imagine that the R&D buyer firm can hardly observe the supplier’s behavior (Kloyer 2011; Kloyer/Scholderer 2012). “Hidden information,” on the contrary, refers to the problem of the principal lacking the necessary information to evaluate the agent’s output, e.g., in terms of quality (Arrow 1985; Furubotn/Richter 2000). Given the often existing novelty and complexity of R&D results, buyer firms can be expected to have great difficulties in determining a functional relationship between resource input and R&D output (Kloyer 2011). As a consequence, R&D suppliers have considerable leeway to deliberately withhold efforts.

Despite distinguishing opportunism according to its time of occurrence, it can furthermore be classified as being either active or passive in nature. While this classification goes back to

Williamson (1985, 1991), it was revitalized and further advanced by Wathne and Heide (2000). One may refer to active or passive opportunism “*when a party either engages in or refrains from particular actions*” (Wathne/Heide 2000, p. 38). Taking actions that are forbidden by contract can be considered active opportunism, whereas passive opportunism manifests itself in deliberately withholding efforts (Masten 1988) or refraining from performing agreed-on activities (Goetz/Scott 1981). According to this classification, moral hazard can be understood as a form of passive opportunism (Kloyer 2011).

The beginning of this chapter has highlighted that economic actors constantly pursue their own interests. While self-interest seeking per se is not necessarily “evil,” one ends up wondering what leads supplier firms to finally act in morally reprehensible ways. The reasons for supplier opportunism can be twofold. First, suppliers may engage in unethical behavior simply because they believe it will pay off handsomely (Williamson 1975, 1985, 1993a; 1993b).⁶ Purposely withholding efforts allows cost savings and, thus, the generation of higher profits (Kloyer 2011; Kloyer/Scholderer 2012). Second, the suppliers’ propensity towards opportunism can be the reaction to a perceived hold-up by the buyer (Kloyer 2011; Kloyer/Helm 2008; Kloyer/Scholderer 2012). Hold-up, as the central phenomenon in TCT, describes a situation in which the buyer firm tries to opportunistically exploit the supplier firm’s dependence by renegotiating the original contract to the supplier firm’s disadvantage (Klein et al. 1978). If applying a “tit-for tat”-strategy (Axelrod 1984), supplier firms that anticipate buyer hold-up can themselves become motivated to behave unethically (Kloyer 2011; Kloyer/Helm 2008; Kloyer/Scholderer 2012).

Given the increasing prevalence of partner opportunism in business practice (Hawkins et al. 2008), researchers and practitioners alike strive to improve their understanding of the phenomenon. The following section briefly points out the main research areas of opportunism and illustrates how this doctoral thesis contributes to prior research by outlining the content of the three empirical papers that build the pillars of this dissertation.

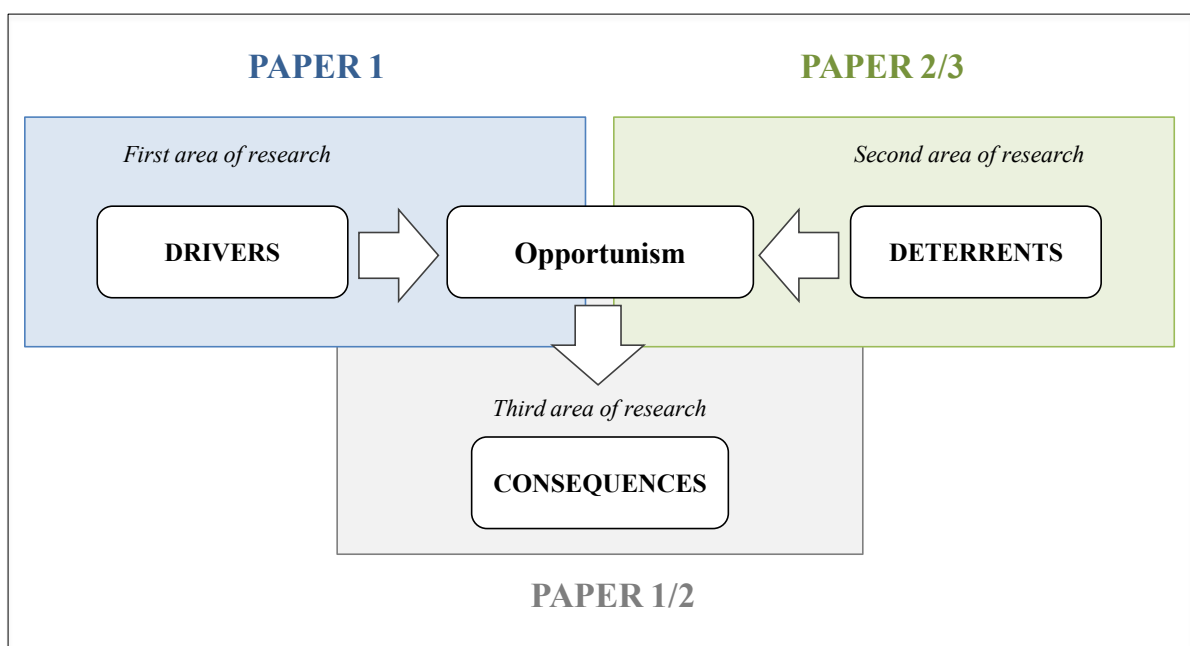
3.2 Research on opportunism and focus of the three papers

The opportunism phenomenon has received substantial attention from scientific researchers over the last three decades. This attention has resulted in a vast number of theoretical, conceptual, and empirical articles. A review and synthesis of the academic literature reveals that re-

⁶ The decision to behave unethically is the result of an economic calculus. If the payoffs from opportunism surpass the benefits of cooperation, partners are more likely to behave unethically (Williamson 1975, 1985, 1993a, 1993b).

search on opportunism has basically developed along three main lines. As illustrated in Figure 6, there has been, first, scientific interest in the factors that provoke and facilitate unethical partner behavior (e.g., Katsikeas et al. 2009; Morgan et al. 2007; Ting et al. 2007; Yaqub 2009). Second, considerable efforts have been dedicated to determining mechanisms that help to deter or lessen partner opportunism (e.g., Brown et al. 2000; Cavusgil et al. 2004; Helm/Kloyer 2004; Jap/Anderson 2003; Yaqub 2009). Third and finally, research has strived to examine the consequences of partner misbehavior (e.g., Luo et al. 2009; Morgan et al. 2007; Parkhe 1993; Ting et al. 2007).

Figure 6. Areas of opportunism research and focus of the research papers



Despite the rich scenario of prior research efforts, academic research is still far from having completely understood the opportunism phenomenon (Hawkins et al. 2008). Given its prevalence in exchange relationships and the wide divergence of empirical opinion regarding its drivers, deterrents, and consequences, the phenomenon requires much more academic attention (Das/Rahman 2010; Hawkins et al. 2008). This dissertation responds to the call by touching on and contributing to each of the three aforementioned areas of opportunism research, thus painting a fairly complete picture of the opportunism phenomenon in an R&D supply context.

Paper 1 of this doctoral thesis covers the first area of opportunism research. Gaining knowledge about the factors that provoke unethical partner behavior is indispensable in order to apply effective safeguarding measures. Prior research has dedicated considerable efforts to determining the antecedents of partner opportunism (e.g., Katsikeas et al. 2009; Morgan et al.

2007; Ting et al. 2007; Yaqub 2009). While these efforts have certainly provided valuable insights, some issues still need to be clarified. First, there is wide disagreement about the roles played by various antecedents in driving a firm's unethical behavior since findings vary in terms of significance, direction, and magnitude (Hawkins et al. 2009). Second, while some factors have been widely studied (e.g., specific investments, external uncertainty), others have received comparably limited empirical attention (information asymmetries, internal uncertainty). Third, to the best of the author's knowledge, there is no empirical study that considers simultaneously the whole range of TCT- and PAT-related drivers of opportunism in an R&D supply context. Motivated by the aforementioned issues, Paper 1 combines the views of TCT and PAT and strives to answer the following research question:

Research Question 1: *What drives an R&D supplier to behave unethically towards its buyer firm in an R&D outsourcing relationship?*

Given the devious nature of the opportunism phenomenon (e.g., Caniëls/Gelderman 2010; Das/Rahman 2010; Gassenheimer et al. 1996; Parkhe 1993), manufacturing firms would most likely refrain from collaborating with external R&D providers if there were no way to effectively control the moral hazard danger (Kloyer 2011). But despite the major efforts to work out mechanisms that help to protect and preserve the cooperative relationship (e.g., Brown et al. 2000; Cavusgil et al. 2004; Helm/Kloyer 2004; Jap/Anderson 2003; Vázquez et al. 2007; Wathne/Heide 2000), no consensus has been reached on their effectiveness (Achrol/Gundlach 1999; Caniëls/Gelderman 2010). Moreover, despite knowing about their potential relevance in explaining economic behavior, prior work has focused primarily on extrinsic, hard measures and has almost completely neglected to consider the role played by non-extrinsic, soft safeguards in curbing partner opportunism, (Kloyer 2011; Kloyer/Scholderer 2012). Paper 2 addresses these shortcomings by also taking account of soft variables such as supplier trust, intrinsic motivation, and organizational culture. Being, to the best of the author's knowledge, the first study to simultaneously consider and contrast a wide array of hard and soft governance mechanisms, Paper 2 is dedicated to answering the subsequent research question, thus covering the second area of opportunism research:

Research Question 2: *What determines supplier knowledge sharing in R&D supply relationships and are soft factors the underestimated drivers?*

Like Paper 2, Paper 3 contributes to the second area of opportunism research by taking up and further examining a variable discussed in Paper 2: the R&D supplier firm's trust in the buyer. Due to its reconciliatory nature, trust is often hyped as a "silver bullet" in governing economic

exchange relationships. While there certainly is a vast array of research on its positive outcomes (Claro/Claro 2008; Cullen et al. 2000; Das/Teng 2001; Lane et al. 2001; Mohr 2004, Morgan/Hunt 1994; Zaheer et al. 1998), the antecedents of trust are not sufficiently understood. In prior work, trust is occasionally considered to develop gradually over time (e.g., Gulati 1995; Parkhe 1993; Rousseau et al. 1998). This non-calculative view neglects, however, the more calculative reasons for trust. In an R&D supply context, it can be assumed that trust is primarily a function of perceived opportunism control. Hence, factors that keep the danger of buyer opportunism (e.g., hold-up) at a minimum may certainly be key levers in driving the supplier's trust in the buyer. Research that claims to investigate the sources of trust should, therefore, consider both non-calculative and calculative reasons. Furthermore, despite the extensive research on the consequences of trust, little is known about the role of trust in facilitating the supplier firm's intrinsic motivation. This is surprising for two reasons. First, intrinsic motivation is viewed as being an indispensable precondition for successful knowledge transfer (Ko et al. 2005; Lin 2007). Second, it is assumed that intrinsic motivation is more likely to develop in a positive and trusting atmosphere (Frey/Bohnet 1995; Ryan/Deci 2000b). However, appropriate empirical research, especially in an inter-organizational setting, is still missing. Inspired by these issues, Paper 3 aims at answering the following research question:

Research Question 3: *What leads the R&D supplier to trust its buyer firm and does that trust spur the supplier firm's intrinsic motivation?*

In order to paint a complete picture of the opportunism phenomenon, it is necessary to also take a look at its consequences. A review of the academic literature gives rise to the impression that opportunism has invariably negative effects (Hawkins et al. 2008). Indeed, several studies found that one-sided opportunism impairs the success of the affected party (e.g., Dahlstrom/Nygaard 1999; Morgan et al. 2007; Skarneas et al. 2002; White/Lui 2005) and the cooperation as whole (Luo 2007; Luo et al. 2009; Parkhe 1993; Ting et al. 2007) by destroying a part of the cooperative surplus. What has remained understudied, however, are the consequences unethical behavior has for the success of the opportunist. Motivated by this gap in the literature, Papers 1 and 2 seek to answer the subsequent research question, thus contributing to the third area of opportunism research:

Research Question 4: *How does supplier opportunism affect the R&D supplier's success?*

Table 4 summarizes the main structure of the three papers and provides additional information on the methodological approach and the paper's publication status.

Table 4. Overview of the dissertation papers

	Paper 1	Paper 2	Paper 3
Chapter	Chapter 4	Chapter 5	Chapter 6
Title	Drivers of supplier opportunism in vertical R&D collaboration from the perspectives of transaction cost- and principal-agent theory	R&D collaboration between firms: Hard and soft antecedents of supplier knowledge sharing	Sources of trust and intrinsic motivation in R&D supply relations
Authors	<ul style="list-style-type: none"> • Kloyer, Martin • Helm, Roland • Aust, Christin 	<ul style="list-style-type: none"> • Helm, Roland • Kloyer, Martin • Aust, Christin 	<ul style="list-style-type: none"> • Aust, Christin • Kloyer, Martin • Helm, Roland
Research questions	<ul style="list-style-type: none"> • What drives an R&D supplier to behave unethically towards its buyer firm in an R&D outsourcing relationship? • How does supplier opportunism affect the R&D supplier's success? 	<ul style="list-style-type: none"> • What determines knowledge sharing in R&D supply relationships? Are soft factors the underestimated drivers? • How does supplier knowledge sharing affect the R&D supplier's success? 	<ul style="list-style-type: none"> • What leads the R&D supplier to trust its buyer firm? • Does supplier trust spur the supplier firm's intrinsic motivation?
Model variables	<p><u>Dependent variables:</u></p> <ul style="list-style-type: none"> • Supplier opportunism • Supplier success <p><u>Independent variables:</u></p> <ul style="list-style-type: none"> • External uncertainty • Internal uncertainty • Specific investments • Supplier dependence • Buyer dependence • Information asymmetries 	<p><u>Dependent variables:</u></p> <ul style="list-style-type: none"> • Supplier knowledge sharing • Supplier success <p><u>Independent variables:</u></p> <ul style="list-style-type: none"> • Behavior monitoring • Prior collaboration • Collaboration perspective • Supplier trust • Supplier organizational culture • Supplier intrinsic motivation 	<p><u>Dependent variables:</u></p> <ul style="list-style-type: none"> • Supplier trust • Supplier intrinsic motivation <p><u>Independent variables:</u></p> <ul style="list-style-type: none"> • Prior collaboration • Collaboration perspective • Buyer dependence • Supplier organizational culture
Methodology	Quantitative: Partial least squares (PLS)		
Data	Survey data, collected 2013 (sample drawn from ORBIS database, complemented by web research)		
Research context	Firms operating as R&D suppliers		
Status	<u>Under review:</u> Academy of Management Journal (A+)	<u>Under review:</u> Research Policy (A)	<u>Under review:</u> Strategic Management Journal (A)

As Table 4 visualizes, the three papers that build the pillars of this dissertation draw on empirical data received from an online survey conducted in 2013. Besides being among the few empirical studies to examine unethical partner behavior in an R&D context (for exceptions,

see, for example, Carson et al. 2006, Kloyer 2011; Kloyer/Scholderer 2012), this doctoral thesis departs from prior work such as Morgan et al. (2007) by surveying the potential opportunist (the R&D supplier) and not the party affected by opportunism. It is reasonable to question the R&D supplier as only they can provide reliable information on their behavior. R&D buyer firms, on the contrary, are victims of “hidden action” and “hidden information.”

The questionnaire used for data collection was issued in German and English. The English version of the questionnaire is displayed in the Appendix. Partial least squares structural equation modeling (PLS-SEM) was used to test the papers’ hypotheses. It is a variance-based approach that has been widely applied in marketing and business research (Hair et al. 2012; Henseler et al. 2009).⁷

The following Chapters 4, 5, and 6 include the three papers of this dissertation. Each paper is or was under review in a top-ranked academic journal. Due to journal-specific requirements they will differ slightly in terms of structure and citation format.

⁷ To avoid redundancy, the author deliberately skips providing further information on the PLS approach at this point, as its use is described in detail in each of the three research papers. The interested reader is, furthermore, referred to Hair et al. (2014), who provide a comprehensive manual on the PLS approach.

4. Paper 1: Drivers of supplier opportunism in vertical R&D collaboration from the perspectives of transaction cost- and principal-agent theory

4.1 Introduction

Organizations are increasingly confronted with a variety of challenges such as intensified competition, cost-pressure, and ever-shortening product life cycles. In order to remain competitive, even large manufacturing firms are often required to complement their knowledge base by collaborating with external R&D partners. The outsourcing of R&D has become a prevalent phenomenon (Arora & Gambardella, 2010; Calantone & Stanko, 2007; Sampson, 2007) that certainly allows for specialization benefits (Kloyer & Scholderer, 2012). By tapping into external sources of knowledge, however, the manufacturing firm unavoidably risks being confronted with opportunism by its R&D supplier, i.e., through moral hazard (Sampson, 2007).⁸ The supplier could withhold important information, provide false information, or simply cheat (Park & Ungson, 2001) by withholding efforts, selling knowledge to third parties, or using it for its own competitive activities (Kloyer, 2011; Kloyer & Scholderer, 2012). It is, therefore, not surprising that opportunism is widely considered to be among the major reasons for cooperation failure (Das, 2004; Tidström & Ahman, 2006) or, at least, diminished relationship satisfaction and performance (Gassenheimer, Baucus, & Baucus, 1996; Joshi & Arnold, 1997). Despite the fact that opportunism has attracted increasing scholarly attention in recent years, our understanding of the opportunism phenomenon is still fragmentary and, thus, far from being adequate (Das, 2006; Das & Rahman, 2010; Hawkins, Wittmann, & Beyerlein, 2008; Wathne & Heide, 2000).

While much empirical attention has been devoted to the incentives or mechanisms that deter or at least lessen partner misbehavior (for an overview, see, for example, Brown, Dev, & Lee, 2000; Cavusgil, Deligonul & Zhang, 2004; Helm & Kloyer, 2004; Jap & Anderson, 2003; Vázquez, Iglesias, & Rodríguez-del-Bosque, 2007; Wathne & Heide, 2000), only a modest number of empirical studies throw light on the potential drivers of opportunism (Das, 2006; Hawkins et al., 2008). This is surprising as only by understanding the antecedents of opportunism can firms anticipate such self-serving behavior and take preventative actions. The existing studies have shown mixed and sometimes even conflicting findings that do not allow for deriving warranted conclusions and, thus, call for more research on the topic. To date,

⁸ This article will not describe the basics of new institutional economics with its sub-theories of property rights theory, transaction cost theory, and principal-agent theory. There are several established introductions to these theories (e. g., Williamson (1985) on transaction cost theory, Arrow (1985) on principal-agent theory, on the whole system of theories, for example, Furubotn and Richter (2000), Ménard and Shirley (2008), and Milgrom and Roberts (1992).

there is no study that simultaneously considers all the factors that transaction cost theory and principal-agent theory present as antecedents of supplier opportunism, particularly not in such a sensitive field as collaboration in R&D. Both theories explicitly regard opportunism as one of their central assumptions (e.g., Williamson, 1981, 1996). While transaction cost theory proposes that transaction characteristics such as uncertainty and asset specificity aggravate the opportunism problem (e.g., Williamson, 1996), according to principal-agent theory, it is the information asymmetries among the contracting parties that allow deriving the scope for opportunistic behavior (Jensen & Meckling, 1976). Principal-agent theory and the information asymmetries have been applied rudimentarily in empirical research on opportunism (Steinle, Schiele, & Ernst, 2014). From a practical stance, knowledge about the sources of R&D supplier opportunism is centrally important as it helps buyer firms to shape organizational instruments against opportunism, i.e., incentive systems, safeguards, etc.

In addition to contributing to the existing knowledge of opportunism drivers, we also examine the relationship between a supplier's opportunism and its individual success within the cooperation. While Hawkins et al. (2008) claim that the prevalence of opportunism in economic exchange relations is not met with a corresponding research interest concerning its performance effects, we discovered a lack of empirical research on the link between supplier opportunism and supplier success. In order to fill this gap, we empirically scrutinize whether it is beneficial for a supplier firm to behave unethically in an R&D collaboration

In order to test our hypotheses, we examined a sample of 104 R&D supplier firms. Some of our findings raise non-trivial theoretical questions. The positive impact of specific investments is contrary to one of the main propositions of transaction cost theory. The differing effects of external vs. internal uncertainty underline the need to elaborate the view on that transaction cost determinant. Other findings, however, correspond to our theory-based expectations; as principal-agent theory predicts, information asymmetries lead to an increase of supplier opportunism. Finally, our results indicate that supplier opportunism has a negative effect on the supplier's success within the cooperation. This finding raises some non-trivial questions concerning the relative importance of different types of supplier goals within the cooperation.

The article is structured as follows. In the next section, we show the theoretical development of our study's hypotheses and then present our empirical study in Section 4.3. The results of the study are reported in Section 4.4. The article ends with a discussion of the main findings, the major managerial implications, and the study's limitations.

4.2 Theory and hypotheses

4.2.1 *Moral hazard caused by R&D suppliers*

While the outsourcing of R&D activities is a prevalent phenomenon (Arora & Gambardella, 2010; Calantone & Stanko, 2007; Sampson, 2007), it does not come without risks. R&D supply relationships certainly allow for specialization benefits, but they also bear the danger of partner opportunism. While according to transaction cost theory not all economic actors are considered prone to opportunism, the risk of partner misbehavior should always be considered when examining economic exchange relationships as it is hardly possible to distinguish between the actors who are and those who are not opportunistic (Williamson & Ouchi, 1981). As both parties of a dyad can be inclined to behave opportunistically, it is the potential opportunism of the supplier firm we focus on in our study. More precisely, we examine moral hazard (e.g., Arrow, 1963; Spence & Zeckhauser, 1971) that is caused by the R&D supplier. This kind of post-contractual opportunism is the main focus of principal-agent theory. Moral hazard results from the information asymmetry of hidden action. This means that without knowing it, a buyer that cannot observe a supplier's behavior faces the danger of paying more remuneration than justified by the supplier's activities. This problem is especially severe in R&D supply relations as R&D efforts can hardly be observed because generating and implementing innovative and creative ideas is inevitably not transparent.

Suppliers may behave opportunistically simply because they believe it will pay off handsomely (Williamson, 1975, 1985, 1993a; 1993b). Cost savings due to reduced efforts may enable the supplier firm to generate higher profits (Kloyer, 2011; Kloyer & Scholderer, 2012); however, one-sided opportunism may only be beneficial for a supplier under two conditions: firstly, it is not detected (Hill, 1990), and secondly, there is no perspective of a future collaboration with the same partner. If it were to be detected, the supplier's reputation would be damaged, and a supplier that anticipates follow-up contracts has no rational motive to weaken the current and future partner.

Although transaction cost theory does not directly examine moral hazard, it has to be considered in our study too. It mainly focuses on the phenomenon of hold-up (e.g., Klein, Crawford, & Alchian, 1978). Hold-up describes an ex-post renegotiation of an original contract, which becomes possible when one party slides into dependence because of one-sided specific investments. The renegotiation danger is aggravated in cases of uncertainty, which inevitably results in incomplete contracts (Aghion & Tirole, 1994; Grossman & Hart, 1986; Hart & Moore, 1988, Pisano, 1990). Hold-up influences the danger of moral hazard because a dependent supplier that anticipates buyer opportunism may be inclined to behave opportunisti-

cally during the supply process (Kloyer, 2011; Kloyer & Helm, 2008; Kloyer & Scholderer, 2012). In order to compensate for potential losses due to anticipated hold-up, the supplier firm could be motivated to withhold information or efforts intentionally. Such actions are presumably particularly strong in R&D collaboration since uncertainty and contractual incompleteness as causes of hold-up are inevitable. Thus, to summarize, a study that claims to consider the complete set of the antecedents of moral hazard caused by an R&D supplier has to consider information asymmetries (based on principal-agent theory) as well as investment specificity and uncertainty (based on transaction cost theory).

In view of its prevalence in corporate practice, literature on organization theory has devoted considerable attention to the opportunism phenomenon. Despite the wide research endeavors on the subject, however, the phenomenon of moral hazard is not understood in its entirety (Hawkins et al., 2008; Jap & Anderson, 2003), and our knowledge of the antecedents is rather fragmented (Das, 2006; Hawkins et al., 2008).

4.2.2 Uncertainty and its influence on supplier opportunism

In transaction cost theory, uncertainty is considered a primary constituent of contractual relations (Williamson, 1979, 1996). Uncertainty is typically understood as the extent to which environmental changes alter the conditions underlying an exchange relationship (Leiblein & Miller, 2003), which often requires adaptation, that is, the adaption of contractual agreements to changing circumstances (Williamson, 1979). By influencing the costs of governance, uncertainty works as a central factor in guiding firms' vertical integration decisions.

The risk of partner opportunism accrues from the fact that the combination of environmental uncertainty and bounded rationality (Simon, 1957) make it impossible for the partner firms to foresee and articulate the myriad eventualities that may arise in the future (Williamson, 1975, 1985). This in turn prevents the allying firms from drafting complete contracts. Incomplete contractual agreements leave each party discretionary leeway to serve their self-interests unscrupulously (Aghion & Tirole, 1994; Artz & Norman, 2002; Goldberg, 1976a; Grossman & Hart, 1986; Hart & Moore, 1988; Pisano, 1990; Tripsas, Schrader, & Sobrero, 1995).

Furthermore, uncertain environments require firms to occasionally revise their strategies and, hence, adapt their contractual agreements towards unforeseen contingencies (Lee & Cavusgil, 2006). While these adaptations are necessary, they provide, however, latitude to behave opportunistically and to renegotiate to their own advantage (Anderson & Narus, 1990), i.e., to hold-up. In our case, it is the R&D buyer that could try to beat down the supplier firm's remuneration (Tirole, 1986); however, supplier firms anticipating buyer hold-up can themselves

become motivated to behave unethically (Kloyer, 2011; Kloyer & Helm, 2008; Kloyer & Scholderer, 2012). In highly volatile environments, moreover, the parties of a dyad cannot predict with certainty whether and when their efforts may pay off economically. Firms whose financial scope is restricted – consider, for instance, an R&D startup firm – could become inclined to prefer the direct benefits of behaving opportunistically over uncertain long-term pay-offs from cooperation (Lai, Tian, & Huo, 2012).

Even though it has been conceptualized slightly differently in research, several empirical studies confirmed the opportunism-increasing effect of environmental uncertainty in exchange relationships (Katsikeas, Skarmeas, & Bello, 2009; Lai et al., 2012; Liu, Su, Li, & Liu, 2010; Luo, 2007; Mysen, Svensson, & Payan, 2011; Skarmeas, Katsikeas, & Schlegelmilch, 2002; Wang & Yang, 2013). Carson, Madhok, and Wu (2006), however, found that environmental uncertainty in R&D alliances only unfolds its opportunism-driving force under formal but not under relational contract regimes. Anderson (1988), in contrast, failed to confirm the opportunism-increasing effect of environmental unpredictability.

The aforementioned empirical studies do not explicitly differentiate between external and internal causes of uncertainty. Implicitly, they refer to external determinants of uncertainty, such as difficulties in anticipating the developments of market and competition. We will deliberately use the term “external uncertainty” because it is not necessarily positively correlated with the kind of uncertainty that results from the R&D process itself. Following our reasoning and in line with prior research, we assume external uncertainty to give rise to supplier opportunism. Therefore, we suggest the following hypothesis:

Hypothesis 1a. The higher the external, environment-related uncertainty in R&D cooperation, the higher the R&D supplier’s opportunism.

Apart from the external, environment-related uncertainty, there is an internal, process-related uncertainty in R&D collaboration. The R&D process itself can be uncertain; neither buyer firm nor supplier firm know which scientific and technological hurdles will come their way and whether the supplier firm has the capabilities necessary to overcome them (Kloyer, 2011). Given the vagueness of the R&D process, the supplier firm needs more entrepreneurial scope in order to try new paths. This implies that the supplier firm’s duties and responsibilities cannot be fully specified contractually (Aghion & Tirole, 1994; Klein, 1980; Liebeskind, 1996), which may give the supplier leeway to withhold efforts intentionally without the risk of detection. Furthermore, there may actually be no clarity about where the supplier’s self-interest seeking ends and mean spirited acting “with guile” (Williamson, 1975: 26) begins. Hence, a general lack of contractual specification may actually “allow” the supplier firm to operate at

the edge of legality without violating agreements. Additionally, it seems plausible to expect that a supplier firm that doubts its own capabilities may be inclined to enjoy the short-term benefits from opportunism rather than to fully cooperate and take an “uncertain journey.” Therefore, we posit the following hypothesis:

Hypothesis 1b. The higher the internal, process-related uncertainty in R&D cooperation, the higher the R&D supplier’s opportunism.

4.2.3 Specific investments and their influence on supplier opportunism

While both parties in an exchange relationship usually invest specifically, it is, however, the R&D supplier firm that, particularly at the beginning, has to make the higher transaction-specific investments compared to the buyer firm (Kloyer, 2011). Transaction-specific investments are tangible and intangible investments that are of high value within a focal transaction (Williamson, 1981, 1985). They comprise investments in equipment, machinery, employee training, and/or knowledge that are tailored to the specific relationship (Anderson, 1985). As these investments are unique to a certain task, they lose at least part, if not all, of their value if redeployed outside the transaction (Williamson, 1981, 1985). Exchange partners, however, find it economical to invest in transaction-specific assets for several reasons. First, in contrast to generalized assets, transaction-specific assets allow higher efficiency in operations and lead to cost savings in the long run (Das & Rahman, 2010). Second, transaction-specific investments signal good faith and the intention to continue the relationship, which could help facilitate the development of trust among partners (Katsikeas et al., 2009; Parkhe, 1993).

From the transaction cost perspective, specific investments are said to play a major role in curbing partner opportunism (Brown et al., 2000; Williamson, 1985). In alliances, the firm that makes idiosyncratic investments, in our case the R&D supplier, is automatically locked into the exchange relationship as the invested assets cannot be redeployed elsewhere without falling in value. In order to receive full amortization of its investments, the supplier is interested in sustaining the relationship (Anderson & Weitz, 1992; Jap & Anderson, 2003). Therefore, the supplier firm would refrain from any behavior that would put the exchange relationship and, consequently, the assets’ actual value at risk (Vázquez et al., 2007). By increasing the costs of breaking a relationship (Parkhe, 1993), supplier opportunism is curtailed effectively. Hence, it is the potential of economic loss that may serve as a disincentive for supplier opportunism (Crosno & Dahlstrom, 2008; Wathne & Heide, 2000).

Several studies examined this line of argument empirically. Katsikeas et al. (2009) confirmed the negative effect of specific investments on the level of opportunism in import-export rela-

tionships. The same applies to Ting, Chen and Bartholomew (2007), who found that specific investments lower an entrepreneur's opportunism. Joshi and Stump (1999) proved that specific investments lead to increasing the dependence on the partner firm, which in turn reduces the incentives to behave opportunistically. Skarmeas et al. (2002) could confirm that increasing specific investments leads to a greater relationship commitment by the investing party.

However, there are also those who doubt the opportunism-reducing effects of specific investments by the supplier (Brown et al., 2000; Crosno & Dahlstrom, 2008; Crosno, Manolis, & Dahlstrom, 2013). Demsetz (1993: 166) states that "Asset specificity raises the prospects for opportunism." This argument can be viewed from two perspectives. First, while specific investments may reduce the supplier's propensity to behave opportunistically due to a relationship lock-in, they may simultaneously stimulate the buyer firm to exploit the supplier firm's vulnerability opportunistically via hold-up (Heide & John, 1990; Klein, 1996). Mysen et al. (2011) and Wang, Li, Ross, and Craighead (2013) confirmed empirically that specific investments actually drive the receiving party to expropriate the investments' value; however, in contrast to Wang et al. (2013), Mysen et al. (2011) did not test the effect of specific investments on opportunism directly but indirectly via dependence. They found that specific investments increase the investing party's dependence, which leads to opportunistic exploitation by the receiving party. Rokkan, Heide, and Wathne (2003) also found a positive relationship between specific investments and the receiving party's opportunism if neither relational norms nor a shadow of the future exist. Furthermore, Liu, Liu, and Li (2014) confirmed that a firm's specific investments lead to partner opportunism when the firm's network embeddedness and the partner firm's own specific investments are low. How though would buyer opportunism now influence supplier misbehavior? As mentioned before, a supplier that anticipates the opportunistic exploitation by its buyer firm can become motivated to behave opportunistically itself (Kloyer, 2011; Kloyer & Helm, 2008; Kloyer & Scholderer, 2012) to forestall potential losses due to hold-up.

Second, a relationship lock-in puts a lot of psychological pressure on the supplier firm, which leads in the end to counterproductive behavior, such as opportunism. What may appear paradoxical from an economic stance, can be justified by taking a social psychology perspective. According to reactance theory (Brehm, 1966; Brehm & Brehm, 1981), unethical supplier behavior is not uncommon when the supplier has invested specifically. The underlying logic is quite simple: transaction-specific investments cause a one-sided dependency that often leads the investing party to cede control to the partner firm (Heide & John, 1992). Being deprived of control means a restriction of behavioral freedom that, in line with reactance theory logic, can motivate the supplier firm to engage in activities tailored to restoring that freedom, i.e.,

regaining control over the contributed assets. Such activities can include retaliatory, self-serving behavior such as opportunism.

Crosno et al. (2013) took this stance and assumed that with increasing specific investments, the opportunism of the investing party also increases. In line with their assumption, the authors could confirm empirically that specific investments are positively related to the investing party's passive⁹ opportunism. Contrary to their original assumption about specific investments and the investing party's opportunism being negatively related, Brown et al. (2000) had come to the conclusion that specific investments do not restrict opportunism but actually cause reactant behavior on the part of the investor.

However, drawing on the majority of previous findings and following the logic of transaction cost theory, we assume specific investments of the supplier to reduce supplier opportunism, which is why we suggest the following hypothesis:

Hypothesis 2. The higher the specific investments made by the R&D supplier, the lower the supplier's opportunism.

4.2.4 Partner dependence and its influence on supplier opportunism

At this point, we deliberately extend the set of opportunism antecedents in transaction cost theory because one-sided dependence—with its assumed effects on opportunism—is not only caused by one-sided specific investments. Therefore, we will consider dependence between cooperation partners in general.

Dependencies are viewed as the original motive behind firms cooperating. Given that resources are not distributed equally, one organization might have the capabilities beneficial to but not possessed by the other. In order to gain access to and leverage the required resources, firms enter into collaborative relationships (Gulati, 1998; Morgan, Kaleka, & Gooner, 2007).

While the previous section has shown that dependencies can also rest on partners having invested specifically, we now concentrate on the dearth of alternative cooperation partners possessing the required resources and capabilities (Emerson, 1962; Morgan et al., 2007; Pfeffer & Salancik, 1978; Provan & Skinner, 1989). Hence, when speaking of partner dependence, we refer to the degree to which one partner relies on the other partner's resources and capabilities in order to achieve its business goals (Dwyer, Schurr, & Oh, 1987).

⁹ The term “passive opportunism” describes the omission of particular actions including the evasion of obligations, quality shirking, the refusal to adapt, and the withholding of information (Crosno et al., 2013; Wathne & Heide, 2000).

While mutual dependencies act as glue that secures cooperation stability, unilateral dependencies or dependencies that vary a lot in extent need to be considered with caution. Instead of providing ground for cooperation, unilateral dependencies can create power asymmetries that may eventually cause inappropriate partner behavior (Das & Teng, 2000b; Das & Teng, 2003, Xia, 2011). As dependencies can occur on both sides of the dyad, we will successively derive how supplier and buyer dependence may have an impact on supplier opportunism. First though, we will outline some general thoughts on how these two factors, dependence and opportunism, interact.

In the literature, there are two very different perspectives concerning the relationship between dependencies and opportunism. Proponents of the first perspective follow the logic of transaction cost theory and suggest that dependence and opportunism are negatively related (Provan & Skinner, 1989). Dependence on an exchange partner is said to reduce own incentives to behave unethically (Joshi & Arnold, 1997; Provan & Skinner, 1989) as detection by the partner would put the cooperative relationship in danger (Das & Rahman, 2001). Given that the dependent firm relies on the partner's resources and capabilities to achieve its business goals, the dependent firm would do anything to preserve the relationship (Joshi & Arnold, 1997, Provan & Skinner, 1989). This may even include tolerating misbehavior by the partner firm to a certain extent (Wathne & Heide, 2000).

Proponents of the second view, however, propose that dependence and opportunism are positively related (Joshi & Arnold, 1997). Instead of fostering cooperative behavior, dependence can actually cause opposite effects such as unethical behavior. As previously outlined, dependence implies a potential loss of control and, hence, constraints on the freedom of action. Taking a social psychological stance and following reactance theory (Brehm, 1966; Brehm & Brehm, 1981), restrictions of freedom can motivate the dependent party to undertake actions that re-establish the threatened or lost freedom. These actions can be explicit and direct, or implicit and hidden, such as opportunism (Joshi & Arnold, 1997). Furthermore, being dependent on the partner firm entails the risk of own vulnerabilities being exploited opportunistically by that partner. However, the anticipation of partner opportunism can in turn motivate the dependent firm itself to behave opportunistically (Joshi & Arnold, 1997; Kloyer, 2011; Kloyer & Helm, 2008; Kloyer & Scholderer, 2012).

So what does this mean for the relationship between supplier dependence and supplier opportunism? According to the first view, dependence should effectively prevent supplier firms from behaving unethically as any opportunistic behavior would put the cooperative relationship and hence, the achievement of the firm's longer-term business goals at risk. The second view, however, implies that a dependent supplier firm may actually be more inclined to act

opportunistically as a form of reactance to the constraints on freedom imposed by the condition of dependence.

Previous studies that examined the relationship between dependence and opportunism usually applied the logic of transaction cost theory and assumed both constructs to be negatively related; however, the studies' findings are mixed. By surveying farm and power equipment dealers, Provan and Skinner (1989) could confirm a negative relationship between dealer dependence and dealer opportunism. In their study on supermarket retailers and their suppliers, Morgan et al. (2007), however, could not find a significant effect of supplier dependence on supplier opportunism. Joshi and Arnold (1997) assumed dependence and opportunism to be positively as well as negatively related—but under different conditions. In an experiment with purchasing managers, they found that relational norms moderate the relationship between dependence and opportunism. Under “low” relational norms, buyer dependence and buyer opportunism were positively related, whereas both constructs proved to be negatively related under “high” relational norms.

Following the logic of transaction cost theory, we assume a dependent R&D supplier will refrain from opportunism. Therefore, we propose the following hypothesis:

Hypothesis 3a. The higher the supplier's dependence on the buyer, the lower the R&D supplier's opportunism.

Looking at the relationship between buyer dependence and supplier opportunism, we might argue from a transaction cost theory-perspective that a dependent buyer firm is locked into the relationship with the supplier. In order to not sacrifice its longer-term business goals, the buyer firm would rather “sit through” tensions than give up on the relationship easily (Joshi & Arnold, 1997; Provan & Skinner, 1989). This may even include tolerating supplier opportunism (Klein et al., 1978; Wathne & Heide, 2000; Williamson, 1985). As the dependent buyer firm is unable to counter supplier misbehavior by threatening the supplier with switching to another market partner, it can be expected that the supplier firm will care less about the consequences of opportunistic behavior should it become apparent (Steinle et al., 2014). Hence, being aware of the buyer firm's vulnerable situation could motivate the supplier firm to exploit the buyer firm's dependence opportunistically. Even the buyer firm demonstrating reactant behavioral intentions would not change that situation as buyer reactant behavior is even more likely to be reciprocated by the opportunism of the supplier firm. Thus, we can expect buyer dependence to spur supplier opportunism.

In their empirical study of supermarket retailers and their suppliers, Morgan et al. (2007) assumed that retailer dependence would positively influence supplier opportunism. Their find-

ings, however, convey a different message as the authors found the constructs to be unrelated. Steinle et al. (2014) came to the same conclusion in their study of buyer-supplier relationships: buyer dependence showed hardly any influence on supplier opportunism.

Though empirical studies could not find any relationship between buyer dependence and supplier opportunism, we follow our line of argument and posit, in line with the logic of transaction cost theory, the following hypothesis:

Hypothesis 3b. The higher the buyer's dependence on the supplier, the higher the R&D supplier's opportunism.

4.2.5 Information asymmetries and their influence on supplier opportunism

While the aforementioned transaction cost-related variables have recurrently been the subject of empirical research on opportunism in exchange relationships, only few studies have applied a classic principal-agent-perspective on opportunism (Hawkins et al., 2008; Steinle et al., 2014). This seems quite surprising given its potential explanatory power (Steinle et al., 2014) and the suitability of principal-agent theory for exploring buyer-supplier relationships (Arnold, Neubauer, & Schoenherr, 2012). Information asymmetries are at the heart of the principal-agent theory. They occur in situations in which critical information is distributed unequally among the partners of a transaction.

Information asymmetries are both drivers and consequences of the division of labor (Yang & Ng, 1993) and thus, a firm constituent of outsourcing relationships (McCarthy, Silvestre, & Kietzmann, 2013). It is the R&D buyer that engages a R&D supplier in order to benefit from its resources and capabilities. As the R&D supplier is an expert in its field, information asymmetries exist from the outset of the relationship and may further increase throughout the project as the supplier becomes more and more familiar with the R&D task.

While information asymmetries may not be problematical per se, it is the principal-agent theory's underlying assumption that because of differing preferences and objectives among buyer and supplier, the supplier firm may strive to exploit the information advantage opportunistically: "If both parties to the relationship are utility maximizers, there is a good reason to believe that the agent will not always act in the best interests of the principal." (Jensen & Meckling, 1976: 308).

As already mentioned, our study does not concentrate on hidden characteristics and adverse selection but on moral hazard, one of the prominent constructs of opportunism research in exchange relationships (Stump & Heide, 1996; Wathne & Heide, 2000). Moral hazard results from the information asymmetries of hidden action (the unobservability of partner behavior)

and hidden information (the inability to assess partner behavior due to a lack of expert knowledge) that allow the supplier firm to shirk after contracting (Arrow, 1985; Furubotn & Richter, 2000) without the buyer firm noticing. In R&D supply relationships, the buyer firm cannot observe the supplier's efforts during the process of knowledge generation. Even ex-post, the buyer firm cannot fully assess the quality of the supplier's intermediate or final knowledge output. It does not know if the output is the result of the supplier's efforts or whether it is due to exogenous factors (Kloyer, 2011; Steinle et al., 2014).

Empirical studies on the relationship between information asymmetries and opportunism are comparably scarce and provide differing results. Whereas Katsikeas et al. (2009) came to the conclusion that information asymmetries do not necessarily lead to partner opportunism, studies by Anderson (1988), Steinle et al. (2014) and Ting et al. (2007) confirmed the opportunism-increasing effect of unequally distributed information among transaction partners. The results of Carson et al.'s (2006) study vary depending on the contracting regime applied to restrain opportunism. Whereas the relationship between information asymmetries and opportunism is positive under relational contracting regimes, no such relationship could be confirmed under formal contracting regimes.

Given the relatively limited research interest in information asymmetries as a potential antecedent of partner opportunism, we want to enrich prior work by examining the interrelationship between information asymmetries and supplier opportunism in an R&D supply context. Following our theoretical reasoning, we assume that the information asymmetries of hidden action and hidden information will provide the supplier firm with ample leeway to maximize its own benefits by behaving opportunistically. Therefore, we propose the following hypothesis:

Hypothesis 4. The higher the information asymmetries in favor of the R&D supplier, the higher the R&D supplier's opportunism.

4.2.6 Supplier opportunism and its influence on supplier success

A review of the literature on the opportunism phenomenon may inevitably lead to the conclusion that due to its devious nature, opportunism has a detrimental impact on the success of cooperative relationships (Hawkins et al., 2008). However, in order to fully understand the interaction between opportunism and success, it is necessary to draw a more differentiated picture: In an inter-firm cooperation, there are two types of success effects from one-sided opportunism. On the one hand, there are the effects on the individual success of the opportunistic party (1) and of the party affected by opportunism (2). On the other hand, one-sided op-

portunism has an impact on the success of the cooperation as a whole (3). From a theoretical point of view (e.g., Grossman & Hart, 1986; Hart & Moore, 1988), the effects are undisputable when only looking at one cooperation episode: For (1) the effect is positive, while for (2) and (3) it is negative.

While several studies have examined and proved the negative impact of opportunism on the success of the affected party (2) (e.g., Dahlstrom & Nygaard, 1999; Morgan et al., 2007; Skarmeas et al., 2002; White & Lui, 2005) and the cooperation as a whole (3) (e.g., Luo, 2007; Luo, Liu, & Xue, 2009; Parkhe, 1993; Ting et al., 2007), there is, quite surprisingly, a dearth of research on the link between opportunism and the success of the opportunistic party (3). This relationship, however, is the most interesting as it is anything but trivial.

According to theory (Grossman & Hart, 1986; Hart & Moore, 1988), opportunism positively affects the opportunistic party's success as the opportunist can immediately realize material benefits by reducing its efforts. This logic may certainly hold true for one-shot anonymous interactions; however, cooperative transactions, such as collaboration in R&D, are not usually one-shot deals (Rose, 2011). On the contrary, partners of an exchange normally strive for repeated interaction and a reputation that attracts future collaboration partners (Hill, 1990; Rose, 2011).

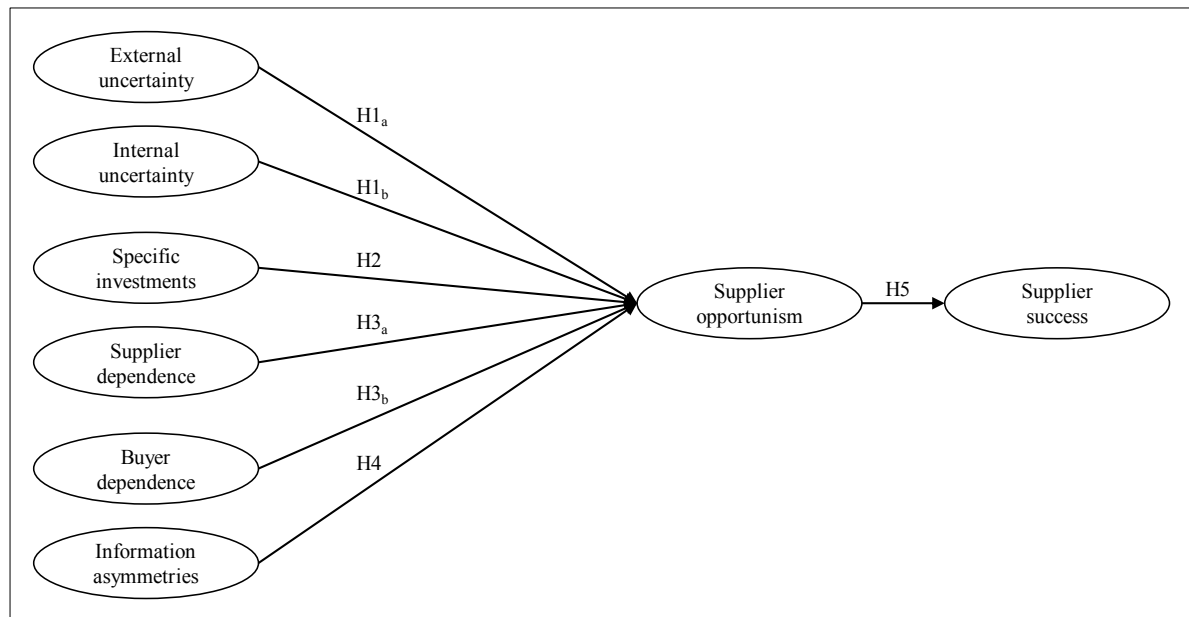
In relationships that involve the exchange of credence goods such as R&D results, possessing a good reputation is an important measure to increase a supplier's credibility with its potential clients (Ganesan, 1994). "Foul play" not only puts chances of future business with the current partner at risk (Carson et al., 2006), but it also sends unpleasant signals to other potential business partners (Barney & Hansen, 1994; Hill, 1990). An R&D supplier firm that due to opportunism has a record of rather short-lived prior exchange relations and/or that lacks high-class references in its R&D project portfolio is not an attractive collaboration partner. Buyer firms will refuse to do business with the respective supplier as they doubt the supplier's abilities and/or its cooperative nature (Anderson & Weitz, 1989; Shapiro, 1983). Therefore, when looking at more than one cooperation episode, it is not the immediate material success, as proposed by Grossman and Hart (1986) and Hart and Moore (1988), but the supplier firm's longer-term success that matters; however, this longer-term success will suffer from a supplier trying to reap short-term benefits by behaving unethically.

With our measures reflecting the supplier's perception of general as well as strategic success, we consequently assume supplier opportunism and supplier success to be negatively related. This is why we propose the following hypothesis:

Hypothesis 5. The higher the supplier's opportunism, the lower the supplier success.

Figure 7 summarizes and visually depicts the relationships investigated in this study.

Figure 7. Research model



4.3 Methods

4.3.1 Sample description

We used primary data to test our hypothesized research model. Given that R&D buyer firms cannot provide valid information on supplier behavior due to information asymmetries, we decided to survey the R&D supplying firms only. We deliberately decided against interviewing both parties of the dyad for two reasons. First, given the sensitivity of the subject, we considered it impossible to motivate suppliers to report on their opportunism if there was even the slightest possibility of this information being leaked to their buyer firms. Second, we had preliminary evidence that suppliers were reluctant to reveal their buyer firms for reasons of confidentiality.

To obtain our data, we surveyed R&D supplying firms from eight European countries (Germany, Switzerland, Austria, Norway, Sweden, Finland, Denmark, and the Netherlands). The firms were selected by tapping into two sources. First, we used the ORBIS database to choose a sample of firms belonging either to the industry group “7112 - Engineering activities and related technical consultancy” or “721 - Research and experimental development on natural sciences and engineering”. We decided on these two groups because we believed them to consist to a high percentage of companies that act as R&D suppliers. Second, we used the internet to complement our sample population by searching for firms that clearly presented themselves as being active in the defined field. Using SoSciSurvey (Leiner, 2013), we created

a bilingual (German and English) questionnaire, which, following pre-tests with academic experts, was made available to the participants on www.soscisurvey.com.

In April 2013, we sent invitation e-mails to the selected companies. The invitation e-mail provided a short description of the study's purpose and a link to our online survey. We asked the project manager of the last completed R&D supply project to answer our questionnaire as we believed him or her to be highly familiar with all R&D project-related features. We assumed the average response time of our questionnaire to be no longer than 15 to 20 minutes. In order to incentivize potential respondents, we offered an overview of our study's major findings.

About four weeks after our first mail dispatch, we sent a second mail request. Since our mailing efforts did not result in a sufficient response rate, we opted for follow-up phone calls, focusing, however, only on German firms. Trained interviewers contacted the companies by phone, verified their suitability for the study, and outlined the studies' purpose. Dialog partners who agreed to participate in our survey were sent yet another invitation e-mail.

In sum, we received 107 questionnaires, 104 of which could be used for further analyses. Given that the survey tapped into one of the most sensitive areas of a company, 104 useable questionnaires can be considered satisfactory.

As portrayed in Table 5, most of the R&D supplying firms were small and medium-sized companies, located in Germany, and with a median age of 12 years.

Table 5. Sample description

Firm location: N = 104		Number of employees: ^a N = 104		Firm age in years: N = 103 (1 missing)	
Austria	4	1-19	52	2-5	19
Denmark	2	20-99	34	6-10	28
Finland	2	100-499	15	11-20	35
Germany	89	≥ 500	3	> 20	21
Switzerland	7				

^a For the purpose of conducting unifactorial analyses of variance, we decided to merge the last two groups of firms into one group, given the insufficient number of R&D suppliers employing 500 or more people.

Unifactorial analyses of variance and Kruskal Wallis tests revealed no significant differences between the groups of "firm age" and "number of employees" concerning our model's dependent and independent variables.

4.3.2 Construct measurement

All variables were measured reflectively. Where possible, we adapted existing scales, and where needed, we developed new measures based on sound analyses of the literature. Our measures were refined by a pre-test with academic experts. The final items employed in our study are summarized in Table 6. All items were measured on seven-point-Likert scales ranging from “agree not at all” (1) to “agree completely” (7). If necessary, the direction of responses was reversed prior to analysis (see, for example, supplier opportunism).

4.3.2.1 Dependent variables

The dependent variables in our study are opportunism of the R&D supplier and the supplier’s success. Opportunism was measured by four items that were adapted from earlier studies on opportunism in exchange relationships (Brown et al., 2000; Grzeskowiak & Al-Khatib, 2009; Heide, Wathne, & Rokkan, 2007; John, 1984). To measure the success of the supplier firm, we employed a five-item measurement drawing on items from Jap (1999), Kumar, Scheer, and Steenkamp (1995) and Saxton (1997).

4.3.2.2 Independent variables

In our study, we considered the influence of six independent variables. Besides measuring the external, environment-related uncertainty, we enriched the concept of uncertainty in R&D supply relations by adding an internal, process-related dimension. Each uncertainty variable was measured using two newly developed items. The items of external uncertainty reflect the R&D supplier’s uncertainty concerning the market development and the competitors, whereas the items of internal uncertainty express the R&D supplier firm’s uncertainty concerning its capabilities to solve the specific R&D task. To measure specific investments, we used two items that are similar to those used by Carson et al. (2006). Buyer and supplier dependence were each measured by four items adopted from previous studies (e.g., Jap & Ganesan, 2000; Morgan et al., 2007). The construct “information asymmetries” was measured by two newly developed items reflecting the hidden action and hidden information problem.

4.3.2.3 Control variables

In empirical studies, the insertion of control variables allows us to account for possible confounding factors. What has become common practice in research has to be viewed critically from a methodological stance. Control variables are often included in studies without justifi-

cation; however, as their blind insertion may lead to false conclusions, the use of control variables should always be driven by either theory and/or empirical evidence (see, for example, Becker, 2005; Spector & Brannick, 2011 on this issue).

In our specific case, we decided to include the variable *project importance* as a control variable because of its potential negative effect on supplier opportunism. To measure the construct, we asked the supplier firms to assess the relative importance of the focal R&D supply project within the company's project portfolio on a scale ranging from (1) "not important at all" to (7) "very important".

Following transaction cost theory, the higher the chances or costs of detection, the less likely opportunism will occur. With an increasing project importance, the costs of behaving unethically increase too. Hence, a supply project that is considered to be of high value for the supplier firm should function as an incentive to not behave unethically throughout the relationship.

Table 6. Measurements of the variables

Variable (abbreviation)	Item (abbrev.)	Items
External uncertainty (EUN)	EUN01_01	: When the contract was concluded, we could <u>not</u> foresee whether there would be a market for a final product / final products that would be based on our R&D results.
	EUN01_02	: When the contract was concluded, we could <u>not</u> foresee which competing R&D suppliers would become active on the same R&D field.
Internal uncertainty (IUN)	IUN01_01	: When the contract was concluded, we could <u>not</u> foresee whether we would be able to overcome the technological problems connected with our R&D task.
	IUN01_02	: When the contract was concluded, we could <u>not</u> foresee whether our R&D capabilities would be sufficient.
Specific investments (SI)	SI01_01	: In the beginning of this concrete supply relationship, we had to make material and immaterial investments in order to cope with the specific requirements of this contract.
	SI01_02	: In the beginning of this concrete supply relationship, we had to make some investments that could not be used for other contracts without adaptation.
Supplier dependence (SD)	SD01_01	: When the contract was concluded, we had no other possibility than to collaborate with our partner to gain access to the resource(s) that was (were) crucial to us.
	SD01_02	: When the contract was concluded, it would have been difficult for us to replace our partner.
	SD01_03	: When the contract was concluded, we were quite dependent on our partner.
	SD01_04	: When the contract was concluded, we did not have a good alternative to our partner.
Buyer dependence (BD)	BD01_01	: When the contract was concluded, our partner had no other possibility than to collaborate with us to gain access to the resource(s) that was (were) crucial to her/him
	BD01_02	: When the contract was concluded, it would have been difficult for our partner to replace us.
	BD01_03	: When the contract was concluded, our partner was quite dependent on us.
	BD01_04	: When the contract was concluded, our partner did not have a good alternative to us.
Information asymmetries (IA)	IA01_01	: The buyer was objectively <u>not</u> capable of observing our work.
	IA01_02	: The buyer was objectively <u>not</u> capable of attributing interim and final results to our work.
Supplier opportunism (OP)	OP01_01	: We provided our buyer with a completely truthful picture of our activities. ^b
	OP01_02	: Sometimes we had to withhold information from the buyer in order to protect our interests.
	OP01_03	: Sometimes we had to alter the facts slightly in order to get what we needed.
	OP01_04	: Sometimes we had to act in a way that did not correspond exactly to the contractual agreements.
Supplier success (SS)	SS01_01	: The collaboration with this buyer has been a successful one.
	SS01_02	: The collaboration with this buyer has realized the goals we set out to achieve.
	SS01_03	: The collaboration with this buyer enabled us to compete more effectively in the marketplace.
	SS01_04	: The collaboration with this buyer strengthened our core competences.
	SS01_05	: Overall, we are very satisfied with the performance of the collaboration with this buyer.

^b The direction of the responses was reversed prior to analysis.

4.3.3 Analyses

For data analysis, we applied partial least squares (PLS) using SmartPLS 2.0 software. PLS is a variance-based method that primarily aims to maximize the endogenous variables' explained variance using an ordinary least square regression-based estimation procedure. While still in its infancy (Wong, 2013), studies by Hair, Sarstedt, Ringle, and Mena (2012) and Henseler, Ringle, and Sinkovics (2009) have shown that the PLS approach has been used increasingly in marketing and business research in recent times. Due to its less restrictive nature concerning distribution, sample size, and measurement scales, it is often referred to as a "soft modeling approach" (Vinzi, Trinchera, & Amato, 2010: 48). Given the explorative nature of our research, our newly developed measures, and the small sample size, we consider the use of PLS as appropriate for our purposes.

To systematically evaluate PLS results, several criteria need to be applied. Following common practice, the measurement (or outer) models are assessed first. Reflective measurement models are described using three indices: internal consistency, convergent validity, and discriminant validity. Internal consistency is measured using the constructs' composite reliability, where values of 0.60 to 0.70 are considered acceptable (Bagozzi & Yi, 1988; Nunnally & Bernstein, 1994). Convergent validity is established on the indicator level when the factor loadings, given their significance, exceed the value of 0.70 (Carmines & Zeller, 1979) and on the construct level when the average variance extracted (AVE) is above 0.50 (Fornell & Larcker, 1981). To exclude discriminant validity problems, the square root of a construct's AVE should be higher than its highest correlation with any other construct in the model (Fornell-Larcker criterion).

In order to evaluate the structural (or inner) model, which reflects the relationships between the constructs, it is necessary to first check for multicollinearity issues concerning the predictor variables. This can be done by calculating variance inflation factors (VIF) on the construct level, using SPSS-software. VIF-values smaller than five indicate no problems with multicollinearity (Hair, Hult, Ringle, & Sarstedt, 2014). The most prominent measure to assess the inner model is the percentage of variance explained (R^2), which reflects the model's predictive accuracy. Researchers should also examine Stone-Geisser's Q^2 -values, whereat positive Q^2 -values indicate that the exogenous constructs have predictive relevance for the endogenous constructs of concern. The hypotheses are tested by examining the magnitude and significance of the structural path coefficients (Hair et al., 2014).

4.4 Results

4.4.1 *Common method bias*

As already outlined above, we did not see any possibility for surveying both parties of the dyad. Relying on self-report data collected from a single source, however, represents a potential for common method bias. In order to reduce the potential of common method bias ex-ante, we followed Podsakoff, MacKenzie, Lee, and Podsakoff's (2003) recommendations. First, we structured our questionnaire in a way that led to no conclusion on the assumed relations between the variables. We asked questions on the outcome variables first, followed by questions on the input variables and firm demographics. Second, we guaranteed our participants that all provided information would be used in anonymous form and only for research purposes. Third, we asked them to answer our questions honestly and to the best of their knowledge, emphasizing that there are no right or wrong answers. In addition, we performed statistical analyses ex-post in order to assess the severity of a possible bias. Conducting Harman's single-factor test on the model's variables led to an extraction of several factors, with the largest factor explaining less than 30% of the variance. Hence, we draw the conclusion that significant common method bias is unlikely to be present in our data.

4.4.2 *Assessment of the measurement (outer) models*

Using SPSS, we conducted principal component analyses with Varimax rotation on each set of indicators to test for unidimensionality of the constructs. Unidimensionality means that each set of indicators must have only one construct in common. Achieving unidimensionality is a necessary condition in reflective measurement models as the indicators are understood as the variables' consequences and, thus, are considered interchangeable (Anderson & Gerbing, 1988). With loadings well above the threshold of 0.5, each set of indicators loaded on its corresponding factor, hence confirming the constructs' unidimensionality.

To further assess our measurement models, we used SmartPLS software (Ringle, Wende, & Will, 2005). Table 7 contains the outcomes of our outer model estimations using SmartPLS.

Table 7. PLS results of the reflective measurement models

Latent variable	Indicators	Outer loadings	T-statistics	Composite reliability	AVE	Discriminant validity
External uncertainty	EUN01_01	0.98	2.82	0.82	0.71	Yes
	EUN01_02	0.68	1.76			
Internal uncertainty	IUN01_01	0.80	4.23	0.88	0.79	Yes
	IUN01_02	0.97	5.97			
Specific investments	SI01_01	0.89	18.87	0.87	0.78	Yes
	SI01_02	0.87	12.27			
Supplier dependence	SD01_01	0.92	3.78	0.92	0.75	Yes
	SD01_02	0.88	3.65			
	SD01_03	0.86	3.34			
	SD01_04	0.79	2.93			
Buyer dependence	BD01_01	0.88	9.91	0.94	0.79	Yes
	BD01_02	0.91	10.37			
	BD01_03	0.94	10.91			
	BD01_04	0.83	8.76			
Information asymmetries	IA01_01	0.88	16.53	0.92	0.85	Yes
	IA01_02	0.96	70.60			
Supplier opportunism	OP01_01 ^c	0.70	8.42	0.82	0.53	Yes
	OP01_02	0.75	10.59			
	OP01_03	0.80	15.60			
	OP01_04	0.65	6.41			
Supplier success	SS01_01	0.94	13.27	0.92	0.70	Yes
	SS01_02	0.93	13.32			
	SS01_03	0.69	4.24			
	SS01_04	0.65	4.04			
	SS01_05	0.92	12.82			

^c The direction of the responses was reversed prior to analysis

As can be seen from the results, all constructs show composite reliability-values of above 0.7, which allows us to conclude that our measures are internally consistent. For the AVE-values, each latent construct accounts for at least 50 % of the variance in the items. The indicator loadings are above or close to the demanded 0.70, and their t-values indicate that they are significant at a 0.05 level at least, except for EUN01_02. Despite missing the five percent significance level, we decided to retain the indicator for several reasons. First, the external uncertainty construct scores high on the other quality criteria such as composite reliability or AVE. Second, with the “No Sign Change”-option, we used the most conservative bootstrapping option known to result in lower t-values. When switching to the “Individual Sign Change”- or “Construct Level Change”-option, the indicator’s loading becomes significant at a five percent level. Lastly, deleting the indicator would not alter our structural model results. We tested the constructs’ discriminant validity by comparing the square root of each construct’s AVE with the construct’s highest correlation with any other construct in the model. We could not find any indication of discriminant invalidity for our constructs. Overall, our measurement models can be considered reliable and valid.

4.4.3 Assessment of the structural (inner) model

To rule out doubts of multicollinearity among the predictor variables, we calculated VIF-values in SPSS using the latent variable correlations provided by SmartPLS. All VIF-values fall below the critical value of five. Thus, multicollinearity is not a concern in our study.

Table 8 presents the results of our inner model estimation, comprising the endogenous variables' R²- and Q²-values and the path relationships with their corresponding t-values.

Table 8. PLS results of the structural model

Predicted variable	Predictor variable	Hypothesis	Without control path		With control path project importance	
			Path	T-value ^d	Path	T-value ^d
Hypothesized paths						
Supplier opportunism	External uncertainty	H1 _a	- 0.27	2.17	- 0.28	2.16
	Internal uncertainty	H1 _b	0.27	2.56	0.27	2.62
	Specific investments	H2	0.25	2.67	0.25	2.66
	Supplier dependence	H3 _a	0.12	1.28	0.13	1.32
	Buyer dependence	H3 _b	0.16	2.02	0.16	2.08
Supplier success	Information asymmetries	H4	0.37	5.13	0.37	5.09
	Supplier opportunism	H5	- 0.35	4.12	- 0.35	4.13
Control path						
Supplier opportunism	Project importance				- 0.04	0.45
Variance explained						
Supplier opportunism			R ² = 0.386		R ² = 0.387	
Supplier success			R ² = 0.125		R ² = 0.125	
Predictive relevance						
Supplier opportunism			Q ² = 0.199		Q ² = 0.210	
Supplier success			Q ² = 0.067		Q ² = 0.067	

^d T-values greater than 1.96 are significant at $p < 0.05$, those greater than 2.57 are significant at $p < 0.01$.

For Hypothesis 1a, the assumed positive relationship between external uncertainty and supplier opportunism cannot be supported. Contrary to our expectations, external uncertainty has a significant negative effect on supplier opportunism ($\beta = - 0.27$; $p < 0.05$). In line with our expectations, Hypothesis 1b is supported, indicating a positive impact of internal uncertainty on supplier opportunism ($\beta = 0.27$; $p < 0.05$). The negative relationship between specific investments made by the supplier and supplier opportunism, as stated in Hypothesis 2, cannot be confirmed. Instead we find that specific investments have a significant positive effect on supplier opportunism ($\beta = 0.25$; $p < 0.01$). With regard to the impact of supplier dependence on supplier opportunism, we have to reject Hypothesis 3a. The path coefficient fails to be significant ($\beta = 0.12$; n.s.). In line with our expectations, we find support for Hypothesis 3b, indicating a positive effect of buyer dependence on supplier opportunism ($\beta = 0.16$; $p < 0.05$). Hypothesis 4 is supported as well; as assumed, we find a positive effect of information asymmetries on supplier opportunism ($\beta = 0.37$; $p < 0.01$). The assumed negative link between suppli-

er opportunism and supplier success, as stated in Hypothesis 5, can also be supported ($\beta = -0.35$; $p < 0.01$). With regard to our control variable relative project importance, our findings indicate no significant relationships with supplier opportunism ($\beta = -0.04$; n.s.).

Four of our six variables turn out to be opportunism drivers, with information asymmetries having the greatest and buyer dependence having the lowest impact. Surprisingly, external uncertainty has an opportunism-reducing effect, while there is no evidence on the role of supplier dependence.

The overall model explains 38.6% percent of the variance in supplier opportunism and 12.5% in supplier success. It is not appropriate to assess the constructs' R^2 by drawing on cut-off values presented in the academic literature. The recommended values were often no more than estimation results of one specific exemplary model and, thus, never initially intended for use as general quality guidelines (see, e.g., Chin, 1998: 323). Furthermore, defining acceptable R^2 -values is difficult in so far as this largely depends on the model complexity, the research discipline (Hair et al., 2014), and the total number of possible factors influencing the dependent variable. Hence, a more complex reality needs to be more strongly simplified in order to be reproduced in a model. This simplification of reality, however, goes hand in hand with a loss of information content and, thus, smaller R^2 -values. Given the complex and multifaceted nature of the opportunism phenomenon, we regard the achieved R^2 as respectable. The same applies to the R^2 of supplier success when bearing in mind that there are most certainly more factors than opportunism that explain its variance.

Since the Q^2 -values for opportunism ($Q^2 = 0.199$) and for supplier success ($Q^2 = 0.067$) are larger than 0, we can attest that our model has predictive relevance. Entering our control variable, project importance, into the model does not lead to a significant increase of the R^2 - or Q^2 -value of supplier opportunism.

4.5 Discussion, managerial implications and limitations

4.5.1 Discussion of the research findings

Moral hazard is, without doubt, a highly relevant danger that manufacturers of final products have to consider if they want to benefit from the knowledge of external R&D suppliers. Our interest in investigating the drivers of supplier opportunism accrued from the fact that prior empirical work has produced conflicting findings or did not adequately examine some of the potential drivers (e.g., information asymmetries and uncertainty). To date, there has not been a study that considers all potential opportunism antecedents simultaneously. Based on an extensive review of the literature and prior empirical work, we built a comprehensive theoretical model and tested it empirically in an R&D-supply context.

Our findings reveal that supplier opportunism is, in fact, driven by several factors. Surprisingly, *external uncertainty* is not one of them. As our findings indicate, higher external uncertainty leads to lower supplier opportunism. At a first glance, this result is counterintuitive, but there may be good reasons why a supplier refrains from opportunism when faced with external uncertainty. First, in an uncertain surrounding, the supplier has to perform well in order to stand out. Without outstanding supplier performance, creating a final product that achieves market acceptance and generates positive returns is very unlikely. Hence, refraining from opportunism increases the possibility of creating a superior technological outcome that can be translated into a successful product. Second, creating a superior outcome may enable the supplier to actually define a dominant design, which, third, might help to build up a reputation that makes the supplier firm less replaceable by competitive suppliers, securing thereby future income.

In contrast to external uncertainty, our findings reveal that *internal uncertainty* seems to drive supplier opportunism. Obviously the more uncertain the R&D-process, the harder it is for the buyer firms or third parties to effectively control supplier behavior. This in turn leaves ample leeway for supplier opportunism to flourish without the unethical behavior being detected. Moreover, not even the supplier knows whether his competences will be sufficient to overcome technological hurdles. Hence, for a supplier that doubts his own abilities, cooperation is not an attractive option, as the corresponding long-term benefits are quite uncertain compared to the short-term gains from opportunism.

We believe that these opposing findings concerning the two uncertainty dimensions are highly interesting. As prior empirical work has focused primarily on the external, environment-related dimension, we enriched the concept of uncertainty by adding an internal process-

related facet. Our findings support our assumption of uncertainty having more than one face in determining opportunism in R&D supply relationships.

With regard to *information asymmetries*, we were able to confirm their opportunism-driving force. The higher the R&D supplier firm's information advantages, the higher supplier opportunism. Problems of hidden action and hidden information prevent the buyer firm from observing or assessing the R&D supplier's work. Hence, the chances for supplier misbehavior to remain undetected are high, which, consequently, increases the benefits from cheating and turns supplier opportunism into a profitable option. This finding is consistent with principal-agent theory, which proposes that information asymmetries are a main source of opportunism problems in economic exchange.

From the theoretical point of view, the perhaps most surprising result is that the more specifically a supplier firm has invested, the higher its opportunism is. One of the main propositions of transaction cost theory is that a partner that transfers hostages ought to refrain from opportunism in order to not lose the hostage. Therefore, a supplier firm that has transferred hostages in the form of its *buyer-specific investments* would have good reason to not jeopardize the continuation of the relationship through opportunism. Relationship termination would lead to all, or at least a great deal, of the specific investments being sunk costs. To our surprise, the results point in the opposite direction. We explain this finding by drawing on two different aspects: the anticipation of hold-up and reactance theory. When a supplier firm has invested specifically, the buyer firm gains leeway for hold-up. However, supplier firms that anticipate the buyers' hold-up intentions have a reason to behave opportunistically by expending less effort. Furthermore, from a reactance theory point of view, the supplier firms being locked into their relationships could automatically have caused a reinforcing spiral of opportunism. This accrues from the fact that a supplier whose freedom of action is constrained may be encouraged to restore this freedom of action by performing counterintuitive behavior such as opportunism. Both anticipation of hold-up and reactance theory seem to be plausible explanations for our finding.

With regard to the effect of *supplier dependence* on supplier opportunism, we found no evidence that a dependent supplier is less opportunistic. Hence, we cannot draw any conclusion on the role of supplier dependence in explaining supplier opportunism, but the failed verification of the hypothesis is in line with the findings on supplier specific investments.

In line with our assumptions, we found a positive significant effect of *buyer dependence* on supplier opportunism. As it is either too costly or even impossible for the buyer firm to change R&D supplier, the supplier firm can rest assured that the buyer firm will rather endure tensions than give up on the relationship easily, which means that the buyer firm is also pre-

pared to absorb the costs of supplier opportunism. Being sure about the buyer firm “not going anywhere” seems to automatically open doors to R&D supplier misbehavior.

With regard to the relationship between supplier opportunism and *supplier success*, we were able to confirm that opportunism lowers the supplier firm’s success. While, according to Frank (1988), the human brain has evolved to prefer near-term rewards of opportunism to long-term benefits of cooperation, supplier firms seem to be wiser in hindsight and realize that unethical behavior does not pay off in the long run.

4.5.2 Managerial implications

Our findings offer crucial guidance for managers of both buyer and supplier firms. First and most importantly, managers need to sharpen their awareness of the potential for opportunism in R&D supply relationships and the factors that promote such unethical behavior. Only knowing the dangers may enable them to anticipate unethical forms of behavior and take preventative actions.

Buyer firms, however, do not need to worry about the external uncertainty surrounding an R&D project as it is seen as a challenge by supplier firms that spurs their motivation to perform well. Things look different when considering the internal uncertainty dimension of an R&D project. Apart from recommendations such as selecting a competent partner firm with outstanding records in the required field, it is hardly possible to diminish a project’s internal uncertainty, especially if the project taps into novel grounds.

As one-sided dependencies have the potential to provoke opportunism, they are—though hardly avoidable—not a desirable state in the long run. Managers of the corresponding firms should, therefore, dedicate their efforts to balancing out disparities. Transaction cost theory provides several instruments to change a one-sided dependency into a mutual one; however, these instruments have to correspond to the specific problem of the unavoidable incompleteness of contracts in R&D collaboration. Hence, contract fines that a buyer firm would have to pay in the case of hold-up cannot be determined *ex ante* with sufficient precision. In contrast to this, it is feasible for a buyer to make supplier-specific counter-investments such as HR development measures that enable its R&D personnel to deepen the collaboration with their colleagues on the supplier side. The opportunism-driving effect of buyer-specific investments made by the supplier could also be buffered, for example, by agreeing on an extension of the cooperative relationship in the future, which would allow the supplier to recoup its investments. Such an announcement, however, has to be credible, *i.e.*, the supplier firm has to have reason to believe that there is a rational need for employing it again. Another instrument

would be the status of an exclusive supplier as this binds the buyer firm to the specific supply relationship and equalizes the supplier firm's loss of control when investing specifically. On the other hand, managers of the supplier firm should recognize that they are prone to opportunism when having invested specifically and when dealing with dependent buyer firms. Bearing in mind that by shirking they may put the relationship and, thus, the firm's long-term goals at risk, managers of the supplier firm should take a long-term perspective and engage in self-monitoring and control (Crosno et al., 2013).

While information asymmetries are a natural side effect of outsourcing relationships, they can, however, exacerbate the opportunism-problem and curtail relationship effectiveness. As monitoring faces several difficulties in R&D supply relationships (Kloyer & Scholderer, 2012), it may not be a reliable tool for overcoming information asymmetries. Besides calling for supplier firms to take a long-term perspective and engage in self-control, harmonizing both parties' interests can diminish concerns of moral hazard by sharing in the innovation return. Patent ownership shares assigned to the supplier firm are highly effective in this regard (Kloyer & Scholderer, 2012).

4.5.3 Limitations and directions for future research

Even though we believe we have tested a sound theoretical model with a reliable and valid survey instrument, every study, including this one, leaves room for improvement. In the following, we enumerate some shortcomings and unanswered questions that could be addressed in future research endeavors.

First of all, our data concerns the supplier's point of view only. Hence, future studies could question the buyer firms as well. Interviewing both sides of the dyad, however, may bring severe practical problems, as outlined in our section on sample description. It is, therefore, questionable whether attempts to survey supplier and buyer firms would provide further insights at all. Even if supplier firms demonstrate a credible willingness to reveal their buyers, researchers are advised to always carefully consider whether "going the extra mile" is not outweighed by the losses in data quality on the side of the supplier firm. Second, the surprising effect of external uncertainty on opportunism definitely deserves more empirical attention. Further research could, for example, examine more closely the circumstances under which uncertainty develops its differing effects on opportunism. Lastly, most of our respondents are German suppliers. Future endeavors could stretch beyond national borders and test if our findings are generalizable to foreign settings.

5. Paper 2: R&D collaboration between firms: Hard and soft antecedents of supplier knowledge sharing

5.1 Introduction

In order to remain competitive and master the increasing technological complexity of new products, such as their compatibility to industry 4.0 requirements, manufacturing firms are increasingly tapping into external sources of knowledge by integrating R&D supplying firms into the innovation process (Gassmann et al. 2010; Un et al., 2010).

Even though R&D outsourcing is a popular phenomenon (Arora and Gambardella, 2010; Calantone and Stanko, 2007; Gans and Stern, 2003), it has to be viewed as a double-edged sword. Using the “market” for the generation of valuable knowledge inputs certainly allows for specialization benefits, but—alongside other drawbacks such as leading to internal knowledge gaps, dependencies, etc.—it renders the outsourcing party vulnerable to moral hazard caused by its R&D supplier (Sampson, 2007).

Information asymmetries and uncertainty provide the supplier firm with ample leeway to pursue own interests at the buyer firm’s expense (Arrow, 1985; Furubotn and Richter, 2000). In R&D outsourcing relationships, this can include the deliberate extension of the project duration, the withholding of relevant knowledge, the selling of knowledge to third parties, or using it for own competitive activities (Howells et al., 2008; Kloyer, 2011; Kloyer and Scholderer, 2012; Oxley, 1997). Hence, among other things, it is the amount of knowledge shared with the buyer firm that indicates how opportunistically a supplier firm behaved throughout the cooperation process, with lower levels of knowledge sharing indicating higher levels of supplier opportunism.

Particularly if knowledge is implicit or complex, there is no guarantee of successful knowledge transfer (Sampson, 2007). Deliberately withholding efforts and thus providing an inferior knowledge output may help the supplier firm to increase own benefits, but at the same time, it calls into question the collaboration’s effectiveness. If not forced by particular circumstances, buyer firms would refrain from engaging in outsourcing if there was no way to keep the moral hazard danger caused by the R&D suppliers in check (Kloyer and Scholderer, 2012). Hence, the central question is: how can supplier misbehavior be effectively controlled for and, consequently, knowledge sharing be stimulated?

The so-called “governance mechanisms” play a pivotal role in answering this question. They represent means that help establish and coordinate exchange relationships (Heide, 1994) by lowering the incentives to behave opportunistically (Jap and Anderson, 2003). Although the academic literature on exchange theory presents numerous mechanisms that deter partner

misbehavior (for an overview, see, for example, Brown et al., 2000; Cavusgil et al., 2004; Helm and Kloyer, 2004; Jap and Anderson, 2003; Vázquez et al., 2007; Wathne and Heide, 2000), there is no consensus on their effectiveness (Achrol and Gundlach, 1999; Caniëls and Gelderman, 2010). Furthermore, most studies consider primarily extrinsic determinants of the opportunism motivation whereas little is known about the role non-extrinsic mechanisms play in this context (Kloyer, 2011; Kloyer and Scholderer, 2012). Our study will simultaneously investigate major extrinsic and non-extrinsic factors that presumably influence the willingness of R&D suppliers to refrain from opportunistic withholding of knowledge. These factors are of paramount importance from the Organization Theory perspective as well as in light of the results of our qualitative research. Some potential determinants will be examined for the first time.

Extrinsic motivation to refrain from opportunism is based on economic calculation. In the following, factors affecting extrinsic motivation will be labelled “hard” in contrast to the “soft” factors that influence the non-extrinsic motivation to transfer knowledge. Economic calculation in supply relations results mainly from three determinants. First, specific investments made in the past (during prior collaboration) lead to lower transaction costs, which rational partners ought to preserve. Second, a supplier who expects a future collaboration with the same buyer has no rational reason to weaken that buyer through opportunism. Third, detection of opportunism by monitoring would lead to direct economic disadvantage. The non-extrinsic, i.e., soft, factors that we presume will have an influence on the willingness to abstain from knowledge withholding are organizational culture, intrinsic motivation, and trust. The effects of the supplier firm’s culture and the supplier’s intrinsic motivation have not been empirically examined to date.

Besides our major attempt to examine and contrast the hard and soft determinants of supplier knowledge sharing, we also want to shed light on the question of how supplier knowledge sharing, i.e., refraining from opportunism, affects the supplier’s success. This is, to the best of our knowledge, new insofar as previous studies have majorly examined the success effects of the party affected by opportunism and of the cooperation as a whole, while little is known about the success effects for the alleged opportunist.

We conducted an empirical study based on an examination of 104 R&D supplier firms. The findings indicate that prior collaboration, organizational culture, and supplier intrinsic motivation actually drive supplier knowledge sharing whereas behavior monitoring, the collaboration perspective, and trust in the buyer firm surprisingly do not explain supplier knowledge sharing. Finally, we found that supplier knowledge sharing has a positive impact on the supplier firm’s success.

Our article is organized as follows. In Section 5.2.1, we present theoretical background on the opportunism phenomenon and its nexus with knowledge sharing. Sections 5.2.2, 5.2.3, and 5.2.4 are dedicated to deriving our hypotheses by drawing on existent literature. We present our empirical study in Section 5.3, while the study's results are outlined in Section 5.4. We conclude with a discussion of the key research findings, the managerial implications, and the study's limitations in Section 5.5.

5.2 Theory and hypotheses

5.2.1 *Supplier opportunism and knowledge sharing in R&D collaboration*

Despite the prevalence of the outsourcing phenomenon, cooperating with external partners always opens doors to relational risks such as partner opportunism (Caniëls and Gelderman, 2010, Das, 2004; Das and Rahman, 2001). While certainly not all economic actors are mean-spirited, it is almost impossible to distinguish between those that are and those that are not (Williamson, 1985; Williamson and Ouchi, 1981). Hence, partner misbehavior remains a serious threat in exchange relationships.

With its roots in transaction cost theory, opportunism is understood as “self-interest seeking with guile” (Williamson, 1975, p. 26). However, it is not the self-interest seeking itself, but the combination with dishonest behavior such as “incomplete or distorted disclosure of information, and calculated efforts to mislead, distort, disguise, obfuscate or otherwise confuse” (Williamson, 1985, p. 47) that renders the opportunism phenomenon its unethical and devious touch. As opportunism can occur before or after contract conclusion (Williamson, 1985) it is called either *ex-ante* or *ex-post* opportunism, depending on when it occurred. While either party in an R&D exchange relationship can engage in opportunistic behavior (Jap and Anderson, 2003), our study focuses primarily on a form of *ex-post* opportunism on the part of the supplier firm called moral hazard.

Supplier moral hazard is a form of passive opportunism that describes how a supplier provides the buyer firm with lower levels of quality or output than was contracted for (Wathne and Heide, 2000). By withholding efforts intentionally and delivering an inferior knowledge output, the supplier firm strives to maximize its benefits, but at the cost of the buyer firm. As behaving opportunistically is associated with withholding knowledge from the buyer, lower levels of knowledge sharing with the buyer firm indicate higher levels of supplier opportunism.

Two circumstances provide latitude for the R&D supplier to behave unethically. First, due to information asymmetries (Furubotn and Richter, 2000), the buyer can neither observe supplier

behavior during the generation of innovative ideas (hidden action) nor does the buyer firm have the necessary information to fully assess the supplied intermediate and/or final knowledge output (hidden information). Second, due to some degree of uncertainty, supplier duties cannot be specified in all detail, which leads to inevitably incomplete R&D contracts (Aghion and Tirole, 1994; Klein, 1980; Liebeskind, 1996).

But why do R&D supplier firms engage in opportunism in the first place? Suppliers may decide to hold back efforts simply because they believe it will pay off handsomely (Kloyer, 2011; Kloyer and Scholderer, 2012). Besides reaping potential profits, supplier firms may behave unethically because they fear being exploited opportunistically by their buyers through hold-up (Klein et al., 1978).

The nature of R&D collaboration definitely calls for possibilities to keep R&D supplier misbehavior in check. The different streams of organization theory provide several so-called “governance mechanisms” that allow firms to protect their outcomes and interests against partner opportunism (Jap and Anderson, 2003). Governance mechanisms are means that help establish and coordinate exchange relationships (Heide, 1994) by lowering the incentives to behave opportunistically (Jap and Anderson, 2003). Generally, we have to differentiate the following main mechanisms: (1) behavior monitoring (typically connected with extrinsic incentives); (2) non-extrinsic mechanisms such as intrinsic motivation and organizational culture; (3) incentives resulting from specific investments (shadow of the past), socio-emotional investments (relational contracting), and material investments; and (4) incentives that are based on the perspective of a future collaboration with the same partner (shadow of the future). The following sections are dedicated to deriving our model’s hypotheses.

5.2.2 Hard determinants of supplier knowledge sharing

5.2.2.1 Behavior monitoring and its influence on knowledge sharing

Monitoring is an organizational process that describes the attempt by one party to measure the other party’s effort (Heide et al., 2007). According to agency and transaction cost theory, monitoring serves as an effective mechanism to reduce partner opportunism in inter-firm exchange relationships (Bergen et al., 1992; Wathne and Heide, 2000). It is targeted at overcoming the information imbalances that are usually present in exchange relationships (Eisenhardt, 1989). This, however, implies that monitoring will not be effective if the source of opportunism is anything other than information-related (Wathne and Heide, 2000).

The opportunism-decreasing potential of monitoring can be viewed from two perspectives. From an economic perspective, monitoring the partner’s actions or outcomes increases the

chances of a defecting partner being caught and ultimately sanctioned for defective behavior (Wathne and Heide, 2000). By increasing the chances and costs of being caught, opportunism becomes less attractive. Hence, it seems plausible to assume that opportunism can be curtailed effectively by increasing investments in monitoring (Heide and Miner, 1992; Jensen and Meckling, 1976; Wathne and Heide, 2000).

Alongside this purely economic perspective, the behavioral perspective argues that monitoring may reduce opportunism and enhance compliance with norms and agreements by applying unpleasant social pressure on the party concerned (Blau and Scott, 1962; Murry and Heide, 1998; Stump and Heide, 1996). Steinle et al. (2014) took this stance in their empirical investigation of buyer-supplier-relationships and indeed found that if more monitoring mechanisms were in place, the moral hazard caused by the supplier was lower.

However, there is also empirical evidence that monitoring may have effects on opportunism that are contrary to what is predicted by agency and transaction cost theory (Anderson, 1988; Heide et al., 2007). Instead of suppressing opportunism, monitoring could actually motivate actors to behave even more unethically. The underlying rationale draws on reactance theory: curtailing a person's freedom of action or opinion through monitoring "moves a person to try to restore his freedom" (Brehm, 1972, p. 1). Activities tailored to restoring that freedom include retaliatory, self-serving behavior like opportunism (Joshi and Arnold, 1997).

Heide et al. (2007) believe the key to reconciling the opposing views on monitoring is to consider whether it is the partner's actions (behavior monitoring) or the visible consequences of the partner's actions (output monitoring) that are monitored. Whereas the latter is viewed as a more "lean back" form of control, the first risks being viewed as intrusive. In contrast to output monitoring, behavior monitoring threatens the partner's freedom to decide which and how things are done, leading to higher levels of reactance and, thus, a crowding out of cooperative behavior. The authors were able to confirm this reasoning empirically. While output monitoring helped to reduce the opportunism of the partner firm, monitoring of partner behavior led to an increase in partner opportunism (Heide et al., 2007).

Anderson (1988) originally assumed a sales manager's behavior monitoring to reduce the sales force's opportunism. The findings revealed, however, that both variables are insignificantly related. Morgan et al. (2007), on the other hand, found that supplier opportunism was less likely to occur with increasing retailer ability to monitor supplier behavior.

These differing findings call for additional insights into this issue. We follow this call by examining how buyer monitoring of supplier behavior has an impact on R&D supplier opportunism and hence the supplier firm's knowledge sharing. In line with agency and transaction cost theory, we basically presume that monitoring—regardless of type—will help to over-

come the problem of ex-post information asymmetries and hence reduce the likelihood of opportunism. However, for monitoring to unfold its opportunism-decreasing power, three conditions are necessary:

- First, there needs to be clarity in defining opportunistic behavior, given the generally fine line between serving self-interests and serving self-interests “with guile” (Williamson, 1975). This, furthermore, implies the selection of monitoring criteria that are relevant and tailored to actually detect non-compliance with norms and agreements (Anderson and Oliver, 1987).
- Second, there should be a certain degree up to which monitoring is accepted and considered appropriate by both parties of the dyad (Wathne and Heide, 2000). Otherwise, any monitoring could evoke reactant behavior on the part of the monitored partner firm.
- Third and most important, the partner firm’s behavior needs to be observable and/or the firm’s outputs need to be measurable (Kloyer, 2011; Kloyer and Scholderer, 2012).

Although the third condition is not typically fulfilled in R&D collaboration—in intransparent research even less so than in development—many buyer firms try to reduce supplier opportunism with instruments of monitoring. Therefore, we state the following hypothesis:

Hypothesis 1. Monitoring of supplier behavior by the buyer firm has a positive impact on supplier knowledge sharing.

5.2.2.2 Collaboration perspective and its influence on supplier knowledge sharing

The time horizon of an exchange relationship is also called the “shadow of the future” (SOF) (Das and Rahman, 2010). This term metaphorically expresses the nexus between current moves and future consequences (Parkhe, 1993). The SOF is a game theory concept (Axelrod, 1984) that illustrates the idea that actors would behave differently if they expected to interact with each other in the future. Thus, research suggests that the SOF plays a major role in curbing partner opportunism in exchange relationships (e.g., Artz, 1999; Axelrod, 1984; Heide and Miner, 1992).

By comparing the immediate gains from behaving unethically with the potential loss of future benefits, exchange partners that expect to deal with each other repeatedly over time evaluate carefully whether engaging in opportunism is a fruitful option. Opportunism is only attractive if the short-term benefits from cheating surpass the expected long-term benefits from continued exchange (Nagin et al., 2002; Telser, 1980).

However, continued cooperation brings about many benefits, leading to an increase in the relationship's future value. First, ongoing cooperation enhances the chances of fully amortizing relation-specific investments made by the parties (Das, 2006). Second, by setting up common routines and installing common interfaces (Deeds and Hill, 1999; Hoang and Rothaermel, 2005), the partners will be able to transact with each other more cost-efficiently (Dyer and Singh, 1998) in the future. Third, prolonged cooperation allows the partners to balance out temporary iniquities amongst them over time (Das and Rahman, 2010). By engaging in unethical behavior, however, these long-term benefits would be put at risk as the betrayed party could decide to terminate the current relationship immediately and/or to refuse to do future business with the opportunistic partner (Carson et al., 2006).

But how can prospects of prolongation now drive supplier knowledge sharing? First of all, prospects of prolonged cooperation can be viewed as a credible signal that the buyer firm has a long-term interest in the exchange relationship. Such an interest implies the forgoing of individual interests in favor of mutual benefits (Anderson and Weitz, 1992). Hence, the danger of the supplier being exploited opportunistically by the buyer firm through hold-up can be considered rather low, which in turn should equally motivate the supplier to "play by the rules" and share the necessary knowledge. The fact that the SOF actually reduces the expropriation risk inherent in specific investments could be supported partially (only for the investor but not the receiver sample) by Rokkan et al. (2003). Second, as prolonged cooperation allows the partners to punish and be punished for misbehavior (Blumberg, 2001; Heide and Miner, 1992), expectations of reciprocity should discipline the supplier firm to not engage in unethical behavior (Parkhe, 1993) but rather to share the relevant knowledge. Third, the threat of lost future benefits should be incentive enough for the supplier firm to refrain from opportunism, thus driving supplier knowledge sharing.

Several authors examined the relationship between the SOF and opportunism only indirectly by assuming that relationship extendedness will reduce the likelihood of opportunism and thus result in cooperative partner behavior and/or better cooperation performance. Drawing on this assumption, Artz (1999) and Parkhe (1993) found that the SOF led to better performance, whereas Heide and Miner (1992) confirmed that the SOF positively influences cooperative behavior.

Given our line of arguments and prior empirical research, we assume that the SOF will effectively curtail supplier opportunism and thus have a positive impact on supplier knowledge sharing. Hence, we put forth the following hypothesis:

Hypothesis 2. The collaboration perspective positively influences supplier knowledge sharing.

5.2.2.3 Prior collaboration and its influence on supplier knowledge sharing

Due to the so-called “shadow of the past” (SOP), the probability of opportunism is believed to be lower in already-established relationships than in new relationships. The SOP is a figurative term describing how prior exchange episodes have an impact upon how partners will interact in the present and the future (Deeds and Hill, 1999; Jap et al., 2013; Parkhe, 1993). It is assumed that having a shared history motivates the collaborating parties to forego individual interests in favor of joint outcomes (Jap et al., 2013; Squire et al., 2009; Uzzi, 1997).

The underlying rationale is simple: both firms have made material and socio-emotional relation-specific investments in the past that behaving opportunistically in the present would put at risk (Deeds and Hill, 1999; Luo, 2002a). To be more precise, relation-specific investments have led to the development of relation-specific skills, working routines, and practices. These skills, routines, and practices encompass knowledge about the structure and operation of the partner firm (Deeds and Hill, 1999; Luo 2002a), the refinement of partner-specific interfaces as well as conflict resolution (Hoang and Rothaermel, 2005), and communication strategies that enable the supplier to transact with the buyer firm more efficiently (Deeds and Hill, 1999; Kotabe et al., 2003; Luo, 2002a; Zollo et al., 2002). By establishing a relationship with the buyer that is characterized by commonly shared norms, mutual understanding and, at best, trust (Blau, 1964; Gulati, 1995 & 1998; Parkhe, 1993; Richards and Yang, 2007), misunderstandings and misinterpretations are less likely to occur (Zollo et al., 2002), enabling knowledge to be shared among the partner firms without friction and thus at lower costs. The cost-advantages resulting from prior relation-specific investments may lead to a competitive advantage on both sides of the dyad that neither party would want to put at risk by behaving opportunistically. Furthermore, relational concerns and the desire to maintain loyalty across organizational borders increase the “moral costs” of defection, thereby rendering opportunism less attractive (Granovetter, 1985; Jap et al., 2013).

The opportunism-decreasing effect of prior collaboration could be confirmed empirically by Luo (2007) and Parkhe (1993). Deeds and Hill (1999) found instead an inverted U-shaped relationship between the age of the relationship and perceived opportunism, “...with opportunism rising when the alliance is young and then reaching a peak and declining after some initial honeymoon period” (Deeds and Hill, 1999, p. 148).

Given our lines of argument and previous empirical findings, we assume that prior collaboration motivates the supplier to refrain from opportunism and share the relevant knowledge, which leads us to put forth the following hypothesis:

Hypothesis 3. Prior collaboration between buyer and supplier has a positive effect on supplier knowledge sharing.

5.2.3 Soft determinants of supplier knowledge sharing

5.2.3.1 Supplier trust in the buyer firm and its influence on supplier knowledge sharing

The phenomenon of trust has been widely studied across the organizational and social sciences (Ebert, 2009; MacDuffie, 2011). In economic exchange, trust is considered to be a key success factor as it lessens concerns about opportunistic behavior and reduces partner conflicts and the necessity of formal contracting (Boersma et al., 2003; Krishnan et al., 2006; Robson et al., 2008; Zaheer et al., 1998). Furthermore, trust is said to foster communication, commitment (Cullen et al., 2000; Mohr, 2004), and organizational learning (Lane et al., 2001). However, despite the attention paid to the trust phenomenon, the question of how to define it remains (Das and Teng, 2001).

Originally considered as an interpersonal phenomenon by social scientists (e.g., Deutsch, 1958; Rotter, 1967), management scholars have pointed to the considerable role inter-organizational trust may play in economic exchange (Gulati, 1995 & 1998; Sako and Helper, 1998; Zaheer et al., 1998). In contrast to interpersonal trust, where a single member of the partner organization is the object of trust, it is the partner organization as a whole that is focused on when it comes to inter-organizational trust (Laaksonen et al., 2008; Zaheer et al., 1998). As inter-organizational trust is immune to employee turnover and hence more stable than interpersonal trust, we concentrate our examination on the latter form of trust (Sako and Helper, 1998).

In the literature, trust has been viewed from two different angles. Whereas some consider trust to be a belief or a positive expectation (Blau, 1964; Pruitt, 1981; Rotter, 1967), others view trust as behavior or behavioral intention (Coleman, 1990; Deutsch, 1962; Giffin, 1967; Schlenker et al., 1973; Zand, 1972). Moorman et al. (1992) tried to bridge this gap by combining the approaches and suggesting that for trust to be present, it needs to consist of both, the belief and the behavioral intention component. Morgan and Hunt (1994) counter that trustworthiness already implicitly incorporates the intention to act and that the intention itself should not be viewed as part of the trust definition but rather as an outcome of trust. Given

that we are interested in how the tendency to trust leads to supplier knowledge sharing, we follow Morgan and Hunt (1994) and separate trust from associated behaviors. Hence, we conceptualize supplier trust in our study as an attitude, i.e., as the belief or positive expectation of the supplier firm concerning the buyer firm's trustworthiness.

A buyer firm's trustworthiness can be grounded on the evaluation of different dimensions. Here we adopt the dimensions used by authors such as Cummings and Bromiley (1996), Doney and Cannon (1997) as well as Kumar et al. (1995): honesty and benevolence. While trusting in a buyer's honesty encompasses the belief that the buyer is sincere and stands by its word, trusting in a buyer's benevolence reflects the supplier's belief that the buyer is interested in the supplier's welfare and would not do anything that could possibly harm the supplier firm, even under changing circumstances (see Kumar et al., 1995).

Trust is considered a critical element of cooperative relationships (Laaksonen et al., 2008; Luo, 2002b). By creating an understanding that the partner firms are interested in each other's welfare and would not act at each other's expense, trust eases concerns about opportunistic behavior (Zaheer et al., 1998). This in turn lowers the proclivity to guard against partner misbehavior, resulting in transaction cost savings and hence more efficient governance (Bromiley and Cummings, 1995, John, 1984, Zaheer et al., 1998). Moreover, by establishing a level of behavioral predictability and reliability (Chen et al., 2012), higher levels of trust induce positive attitudes toward the partner firm and, thus, better cooperation (Dirks and Ferrin, 2001).

Several studies have come to the conclusion that trust is, indeed, effective in reducing partner opportunism (Cavusgil et al., 2004; Liu et al., 2009; Wu et al., 2007). In the same vein, Chariki and Josserand (2008) confirmed that a loss in trust augurs higher levels of defective partner behavior. Furthermore, by curtailing the perception of unfair play and fostering the formation of close relationships (Hajidimitriou et al., 2012), trust facilitates knowledge sharing (Chen et al., 2012; Chen et al., 2014; Cheng et al., 2008).

Given the above reasoning, believing in a buyer's honesty and good intentions should lessen the supplier's concerns about being exploited opportunistically by the buyer firm through hold-up. This in turn lowers the supplier firm's incentive to behave opportunistically itself by holding back relevant knowledge. Instead, trust in the buyer firm should increase the supplier firm's impetus to knowledge sharing. Therefore, we put forth the following hypothesis:

Hypothesis 4. The supplier's trust in the buyer has a positive effect on supplier knowledge sharing.

5.2.3.2 Supplier intrinsic motivation and its influence on supplier knowledge sharing

Intrinsic motivation has been firmly established in the behavioral sciences since the 1950s (Argyris, 1964; Herzberg et al., 1959; Likert, 1961; Maslow, 1954; McGregor, 1960). Economic theories, though, acknowledge the existence of intrinsic motivators but pay no further attention to them as they are considered difficult to analyze and control (e.g. Williamson, 1975 & 1985). However, by focusing primarily on extrinsic motivation as a means to influence behavior, economic theories fail to offer explanations for why individuals contribute voluntarily, even without extrinsic incentives. Voluntary contributions are indeed results of intrinsic motivation (Simon, 1991).

Motivation is intrinsic if an individual engages in an activity for inherent satisfaction (Ryan and Deci, 2000a). Unlike extrinsic motivation, motivation that is intrinsic is not tied to monetary incentives. It is either the activity's flow (Csikszentmihalyi, 1975; Ryan and Deci, 2000a) or a corresponding end-goal (Loewenstein, 1999) that are the source of satisfaction. In our specific case, we concentrate on the activity's flow, i.e., the enjoying and challenging experiences the R&D project provides the supplier firm with.

The organizational importance of intrinsic motivation arises from its core advantages. First, intrinsic motivation positively influences the quality of work, resulting in more creative and innovative outcomes (Amabile, 1996, Ryan and Deci, 2000a; Schwartz, 1990). This should be particularly relevant for R&D supply projects. Instead of following the tried and trusted, R&D projects often require creative thinking, breaking new ground, and dealing with backlashes. Second, intrinsic motivation helps to balance out problems associated with incomplete contracts. As incomplete contracts, by definition, do not specify all relevant aspects of behavior and its desired outcomes, they may give rise to dysfunctional behavior. Intrinsic motivation helps to fill contractual gaps and align behavior towards issues that are not contractually specified (Gibbons, 1998; Prendergast, 1999). Third, the transfer of implicit knowledge can hardly be stimulated by extrinsic incentives and thus depends to a great extent on the intrinsic motivation of the people involved (Ko et al., 2005; Lin, 2007).

Individuals who are motivated intrinsically are, by nature, not only attracted to extrinsic incentives. Given that opportunism is considered a strong form of extrinsic motivation, the tendency to behave opportunistically and hold back knowledge should decrease the more intrinsically motivated individuals are. This means that an intrinsically motivated supplier firm enjoys and values working on a specific R&D project for its own sake. The supplier derives immediate satisfaction from the task itself and should have no interest in behaving unethically

by withholding relevant knowledge. Instead, his intrinsic motivation should foster knowledge sharing with the buyer firm. As a consequence, our hypothesis is:

Hypothesis 5. The supplier's intrinsic motivation has a positive effect on supplier knowledge sharing.

5.2.3.3 Organizational culture and its influence on knowledge sharing

Given its potential for driving superior performance and generating competitive advantage (Barney, 1986; Schein, 1985), the concept of organizational culture has recurrently been the subject of empirical studies during the past few decades. In the literature on cooperation, special attention was paid to the question of whether and how the cultural similarity of the allying firms influences cooperation performance (e.g., Avny and Anderson, 2008; Fey and Beamish, 2001; Pothukuchi et al., 2002). In this study, we focus, however, solely on the supplier firm's culture and analyze its impact on supplier knowledge sharing.

Casually described by Deal and Kennedy (1982, p. 4) as "the way we do things around here," organizational culture is a rather complex concept. This complexity is underlined by the variety of existing definitions (Barney, 1986). Among researchers, however, a minimum consensus has emerged that organizational culture can be referred to as a set of shared assumptions, values, and norms that are manifested in practices, behaviors, and artifacts (Hofstede, 1980; Trice and Beyer, 1993).

Within an organization, culture performs several functions, such as defining the organizational boundary (Peters and Waterman, 1982; Pfeffer, 1981; Schein, 1992), conveying organizational members a sense of identity (Pfeffer, 1981), and fostering the generation of commitment (Peters and Waterman, 1982; Pfeffer, 1981). Often referred to as "social glue" (Cartwright and Cooper, 1993; Robbins, 2001), culture creates organizational cohesiveness and, most importantly, directs and shapes organizational members' attitudes and behaviors by providing appropriate rules and standards of conduct (Pfeffer, 1981).

In research, it is the concept of values that is commonly used to understand and assess corporate culture (Hofstede, 1980; O'Reilly et al., 1991). This may be due to the fact that shared values are considered to be "...among the building blocks of culture" (Hofstede, 1980, p. 21). Values represent relatively stable, collectively held standards of what is right or wrong, acceptable or unacceptable (Andersen et al., 2014; Singh, 2009). That means values offer a set of general guidelines that regulate and unify the behavior of organizational members (Dobni et al., 2000; Morgan and Hunt, 1994; Soyer et al., 2007). At the heart of the organizational culture, values determine how firms conduct their business (Barney, 1986) and how organiza-

tional members interact with each other and with key players outside the organization (Louis, 1983).

Against this background, it is reasonable to assume that a supplier firm characterized by a “healthy,” cooperative organizational culture should refrain from any opportunistic behavior. Sound values such as fairness, collaboration, and support reinforce “correct” thinking and guide behavior when interacting with R&D buying firms. Not sharing the relevant knowledge would be contrary to the collectively held values. As a consequence, R&D supplier firms acting on sound organizational principles should be motivated to share the relevant knowledge. Even if opportunities for opportunism arise, supplier firms would not take advantage of them because “engaging in opportunistic behavior imposes psychic disutility, is punished by social sanction or is perceived to be inconsistent with their long-term best interest” (Ellig, 2001, p. 235). Hence, we propose the following:

Hypothesis 6. Cooperativeness as a feature of the organizational culture of the supplier firm has a positive effect on supplier knowledge sharing.

5.2.4 Supplier knowledge sharing and its influence on supplier success

In R&D supply relations, a supplier firm’s opportunism is majorly reflected in the amount of knowledge shared with the respective buyer. Consequently, higher levels of supplier knowledge sharing indicate lower levels of supplier opportunism. In order to understand the relationship between knowledge sharing and success, the literature on the opportunism phenomenon must be reviewed, which, however, inevitably creates the impression that unethical behavior is “bad” in any case (Hawkins et al., 2008). But is the relationship between opportunism, i.e., withholding knowledge, and success that straightforward?

To answer this question, it is necessary to clarify what type of success one is referring to: (1) the success of the opportunistic party, (2) the success of the party affected by opportunism, or (3) the success of the cooperation as a whole. From a theoretical stance (e.g., Grossman and Hart, 1986; Hart and Moore, 1988), the success effects of one-sided opportunism are clear when only looking at one cooperation episode. For (1), the effect is positive, as the opportunist can immediately reap material benefits by reducing its efforts; for (2) and (3), the effect is negative, as the other party has invested in a cooperation that ultimately does not perform as it would have in the case of bilateral specific investments.

Several empirical studies confirmed the negative influence of one-sided opportunism on the success of the affected party (2) (e.g., Dahlstrom and Nygaard, 1999; Morgan et al., 2007; Skarmeas et al, 2002; White and Lui, 2005) and the cooperation as a whole (3) (Luo, 2007;

Luo et al., 2009; Parkhe, 1993; Ting et al., 2007). What is missing, however, is empirical research on the link between opportunism and the success of the opportunistic party (1). This is surprising as this relationship is anything but trivial.

In the models of Grossman and Hart (1986) and Hart and Moore (1988), opportunism proves to be a beneficial strategy as inter-firm relationships are considered to be one-shot deals. However, the majority of real world cooperative transactions are not that short-lived (Rose, 2011). On the contrary, partners of an exchange usually aim at building and maintaining long-lasting partnerships and a reputation that attracts future business partners (Hill, 1990; Rose, 2011). Consequently, it is not necessarily the short-term material success but the exchange partner's longer-term success that matters. This long-term success, however, is at risk if they have a reputation as a cheater (Barney and Hansen, 1994; Carson et al., 2006; Hill, 1990; Pruitt, 1981). Prospective clients will most likely distance themselves from supplier firms when doubting their abilities and/or cooperative nature (Anderson and Weitz, 1989; Shapiro, 1983).

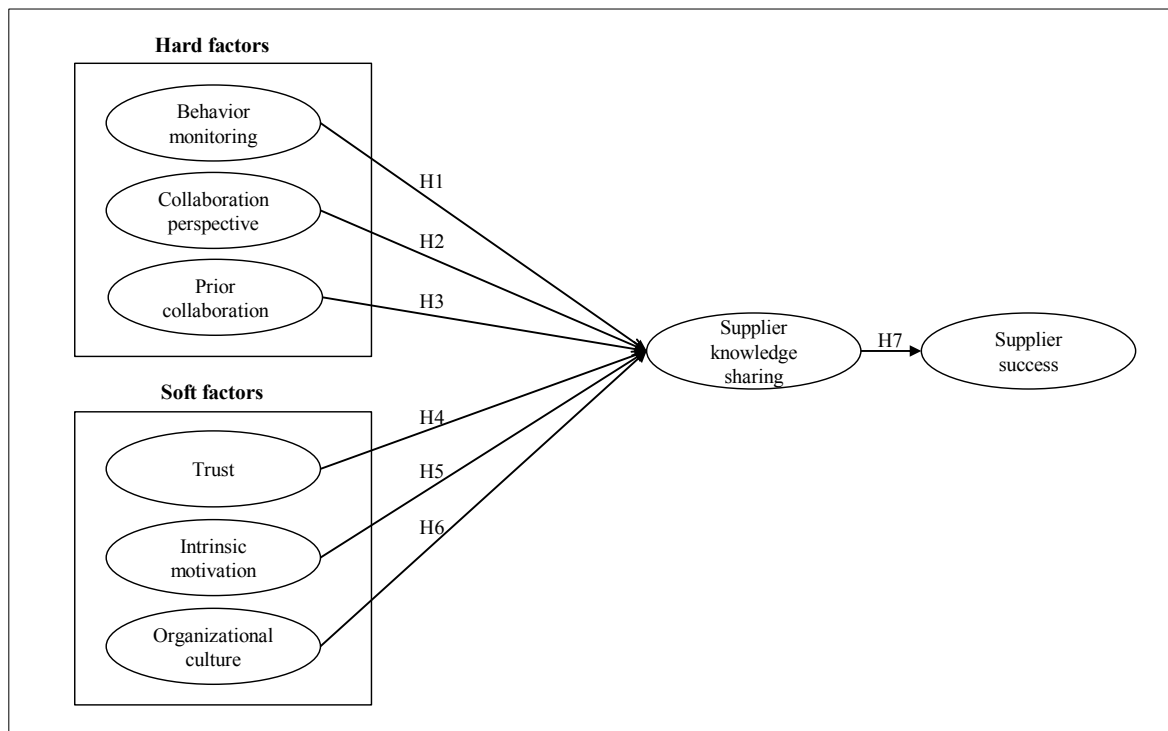
Thus, sharing the relevant knowledge and putting in the necessary effort to complete a given R&D task does not only improve the buyer's chances of creating a marketable product, it simultaneously benefits the supplier firm in terms of maintaining a flawless reputation that stimulates future business. Having a good reputation is an important measure to increase a supplier's credibility with its potential clients (Ganesan, 1994), especially when exchanging credence goods, such as R&D results.

Therefore, in the long run, supplier firms are better off not behaving opportunistically and sharing the relevant knowledge with their buyers. Given that our measures reflect the supplier's perception of success that is more strategic in nature, we assume supplier knowledge sharing to positively affect the supplier's success. Hence, we state the following hypothesis:

Hypothesis 7. The better the supplier knowledge sharing, the higher the supplier success.

The research model displayed in Figure 8 visualizes our seven hypotheses.

Figure 8. Research model



5.3 Methodology

5.3.1 Sample description

As R&D buying firms are victims of hidden action and hidden information, they are not reliable sources when assessing supplier knowledge sharing. Hence, we decided to obtain our data by surveying the R&D supplying firms instead. It is of course desirable to question the R&D buyer firms as well in order to gain additional insights into the topic; however, as with intra-firm R&D, R&D supply relationships are kept confidential. Our preliminary interviews showed that R&D supplier firms are overly reluctant to reveal their corresponding buyers. Furthermore, there is always the danger of a loss in data quality on the side of the suppliers when questioning both parties in the exchange relationship. Supplier firms that fear their information will be leaked to their buyers may be tempted to provide untrue information. Against this background, we decided to only question the supplying firms.

We surveyed R&D supplying firms from eight European countries (Germany, Switzerland, Austria, Norway, Sweden, Finland, Denmark, and the Netherlands). The firm's contacts were obtained using the ORBIS database and additional web searches. With ORBIS, we considered the industry groups "7112 - Engineering activities and related technical consultancy" and "721 - Research and experimental development on natural sciences and engineering" most

suitable to draw a sample from, as they are likely to consist to a high percentage of R&D supplying firms. Our bilingual (German and English) questionnaire was created with SoSciSurvey (Leiner, 2013), pretested with academic experts, and following refinements, made available to the participants on www.soscisurvey.com.

In April 2013, the selected companies received an e-mail that provided a short description of the study's purpose and a link to our online survey. We asked that our questions be answered by the companies' project manager who was in charge of the last, completed R&D supply project. We believe that project managers have the best insights into the R&D process and are highly familiar with the contractual, situational, and contextual features surrounding an R&D project. We assumed the average response time of our questionnaire to be no longer than 15 to 20 minutes. In order to incentivize potential respondents, we offered an overview of our study's major findings.

About four weeks after our first mail dispatch, we sent yet another mail request. We then decided to proceed with follow-up phone calls as our response quote had not been sufficient. Trained interviewers called the companies concerned, verified their suitability for the study, and asked for their support. Dialog partners who agreed to participate in our survey received another e-mail containing a short description and a link to our online-survey. In sum, we received 107 questionnaires, of which 104 could be used for further analyses. This can be considered quite satisfactory given the comparably sensitive information the respondent firms had to provide.

Table 9 shows that the respondent firms have an average age of 12 years. 86 of the 104 firms are small or medium-sized companies. Except for four cases, all firms are located in the DACH region; however, most of them are in Germany.

Table 9. Sample description

Firm location:	N = 104	Number of employees:*	N = 104	Firm age in years:	N = 103 (1 missing)
Austria	4	1-19	52	2-5	19
Denmark	2	20-99	34	6-10	28
Finland	2	100-499	15	11-20	35
Germany	89	≥ 500	3	> 20	21
Switzerland	7				

* For the purpose of conducting unifactorial analyses of variance, we decided to merge the last two groups of firms into one group, given the insufficient number of R&D suppliers employing 500 or more people.

Using unifactorial analyses of variance and non-parametric methods such as Kruskal Wallis, we tested for mean differences between the groups. Our findings did not reveal any differences between the groups of firm age and number of employees concerning our model's dependent and independent variables.

5.3.2 Construct measurement

Table 10 contains the items we used in our study to operationalize our latent variables.

Table 10. Measurements of the variables

Variable (abbrev.)	Item (abbrev.)	Items
Behavior monitoring (BM)	BM01_01	: They buyer tried to observe our work.
	BM01_02	: The buyer tried to measure our efforts.
	BM01_03	: The buyer tried to attribute intermediate and final results to our work.
Collaboration perspective (CP)	CP01_01	: When the contract was concluded, we had reason to believe that we could get an order from the same buyer firm in the near future.
	CP01_02	: When the contract was concluded, we were convinced that it would be possible to extend our collaboration with this buyer.
Prior collaboration (PC)	PC01_01	: In the past, we have closely collaborated with the same buyer firm.
	PC01_02	: In the past, we have developed a close business relationship with the same buyer firm.
	PC01_03	: In the past, we have continuously adapted our collaborational skills and techniques (e.g., workflow, communication, process management) to the specific requirements of the buyer firm.
Trust (TR)	TR01_01	: When the contract was concluded, we were convinced that the buyer firm would keep its promises.
	TR01_02	: When the contract was concluded, we were convinced that we could count on the buyer to be sincere.
	TR01_03	: When the contract was concluded, we were convinced that the buyer would provide us with accurate information.
	TR01_04	: When the contract was concluded, we were convinced that the buyer would consider our concerns in case of changing circumstances.
	TR01_05	: When the contract was concluded, we were convinced that we could depend on the buyer's support concerning important matters.
	TR01_06	: When the contract was concluded, we were convinced that the buyer would not take advantage of power asymmetries.
	TR01_07	: When the contract was concluded, we were convinced that the buyer would not take advantage of one-sided dependencies.
Intrinsic motivation (IM)	IM01_01	: Working on the R&D task within the collaboration was interesting
	IM01_02	: Working on the R&D task within the collaboration was challenging.
	IM01_03	: Working on the R&D task within the collaboration was satisfying.
	IM01_04	: Working on the R&D task within the collaboration was enjoyable.
Organizational culture (OC)	OC01_01	: Our organizational culture is characterized by sharing information freely.
	OC01_02	: Our organizational culture is characterized by fair terms of exchange.
	OC01_03	: Our organizational culture is characterized by being supportive.
	OC01_04	: Our organizational culture is characterized by working in collaboration with others.
	OC01_05	: Our organizational culture is characterized by trust in our collaboration partners.
Supplier knowledge sharing (KS _s)	KS01_01	: Our engineers and sales staff established a close relationship with our partner's staff.
	KS01_02	: We shared to full extent the knowledge that was necessary to fulfill our contractual obligations.
	KS01_03	: We tried to maximize our customer's satisfaction by the best possible knowledge sharing.
Supplier success (SS)	SS01_01	: The collaboration with this buyer has been a successful one.
	SS01_02	: The collaboration with this buyer has realized the goals we set out to achieve.
	SS01_03	: The collaboration with this buyer enabled us to compete more effectively in the marketplace.
	SS01_04	: The collaboration with this buyer strengthened our core competences.
	SS01_05	: Overall, we are very satisfied with the performance of the collaboration with this buyer.

All our variables represent reflectively-measured constructs. The items were measured on seven-point Likert scales ranging from “agree not at all” (1) to “agree completely” (7), except for the items of behavior monitoring, which were measured on seven-point Likert scales rang-

ing from “not at all” (1) to “very intensively” (7). To derive our measurement scales, we mainly drew upon prior empirical work. We pre-tested our questionnaire to refine and validate our measurement scales.

5.3.2.1 Dependent variables

The R&D supplier’s knowledge sharing and the success of the cooperation are the dependent variables in our study. To measure knowledge sharing, we employed a three-item measurement. The items were adapted from prior studies, such as those conducted by Kotabe et al. (2003) and Lawson et al. (2009). Supplier success was measured using five items adopted from several studies by, among others, Jap (1999), Kumar et al. (1995) and Saxton (1997).

5.3.2.2 Independent variables

In our empirical study, we examined the effect of six independent variables on supplier knowledge sharing. To measure behavior monitoring, we applied a newly developed three-item scale, with the items targeted at overcoming the information imbalances of hidden action and hidden information. Collaboration perspective was measured by two items similar to those used by Carson et al. (2006). We also drew on Carson et al. (2006) to measure prior collaboration and employed three similar items. For the latent variable trust, we mainly adopted the items from Kumar et al. (1995), tapping the two trust-dimensions honesty and benevolence. Even though honesty and benevolence may be theoretically distinct variables, our data pointed to the fact that honesty and benevolence are inseparable in practice. Therefore, we followed Doney and Cannon (1997) and treated trust as a unidimensional construct. In order to measure intrinsic motivation, we employed a four-item-scale based on Mossholder (1980). Organizational culture was operationalized using five items derived from O’Reilly et al. (1991).

5.3.2.3 Control variables

In order to account for confounding factors, control variables are usually included in empirical analyses. Authors such as Becker (2005) or Spector and Brannick (2011), however, advise abstaining from including control variables blindly or out of habit. Rather, their inclusion should always be driven by either theory or empirical evidence.

In our study, we decided to control for the potential influence of project importance on supplier knowledge sharing. According to transaction cost theory, supplier opportunism pays off if the benefits of such unfaithful behavior surpass the costs of being caught (Williamson, 1975

& 1985). Working on a project that is of major importance to the R&D supplier firm arguably increases the costs of being detected, which renders supplier opportunism less attractive and hence less likely to occur. As a consequence, it can be assumed that project importance positively influences supplier knowledge sharing.

We measured project importance by asking the respondents to assess the relative importance of the focal R&D project compared to other projects in the company's project portfolio, ranging from (1) "not important at all" to (7) "very important."

5.3.3 *Analyses*

We applied structural equation modeling (SEM), using SmartPLS 2.0 software to validate our measures and test our hypotheses. Partial least squares (PLS) is a variance-based, non-parametric approach that uses an OSL regression-based estimation procedure to minimize the amount of unexplained variance. PLS is most appropriate when the research emphasis is predictive in nature. Given its minimal demands on data concerning distribution, sample size, and measurement scales, it is often referred to as "soft modeling technique." While still a very young approach compared to commonly applied covariance-based techniques, PLS' popularity has increased over the last years, especially in marketing and business research (Hair et al., 2012; Henseler et al., 2009). The explorative nature of our study and our small sample size support the use of the variance-based PLS approach.

PLS-SEM results are systematically analyzed, with the measurement (or outer) models evaluated first and the structural (or inner) model afterwards. The measurement models reflect the relationships between indicator variables and constructs. As all our constructs are measured reflectively, the criteria presented in the following only pertain to the evaluation of reflective measurement models.

Reflective measurement models are assessed using three criteria: internal consistency and convergent as well as discriminant validity. For a construct to be internally consistent, the construct's composite reliability should have values of 0.60 to 0.70 (Bagozzi and Yi, 1988; Nunnally and Bernstein, 1994). Convergent validity is established on the indicator level when the factor loadings, given their significance, exceed the value of 0.70 (Carmines and Zeller, 1979) and on the construct level when the average variance extracted (AVE) is above 0.50 (Fornell and Larcker, 1981). To rule out doubts of discriminant invalidity, the square root of a construct's AVE should be higher than its highest correlation with any other construct in the model (Fornell-Larcker criterion).

With the structural model, which displays the relationships between the constructs, it is necessary to first check whether the predictor variables suffer from issues of collinearity by calculating variance inflation factors (VIF). VIF-values smaller than five indicate no problems with collinearity (Hair et al., 2014). The percentage of variance explained (R^2) is the most prominent measure to assess the structural model. Besides R^2 values, researchers should examine Stone-Geisser's Q^2 values as well. Positive Q^2 values indicate that the exogenous constructs have predictive relevance for the endogenous constructs of concern. The standardized path coefficients and their corresponding t-values provide information on the hypothesized relationships. Path coefficients can be compared by their magnitude (Hair et al., 2014).

5.4 Results

5.4.1 Common method bias

Given the above-mentioned problems associated with questioning both parties of the dyad, we collected our data on the dependent and the independent variables from one source only. Studies such as ours can, however, suffer from common method bias. To reduce the emergence of biases, we followed the recommendations of Podsakoff et al. (2003) and applied several ex-ante measures. First, we structured our questionnaire properly, allowing no conclusion on the underlying relations between dependent and independent variables. Questions on the outcome variables were asked first, followed by questions on the input variables and firm demographics. Second, we guaranteed participant anonymity and that the information provided would be used for research purposes only. Third, we asked that the questions be answered honestly and to the best of their knowledge, emphasizing that there are no right or wrong answers. To statistically assess the magnitude of a possible bias ex-post, we performed Harman's single-factor test by simultaneously conducting an unrotated exploratory factor analysis on our dependent and independent variables. The test extracted several factors, with the largest factor explaining less than 30% of the variance, indicating no threat of common method bias.

5.4.2 Assessment of the measurement (outer) model

Before evaluating the reflective measurement models using SmartPLS (Ringle et al., 2005), we applied SPSS and ran separate principal component analyses with Varimax rotation on each set of indicators to test for unidimensionality of the constructs. When measuring variables reflectively, achieving unidimensionality is a necessary condition, (Anderson and Gerbing, 1988). With loadings well above the threshold of 0.5, each set of indicators loaded on its corresponding factor, thus confirming the unidimensionality of our constructs.

To further assess the measurement models, we applied PLS-SEM analysis. Table 11 contains the PLS results for the outer models. The composite reliabilities of our measures range from 0.8399 to 0.9282, suggesting that each scale has excellent reliability. All items have significant t-values and, except for TR01_01 and IM01_02, loadings above the recommended value of 0.7. Given that TR01_01 and IM01_02 are only slightly below the requested threshold, we consider their shortfall of minor importance and our measures as valid on the indicator level. As every construct's AVE exceeds the minimum value of 0.5, convergent validity is supported on the construct level as well. Furthermore, we compared the square root of each construct's AVE with the construct's highest correlation with any other construct in the model to rule out doubts of discriminant invalidity. We could not find any indication of discriminant invalidity regarding our constructs.

Table 11. Results of the reflective measurement model

Latent variable	Indicators	Outer loadings	T-statistics	Composite reliability	AVE	Discriminant validity
Behavior monitoring	BM01_01	0.827	2.792	0.8775	0.7049	Yes
	BM01_02	0.849	2.948			
	BM01_03	0.843	2.981			
Collaboration perspective	CP01_01	0.927	21.756	0.9282	0.8661	Yes
	CP01_02	0.935	19.306			
Prior collaboration	PC01_01	0.900	22.289	0.9041	0.7592	Yes
	PC01_02	0.912	21.710			
	PC01_03	0.797	13.491			
Trust	TR01_01	0.690	6.668	0.9201	0.6227	Yes
	TR01_02	0.785	10.833			
	TR01_03	0.821	16.508			
	TR01_04	0.780	9.674			
	TR01_05	0.782	8.875			
	TR01_06	0.821	10.703			
	TR01_07	0.836	11.560			
Intrinsic motivation	IM01_01	0.835	15.309	0.8869	0.6643	Yes
	IM01_02	0.681	6.422			
	IM01_03	0.885	22.254			
	IM01_04	0.845	17.745			
Organizational culture	OC01_01	0.827	22.050	0.9169	0.6886	Yes
	OC01_02	0.820	20.803			
	OC01_03	0.878	28.064			
	OC01_04	0.768	12.470			
	OC01_05	0.853	25.234			
Supplier knowledge sharing	KS01_01	0.739	11.109	0.8399	0.6370	Yes
	KS01_02	0.853	22.346			
	KS01_03	0.799	17.748			
Supplier success	SS01_01	0.901	22.328	0.9271	0.7191	Yes
	SS01_02	0.901	23.692			
	SS01_03	0.787	9.154			
	SS01_04	0.737	7.916			
	SS01_05	0.899	20.280			

$t > 1.65$, $p < 0.10$; $t > 1.96$, $p < 0.05$; $t > 2.57$, $p < 0.01$

5.4.3 Assessment of the structural (inner) model

First, the structural model was checked for collinearity problems. This was done by calculating VIF-values for each predictor variable in SPSS using the latent variable correlations provided by SmartPLS. Since all VIF-values are well below the critical cut-off of five, collinearity is not considered an issue in our study.

Table 12 shows the results of our inner model estimation, comprising the endogenous variables' R²- and Q²- values, the path relationships, and their corresponding t-values.

Table 12. Results of the structural model

Predicted variable	Predictor variable	Hypothesis	Without control path		With control path project importance	
			Path	T-value	Path	T-value
Hypothesized paths						
Supplier knowledge sharing	Behavior monitoring	H1	0.095	1.368	0.101	1.410
	Collaboration perspective	H2	0.094	1.072	0.098	1.095
	Prior collaboration	H3	0.274	2.984	0.272	2.908
	Trust	H4	0.091	1.272	0.091	1.267
	Intrinsic motivation	H5	0.141	1.924	0.164	2.098
	Organizational culture	H6	0.451	5.762	0.450	5.606
Supplier success	Supplier knowledge sharing	H7	0.413	3.717	0.413	3.732
Control path						
Supplier knowledge sharing	Project importance				-0.047	0.607
Variance explained						
Supplier knowledge sharing			R ² = 0.528		R ² = 0.530	
Supplier success			R ² = 0.171		R ² = 0.171	
Predictive relevance						
Supplier knowledge sharing			Q ² = 0.2986		Q ² = 0.3311	
Supplier success			Q ² = 0.1210		Q ² = 0.1210	

t > 1.65, p < 0.10; t > 1.96, p < 0.05; t > 2.57, p < 0.01

As revealed in Table 12, Hypothesis 1, implying a positive effect of behavior monitoring on supplier knowledge sharing, cannot be supported. The path-coefficient is close to zero and not significant ($\beta = 0.095$; n.s.). Contrary to our expectations, there is also no significant relationship between collaboration perspective and supplier knowledge sharing ($\beta = 0.094$; n.s.). Hence, Hypothesis 2 has to be rejected as well. Hypothesis 3, indicating a positive impact of prior collaboration on supplier knowledge sharing, is supported ($\beta = 0.274$; $p < 0.01$). Supplier trust in the buyer shows no significant impact on supplier knowledge sharing ($\beta = 0.091$; n.s.). Hence, Hypothesis 4 has to be rejected. As stated in Hypothesis 5, intrinsic motivation has a significant positive effect on supplier knowledge sharing ($\beta = 0.141$; $p < 0.10$), which leads us to accept Hypothesis 5. The positive relationship between organizational culture and supplier knowledge sharing stated in Hypothesis 6 is supported as well ($\beta = 0.451$; $p < 0.01$). For the impact of supplier knowledge sharing on supplier success, we found a significant positive effect ($\beta = 0.413$; $p < 0.01$). Hence, Hypothesis 7 is supported. As to our control variable relative project importance, there is no significant relationship with supplier knowledge sharing ($\beta = -0.047$; n.s.).

Altogether, we could confirm four of our seven hypotheses. As can be seen from the standardized path coefficients, organizational culture has the strongest impact on supplier knowledge sharing, followed by prior collaboration. Intrinsic motivation, on the contrary, has the smallest effect on supplier knowledge sharing.

The overall model explains 52.8 percent of the variance in supplier knowledge sharing and 17.1 percent in supplier success. These R^2 -values can be considered satisfactory given the complexity of the knowledge sharing phenomenon and the multifaceted nature of the supplier success.

The Stone-Geisser's Q^2 values are with 0.2986 for supplier knowledge sharing and 0.1210 for supplier success larger than 0, which confirms the models' overall predictive relevance. An inclusion of our control variable in the model does neither lead to a significant increase in the R^2 - nor Q^2 -coefficients of supplier knowledge sharing or supplier success.

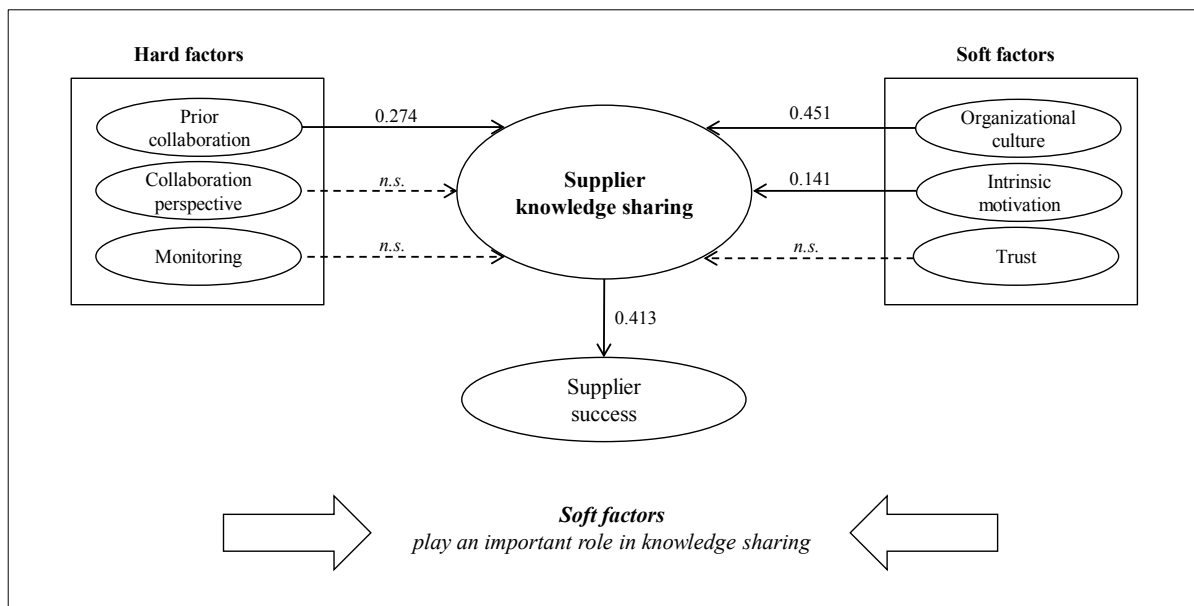
5.5 Discussion and conclusion

5.5.1 Discussion of the key research findings

In our study, we examined which factors determine supplier knowledge sharing. Knowledge, as the exchange good in R&D supply collaboration, is often not shared properly with the buyer firm due to opportunistic behavior of the supplier. Hence, the amount of knowledge shared with the buyer can be taken as a proxy of how opportunistically a supplier behaved throughout the cooperation process, with lower levels of knowledge sharing indicating higher levels of supplier opportunism.

Given its devious nature and its assumed detrimental impact on performance (Dahlstrom and Nygaard, 1999; Luo et al., 2009; Parkhe, 1993; White and Lui, 2005; Williamson, 1985), it appears inevitably necessary to reduce the potential of opportunistic behavior in collaborative relationships and boost the knowledge sharing efforts of the supplier through the use of governance mechanisms.

We extended earlier work on governance mechanisms by focusing on “soft” determinants that, except for trust, have not been considered so far. These “soft” determinants were complemented and contrasted by several “hard” factors that are considered crucial by organization theory and experts from management practice. Our results are nothing short of remarkable as they reveal the strong impact “soft” factors have and, thus, emphasize the need for theory and practice to embrace such non-extrinsic determinants more tightly in the future. Figure 9 summarizes our study's findings.

Figure 9. The influence of hard and soft factors on supplier knowledge sharing

As can be seen from Figure 9, it is the supplier firm's organizational culture that has the strongest influence on supplier knowledge sharing. By promoting and reinforcing "right" thinking and adequate behavior, a firm's shared mental assumptions shape organizational members' attitudes and decision-making. Once transmitted through the organization and acknowledged by all organizational members, values function as guiding principles that result in collective behaviors. Hence, a supplier firm that is characterized by strong values such as cooperation, fairness, and support will act correspondingly when interacting with third parties, e.g., by sharing the necessary knowledge. This should hold especially true for people working in the supplier company for a longer time as they have already internalized the company's values.

No less important for supplier knowledge sharing seems to be another soft factor: the supplier firm's *intrinsic motivation*. In line with our reasoning, our results indicate that higher intrinsic motivation leads to higher supplier knowledge sharing. Individuals who are intrinsically motivated derive satisfaction from fulfilling the task itself and are, thus, automatically immune to external stimuli that result from the opportunistic withholding of knowledge. Knowledge is created by individuals and largely stored in their heads (Beazley et al. 2002; Wah 1999). Hence, for knowledge to be shared it requires the peoples' willingness to share. According to our results, this willingness to share seems to play an important role even beyond organizational borders, thus turning intrinsic motivation into an inter-organizational phenomenon.

What really surprised us is the fact that supplier trust does not seem to be as important to knowledge sharing as stated in prior work, given the insignificant effect in our study. Bakker et al. (2006), who examined the role of trust in new product development teams, consider the

effect of trust on knowledge sharing as highly overrated. Given our result, we have to carefully review the role trust plays in R&D supply contexts. Like Bakker et al. (2006), we assume that trust may be a condition for but not a driver of knowledge sharing. While the absence of trust may hamper supplier knowledge sharing, its presence has only limited effects. Speaking in terms of Herzberg et al. (1959), trust does not seem to be a motivator but rather a hygiene factor.

When it comes to the hard factors, which are depicted on the left side of Figure 9, only prior collaboration seems to drive supplier knowledge sharing. Mutual material and socio-emotional investments of the buyer and the supplier firm allow the partners to share knowledge more efficiently and thus, to transact with each other at lower costs. More efficient knowledge sharing may in turn lead to competitive advantages that the supplier firm would put at risk by behaving unethically. This motivates the supplier to satisfy and strengthen the buyer firm by sharing the relevant knowledge. The positive effect of prior collaboration may, however, only prevail if the employees at both organizations remain more or less the same. When major employees leave the organizations, so do the established bonds and routines.

Neither *behavior monitoring* nor the *collaboration perspective* show a significant positive influence on supplier knowledge sharing. Regarding the latter, it can be assumed that effective knowledge sharing requires more than the willingness to strengthen the current and future buyer. Apparently, it is the common knowledge sharing practice in prior collaboration episodes that is decisive. Behavior monitoring, on the other hand, is confronted with two major problems. Firstly, monitoring across organizational borders needs to overcome issues of physical distance. Secondly, and most importantly, the R&D process is characterized by opacity, which hampers the observation of supplier behavior. These obstacles seem to curb the effectiveness of behavior monitoring in detecting opportunism and spurring supplier knowledge sharing. Our finding is in line with Kloyer and Scholderer (2012), who found that milestone payments are an ineffective governance mechanism in R&D supply relationships.

Concerning the relationship between *knowledge sharing* and supplier success, our findings indicate that higher supplier knowledge sharing leads to higher perceived success of the supplier firm. While reaping short-term material benefits may be tempting, supplier firms seem to realize that withholding efforts does not pay off in the long run. Only by sharing the relevant knowledge with their buyers can R&D supplier firms increase their chances of establishing long-lasting partnerships and building a reputation as a loyal business partner. This in turn will help ensure the supplier firms' continued existence and their financial well-being.

5.5.2 *Managerial implications*

Having explored the determinants of knowledge sharing, our results allow recommendations to be derived for managers of R&D buyer as well as R&D supplier firms. Most remarkable is certainly the decisive role “soft” factors play in determining R&D supplier knowledge sharing. This implies that the management of R&D outsourcing is a complex and challenging undertaking that requires an exceptional focus on the “human element” for it to be successful. The sole focus on mechanisms that are easy to measure and implement is short-sighted and may eventually prove insufficient. In order to create successful R&D supply relationships, managers also need to zoom in on less tangible “soft” factors. With the supplier firm’s organizational culture having the strongest impact on knowledge sharing, R&D buyer firms are strictly advised to always keep a watchful eye on a company’s value system in the course of partner selection. Tracking the supplier firm’s cooperation history, visiting supplier facilities, supplier audits as well as face-to-face-communication may help to gain first impressions on the basic principles that guide supplier behavior. It is highly advisable to engage with the people who have a long employment history at the supplier firm. They have already internalized the firm’s values and norms and can provide reliable information about how business with external partners is handled. As a firm’s values are, however, mostly below the line of visibility (Schein, 1985), it is also the supplier’s responsibility to make the firm’s core values visible to third parties through words and actions. This can include sending credible signals of good faith and intentions, and implementing rules and procedures that provide a predictable structure (Deeds and Hill, 1999). In this way, the supplier firm can enhance its chances of being selected as a collaboration partner.

A supplier’s intrinsic motivation has proved to be another important “soft” driver of knowledge sharing in R&D collaboration. While intrinsic motivation is always given voluntarily, one might wonder whether there is a way of stimulating this kind of motivation. Widely considered a tool that is hard to manage (Kloyer, 2011; Kloyer and Scholderer, 2012; Lewis, 2013), we are convinced that a buyer firm can make important contributions to the development of a supplier firm’s intrinsic motivation. That which is called empowerment in management literature should be applicable to the context of inter-firm R&D collaboration as well. As it is assumed that people who feel self-determined and believe their work to be meaningful are more intrinsically motivated (Deci et al., 1999, Ryan and Deci, 2000b), we recommend that R&D buyers regularly revise their implemented control structures in order to not hamper the development of supplier intrinsic motivation. A too close monitoring of the supplier firm can be detrimental as it may “crowd out” the intrinsic reason for undertaking a

task for its own sake. Furthermore, it can be interpreted as a signal of distrust and provoke opportunism instead of compliance (Frey, 1993; Lewis, 2013). In order to provide fertile ground for supplier intrinsic motivation to flourish, buyer firms should grant their R&D suppliers more decision-making autonomy in the R&D process (Reeve, 2009; Reeve and Jang, 2006; Ryan and Deci, 2000a).

When cooperating for the first time, however, a buyer firm cannot perceive a supplier firm's organizational culture easily or know whether the supplier has fulfilled previous contracts out of intrinsic motivation (Kloyer, 2011, Kloyer and Scholderer, 2012). Against this background, we suggest that collaborating with a familiar supplier firm can diminish a buyer firm's doubts concerning the supplier firm's lived values and working attitudes. While partner selection for future outsourcing endeavors should certainly always be oriented towards the buyer firm's specific resource needs (Hitt et al., 2000), a buyer firm is, however, well advised to always consider the pool of prior partners first. This may not only save search costs, but it also diminishes the threat of opportunism associated with new partners (Gulati and Gargiulo, 1999; Podolny, 1994) and, most importantly, result in knowledge being shared efficiently.

Even though the role of trust in supplier knowledge sharing seems to be limited to being a condition and not a driver, we recommend that outsourcing partners actively invest in trust-building measures from the outset for two reasons. Firstly, an absence of trust or even mistrust can hamper knowledge sharing with the buyer firm (Bakker et al., 2006). Secondly, trust can create a positive collaboration atmosphere that may provide fruitful ground where supplier intrinsic motivation can evolve.

The non-effectiveness of behavior monitoring underlines that the outsourcing of R&D seems to be inevitably linked to problems in observing and/or assessing work across organizational borders. Although widely applied in practice, we strongly advise R&D buyer firms against relying on behavior monitoring when controlling for R&D supplier moral hazard. It is not only ineffective in driving supplier knowledge sharing but might, in the worst case, even impede the development of supplier intrinsic motivation—an important prerequisite for knowledge sharing.

5.5.3 Limitations and directions for future research

Although we believe we have tested a sound theoretical model using reliable and valid measures, our study is subject to several limitations that should be addressed in future research endeavors. In the following, we will provide our study's constraints and pave avenues for further research.

First, our findings revealed that the impact of supplier trust on supplier knowledge sharing is rather limited. This finding should be explored more deeply, whereby special attention should be granted to the indirect effects of trust on knowledge sharing. Second, data were obtained from the supplier's side only. Thus, collecting data from both supplier and buyer firms might seem preferable in order to gain deeper insights into the topic; however, we learned in preliminary discussions that supplier firms refused to reveal their business partners. Even if supplier firms are willing to unveil their buyer firms, researchers are advised to carefully consider whether there is merit in surveying both parties of the dyad by taking into account the potential loss of data quality on the side of the supplier firms. Lastly, our sample consists, to a high percentage, of German suppliers, which leads us to question the generalizability of our results across national borders. Future endeavors could devote their efforts to examining the influence of cultural aspects on knowledge sharing.

6. Paper 3: Sources of trust and intrinsic motivation in R&D supply relations

6.1 Introduction

Collaboration in R&D is a highly prevalent phenomenon (Arora and Gambardella, 2010; Calantone and Stanko, 2007). This results from several phenomena, including the fact that single firms are more often faced with an increased complexity of product innovations that they can no longer master alone (Gassmann, Enkel and Chesbrough, 2010; Un, Cuervo-Cazurra and Asakawa, 2010) as well as the possibility of using collaboration in the form of simultaneous engineering to speed up research and development processes (Kloyer and Helm, 2008), which is an indispensable necessity because of shorter technology and product life cycles. However, an R&D supplier firm will neither enter a supply relationship (if it is not forced to do so for economic reasons) nor will it be motivated during the collaboration if it anticipates opportunistic buyer behavior. The kind of buyer opportunism that is possible in R&D supply relations is the danger of hold-up, which is caused by one-sided buyer-specific investments of the supplier (Klein, Crawford and Alchian, 1978). Therefore, it is highly important for the practice of R&D management to examine under which circumstances the supplier does not anticipate hold-up, i.e., under which circumstances the supplier develops trust in the buyer.

Yet, finding the preconditions of supplier trust is not only a topic for management practice, but it is also relevant from the perspective of organization theory. Certainly, the general importance of inter-organizational trust generation has often been mentioned, e.g., by Claro and Claro, 2008; Das and Teng, 2001; Lane, Salk and Lyles, 2001; Mohr, 2004; Morgan and Hunt, 1994; Zaheer, McEvily and Perrone, 1998. Until now, however, the main focus of empirical research in this field has been on the consequences of trust (Gulati and Sych, 2008), whereas the empirical findings on the preconditions of trust are fragmentary, especially for the specific case of R&D supply relations. Moreover, until now, the research on the generation of inter-firm trust has not sufficiently considered the perspectives of new institutional economics and game theory. We will use the insights of these theories not only with regard to our selection of potential trust determinants but also concerning the operationalization of the dependent variable of trust itself. Concretely, we will concentrate on the independent variables of collaboration perspective, prior collaboration, buyer dependence, and the organizational culture of the supplier. Although collaboration perspective and prior collaboration received scholarly attention in the past (Deeds and Hill, 1999; Gulati, 1995; Gulati and Sych, 2008; Poppo, Zhou and Ryu 2008; Young-Ybarra and Wiersema, 1999), corresponding empirical findings are scarce and inconsistent. As for the organizational culture of the supplier

and the buyer dependence, we are, to the best of our knowledge, the first to examine their role in R&D supplier trust building.

In addition to this first purpose of the article, we seek to explore whether and how trust has an impact on the supplier's intrinsic motivation. We deliberately focus on this question because of the specific problems facing the management of an R&D supply relationship. Both research and development collaboration—research more than development—require the transfer of tacit knowledge that cannot be observed and can therefore not be steered by classic incentives (see, e.g., Kloyer, 2011, Kloyer and Scholderer, 2012). Thus, intrinsic motivation of the supplier seems to be an almost indispensable precondition for the transfer of tacit knowledge (Ko, Kirsch and King, 2005; Lin, 2007). While, by its very nature, intrinsic motivation is always voluntary, we suggest that supplier intrinsic motivation is more likely to evolve in a trusting atmosphere. Despite the growing body of literature on the positive effects of trust, little is known about how trust and intrinsic motivation interrelate.

We attempt to fill this gap by throwing light on this under-researched issue. Hereby, we also address the question of whether intrinsic motivation is not only an intra- but also an inter-organizational phenomenon.

Our empirical study is based on an examination of 104 supplier firms. The findings show that trust does indeed provide fertile conditions for supplier intrinsic motivation to evolve. But where does supplier trust come from? According to our research results, it is the expectation of a prolongation of the relationship as well as the organizational culture of the supplier firm that boost supplier trust, whereas prior collaboration and buyer dependence surprisingly do not significantly affect trust. We believe that our findings add to prior research by providing new insights into a highly relevant topic.

This article is organized as follows: The next section provides the theoretical basis of our empirical study by briefly presenting the trust phenomenon and describing the role buyer opportunism plays in supplier trust building. Drawing on existent literature, the subsequent section is then dedicated to developing our hypotheses on possible sources of supplier trust and the impact of trust on supplier intrinsic motivation. Our empirical study follows, and the results, managerial implications, and the study's limitations are then discussed in the article's last section.

6.2 Theory

6.2.1 *Supplier trust in the buyer firm*

The concept of trust enjoys great popularity in several disciplines, which is underlined by the huge amount of literature on the topic (see, e.g., Brinkhoff, Özer and Sargut, 2015; Dietz and Den Hartog, 2006; Laaksonen, Pajunen and Kulmala, 2008; Paliszkievicz, 2011; Zhong *et al.*, 2014). Economists consider trust to play an important role in economic relations because it substitutes governance mechanisms such as monitoring and formal contracts that would cause transaction costs (Claro and Claro, 2008; Das and Teng, 2001; Zaheer *et al.*, 1998). Furthermore, trust is said to reduce the incidence of conflict (Zaheer *et al.*, 1998) and encourages communication, commitment (Cullen, Johnson and Sakano, 2000; Mohr, 2004, Morgan and Hunt, 1994), and organizational learning (Lane *et al.*, 2001).

However, despite all the euphoria about trust, there is no consensus on its definition (Das and Teng, 2001). Instead, a colorful potpourri of different trust definitions exists (see Claro and Claro, 2008). In the following, we will gradually develop how we understand and use trust throughout this study by considering different aspects: levels of trust, forms of trust, attributes of trustworthiness, and the role of calculativeness in trust.

While trust can exist at multiple levels such as the organizational, group, or individual level (Das and Teng, 2001), we focus on the inter-organizational level only by examining what leads a supplier firm to trust its buyer firm. Although there is some disagreement in the literature on whether organizations can be targets of trust (see Doney and Cannon, 1997), we follow researchers such as Zaheer *et al.* (1998) and emphasize that firms can be recipients as well as donors of trust. Inter-organizational trust can therefore be described as the amount of trust the members of the supplier firm place in their buyer firm.

According to its form, trust is viewed from two different angles by researchers. Whereas some consider trust to be a set of beliefs or positive expectations concerning the partner's trustworthiness (Blau, 1964; Boon and Holmes, 1991; Lewicki, McAllister and Bies, 1998; Rotter, 1967; Whitener *et al.*, 1998), others instead view trust as an intention (Cook and Wall, 1980; McAllister 1995) or action (Coleman, 1990; Deutsch, 1962; Zand, 1972). Researchers such as Moorman, Zaltman and Deshpande (1992) suggest hybrid trust definitions, encompassing both the belief and behavioral component. They argue (p. 315): "...if one believes that a partner is trustworthy without being willing to rely on that partner, trust is limited." Morgan and Hunt (1994), however, criticize the redundancy in Moorman *et al.*'s approach as, to their mind, the belief in someone's trustworthiness already covers the intention or willingness to act correspondingly. In our study on buyer-supplier relationships, we join Morgan and Hunt

(1994) and separate trust from associated behaviors by specifying supplier firm trust as the belief (a quite central attitude in consumer research) or positive expectation concerning the buyer firm's trustworthiness.

A buyer's trustworthiness can rest on the evaluation of different attributes. We follow researchers such as Doney and Cannon (1997) or Kumar, Scheer and Steenkamp (1995) and adopt the attributes honesty and benevolence as we consider them most appropriate for our research endeavor. Honesty reflects a buyer firm's inclination to be sincere and to stand by its words, whereas benevolence mirrors the buyer's concern for the supplier firm's welfare (see Kumar *et al.*, 1995).

While there is no disagreement on the fact that trust can vary in intensity (Williams, 2001), opinions diverge on whether calculativeness should play a role in a trust definition. Trust that is calculative is given out of a rational, well-deliberated inference (Dietz and Den Hartog, 2006; Gulati, 1995; Nooteboom, 2002; Rousseau *et al.*, 1998). It is general in nature and based on transaction expectations (Bhattacharjee, 2007). Grounded on the assumption that the exchange partner always acts in its own self-best interest and thus will refrain from harming itself (Gefen, Karahanna and Straub, 2003), calculative trust emerges when the outcome of the partner's intended action is beneficial for the trustor (Schoder and Haenlein, 2004). Accordingly, a supplier firm would have trust in a buyer firm if the supplier firm can, with some certainty, rule out doubts about buyer misbehavior, simply because buyer misbehavior would be contrary to the buyer firm's best interest.

In contrast to this, non-calculative trust is trustee-specific (Bhattacharjee, 2007) and characterized by strong beliefs in the buyer's good faith and intentions. It is based on the assumption that the buyer's trustworthy behavior does not result from sheer self-interest. Non-calculative trust emerges among partners gradually over time (Gulati, 1995; Parkhe, 1993; Rousseau *et al.*, 1998) and rests on the development of social relationships and positive past experiences (Ring, 1996; Young-Ybarra and Wiersema, 1999). It includes learning about the partner's motives and inclinations as well as identifying with him (Lewicki and Bunker, 1996; Shapiro, Sheppard and Cheraskin, 1992).

While some argue calculative trust should not be considered to be real trust (e.g., Dietz and Den Hartog, 2006; Miller, 2001; Williamson, 1993a), others suggest that in order to draw a complete picture of the trust phenomenon, both calculative and non-calculative elements should be incorporated (Bromiley and Cummings, 1995; McEvily, Perrone and Zaheer, 2003). We believe that trust, particularly in economic exchange, always encompasses some element of calculation (see Lane, 2000). Hence, in order to account for the broad phenomenal

and experimental basis of trust, we consider it necessary to include rational (calculative) and relational (non-calculative) reasons for trust in our framework.

In our definition, we view supplier trust as the positive belief or expectation of members of the supplier firm concerning the buyer firm's honesty and benevolence based on either calculative or relational reasons.

In conjunction with our explanations on calculative trust, we have already mentioned that we expect the anticipation of buyer (mis-)behavior by the supplier to play a crucial role in supplier trust building. This is why we will briefly present the phenomenon of buyer opportunism and its interaction with supplier trust in the following section.

6.2.2 Buyer opportunism and its role in supplier trust building

Partner opportunism is considered to be one of the major threats to collaborative relationships (Caniëls and Gelderman, 2010; Das, 2004; Das and Rahman, 2001) as it has a detrimental impact on relationship performance (Luo, Liu and Xue, 2009; Parkhe, 1993), relationship quality (Katsikeas, Skarmelas and Bello, 2009; Parkhe, 1993), and transaction costs (Dahlstrom and Nygaard, 1999; White and Lui, 2005; Williamson, 1985). Rooted in transaction cost theory, opportunism can, according to Williamson (1975, p. 26), be described as "self-interest seeking with guile." Self-interest seeking itself is by no means unethical but rather an inherent aspect of economic activity. It is the issue of "guile" that gives the opportunism phenomenon its particular devious touch (Jap *et al.*, 2013).

Opportunism, which may take several forms (Wathne and Heide, 2000), can, following transaction cost theory, be distinguished according to the point of time it occurs (Williamson, 1985). Opportunism that appears before contract conclusion is called ex-ante opportunism, whereas opportunism that occurs after the partners have agreed on a contract is referred to as ex-post opportunism. Either party in an R&D exchange relationship can engage in opportunism (Cavusgil, Deligonul and Zhang, 2004; Jap and Anderson, 2003). We focus, however, on ex-post opportunism of the buyer firm because it is the assumption and anticipation of buyer (mis-) behavior that influences supplier trust (building).

A special variety of ex-post buyer opportunism is buyer hold-up. Originally coined by Goldberg (1976b), the term "hold-up" describes situations in which a buyer firm seeks to appropriate the so-called quasi-rent (Klein *et al.*, 1978). In contrast to other forms of ex-post opportunism such as moral hazard, hold-up is not the result of information asymmetries but rather a consequence of buyer-specific investments and thus one-sided dependencies on the part of the supplier. Particularly at the beginning of an exchange-relationship, it is the supplier firm that

has to make high ad-hoc investments in buyer-specific assets such as laboratory equipment (Kloyer, 2011) or employee training. Outside this specific exchange relationship, such investments would lose dramatically in value, causing the supplier firm to be dependent on its buyer. An opportunistic buyer firm could now exploit the dependent supplier by either renegotiating the price (Tirole, 1986) or refusing to pay or serve Alchian and Woodward (1988), which is called “quasi-rent appropriation” (Klein *et al.*, 1978). For the buyer firm, however, opportunistic behavior is only profitable if the benefits of such deceitful behavior surpass the costs associated with it (Williamson, 1975, 1985, 1993a).

According to Kloyer (2011) and Kloyer and Scholderer (2012), supplier firms that anticipate the hold-up risk may become motivated to behave opportunistically themselves. Furthermore, and most important for our study, we believe that a supplier expecting to be a victim of buyer opportunism will most certainly have no trust in a buyer firm. Hence, for our theoretical view on trust sources, it is necessary to always consider whether buyer opportunism may pay off. Only if the supplier firm can, with some certainty, “exclude” buyer misbehavior, may it have (a calculated) confidence in the buyer firm’s trustworthiness. The latter underlines our decision for a wide definition of trust that also encompasses calculative elements.

But ultimately, what are the determinants of supplier trust? In the following section, we explain why we concentrate on the four potential determinants collaboration perspective, prior collaboration, supplier organizational culture, and buyer dependence.

6.2.3 Supplier trust from the perspective of new institutional economics and game theory

From the perspective of new institutional economics, the preferred instrument against hold-up is the assertion of one’s contractual claims in court. However, R&D contracts are inevitably incomplete (e.g., Aghion and Tirole, 1994; Grossman and Hart 1986; Hart and Moore 1988; Klein, 1999; Kloyer, 2011; Kloyer and Helm, 2008; Liebeskind, 1996, Tripsas, Schrader and Sobrero, 1995). In this situation, transaction cost theory provides the instrument of the hostage (Klein, 1985; Williamson, 1983). This means that a buyer that is in a position to conduct a hold-up would refrain from doing so if the supplier would have received a hostage from the buyer. A hostage can consist of any material or immaterial asset that would be valuable for the buyer (Kloyer, 2011; Kronman, 1985). This means that there is a wide range of potential hostages, such as contractual penalties, reputation, etc. However, we will concentrate on the kind of hostage that occurs automatically when a supply relation lasts for some time. This is the phenomenon of relational contracting (Macneil, 1978) that describes the fact that the col-

laboration partners make two-sided specific investments by learning each other's strengths and weaknesses etc. Thus, we will examine the effect of *prior collaboration* on supplier trust. As a "shadow of the past" might exist (see, e.g., Parkhe, 1993; Poppo *et al.*, 2008), there is also the possibility of a "shadow of the future" (Telser, 1980). This is what game theory predicts (Axelrod, 1984). To put it simply, a supplier would have no reason to expect damaging hold-up from its buyer if that buyer wants to extend the collaboration. Damaging a partner would not make sense in case of an interest in future collaboration with the same partner (Axelrod, 1984; Heide and Miner, 1992; Nagin *et al.*, 2002; Telser, 1980). Therefore, we will analyze the effect of the *collaboration perspective* on supplier trust.

We have argued that a supplier firm that receives hostages from the buyer firm in the form of specific investments in relational contracting should trust its buyer. The underlying reason is that these specific investments result in the buyer firm becoming dependent on the supplier firm. Yet, dependency can also result from circumstances other than specific investments (see, e.g., Emerson, 1962; Pfeffer and Salancik, 1978). Particularly on R&D markets, there are often no or only few alternatives to a specific collaboration partner. Therefore, we will also examine the effect of this kind of *dependency* on supplier trust.

Finally, for several reasons, we will look at the potential trust determinant of *organizational culture*. The reason for this is that we have substantial qualitative evidence that the culture of R&D suppliers might differ for certain general norms and attitudes that could have an impact on the trust in their buyers. Hereby, we maintain our perspective of new institutional economics, which not only deals with explicit contractual institutions but also with the implicit institutions of the norms of which a culture consists (Klein, 1999; Williamson, 2000).

6.3 Hypotheses

6.3.1 *Collaboration perspective and its influence on supplier trust*

The longevity of an exchange relationship is considered an important issue of partner behavior as it has an impact on the length of the so-called "shadow of the future" (Das and Rahman, 2010). The "shadow of the future" is a metaphoric expression underlining the nexus between present moves and future consequences (Parkhe, 1993). Research suggests that the longer the shadow of the future, the less likely deceitful behavior will occur (e.g., Axelrod, 1984; Heide and Miner, 1992). The underlying logic seems quite reasonable: partners who expect to interact with each other in the future carefully evaluate whether engaging in opportunism represents a beneficial option. Anticipating the bond between future consequences and current actions, they compare the immediate gains from behaving unethically with the potential loss of

future benefits. Opportunism is considered unattractive if the expected benefits from continued exchange surpass the short-term benefits from cheating, (Nagin *et al.*, 2002; Telser, 1980).

Expectations of continuity enhance the R&D relationship's future value. Ongoing cooperation not only increase the chances of fully recouping relation-specific investments made by the parties (Das, 2006). It also enables transacting with each other more cost-efficiently (Dyer and Singh, 1998) and balancing out temporary iniquities between the partners (Das and Rahman, 2010). By behaving opportunistically in the present, these long-term benefits would be put at risk as the betrayed party could decide on social sanctioning in the form of immediate relationship termination, the refusal to do business with the opportunistic party in the future (Carson, Madhok and Wu, 2006), or retribution in the next move. The latter describes a game-theoretic approach according to which future interactions allow the partners to reward or punish each other's behavior (Heide and John, 1990). The possibility of retaliation in the future casts a shadow back upon current moves, thus lowering the tendency to defect in the present (Parkhe, 1993).

But how can prospects of prolongation now foster supplier trust in the buyer firm? First of all, prospects of prolonged cooperation may be considered as a credible commitment of the buyer firm having a long-term interest in the exchange relationship. Having a long-term interest implies forgoing individual interests in favor of mutual benefits (Anderson and Weitz, 1992). Second, given that further interaction allows the partners to reward and punish each other (Heide and John, 1990), expectations of reciprocity should discipline a buyer firm to not misbehave as it would have to face retaliatory measures by the supplier firm (Parkhe, 1993). Third, the threat of lost future profits provides the incentive for the buyer firm to play by the rules and engenders cooperation in the present.

To sum up, from a calculative perspective, a buyer firm can be trusted if expectations of buyer opportunism (hold-up) are low. This in turn should strengthen supplier firms' confidence in buyer firms' good faith and intentions. Hence, we suggest the following hypothesis:

Hypothesis 1 (H1): The collaboration perspective has a positive effect on the supplier's trust in the buyer.

6.3.2 Prior collaboration and its influence on supplier trust

Aside from the continuity of an exchange relationship, it is the history of interactions between exchange partners that is assumed to be an important determinant of partner behavior. Figuratively referred to as the "shadow of the past," prior ties can determine how partners act in the

present and the future (Deeds and Hill, 1999; Jap *et al.*, 2013; Parkhe, 1993). Instead of self-interest-seeking behavior, actors are more likely to have the “bigger picture” in mind when sharing a common history. This means they forgo individual gains in favor of mutual benefits (Jap *et al.*, 2013; Squire, Cousins and Brown, 2009; Uzzi, 1997).

Throughout the literature, it is propagated that prior collaboration accounts for the formation of interorganizational trust (Gulati, 1995, Gulati and Sytch, 2008; Parkhe, 1993; Poppo *et al.*, 2008). In fact, prior collaboration is seen to be the source of calculative as well as non-calculative trust.

Calculative trust can emerge if the supplier is confident that the buyer will not behave defectively, simply because opportunism would not be in the buyer firm’s best interest. By sharing a cooperative history, it is very likely that the partners have developed common working routines and practices that allow transacting with each other more efficiently in the present exchange episode (Deeds and Hill, 1999; Kotabe, Martin and Domoto, 2003; Luo, 2002a; Macneil, 1978 (relational contracting); Poppo *et al.*, 2008; Zollo, Reuer and Singh, 2002), that is, at lower costs. Furthermore, even buyer firms have made specific investments. Deceitful buyer behavior would put these investments in jeopardy since the supplier could react to detected opportunism by immediately terminating the relationship (Deeds and Hill, 1999; Luo, 2002a). A supplier that knows that the buyer will behave in a trustworthy manner in order to not put the mentioned benefits at risk would have reason to trust in the buyer firm.

Non-calculative trust, on the other hand, emerges gradually over time (Gulati, 1995). It rests on the foundation of social relationships that are characterized by familiarity and strong beliefs in the buyer’s good faith and intentions (Rousseau *et al.*, 1998). Prior interaction allows the partners to get to know each other’s idiosyncrasies, developing thereby a deeper mutual understanding and stronger identification with their exchange partner (Gulati and Sytch, 2008). As buyer-specific experience through past exchange episodes provides additional information on the buyer firm’s objectives, its behavior becomes more predictable (Gulati and Sytch, 2008; Parkhe, 1993; Santoro and McGill, 2005). Additionally, commonly-shared norms and values facilitate cooperation and improve relationship quality (Parkhe, 1993). In contrast to new relationships, older ones are likely to have already gone through critical phases, which may have contributed to stabilizing and improving the working relationship, thus providing a platform for trust to develop (Parkhe, 1993). All in all, we can assume that prior collaboration accounts for the development of relational trust.

Despite the widespread logic in the literature that prior collaboration enables trust, empirical studies are scarce and provide mixed findings. While Anderson and Weitz (1989) found that trust increases as the relationship ages, Poppo *et al.* (2008) found that the overall positive ef-

fect of prior history on trust is achieved indirectly through an expectation of continuity. Doney and Cannon (1997) and Young-Ybarra and Wiersema (1999) failed to find a significant relation between the two constructs. Gulati and Sych's (2008) findings indicate that the history of interaction between organizational boundary spanners contributes to the formation of inter-organizational trust, but in a non-linear fashion. No support was found, however, for the assumed positive relationship between prior organizational history and organizational trust.

Drawing on a calculative as well as non-calculative perspective, we, however, follow the line of reasoning propagated in the literature and posit the following hypothesis:

Hypothesis 2 (H2): Prior collaboration between buyer and supplier has a positive effect on the supplier's trust in the buyer.

6.3.3 Buyer dependence and its influence on supplier trust

Dependence is often viewed as an important determinant of cooperation success. Mutual dependencies are the reason for parties collaborating in the first place, and they provide the foundation for cooperation stability. In contrast, unilateral dependencies or dependencies that vary a lot in extent are viewed critically as they create dangerous relationship imbalances that could provoke inappropriate behavior (Das and Teng, 2000b; Das and Teng, 2003, Xia, 2011).

While partner dependence can be the consequence of having invested specifically (Sanner, 2005), it can also rest on a lack of alternative exchange partners possessing the critical resources (Emerson, 1962; Morgan, Kaleka and Gooner, 2007; Pfeffer and Salancik, 1978; Provan and Skinner, 1989). It is the latter we concentrate on in this study. Hence, we define buyer dependence as the degree to which the buyer relies on the supplier's resources and capabilities in order to achieve its business goals (Dwyer, Schurr and Oh, 1987).

But how does buyer dependence now influence supplier trust?

In order to detangle the relationship between buyer dependence and supplier trust, we first have to again consider the relationship between dependence and opportunism. In the literature, there are two very different views on how dependence and opportunism interrelate.

According to the first view, a negative relationship exists between dependence and opportunism (Provan and Skinner, 1989). Being dependent on an exchange partner keeps in check one's own opportunistic behavior (Joshi and Arnold, 1997; Provan and Skinner, 1989). As opportunism endangers cooperation stability (Das and Rahman, 2001), a dependent buyer firm would avoid any behavior that might put the exchange relationship at risk. In order to

achieve its business goals, the buyer instead aims at preserving the supply relationship by employing all available means (Joshi and Arnold, 1997; Provan and Skinner, 1989), even tolerating supplier misbehavior to a certain extent (Wathne and Heide, 2000). Against this background and drawing on the calculative approach, one can assume that a supplier has trust in a dependent buyer firm because the supplier is confident that the buyer firm can't help but behave in a trustworthy manner in order to not jeopardize the relationship.

According to the second view, however, dependence and opportunism are related positively (Joshi and Arnold, 1997). Instead of fostering cooperative buyer behavior, dependence may actually cause opposite effects. Drawing on reactance theory (Brehm, 1966), dependence brings about constraints on the freedom of the buyer firm. In order to restore its freedom, the buyer firm becomes motivated to take actions that counter these constraints. Such actions can be explicit and direct or implicit and hidden, such as opportunism (Joshi and Arnold, 1997). In view of the above, one can assume that buyer dependence lowers the supplier's trust in the buyer firm's honesty and benevolence as the supplier is aware of possible reactance behavior on the part of the buyer.

However, we support the first view and assume that a dependent buyer firm behaves ethically, simply because opportunistic behavior would be against its best interest. Hence, the more dependent a buyer firm is on its supplier, the higher the supplier firm's trust in the buyer. Therefore our hypothesis is:

Hypothesis 3 (H3): The buyer's dependence has a positive effect on the supplier's trust in the buyer.

6.3.4 Organizational culture and its influence on supplier trust

In order to remain competitive, firms increasingly have to shift their sole focus from outside of the organization to what is manifesting within the firm (Soyer, Kabak and Asan, 2007), namely its culture. It may be the potential to drive superior performance and generate competitive advantage (Barney, 1986; Schein, 1985) that has earned the concept of organizational culture increasing scientific attention in recent years.

Regardless of the myriad of attempts at a definition (Barney, 1986), a firm's organizational culture remains a complex, multi-faceted phenomenon that is hard to grasp. Researchers, however, agree on a minimum consensus according to which organizational culture can be described as a set of shared assumptions, values, and norms that find their tangible expression in practices, behaviors, and artifacts (Hofstede, 1980; Trice and Beyer, 1993).

The substantial role an organization's culture plays in business conduct is underlined by the several functions culture performs. Aside from defining the firm's boundaries (Peters and Waterman, 1982; Pfeffer, 1981; Schein, 1992), providing organizational members with a feeling of identity (Pfeffer, 1981) and fostering the generation of commitment (Peters and Waterman, 1982; Pfeffer, 1981), culture creates organizational cohesiveness (Cartwright and Cooper, 1993; Robbins, 2001) and, most importantly, directs and shapes organizational members' attitudes and behaviors by providing appropriate rules and standards of conduct (Pfeffer, 1981).

Each organization rests on a profound set of organizational values that are timeless, collectively held convictions of what an organization considers right or wrong, desirable or undesirable (Andersen, Taylor and Logio, 2014; Singh, 2009). Values are considered the core components of organizational culture (Hofstede, 1984; Miroshnik, 2013). They regulate and unify the behavior of organizational members (Dobni, Ritchie and Zerbe, 2000; Soyer *et al.*, 2007) and give direction to all decisions made in the organization (Schmidt and Posner, 1983).

While studies in this context often focused on the role cultural similarity between partners plays in the formation of trust (e.g., Kwon, 2008; Robson, Katsikeas and Bello, 2008), we instead consider solely the supplier firm's culture and its impact on trust-building. Are supplier firms whose culture promotes values such as trust throughout the organization more likely to be confident about a specific buyer firm's good faith and intentions? We assume yes. A supplier firm carrying collectively-shared values such as general trust in cooperation partners has a better predisposition to actually trust in a specific buyer firm. This does not automatically mean that their trust is given unconditionally or blindly. It is rather that supplier firms whose organizational culture promotes trust as a guiding principle when interacting with each other and with key players outside the organization are more likely to take a leap of faith and have more favorable perceptions of the buyer's trustworthiness in the first place. Hence, we put forth, the following hypothesis:

Hypothesis 4 (H4): General trust as feature of the organizational culture of the supplier firm has a positive effect on the supplier's trust in the buyer.

6.3.5 Trust and its influence on intrinsic motivation

Despite the huge body of literature and studies on the favorable consequences of trust, the interrelationship between trust and intrinsic motivation in R&D supply relationships still remains poorly understood.

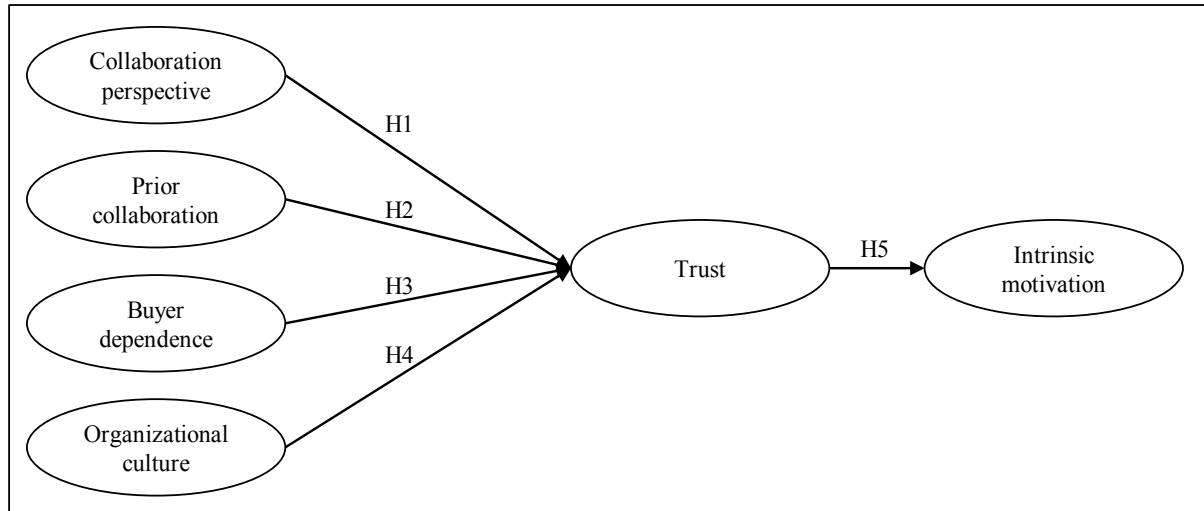
While intrinsic motivation has long traditions in motivation-based organization theory (Argyris, 1964; Likert, 1961; McGregor, 1960), economic theories acknowledge the existence but do not deal with intrinsic motivators because they are regarded as being difficult to analyze and control (Williamson, 1975, 1985). However, individuals contribute voluntarily, and these voluntary contributions are the consequence of intrinsic motivation (Simon, 1991). Motivation is intrinsic if the incentive system can be found in the activity itself. This means that, contrary to extrinsic motivation, intrinsically motivated individuals engage in activities out of genuine interest and for inherent satisfaction (Ryan and Deci, 2000a). It can be the activity itself (Csikszentmihalyi, 1975; Ryan and Deci, 2000a), the compliance with standards and norms (Sripada and Stich, 2006), or the achievement of personal goals, such as climbing a mountain (Loewenstein, 1999), that provide the source of satisfaction. In this study, we focus on the enjoying and challenging experiences the R&D project provides the supplier firm with. The outstanding importance of intrinsic motivation has been examined primarily in the intra-organizational (e.g., Hackman and Oldham, 1976; Lin, 2007) or educational context (e.g., Deci, Koestner and Ryan, 2001; Reeve, 2009). However, the three core advantages that arise from intrinsic motivation can, in our opinion, be transferred to the interorganizational setting as well. First, intrinsic motivation affects work quality, thus leading to more creative and innovative work results (Amabile, 1996; Ryan and Deci, 2000a; Schwartz, 1990). As R&D supply projects often require creative and innovative problem-solving, intrinsic motivation of the supplier firm seems to be a key prerequisite for successful collaborative R&D relationships. Second, intrinsic motivation fosters the transfer of implicit knowledge among the parties concerned (Ko *et al.*, 2005; Lin, 2007), which is also a necessary condition for successful R&D partnerships. Third, intrinsic motivation supports compliance with psychological contracts (Gibbons, 1998; Prendergast, 1999) and thus curbs dysfunctional partner behavior.

Against this background, it is important to question how intrinsic motivation can be stimulated. The literature presents several means that can provide fertile ground for intrinsic motivation to develop. Creating environments that support autonomy (Reeve, 2009; Reeve and Jang, 2006; Ryan and Deci, 2000a, 2000b) are one of these measures. By strengthening self-determination, individuals experience higher levels of intrinsic motivation (Deci *et al.*, 1999). Therefore, it seems advisable for buyer firms to revise implemented control structures. Another set of stimulators can be found in the creation of a positive collaboration atmosphere. Open communication structures and personal relationships (Frey and Bohnet, 1995, Ryan and Deci, 2000b) are considered to be among the building blocks of a positive atmosphere. Such a positive atmosphere is presumably more likely to evolve in a trusting environment. Therefore, we state the following hypothesis:

Hypothesis 5 (H5): The supplier's trust in the buyer has a positive effect on the supplier's intrinsic motivation.

To sum our up reasoning, Figure 10 depicts our research model.

Figure 10. Research model



The five hypotheses will be tested, and their results will be presented in the subsequent section, following some comments on sample description and construct measurement.

6.4 Methodology

6.4.1 Sample description

We used primary data to test our hypotheses. These data were collected by surveying R&D supplying firms from eight European countries: Austria, Denmark, Finland, Germany, the Netherlands, Norway, Sweden, and Switzerland. Given that there is no means of gathering a list of all the R&D-supplying firms from the countries concerned, we are well aware that our sample, in contrast to the ideal approach, is not a random one but rather one that has been chosen.

The corresponding firms were selected using the ORBIS database and web search. With ORBIS, we selected firms that belonged to either the industry group “7112 - Engineering activities and related technical consultancy” or “721 - Research and experimental development on natural sciences and engineering.” We chose these two groups because we believe that they consist to a high percentage of R&D-supplying companies. A web search helped us to complement our sample. Our bilingual (German and English) questionnaire was created with SoSciSurvey (Leiner, 2013), pretested with academic experts, and then, following refinements, made available to the participants on www.soscisurvey.com.

The firms concerned were contacted in April 2013 via an e-mail clarifying the study’s purpose and containing a direct link to our online survey. We asked managers of the last completed R&D project to answer our questionnaire as to our mind they have the best insight into R&D project-related issues. We assumed the average response time to be no longer than 15 to 20 minutes. In order to incentivize potential respondents, we offered an overview of our study’s major findings.

We sent a reminder e-mail four weeks after our first e-mail request. As the response rate had still not been satisfactory after our second mail dispatch, we decided on follow-up phone calls. These phone-calls were concentrated on German firms, only because of low participation quotes from non-German firms and limited resources. The firms concerned were contacted by trained interviewers. Dialog partners who agreed on a participation in our survey were sent yet another e-mail containing a link to our online survey.

In sum, we received 107 completed questionnaires, but only 104 could be used for further analyses. We consider this number to be satisfactory since our survey tapped into one of the most sensitive areas of a company.

As can be seen from Table 13, most of the respondent firms were small and medium-sized companies, located primarily in Germany. The firms of concern had a median age of 12 years. Unifactorial analyses of variance and non-parametric methods such as Kruskal Wallis demon-

strated no differences between the groups of firm age and number of employees concerning our model's dependent and independent variables.

Table 13. Sample description

Firm location:	N = 104	Number of employees:*	N = 104
Austria	4	1-19	52
Denmark	2	20-99	34
Finland	2	100-499	15
Germany	89	≥ 500	3
Switzerland	7		
Firm age in years:	N = 103 ^(1 missing)		
2-5	19		
6-10	28		
11-20	35		
> 20	21		

* For the purpose of conducting unifactorial analyses of variance, we decided to merge the last two groups of firms into one group, given the insufficient number of R&D suppliers employing 500 or more people.

6.4.2 Construct measurement

All of our constructs are measured reflectively, assuming that the construct causes the covariation of the indicator variables. When operationalizing our variables, we used existing scales where possible. All items were refined by pre-tests and measured on seven-point Likert scales, ranging from “agree not at all” (1) to “agree completely” (7). Table 14 contains the final items employed in our study.

Table 14. Measurements of the variables

Variable (abbrev.)	Item (abbrev.)	Items
Collaboration perspective (CP)	CP01_01	: When the contract was concluded, we had reason to believe that we would get an order from the same buyer firm in the near future.
	CP01_02	: When the contract was concluded, we were convinced that it would be possible to extend our collaboration with this buyer.
Prior collaboration (PC)	PC01_01	: In the past, we have closely collaborated with the same buyer firm.
	PC01_02	: In the past, we have developed a close business relationship with the same buyer firm.
	PC01_03	: In the past, we have continuously adapted our collaborative skills and techniques (e.g., workflow, communication, process management) to the specific requirements of the buyer firm.
Buyer dependence (BD)	BD01_01	: When the contract was concluded, our partner had no other possibility than to collaborate with us to gain access to the resource(s) that was (were) crucial to her/him
	BD01_02	: When the contract was concluded, it would have been difficult for our partner to replace us.
	BD01_03	: When the contract was concluded, our partner was quite dependent on us.
	BD01_04	: When the contract was concluded, our partner did not have a good alternative to us.*
Organizational culture (OC)	OC01_01	: Our organizational culture is characterized by sharing information freely.
	OC01_02	: Our organizational culture is characterized by fair terms of exchange.
	OC01_03	: Our organizational culture is characterized by being supportive.
	OC01_04	: Our organizational culture is characterized by working in collaboration with others.
	OC01_05	: Our organizational culture is characterized by trust in our collaboration partners.
Trust (TR)	TR01_01	: When the contract was concluded, we were convinced that the buyer firm would keep its promises.
	TR01_02	: When the contract was concluded, we were convinced that we could count on the buyer to be sincere.
	TR01_03	: When the contract was concluded, we were convinced that the buyer would provide us with accurate information.
	TR01_04	: When the contract was concluded, we were convinced that the buyer would consider our concerns in case of changing circumstances.
	TR01_05	: When the contract was concluded, we were convinced that we could depend on the buyer's support concerning important matters.
	TR01_06	: When the contract was concluded, we were convinced that the buyer would not take advantage of power asymmetries.
	TR01_07	: When the contract was concluded, we were convinced that the buyer would not take advantage of one-sided dependencies.
Intrinsic motivation (IM)	IM01_01	: Working on the R&D task within the collaboration was interesting.
	IM01_02	: Working on the R&D task within the collaboration was challenging.
	IM01_03	: Working on the R&D task within the collaboration was satisfying.
	IM01_04	: Working on the R&D task within the collaboration was enjoyable.

* Item was dropped from statistical analyses

6.4.2.1 Dependent variables

The dependent variables in our study are supplier trust in the buyer and supplier intrinsic motivation. Poppo, Zhou and Li (2015, forthcoming) made attempts to operationalize calculative and relational trust; however, we feel that their trust measures do not describe trust but rather variables that may influence trust. Thus, for example, the calculative trust item “degree of exchange continuity” (Poppo *et al.*, 2015, p. 8) may function as a potential determinant or source of trust but it should, to our mind, not be equated with trust. For our purposes, we therefore separate trust from its associated antecedents and incorporate calculative as well as

non-calculative reasons for trust only on a theoretical basis, without measuring them directly. Our trust scale encompasses the dimensions honesty and benevolence. The corresponding items were mainly adopted from Kumar *et al.* (1995). As our data indicated that honesty and benevolence are heavily intertwined, we decided against modelling two distinct constructs. Instead, we followed Doney and Cannon (1997) and treated trust as a unidimensional construct.

To measure intrinsic motivation, we considered the activity itself to be the source of satisfaction and employed a four-item measurement based on Mossholder (1980).

6.4.2.2 Independent variables

Collaboration perspective, prior collaboration, organizational culture, and buyer dependence represent our independent variables. To operationalize collaboration perspective, we employed two items similar to those used by Carson *et al.* (2006). Again, we were inspired by Carson *et al.* (2006) when creating our three-item measurement for prior collaboration. Buyer dependence was measured by four items adopted from previous studies such as Jap and Ganesan (2000) and Morgan *et al.* (2007). Throughout our analyses, however, we had to cut down our buyer dependence measure to three items. The indicator BD01_04 had to be dropped due to not meeting the quality criteria requested by SmartPLS. We then reran all tests using a three-item measure for buyer dependence. The corresponding findings are described below. For measuring organizational culture, we drew on O'Reilly, Chatman and Caldwell (1991) and employed a five item scale.

6.4.2.3 Control variables

In empirical studies, control variables are used to account for possible confounding factors. The inclusion of variables such as firm age or firm size has become common practice. Sometimes, however, their insertion is far from being well-reasoned, and instead of purifying analytical results, their blind inclusion can be distorting and misleading (see, e.g. Becker, 2005; Spector and Brannick, 2011 on this issue).

We decided to include the variable *project importance* because of its potential impact on supplier intrinsic motivation. According to theory, perceived meaningfulness is considered to contribute to intrinsic motivation. Meaningfulness can be described as the extent to which work is perceived worthwhile and paramount (Pratt and Ashforth, 2003; Thomas, 2000) We believe that being part of something big, such as an important project, can increase the meaningfulness felt and hence spur supplier intrinsic motivation. Therefore, we asked interviewees

to assess the relative importance of the focal R&D supply project within the company's project portfolio on a scale ranging from (1) "not important at all" to (7) "very important."

6.4.3 Analyses

For data analysis, we used partial least squares (PLS), a variance-based structural equation modeling method that aims at minimizing the amount of unexplained variance. Originally invented by Wold (1975) and further developed by Lohmöller (1989), PLS represents an attractive alternative to commonly applied covariance-based equation modeling methods such as LISREL. Often referred to as soft modeling approach, due its minimal demands on data distribution, sample size and measurement scales, PLS has been applied increasingly in marketing and business research over the last years (Hair *et al.*, 2012; Henseler, Ringle and Sinkovics, 2009). Given our small sample size as well as our study's explorative nature, the application of the PLS method seems suitable. The analysis of PLS results contains the evaluation of the measurement (or outer) models and the assessment of the structural (or inner) model.

To ensure that the constructs are reliable and valid, the reflective measurement models are assessed by use of three criteria. A construct is considered as internally consistent if its composite reliability reaches values of 0.60 to 0.70 (Bagozzi and Yi, 1988; Nunnally and Bernstein, 1994). To establish convergent validity on the indicator level, factor loadings should be significant and exceed the value of 0.70 (Carmines and Zeller, 1979). Convergent validity on the construct level is achieved when the construct's average variance extracted (AVE) is above 0.50 (Fornell and Larcker, 1981). In order to exclude doubts of discriminant invalidity, the square root of a construct's AVE should be higher than its highest correlation with any other construct in the model (Fornell-Larcker criterion).

For the structural model, issues of multicollinearity among the predictor variables should first be addressed. This can be done by calculating variance inflation factors (VIF) using SPSS. VIF-values smaller than five indicate no problems with multicollinearity (Hair, Ringle and Sarstedt, 2011). To evaluate the inner model, the percentage of variance explained (R^2) should be considered. Furthermore, Stone-Geisser's Q^2 values should be used to assess the structural model's predictive relevance. Positive Q^2 values indicate that the exogenous constructs have predictive relevance for the endogenous constructs of concern. Information on the hypothesized relationships is expressed by the standardized path coefficients' magnitude and their corresponding t-values (Hair *et al.* 2014).

6.4.4 Common method bias

Collecting data on dependent and independent variables from a single source could cause common method bias. In order to reduce the potential of common method bias, we applied several measures recommended by Podsakoff *et al.* (2003). To begin with, we structured our questionnaire properly, allowing no conclusion on the relations between criterion and predictor variables. Furthermore, we promised our participants anonymity and that their responses would be used for research purposes only. In addition, we stressed that there are no right or wrong answers, asking questions to be answered honestly and to the best of knowledge. To statistically assess the severity of a possible bias ex-post, we applied an unrotated exploratory factor analysis on our dependent and independent variables simultaneously, which is also known as Harmon's single-factor test. The factor that emerged does not account for the majority of variance in the model as it explains way less than 30 percent of the variance, which leads us to conclude that common method bias does not seem to be a major threat in our study.

6.4.5 Assessment of the reflective measurement (outer) models

Before evaluating the reflective measurement models using SmartPLS 2.0 (Ringle, Wende and Will, 2005), we used SPSS to run principal component analyses with Varimax rotation on each set of indicators to test for unidimensionality of the constructs. Achieving unidimensionality is a necessary condition when using reflective measurement models for the constructs. As reflective indicators represent consequences of the construct, they are viewed as interchangeable. Hence, each set of indicators must have only one construct in common (Anderson and Gerbing, 1988). With loadings well above the threshold of 0.5, each set of indicators loaded on its corresponding factor, hence confirming unidimensionality of the constructs.

We then applied PLS-SEM analysis to further assess our measures. The results of our measurement models' estimation are summarized in Table 15. As our results reveal, all our measures are reliable as the constructs' composite reliabilities range from 0.8849 to 0.9338. The item loadings exceed the recommended value of 0.7 and are significant leastwise at a five percent level. Hence, convergent validity is established on the indicator level. As every construct's AVE exceeds the minimum value of 0.5, convergent validity is supported on the construct level as well. When comparing the square root of each construct's AVE with the construct's highest correlation with any other construct in the model, we could not find any indication of discriminant invalidity. Therefore, we conclude that our measurement scales have excellent reliability and validity.

Table 15. Results of the reflective measurement model

Latent variable	Indicators	Outer loadings	T-statistics*	Composite reliability	AVE	Discriminant validity
Collaboration perspective	CP01_01	0.924	23.076	0.9281	0.8659	Yes
	CP01_02	0.937	28.669			
Prior collaboration	PC01_01	0.949	3.485	0.9070	0.7680	Yes
	PC01_02	0.952	3.500			
	PC01_03	0.705	2.561			
Buyer dependence	BD01_01	0.834	2.296	0.9338	0.8252	Yes
	BD01_02	0.937	2.402			
	BD01_03	0.949	2.493			
Organizational culture	OC01_01	0.818	17.026	0.9171	0.6890	Yes
	OC01_02	0.809	16.375			
	OC01_03	0.882	25.008			
	OC01_04	0.785	11.905			
	OC01_05	0.854	23.078			
Trust	TR01_01	0.792	12.565	0.9181	0.6163	Yes
	TR01_02	0.848	23.015			
	TR01_03	0.846	22.105			
	TR01_04	0.740	10.185			
	TR01_05	0.792	13.551			
	TR01_06	0.727	7.802			
	TR01_07	0.741	7.977			
Intrinsic motivation	IM01_01	0.874	9.281	0.8849	0.6586	Yes
	IM01_02	0.776	7.334			
	IM01_03	0.834	6.883			
	IM01_04	0.757	5.125			

* T-values greater than 1.96 are significant at $p < 0.05$, those greater than 2.57 are significant at $p < 0.01$

6.4.6 Assessment of the structural (inner) model

By calculating VIF-values for each predictor variable, we addressed the potential problem of multicollinearity among the predictor variables. As all VIF values were well below the critical cut-off of five, we concluded that multicollinearity is not a serious threat in our study.

The results of our inner model estimation are summarized in Table 16. Hypothesis 1 stated a positive relationship between collaboration perspective and supplier trust. Our findings confirm the positive impact of a prolonged cooperation on supplier trust ($\beta = 0.315$; $p < 0.01$). Hence, Hypothesis 1 is supported. In contrast to our expectations, prior collaboration has no significant positive influence on supplier trust ($\beta = -0.005$; n.s). Therefore, we have to reject Hypothesis 2. With regard to buyer dependence, we cannot confirm a positive effect on supplier trust. The path coefficient is positive but rather small and nonsignificant ($\beta = 0.095$; n.s.). Hence, Hypothesis 3 has to be rejected, too. Our findings confirm that organizational culture positively influences supplier trust ($\beta = 0.292$; $p < 0.01$), which leads us to support Hypothesis 4. In line with our assumption, higher supplier trust leads to higher supplier intrinsic motivation ($\beta = 0.303$; $p < 0.01$). Hence, Hypothesis 5 is supported. With regard to our

control variable relative project importance, our findings show a positive significant relation with supplier intrinsic motivation ($\beta = 0.466$; $p < 0.01$).

Altogether we find support for three of our five hypotheses. Only two of our independent variables appear to be antecedents of supplier trust. The collaboration perspective, as can be seen from the standardized path coefficients, has the strongest impact on trust, followed by organizational culture. Prior collaboration and buyer dependence fail to be significant.

The overall model explains 22.2 percent of the variance in supplier trust and 9.2 percent in intrinsic motivation. However, when entering our control variable, the R^2 of intrinsic motivation increases considerably from 9.2 percent to 29.8 percent.

In order to assess the variance explained, the academic literature most frequently draws on R^2 -values found in Chin (1998, p. 323). However, these values were estimation results of one specific exemplary model and not intended for use as general recommendations for quality evaluation. Providing rules of thumb for acceptable R^2 -values is rather difficult as this heavily depends on the model complexity, the research discipline (Hair et al. 2014), and the total number of possible factors influencing the dependent variable. The more complex the reality, the more it needs to be simplified in order to be reproduced in a model. This simplification of reality, however, leads to a loss of information content and thus results in smaller R^2 -values.

Given the complexity of the trust phenomenon, we regard the achieved R^2 as respectable. The same applies to the R^2 of intrinsic motivation when bearing in mind that there most certainly are more factors that explain its variance.

That our model has predictive relevance is confirmed by our model's Q^2 -values. The Stone-Geisser's Q^2 coefficients for trust ($Q^2 = 0.128$) and intrinsic motivation ($Q^2 = 0.059$) are larger than 0, certifying our model's predictive relevance. When inserting our control variable, the Q^2 -value of intrinsic motivation increases up to 0.190. Given this considerable change in R^2 and Q^2 concerning intrinsic motivation, it seems advisable for future research endeavors to carefully examine the exact role of project importance in building intrinsic motivation and its relationship with other constructs.

Table 16. Results of the structural model

Predicted variable	Predictor variable	Hypothesis	Without control path		With control path project importance	
			Path	T-value*	Path	T-value*
Hypothesized paths						
Supplier trust	Collaboration perspective	H1	0.315	2.850	0.315	2.821
	Prior collaboration	H2	-0.005	0.042	-0.005	0.043
	Buyer dependence	H3	0.095	0.740	0.095	0.748
	Organizational culture	H4	0.292	3.208	0.292	3.185
Supplier intrinsic motivation	Supplier trust	H5	0.303	3.297	0.211	2.530
Control path						
Supplier intrinsic motivation	Project importance				0.466	5.695
Variance explained						
Supplier trust			R ² = 0.222		R ² = 0.222	
Supplier intrinsic motivation			R ² = 0.092		R ² = 0.298	

* T-values greater than 1.96 are significant at $p < 0.05$, those greater than 2.57 are significant at $p < 0.01$

6.5 Discussion, implications and limitations

6.5.1 Key findings

To our knowledge, we present the first empirical study that simultaneously examines the economic preconditions of supplier trust. For this purpose, we focus on those variables that potentially influence supplier trust from the viewpoints of new institutional economics and game theory. Within the theories of new institutional economics, it is mainly transaction cost theory that deals with the problem of a supplier's trust by regarding the danger of buyer hold-up. Agency Theory would deal with moral hazard as a potential source of a lack of buyer trust. On the basis of transaction cost theory, trust-generating effects from specific investments (especially those resulting from relational contracting/prior collaboration) and dependency are to be expected. Moreover, considering new institutional economics in general, the institutions that make up the organization's culture consists should be observed. On the other hand, game theory focuses on the effect of the future.

The most surprising result is that we could not confirm a positive influence of *prior collaboration* on supplier trust. Instead, the effect of prior collaboration is close to zero and not significant. This finding is quite surprising from the perspective of transaction cost theory, which heavily underlines the anti-opportunism (and thereby trust-generating) effect of mutual specific investments in cases of relational contracting. However, given our findings, it seems that for trust to develop, more is needed than just prior exchange (Zollo *et al.*, 2002). In our opinion, a conceivable explanation is that the transaction-cost-reduction-potential of mutual specific investments does not necessarily lead to a prolongation of the collaboration. However, if

there is no need of prolongation—for instance, because the supplier does not have that specific R&D competence that the buyer would need in the future— then the partners could find themselves in the situation of an end game. Then, an opportunistic buyer could incline towards hold-up. A supplier, being aware of that danger, would not have reason to trust anymore.

Also astonishing is the result that the *dependence* of a buyer on the supplier does not lead the supplier to have trust in the buyer. The effect of buyer dependence on supplier trust is positive but rather small and non-significant. However, there is a possible explanation for our finding: a supplier firm may be aware of the fact that buyer dependence does not automatically lead to cooperative behavior but may even cause defective behavior on the part of the buyer firm. This logic is grounded in reactance theory (Brehm, 1966). Being dependent on the supplier limits or even threatens the buyer firm's freedom of action, which leads to buyer reactance. In order to restore its freedom, the buyer firm engages in actions such as opportunism. Supplier firms that face the possible negative effects of buyer dependence do not consequently trust in the buyer's honesty and benevolence.

According to our expectations, chances for a *prolongation* of a present buyer-supplier exchange relationship have a positive impact on a supplier's trust in the buyer. Suppliers seem to view prospects of prolongation as credible commitments on the part of the buyer firms to forgo one-sided interests in favor of mutual gains. Indeed, a buyer firm that wants to continue its collaboration with a specific supplier firm would not act rationally if it would damage that supplier through opportunistic behavior. The supplier has reason to trust in that rationale of the buyer. Following the negative result concerning the variable of prior collaboration, this finding supports the practical relevance of game theory compared with transaction cost economics.

Concerning the suppliers' *organizational culture*, we were not surprised to confirm that trust as a general trait of the organizational culture of the supplier firm has a positive influence on the supplier's trust in a concrete buyer firm. Companies that are characterized by sound values such as honesty, cooperation, and general trust in third parties are, without doubt, more likely to believe in a specific exchange partner's honesty and benevolence. Of course, this does not mean that their trust is given blindly and without limitations, but compared to others, they are more willing to take a leap of faith and trust until they are proven wrong.

Concerning our paper's second aim of shedding light on the poorly understood relationship *between trust and intrinsic motivation of a supplier*, we could confirm, in line with our assumption, that supplier trust in the buyer's honesty and benevolence positively influences the supplier firm's intrinsic motivation. This finding complies with Ryan and Deci (2000b), who

suggest intrinsic motivation to be positively influenced by a sense of relatedness (belongingness or connectedness with others), which is arguably more likely to evolve in a friendly, caring, and trusting environment. However, it is astonishing that the phenomenon of intrinsic motivation apparently appears in distant inter-organizational relations, too.

Our results contribute to the understanding of trust in inter-organizational relationships and allow implications to be derived for the management of buyer and supplier firms, which will be presented in the following section.

6.5.2 Managerial implications

Having explored determinants of supplier trust and its role in the supplier's intrinsic motivation, our results allow recommendations to be derived for managers of R&D buyer as well as R&D supplier firms.

That trust in cooperative relationships is a valuable asset has been recognized throughout the literature and could be confirmed by our results. *Supplier trust* in the buyer firm enhances the R&D supplier's intrinsic motivation, which is an important prerequisite for successful collaboration. Intrinsic motivation leads to more innovative outcomes (Amabile, 1996; Ryan and Deci, 2000a; Schwartz, 1990), it helps to overcome problems of contractual incompleteness (Gibbons, 1998; Prendergast, 1999), and fosters the transfer of implicit knowledge (Ko *et al.*, 2005; Lin, 2007). Therefore, buyer and supplier firms should always actively invest in creating trust-based relationships. The importance of trust in fostering intrinsic motivation raises the question of how trust emerges.

Prospects of *long-term collaboration* lead to an increase in supplier trust. Of course, intentions of prolonging a relationship should never lack a plausible rationale; partner selection should always be oriented towards the buyer firm's specific resource needs (Hitt *et al.*, 2000). However, buyer firms are well advised to always consider whether it might be fruitful to continue an existing relationship and if so, they should credibly declare their prolongation intentions to the supplier firm as this may enhance supplier trust. This could possibly be done by talking and defining future projects when the actual project is currently running. Planning future business represents a specific investment of time and money, signaling the buyer firm's good intentions and thus strengthening supplier firm trust.

Concerning *prior collaboration*, buyer firms should be cautious in concluding that prior ties automatically lead to supplier trust. It seems that for trust to develop, more is needed than just prior cooperation episodes. First, there is the possibility that these episodes were not internal-

ly evaluated too positively by each party. Second, often it is uncertain whether current partners possess the critical resources needed in the future.

Buyer Dependence does not seem to be a source of supplier trust. One-sided dependencies represent power imbalances that most likely lead to dissatisfaction and defective behavior in the long run. Being threatened by defective behavior undermines the development of trust. Therefore, cooperation partners should always try to maintain a balanced relationship by creating mutual, more equal, dependencies. Buyer dependence can be countered with relation-specific investments by the supplier firm in laboratory equipment or employee training or with the increased use of socialization processes (e.g., communication guidelines, joint workshops, team building) in order to build relational capital as suggested by Petersen *et al.* (2008). In this way, both parties are bound to the relationship, thus discouraging self-interest seeking behavior and fostering mutual trust.

A supplier firm that carries *organizational values* such as general trust is more likely to build trusting bonds with a specific buyer firm. On the one hand, it is the supplier firm's responsibility to make core values visible to outsiders by signalling as organizational values are usually below the line of visibility (Schein, 1985). This helps buyer firms to select appropriate collaboration partners more easily and simultaneously increases the chances of supplier firms being selected as potential allies. On the other hand, buyer firms are well advised to always keep an eye on the traits of the organizational culture of the supplier firm. Yet, we are aware of the fundamental problems that a culture analysis between independent firms would be faced with.

6.5.3 Limitations and implications for future research

The study presented suffers from some limitations. First, we deliberately explored only those potential sources of supplier trust that can be derived from new institutional economics and game theory. Our results could be enriched by future empirical research on trust-building effects of all those additional determinants that are discussed in the literature (see, e.g., Anderson and Weitz 1989; Bstieler and Hemmert 2008; Doney and Cannon 1997; Dyer and Chu 2000; for determinants such as frequent communication, aligned goals and interests, reputation, fairness, support and assistance-giving routines, knowledge and information sharing). Second, we only interviewed supplier firms. Even though it may be a challenging undertaking (as our respondents refused to reveal their buyers in the preliminary interviews), interviewing both sides of the dyad could provide valuable, additional information on the topic. Third, unfortunately we could not consider cultural influences as our sample consisted to a great extent

of German suppliers. Future research could be targeted towards the generalizability of our results across national borders. Lastly, our findings reveal a strong influence of our control variable project importance on the supplier's intrinsic motivation. Further empirical studies could investigate this topic more deeply by examining different dimensions of project importance and empirically assess their influence on intrinsic motivation and their relationship with other constructs in the model.

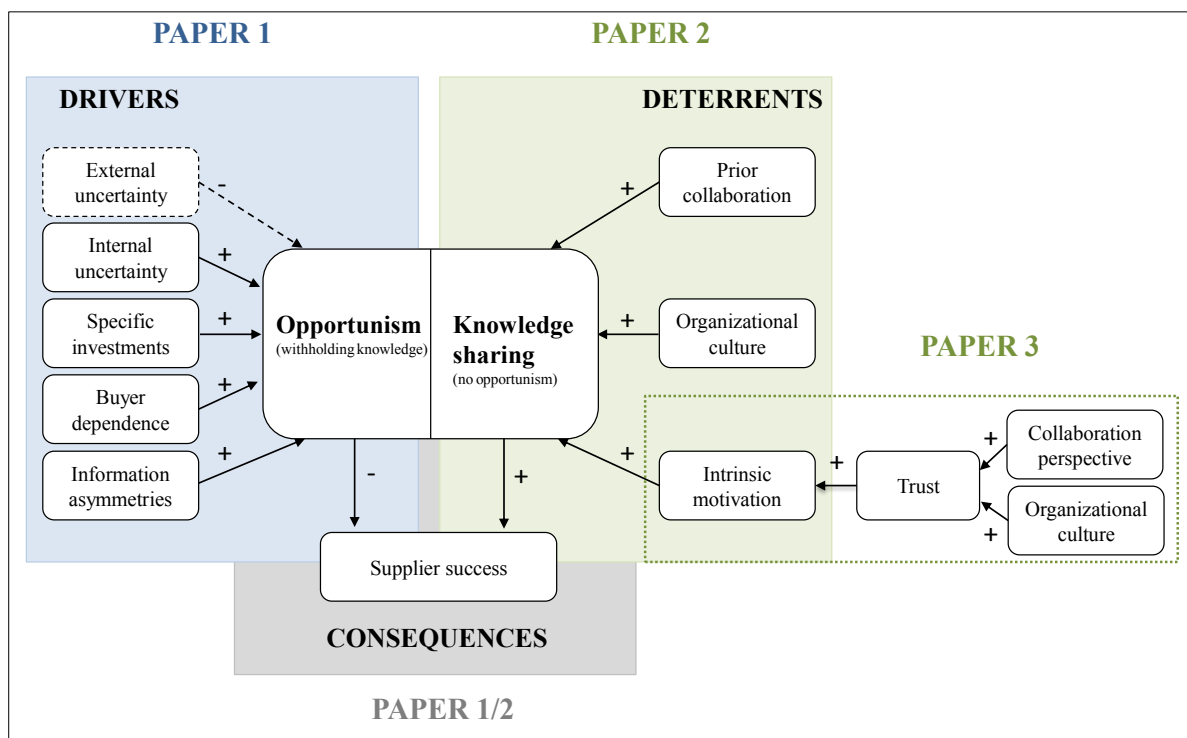
7. Conclusion

7.1 Synopsis

Supplier opportunism is, without a doubt, a serious threat that manufacturers of final products have to consider when tapping into external sources of knowledge by teaming up with R&D supplier firms (Sampson 2007). The prevalence of the opportunism phenomenon has caused broad interest and thus led to a huge amount of literature and empirical research. However, despite these prior efforts, opportunism is far from being understood in its entirety (Das/Rahman 2010; Hawkins et al. 2008). This dissertation is one of a series of recent significant works on the severe danger of opportunism in exchange relationships. It represents an incremental step towards improving the understanding of a phenomenon that is, however, hard to grasp.

Three articles build the cornerstones of the present work. They cover and contribute to the three areas of opportunism research by dealing with the drivers (Paper 1) and consequences of R&D supplier moral hazard (Papers 1 and 2), and by examining the safeguards that quell such unethical partner behavior (Papers 2 and 3). A profound review of the existing literature and prior research led to the development of comprehensive theoretical models that were tested empirically by drawing on survey-based data. The overall results of this dissertation are displayed in the following figure.

Figure 11. Main results of the papers of this dissertation



Paper 1 treated the first area of opportunism research. By combining TCT and PAT, it scrutinized the role several factors play in inducing R&D supplier misbehavior and thus contributes to answering the first research question. While some of this study's findings are perfectly in line with theory, others definitely inspire perplexity. The effects of internal uncertainty, buyer dependence, and information asymmetries certainly belong to the first category of findings. These factors render unethical behavior more attractive and are thus confirmed as drivers of R&D supplier opportunism by the study's results. The effects of buyer-specific investments and external uncertainty belong to the second category of findings. Specific investments of the supplier firm seem to lead to an increase in supplier opportunism, which is contrary to TCT-logic. Possible explanations for this finding can be found in either reactance theory (Brehm 1966, 1972) or the anticipation of hold-up by the buyer (Kloyer 2011; Kloyer/Scholderer 2012). As buyer-specific investments curtail the supplier firm's freedom of action by becoming locked into the relationship, the unethical behavior on the part of the supplier firm can, according to reactance theory, be understood as a means of regaining this lost freedom. Following, furthermore, the hold-up-logic, supplier firms may opportunistically reduce their efforts if they anticipate the buyer firm's intention to unfairly renegotiate their remuneration. Also contrary to TCT-logic and thus not less astonishing is the finding that external uncertainty lowers supplier misbehavior. It seems as if R&D supplier firms interpret this kind of uncertainty as a challenge that needs to be taken to create a superior technological outcome. This technological outcome in turn allows the dominant design to be defined and the suppliers gain a reputation that makes them less vulnerable to substitution by alternative suppliers.

By studying which mechanisms can curb unethical behavior and spur supplier knowledge sharing, Paper 2 provides answers to the second research question. Knowledge, as the good to be exchanged in R&D supply relations, was taken as a proxy for how opportunistically the supplier firms behaved throughout the cooperation episode, with lower levels of knowledge sharing indicating higher levels of supplier opportunism. Besides focusing on traditional, extrinsic mechanisms, this study enriches prior work by zooming in on non-extrinsic, rather soft mechanisms of knowledge sharing that have been treated shabbily in the past. The findings underline that the management of R&D outsourcing relationships is a challenging undertaking that requires an exceptional focus on the "human element" for it to be successful. While traditional mechanisms (e.g., behavior monitoring, collaboration perspective) proved to be little effective, it is the soft mechanisms such as the supplier's organizational culture and its intrinsic motivation that restrain opportunism and spur supplier knowledge sharing. The findings

also highlight that for knowledge to be shared effectively, common routines, practices, and interfaces that have been established in past exchange episodes are required, thus confirming the positive influence of prior collaboration. Slightly bewildering is, however, the finding that the supplier firm's trust in the buyer does not facilitate supplier knowledge sharing. Although contrary to prior research, one could assume that trust triggers knowledge sharing only indirectly by influencing other variables such as the supplier firm's intrinsic motivation. This idea was further developed and examined in Paper 3.

Inspired by the assumption that the role of supplier trust in supplier knowledge sharing might be limited to indirect effects only, the last paper of this dissertation, Paper 3, examined how trust evolves and whether it nurtures the supplier firm's intrinsic motivation, thus contributing to answering the third research question. Being, to the best of the author's knowledge, the first to simultaneously examine the calculative and non-calculative preconditions of supplier trust and the effect trust has on intrinsic motivation in an R&D supply-context, this study offers quite interesting insights. Even though it is often considered a mere organizational phenomenon, intrinsic motivation proved to play an important role in distant inter-organizational settings. Even if it is assumed that intrinsic motivation is always given voluntarily, the findings of this study suggest, however, that it can be nurtured under certain conditions. One of these conditions is the supplier firm's trust in the buyer. Trust provides a friendly environment in which an existing intrinsic motivation can further grow and flourish. The findings further suggest that for a supplier firm to trust its buyer, it requires the extension of a present exchange relationship. The prospects of prolongation are viewed as credible commitments of the buyer to favor mutual gains over one-sided benefits. According to the study's results, the supplier's organizational culture is also conducive to having trust in the buyer firm. Supplier firms that are characterized by sound values such as fairness, cooperativeness, and general trust are more willing to take a leap of faith and have trust in their buyer firms.

Both Papers 1 and 2 contribute to answering the fourth and last research question by studying the consequences of supplier (mis-)behavior. With their focus on the supplier's long-term success, the papers provide consistent findings. The results of Paper 1 indicate that supplier opportunism (e.g., withholding knowledge) is detrimental to the supplier firm's success, whereas in Paper 2, supplier knowledge sharing (i.e., not behaving opportunistically) proved to be beneficial. These findings suggest that behaving unethically and reaping short-term material benefits does not pay off in the long run. In order to secure their existence and financial well-being, supplier firms need to earn a reputation for being a cooperative and reliable business partner.

Apart from providing answers to the research questions, the papers of this dissertation seek to contribute to prior work and organization theory. The research contributions and theoretical implications are outlined in the following section.

7.2 Research contributions and implications for theory

The three papers of this cumulative dissertation consider a very sensitive and, so far, understudied field of interest: R&D supply relations. Due to their specific characteristics, R&D supply relationships provide ideal ground for deepening the understanding of the antecedents and consequences of opportunism and the mechanisms that deter such unethical partner behavior.

Paper 1 enhances current knowledge about the antecedents of supplier opportunism by combining TCT and PAT. Simultaneously examining the whole set of potential opportunism drivers allows a more complete and realistic picture to be drawn, thus extending prior work that has considered only some of the variables concurrently. Paper 1, furthermore, departs from prior work by enriching the concept of uncertainty by adding an internal, R&D process-related dimension. Most of the empirical research on exchange relationships has focused exclusively on the external, environment-related uncertainty; considering the internal uncertainty dimension is, however, a necessary step to account for the unpredictability of the R&D process itself. It is not uncommon for even supplier firms to be unable to anticipate which potential scientific and technological problems will occur and whether they have the competences necessary to solve them (Kloyer 2011). The fact that the results of Paper 1 indicate that the uncertainty dimensions have contrary impacts on supplier opportunism heavily supports the approach of considering both internal and external uncertainty. Future theoretical and empirical work is, therefore, strongly advised to also focus on problems of internal uncertainty.

The most surprising and thought-provoking finding is that external uncertainty reduces the R&D supplier firm's opportunism. While prior work mainly confirmed the opportunism-driving force of environmental uncertainty, Paper 1 reveals that instead of using it as a loophole to serving self-interests, R&D supplier firms seem to view external uncertainty as a chance to assert themselves in a competitive environment by demonstrating their true R&D capabilities. Though contrary to what is proposed by TCT, this finding calls for some rethinking in theory as it opens up a totally new perspective on the role external uncertainty may play, especially in R&D-specific exchange relationships.

In addition, the results of Paper 1 emphasize that economic theory alone cannot sufficiently explain organizational behavior. This is demonstrated by the fact that contrary to TCT-logic, specific investments of the supplier firm do not deter R&D suppliers from behaving opportunistically. Organizations seem to derive value from free choice. Restrictions on this freedom provoke unethical behavior (reactance theory; Brehm 1966, 1972). While this finding is certainly not completely new (see, e.g., Crosno et al. 2013), it highlights, however, that firms are “living organisms” that consist of people and are thus limited to the same extent as humans by bounded rationality and error in judgment (Svedin 2009). Economic theory should, therefore, embrace the insights of social psychology more heavily in order to understand and explain organizational behavior.

Paper 2 enriches the common understanding of those mechanisms that curtail opportunism and spur supplier knowledge sharing. It contributes to research by addressing two main shortcomings. First, even though the relevant literature provides a wide variety of governance mechanisms (for an overview, see, e.g., Brown et al. 2000; Cavusgil et al. 2004; Helm/Kloyer 2004; Jap/Anderson 2003; Vázquez et al. 2007; Wathne/Heide 2000), it also reveals a substantial lack of agreement on the role some variables play in restraining opportunism (Achrol/Gundlach 1999; Caniëls/Gelderman 2010) and spurring supplier knowledge sharing, with prior empirical findings varying a lot in terms of significance, direction, and magnitude. Second, prior work has focused exclusively on the hard, extrinsic determinants of the opportunism motivation whereas knowledge of the soft, non-extrinsic determinants is more than fragmentary. This dearth of research on intrinsic mechanisms stems from the fact that they are widely considered to be difficult to analyze and hard to manage (Kloyer 2011; Williamson 1975, 1985).

Paper 2 is, to the best of the author’s knowledge, the first to consider a wide range of main predictor variables of supplier knowledge sharing in an R&D supply context. It enhances current knowledge by providing additional insights into controversially-discussed relationships (e.g., monitoring). Furthermore, it responds to the recent call by organizational theorists to consider the effects of non-extrinsic variables, such as the supplier’s organizational culture and its intrinsic motivation (e.g., Kloyer 2011; Kloyer/Scholderer 2012). The empirical findings clearly indicate the decisive role “soft” determinants play in supplier knowledge sharing. This underlines the need for economic theories to turn more heavily towards intrinsic motivators as knowledge sharing in an R&D supply context cannot be adequately explained by relying solely on extrinsic determinants.

Building on an assumption from Paper 2 that supplier trust may not directly influence supplier knowledge sharing but rather indirectly via variables that are decisive for knowledge sharing, Paper 3 examined the role trust plays in nurturing the supplier's intrinsic motivation and the reasons that lead to supplier trust. It extends prior work in two ways. First, it considers trust to be not merely non-calculative in nature but to always encompass some element of calculation. By simultaneously examining major non-calculative and calculative reasons for supplier trust, it combines the opposing views and provides a more realistic picture of how trust evolves. Second, as intrinsic motivation is widely considered to be decisive for knowledge sharing, it is surprising that the question of how it can be nurtured has so far received no empirical attention, particularly in an inter-organizational context. Paper 3 is, to the best of the author's knowledge, the first to study this highly interesting link between supplier trust and the supplier's intrinsic motivation.

To conclude, Papers 1 and 2 both add to prior research by exploring the consequences of unethical partner behavior. They refer to Hawkins et al. (2008), who claim that the prevalence of opportunism in business practice is not matched with a corresponding research interest in its consequences. While there are some studies that examined the success effects of one-sided opportunism for the cooperation as a whole (Luo 2007; Luo et al. 2009; Parkhe 1993; Ting et al. 2007) and the party affected by such unethical behavior (e.g., Dahlstrom/Nygaard 1999; Morgan et al. 2007; Skarmeas et al. 2002; White/Lui 2005), no study has examined whether opportunism contributes to the success of the opportunistic party. In all conscience, this dissertation is the first to examine and prove that the gains achieved on the basis of opportunism have no lasting value for an opportunistic supplier as they strive to establish long-term relationships with their buyer firms, which is contrary to the theoretical framework of Grossman and Hart (1986) and Hart and Moore (1988)

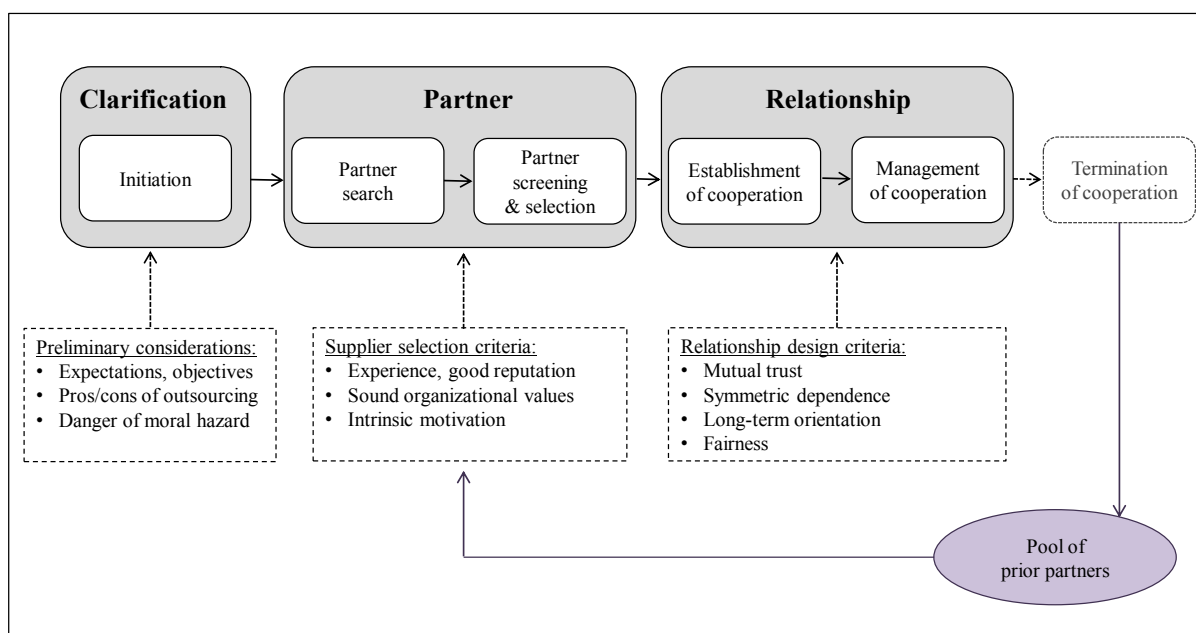
In addition to the outlined research contributions, this dissertation provides R&D buyer and supplier firms with important practical implications. These implications will be presented in the subsequent section.

7.3 Managerial implications

Although each of the three research papers had its own specific objectives and research questions, they provide relevant insights and significant answers to the overarching research question of how to set up and maintain successful R&D outsourcing relationships. By offering helpful hints on how to discern and effectively restrain unethical partner behavior, this dissertation has important implications for both buyer and supplier firms.

The overall findings suggest that three keys are required for R&D outsourcing to meet its intended objectives (see Figure 12).

Figure 12. The keys to successful R&D outsourcing



The preceding figure depicts in its core the cooperation process already portrayed in Section 2.2.2. In order to enrich the process with this thesis’ findings and implications, some of the stages are grouped together. They mark the three keys to successful R&D outsourcing (in grey).

Clarification is the first key to rewarding R&D supply relationships. While clarification is not limited to one stage only, it certainly has the greatest meaning in the initiation stage. Clarification, in this case, refers to buyer firms obtaining a realistic, uncompromising picture of the potential assets and drawbacks of R&D outsourcing when setting their objectives and expectations. Buyers must not be blinded only by the promising advantages of tapping into external sources of knowledge; they must be equally aware of the potential of R&D supplier opportunism. This includes awareness of the circumstances under which supplier firms may be inclined to behave unethically (Paper 1) and knowledge about effective measures to curtail such

unethical partner behavior (Paper 2). Furthermore, buyer firms must know that their own conscious and unconscious demeanor can actually trigger unethical supplier behavior, which requires constantly keeping track of own behaviors and actions by engaging in self-monitoring and self-control.

The second key to successful R&D outsourcing lies in the careful screening and subsequent selection of an adequate business partner. For buyer firms, an adequate business partner is a supplier that is characterized by an excellent reputation and outstanding records in the requested field as well as sound organizational values and principles that guide its actions and intrinsic motivation. Choosing an appropriate supplier firm is “half the battle,” as its qualifications and positive inner attitudes can certainly kill off major concerns from the outset.

The findings of Paper 1, for example, indicate that internal uncertainties are a major threat to the success of R&D outsourcing relationships as they open doors to unethical supplier behavior. Selecting an experienced and qualified supplier firm with sound organizational values can certainly not resolve the problem of internal uncertainties but can lower the possibility of the supplier exploiting them opportunistically. Due to its experience, the R&D supplier firm is used to working in uncertain environments and knows how to deal properly with uncertainties. Furthermore, its reputation is not only a signal of good work and cooperative behavior in the past; it also functions as a hostage that the buyer can destroy in case of supplier misbehavior. Lastly, the sound principles and values such as cooperativeness that guide its behavior prevent the supplier firm from taking advantage of opportunities for opportunism.

The importance of employing an R&D supplier with a cooperative organizational culture is furthermore highlighted by the results of the Papers 2 and 3. A cooperative culture on the part of the supplier firm does not only positively affect the supplier firm’s willingness to share knowledge (Paper 2); it also positively influences the supplier’s trust in the buyer firm, which represents a necessary precondition for the supplier’s intrinsic motivation (Paper 3). In the course of partner selection, buyer firms are, therefore, recommended to always keep a watchful eye on the supplier firm’s organizational culture. First impressions on potential cooperation candidates’ basic norms and values can be gained by tracking the suppliers’ cooperation history, visiting supplier facilities, conducting supplier audits, as well as through face-to-face communication with employees of the respective supplier firms. On the other hand, suppliers are advised to actively engage in making their firms’ core values visible to third parties through words and actions. Sending credible signals about good faith and intentions as well as implementing rules and procedures that provide a predictable structure (Deeds/Hill 1999)

simplify partner selection for the buyer firms and may simultaneously increase the chances of suppliers being selected as future business partners.

The findings of Paper 2 imply that it is important for buyer firms to have a partner that acts out of intrinsic motivation. R&D suppliers that are intrinsically motivated are less prone to opportunism and more willing to share the relevant knowledge with their buyers. Often, however, buyer firms do not know whether suppliers fulfilled previous R&D contracts out of intrinsic motivation, especially when cooperating for the first time (Kloyer 2011; Kloyer/Scholderer 2012). To avoid such doubts, buyer firms are advised to always screen the pool of prior collaboration partners first (see also Figure 12). Drawing on familiar suppliers entails several benefits. First, working with previous partners saves search costs and reduces the opportunism threat associated with new partners (Gulati/Gargiulo 1999; Podolny 1994). Second, being well-acquainted with the supplier's working attitudes and having established common routines and interfaces enable knowledge to be shared more efficiently between the partners, as suggested by the results of Paper 2.

Although intrinsic motivation is always given voluntarily, buyer firms can significantly contribute to creating an environment in which an existing supplier motivation thrives. Creating such a pleasing and friendly environment is inevitably linked to the third and final key component for fruitful R&D outsourcing: the establishment and maintenance of a well-working, cooperative relationship.

A well-working, cooperative relationship is one that is characterized by trust among the partners. The findings of Paper 3 suggest that the supplier firm's trust in the buyer plays a significant role in spurring the supplier firm's intrinsic motivation. Buyer firms should, therefore, constantly invest in trust building measures by sending credible signals about their good faith and intentions. This can include the establishment of a long-term business relationship with the supplier firm as indicated by the results of Paper 3. Furthermore, buyers should abstain from too close monitoring. Monitoring has not only proved to be little effective in R&D outsourcing (Paper 2), it can also be interpreted as a sign of distrust (Frey 1993; Lewis 2013) and "crowd out" the intrinsic reason to undertake a task for its own sake. Thus, buyer firms are well-advised to periodically revise their implemented control structures and grant R&D supplier firms the freedom necessary to strike new paths (Reeve 2009; Reeve/Jang 2006; Ryan/Deci 2000a).

For R&D outsourcing to be successful, the cooperative relationship should, furthermore, be balanced, i.e., characterized by mutual and symmetric dependence among the partners. While

dependencies are certainly among the primary reasons for cooperation, the results of Paper 1 suggest that dependencies that vary a lot in extent are “unhealthy” and can, sooner or later, give rise to unethical supplier behavior. Managers should, therefore, employ effective measures that transform one-sided dependencies into mutual ones. For these measures to be effective, they need to be tailored to suit the unavoidable incompleteness of R&D contracts. Contract fines, for example, that a buyer firm would have to pay in case of hold-up are not reliable instruments as they cannot be precisely stipulated *ex-ante*. Having the buyer input more reciprocal investments (e.g., in HR) is, however, a good way to balance out disparities as they equally bind the partners into the relationship. The same applies to the buyer granting the dependent supplier firm the status of an exclusive supplier. Another way to buffer the opportunism-increasing effect of supplier-dependence is to extend an existing relationship into the future as it allows the supplier firm to recoup its specific investments.

Creating business ties that are long-term oriented is the third “ingredient” for well-working R&D relationships. The findings of Paper 3 suggest that supplier firms that anticipate a prospective collaboration with the buyer firm tend to have more trust in their buyers, which may not only lower the likelihood of supplier opportunism but also positively affects the supplier firm’s intrinsic motivation (Paper 2). Buyer firms are, therefore, recommended to always consider whether it might be fruitful to extend an existing exchange relationship. If there is a plausible rationale for employing the supplier firm in the future, buyer firms should take the chance and credibly discuss their prolongation intentions with their suppliers, e.g., by talking about and defining future projects while the current one is still running.

Besides being trusting, balanced, and long-term oriented, effective R&D supply relationships should, lastly, be characterized by fairness. Fairness in terms of distributive justice is an indispensable asset when it comes to overcoming problems associated with information asymmetries. The findings of Paper 1 clearly demonstrate that although information asymmetries are an unavoidable consequence of R&D outsourcing, they can heavily endanger relationship effectiveness by aggravating the opportunism problem. As monitoring did not prove to be a reliable measure in this context (Paper 2), buyer firms are advised to strive for harmonizing both parties’ interests by sharing fairly in the innovation return. Prior empirical research, especially that of Kloyer (2011) and Kloyer and Scholderer (2012), showed that assigning patent ownership shares to the supplier firm is highly effective in this regard.

Overall, it can be said that the design of successful R&D supply relationships is a complex and challenging undertaking that requires a profound understanding of the chances and pit-

falls of using the “market” for the generation of knowledge inputs. Furthermore, it requires sufficient resources to manage the collaborative arrangement from the outset. For buyer firms, an effective management plans, documents, governs, and controls precisely the outsourcing relationship. This includes not losing sight of prior partners as they may be eligible candidates for future outsourcing endeavors.

Apart from the outlined contributions and implications, this dissertation suffers, like any other work, from limitations. These limitations and the resulting avenues for further research will be presented in the following section.

7.4 Limitations and future research

The three studies conducted within the scope of this dissertation were based on sound theoretical models that were tested using a reliable and valid survey instrument. It is, however, important to note several limitations that readers should keep in mind in relation to the studies’ contributions. These limitations simultaneously pave important avenues for further research. Apart from paper-specific limitations, which will be discussed later on, there are several constraints that refer to the process of data collection and evaluation and thus, equally concern all three papers.

First of all, the data was received by questioning R&D supplier firms only; an approach that is widely accepted in empirical research (e.g., Kloyer 2011; Kloyer/Scholderer 2012). In order to gain additional insights into the topic, it may seem tempting to say that future research should aim at interviewing both supplier and buyer firms. However, questioning both parties of an exchange relationship also entails considerable problems, which may offset its advantages. The data collection within the scope of this dissertation, for example, showed that R&D supplier firms are overly reluctant in revealing their buyers. This may be due to the fact that R&D outsourcing relationships are usually kept confidential from any third parties. Furthermore, there are serious doubts that R&D suppliers would answer questions honestly when fearing that any of their provided information could be leaked to their buyer firms. Over-reporting “good behavior” and under-reporting “bad behavior” could significantly skew results—this is known as the social desirability bias (Crowne/Marlowe 1964). Even if suppliers credibly declare their willingness to name their R&D partner firms, researchers are well advised to always consider the pros and cons of questioning both parties carefully.

Second, despite the attempts to survey supplier firms from seven different countries, most of the respondents in the sample are German R&D suppliers. This, however, did not allow the

testing for potential cultural differences in the empirical studies. Hence, future research could examine the applicability of the presented models and hypotheses beyond German boundaries and test whether the findings of this dissertation are generalizable.

Third, in this dissertation the sample of R&D supplier firms was not distinguished according to the nature of service (research vs. development) they provided. Therefore, prospective studies could, given a sufficient sample size, examine whether and how the findings differ when controlling for the market distance of the supplier firms.

Lastly, the research models of the three papers were tested using PLS path modeling—a variance-based method that due to its limited restrictions concerning distribution, sample size, and measurement scales, is often referred to as a “soft modeling approach” (Vinzi et al. 2010). Despite its various advantages (Hair et al. 2014) and its increased use in marketing and business research (Hair et al. 2012; Henseler et al. 2009), there are also critical voices that doubt the appropriateness of the PLS approach for many of the models tested in research (Guide/Ketokivi 2015) and thus call for it to no longer be used (e.g., Antonakis et al. 2010; Rönkkö 2014). Researchers are, therefore, advised (1.) to always critically question the suitability of the PLS approach for their specific research problem, thus weighing its benefits against its constraints and (2.) to justify its application with well-reasoned arguments. Furthermore, researchers should stay up-to-date on methodological developments in the field of structural equation modeling and PLS in particular.

Besides these general data-based limitations, each study of this dissertation leaves room for improvement. The paper-specific limitations and paths for future research are outlined separately for each paper in the following.

With regard to Paper 1, which deals with the drivers of opportunism, one of the most surprising results is the fact that external uncertainty has an opportunism-decreasing effect in R&D supply relations. This is contrary to theory and most of prior empirical research on dyadic relationships. Hence, this startling outcome definitely requires further empirical attention. Future research endeavours could, for instance, be targeted at defining and examining the conditions that may lead external uncertainty to develop its diverse effects on partner opportunism. Furthermore, previous studies on opportunism drivers in exchange relationships have focused primarily on the external dimension of uncertainty. However, as confirmed by this study, in R&D collaboration, there is also an internal, process-related dimension of uncertainty that provides ample leeway for supplier opportunism. In order to paint a complete picture of the uncertainty phenomenon, upcoming studies are advised to expand their frameworks to

cover both aspects of uncertainty. Lastly, the prevailing lack of research interest in the effect opportunism has on the success of the opportunistic party opens up a fruitful avenue for further research. Prospective studies could examine whether this study's finding can be confirmed in differing contexts. Furthermore, given that the focus of this study is on the supplier firm's longer-term success, future research could extend this work by simultaneously considering the effects opportunism has on measures for short- and long-term supplier success.

Addressing the determinants of knowledge sharing, the results of Paper 2 reveal that the impact of supplier trust on supplier knowledge sharing is rather limited. This finding, which seems to be counterintuitive on the surface and in contrast to theory, needs to be profoundly explored in the future. Special attention should thereby be granted to the assumption that the impact of trust on knowledge sharing may be limited to indirect effects only. Hence, determining and assessing the potential indirect effects of trust appears to be a worthwhile avenue for further research. Furthermore, due to the limited empirical interest in the role soft variables play in knowledge sharing, upcoming studies are advised to verify our findings in differing contexts. Lastly, similar to the recommendations made in Paper 1, there is tremendous scope to explore the success-increasing effect of supplier knowledge sharing. Future work is encouraged to contrast the influence supplier knowledge sharing, i.e., not behaving opportunistically, has on the supplier firm's short-term, material and its long-term, strategic success. This would clearly extend this thesis' results.

Concerning Paper 3, which focuses on the antecedents of supplier trust and how trust influences the supplier firm's intrinsic motivation, limitations result from the fact that the study does not comprehensively consider all potential sources of trust. Instead, this work only focuses on those sources that can be derived from new institutional economics and game theory. Future research is therefore encouraged to examine the trust-enhancing effects of all those potential determinants that were not part of this study but are frequently mentioned in the trust literature (see, e.g., Anderson/Weitz 1989; Bstieler/Hemmert 2008; Doney/Cannon 1997; Dyer/Chu 2000; for determinants such as frequent communication, aligned goals and interests, reputation, fairness, support and assistance-giving routines, knowledge and information sharing). Furthermore, the results show that the supplier firm's intrinsic motivation does not only seem to be heavily influenced by the supplier's trust in the buyer firm but also by the relative importance of the supply project. In this work, however, project importance was given the mere role of a control variable. Upcoming empirical studies should, therefore, elevate the status of project importance so that it becomes an independent variable. Examining different dimensions of project importance and empirically assessing their impact on the supplier

firm's intrinsic motivation and their relationship with other variables in the model represent fruitful avenues for further research.

7.5 Concluding remarks

This dissertation represents another incremental step towards a better understanding of what is needed to set up and maintain successful R&D outsourcing relationships. It addresses the major obstacle manufacturers of final products have to face when using the "market" for the generation of knowledge inputs: the unethical behavior of the R&D supplier firm. Despite having received great attention equally in research and practice, the opportunism phenomenon has still not been fully grasped because of its complex and multi-faceted nature.

By trying to capture the complexity of the opportunism phenomenon, this dissertation has explored the antecedents and consequences of R&D supplier opportunism and the mechanisms that are effective in curbing such unethical supplier behavior. Through addressing issues that have either remained unclear or unconsidered in prior theoretical and/or empirical analyses, this dissertation has contributed to and advanced existing work on opportunism and has illuminated the general understanding of how to improve the efficiency in R&D outsourcing.

While R&D collaborations provide, by their very nature, several opportunities for unethical partner behavior, the overall results and implications of this thesis suggest that the recipe for successful R&D outsourcing includes three major ingredients. First, having a realistic picture of the whole outsourcing endeavor; second, engaging a qualified supplier firm with positive inner attitudes and values; and third, creating and maintaining a lasting, balanced, and fair relationship characterized by a trusting atmosphere and by both partners constantly engaging in self-monitoring and self-control. Overall, it can be said that for outsourcing to meet its intended objectives, firms are advised to provide sufficient resources for adequately planning, documenting, managing, and controlling the outsourcing endeavor.

Given the accelerating technological progress and the increasing product complexity, manufacturing firms can be expected to rely even more heavily on external R&D partnerships in the future. With the market for R&D services constantly growing in width and depth, it may be justly concluded that the phenomenon of opportunism in R&D outsourcing will remain a highly interesting and promising area of research.

Appendix: Questionnaire



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Organizational success factors of R&D-Outsourcing

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Dear Sir or Madam,

for several reasons, the outsourcing of research and development (R&D) has become more important in the recent past. However, its success significantly depends on an effective management of the inter-firm collaboration. Recent evidence shows that the cooperation success decisively depends on effective incentives for the supplier. Therefore, we have started a research project on this topic that addresses suppliers of R&D services in eight European countries.

We have selected your company because of its clear profile as R&D supplier in high-tech industries. We would very much appreciate your support of our study. Of course, you would in turn receive an overview of the key findings as soon as the analyses are finished.

We guarantee you that we will use all provided information only in anonymous form and only for research purposes.

In case you are interested, we ask you to forward the questionnaire to that **project manager** who was in charge of the last project in which you supplied research and/or development services to a manufacturing firm.

We ask you to completely answer our questionnaire. You will not need more than **15-20 min.** In case of questions, please contact:

kloyerm@uni-greifswald.de or Christin.Aust@wiwi.uni-regensburg.de

or call

+49 (0) 941 943 5623

Thank you very much in advance!

Prof. Dr. Martin Kloyer

Prof. Dr. Roland Helm

Ph.D.c. Christin Aust



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	agree not at all						agree completely
Our engineers and sales staff established a close relationship with our partner's staff.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We transferred technology-related know-how to our partner firm, beyond contractual obligations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We shared to full extent the knowledge that was necessary to fulfill our contractual obligations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We provided our buyer with a completely truthful picture of our activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes we had to withhold information from the buyer in order to protect our interests.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes we had to alter the facts slightly in order to get what we needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We tried to maximize our customer's satisfaction by the best possible knowledge sharing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes we had to act in a way that did not correspond exactly to the contractual agreements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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The buyer was objectively ...	agree not at all						agree completely
<u>not</u> capable of observing our work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
capable of measuring our efforts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>not</u> capable of attributing interim and final results to our work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. CONTRACTUAL INCENTIVES

In the following, we would like to find out more about the contract design of your last R&D collaboration. Please indicate to what extent you agree with the following statements.

The collaboration contract assigned the rights to ...	agree not at all						agree completely
control the research activities within the collaboration to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
control the development activities within the collaboration to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
control the early-stage production of final products (that are based on our R&D results) to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
market the final products to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
control the marketing process to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
exclusively market the final products to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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To what extent did the collaboration contract assign ownership shares in the generated patents to you?	%
--	---

The collaboration contract assigned the ...	agree not at all						agree completely
responsibility for patent litigation processes to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
rights to sub-license to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Within the incentive system, ...	agree not at all						agree completely
equity shares played an important role for us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
royalties played an important role for us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
milestone-dependent payments played an important role for us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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4. SITUATIONAL INCENTIVES

By the following statements, we would like to learn more about the situational characteristics of your collaboration. For responding to our statements, please keep in mind to use your last finished R&D project as point of reference.

In the past, we have ...	agree not at all						agree completely
closely collaborated with the same buyer firm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
developed a close business relationship with the same buyer firm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
continuously adapted our collaborational skills and techniques (e.g., workflow, communication, process management) to the specific requirements of the buyer firm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In the beginning of this concrete supply relationship, we had to make ...	agree not at all						agree completely
material and immaterial investments in order to cope with the specific requirements of this contract.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
some investments that could not be used for other contracts without adaptation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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Concerning the following statements, how would you assess **your partner's** situation?

When the contract was concluded, ...	agree not at all						agree completely
our partner had no other possibility than to collaborate with us to gain access to the resource(s) that was (were) crucial to her/him.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
it would have been difficult for our partner to replace us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
our partner was quite dependent on us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
our partner did not have a good alternative to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Concerning the following statements, how would you assess **your** situation?

When the contract was concluded, ...	agree not at all						agree completely
we had no other possibility than to collaborate with our partner to gain access to the resource(s) that was (were) crucial to us.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
it would have been difficult for us to replace our partner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
we were quite dependent on our partner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
we did not have a good alternative to our partner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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When the contract was concluded, we ...	agree not at all						agree completely
had reason to believe that we would get an order from the same buyer firm in the near future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
were convinced that it would be possible to extend our collaboration with this buyer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When the contract was concluded, we were convinced that ...	agree not at all						agree completely
the buyer firm would keep its promises.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
we could count on the buyer to be sincere.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
the buyer would provide us with accurate information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
the buyer would consider our concerns in case of changing circumstances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
we could depend on the buyer's support concerning important matters.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
the buyer would not take advantage of power asymmetries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
the buyer would not take advantage of one-sided dependencies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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The buyer tried to ...	not at all very intensively						
observe our work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
measure our efforts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
attribute intermediate and final results to our work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Third parties were capable of ...	agree not at all agree completely						
appraising the quality of our work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
assessing the impact of our work on the market success of final products.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Our organizational culture is characterized by ...	agree not at all agree completely						
sharing information freely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
fair terms of exchange.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
being supportive.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
working in collaboration with others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
trust in our collaboration partners.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	agree not at all agree completely						
We develop trust in our collaboration partners independently from contractual safeguards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We trust in our collaboration partners as long as they fulfill their contractual obligations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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Working on the R&D task within the collaboration was ...	agree						
	not at all						completely
interesting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
challenging.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
satisfying.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
enjoyable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. DESCRIPTIVE CHARACTERISTICS

Finally, we would like to gather some basic information concerning your company. The following questions refer to the company that carried out the R&D project. In case your company is a subsidiary, please answer the questions from the subsidiary's perspective and not from the parent company's perspective.

What size is your company concerning number of employees?	<input type="checkbox"/> 1 - 19 <input type="checkbox"/> 20 - 99 <input type="checkbox"/> 100 – 499 <input type="checkbox"/> > 500																					
What size is your company concerning annual turnover?	million €																					
How old is your company?	years																					
What is your company's country of origin?	<input type="checkbox"/> Austria <input type="checkbox"/> Finland <input type="checkbox"/> Netherlands <input type="checkbox"/> Sweden <input type="checkbox"/> Denmark <input type="checkbox"/> Germany <input type="checkbox"/> Norway <input type="checkbox"/> Switzerland																					
What was the relative importance of the project within your project portfolio?	<table border="0"> <tr> <td></td> <td>not important</td> <td></td> <td></td> <td></td> <td></td> <td>very</td> </tr> <tr> <td></td> <td>at all</td> <td></td> <td></td> <td></td> <td></td> <td>important</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		not important					very		at all					important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	not important					very																
	at all					important																
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																
If you would like to receive a summary of the final results of this study, please enter your e-mail address. <small>(Please note that this information would not be used for identification purposes. Your e-mail address would be registered separately from your responses.)</small>	E-Mail: <input type="text"/>																					

Thank you very much for your participation!

References

A

- Abel, J. (1992): Kooperationen als Wettbewerbsstrategien für Software-Unternehmen. In Freter, H. (ed.): *Marktorientierte Unternehmensführung*. Peter Lang: Frankfurt am Main.
- Achrol, R. S.; Gundlach, G. T. (1999): Legal and social safeguards against opportunism in exchange. *Journal of Retailing* 75(1): 107–124.
- Aghion, P.; Tirole, J. (1994): The management of innovation. *Quarterly Journal of Economics* 109(4): 1185–1209.
- Akerlof, G. A. (1970): The market for “lemons”: Quality uncertainty and the market mechanism. *Quarterly Journal of Economics* 84(3): 488–500.
- Akhilesh, K. B. (2014): *R&D Management*. Springer: New Delhi.
- Alchian, A. A.; Woodward, S. (1988): The firm is dead, long live the firm. A Review of Oliver E. Williamson's *The economic institutions of capitalism*. *Journal of Economic Literature* 26(1): 65–79.
- Amabile, T. M. (1996): *Creativity in Context: Update to the Social Psychology of Creativity*. Westview Press: Boulder, CO.
- Amit, R.; Schoemaker, P. J. H. (1993): Strategic assets and organizational rent. *Strategic Management Journal* 14(1): 33–46.
- Andersen, M. L.; Taylor, H. F.; Logio, K. A. (2014): *Sociology: The Essentials* (8th edn.). Cengage Learning: Stamford, CT.
- Anderson, E. (1985): The salesperson as outside agent or employee: A transaction cost analysis. *Marketing Science* 4(3): 234–254.
- Anderson, E. (1988): Transaction costs as determinants of opportunism in integrated and independent sales forces. *Journal of Economic Behavior and Organization* 9(3): 247–264.
- Anderson, E.; Oliver, R. L. (1987): Perspectives on behavior-based versus outcome-based salesforce control systems. *Journal of Marketing* 51(4): 76–88.
- Anderson, E.; Weitz, B. (1989): Determinants of continuity in conventional industrial channel dyads. *Marketing Science* 8(4): 310–323.
- Anderson, E.; Weitz, B. (1992): The use of pledges to build and sustain commitment in distribution channels. *Journal of Marketing Research* 29(1): 18–34.
- Anderson, J. C.; Gerbing, D. W. (1988): Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin* 103(3): 411–423.
- Anderson, J. C.; Narus, J. A. (1990): A model of distributor firm and manufacturer firm working partnerships. *Journal of Marketing* 54(1): 42–58.
- Antonakis, J.; Bendahan, S.; Jacquart, P.; Lalive, R. (2010): On making causal claims: A review and recommendations. *Leadership Quarterly* 21(6): 1086–1120.
- Argyris, C. (1964): *Integrating the Individual and the Organization*. Wiley: New York.
- Arnold, U. (2000): New dimensions of outsourcing: A combination of transaction cost economics and the core competencies concept. *European Journal of Purchasing and Supply Management* 6(1): 23–29.

- Arnold, U., Neubauer, J.; Schoenherr, T. (2012): Explicating factors for companies' inclination towards corruption in operations and supply chain management: An exploratory study in Germany. *International Journal of Production Economics* 138(1): 136–147.
- Arora, A.; Fosfuri, A.; Gambardella, A. (2001): *Markets for Technology: The Economics of Innovation and Corporate Strategy*. MIT Press: Cambridge, MA.
- Arora, A.; Gambardella, A. (2010): Ideas for rent: An overview of markets for technology. *Industrial and Corporate Change* 19(3): 775–803.
- Arrow, K. J. (1963): Uncertainty and the welfare economics of medical care. *American Economic Review* 53(5): 941–973.
- Arrow, K. J. (1985): The economics of agency. In Pratt, J. W.; Zeckenhauer, R. J. (eds.): *Principals and Agents: The Structure of Business*. Harvard Business School Press: Boston, MA: 37–51.
- Artz, K. W. (1999): Buyer-supplier performance: The role of asset specificity, reciprocal investments and relational exchange. *British Journal of Management* 10(2): 113–126.
- Artz, K. W.; Norman, P. M. (2002): Buyer-supplier contracting: Contract choice and ex post negotiation costs. *Journal of Managerial Issues* 14(4): 399–417.
- Avny, G.; Anderson, A. R. (2008): Organisational culture, national culture and performance in international joint ventures based in Israel. *International Journal of Business and Globalisation* 2(2): 133–145.
- Axelrod, R. (1984): *The Evolution of Cooperation*. Basic Books: New York.

B

- Bagozzi, R. P.; Yi, Y. (1988): On the evaluation of structural equation models. *Journal of the Academy of Marketing Science* 16(1): 74–94.
- Bakker, M.; Leenders, R. T. A. J.; Gabbay, S. M.; Kratzer, J.; Van Engelen, J. M. L. (2006): Is trust really social capital? Knowledge sharing in product development projects. *The Learning Organization* 13(6): 594–605.
- Barney, J. B. (1986): Organizational culture: Can it be a source of sustained competitive advantage? *Academy of Management Review* 11(3): 656–665.
- Barney, J. B. (1991): Firm resources and sustained competitive advantage. *Journal of Management* 17(1): 99–120.
- Barney, J. B.; Hansen, M. H. (1994): Trustworthiness as a source of competitive advantage. *Strategic Management Journal* 15(S1): 175–190.
- Barthélemy, J. (2001): The hidden costs of IT outsourcing. *MIT Sloan Management Review* 42(3): 60–69.
- Baur, H. (1975): *Internationale Marketingkooperation*. VDI-Verlag: Düsseldorf.
- Beazley, H.; Boenisch, J.; Harden, D. G. (2002): *Continuity Management: Preserving Corporate Knowledge and Productivity When Employees Leave*. Wiley: Hoboken, NJ.
- Becker, T. E. (2005): Potential problems in statistical control of variables in organizational research: A qualitative analysis with recommendations. *Organizational Research Methods* 8(3): 274–289.

- Belcourt, M. (2006): Outsourcing—The benefits and the risks. *Human Resource Management Review* 16(2): 269–279.
- Bergen, M.; Dutta, S.; Walker, O. C. (1992): Agency relationships in marketing: A review of the implications and applications of agency and related theories. *Journal of Marketing* 56(3): 1–24.
- Bettis, R.; Bradley, S.; Hamel, G. (1992): Outsourcing and industrial decline. *Academy of Management Executive* 6(1): 7–22.
- Bhattacharjee, A. (2007): The Formation of Online Trust. In Lee, I. (ed.): *E-Business Models, Services, and Communications*. IGI Global: Hershey, PA: 325–343.
- Blau, P. M. (1964): *Exchange and Power in Social Life*. Wiley: New York.
- Blau, P. M.; Scott, R. W. (1962): *Formal Organizations: A Competitive Approach*. Chandler Publishing Comp.: San Francisco, CA.
- Blumberg, B. F. (2001): Cooperation contracts between embedded firms. *Organization Studies* 22(5): 825–852.
- Blumberg, D. F. (1998): Strategic assessment of outsourcing and downsizing in the service market. *Managing Service Quality* 8(1): 5–18.
- Boersma, M. F.; Buckley, P. J.; Ghauri, P. N. (2003): Trust in international JV relationships. *Journal of Business Research* 56(12): 1031–1042.
- Boon, S. D.; Holmes, J. G. (1991): The dynamics of interpersonal trust: Resolving uncertainty in the face of risk. In Hinde, R. A.; Groebel, J. (eds.): *Cooperation and Pro-social Behaviour*. Cambridge University Press: Cambridge, MA: 190–211.
- Brehm, J. W. (1966): *A Theory of Psychological Reactance*. Academic Press: New York; Oxford, England.
- Brehm, J. W. (1972): *Responses to Loss of Freedom: A Theory of Psychological Reactance*. General Learning Press: Morristown, NJ.
- Brehm, S. S.; Brehm, J. W. (1981): *Psychological Reactance: A Theory of Freedom and Control*. Academic Press: New York.
- Brinkhoff, A.; Özer, Ö.; Sargut, G. (2015): All you need is trust? An examination of inter-organizational supply chain projects. *Production and Operations Management* 24(2): 181–200.
- Bromiley, P.; Cummings, L. L. (1995): Transaction costs in organizations with trust. In Bies, R.; Sheppard, B.; Lewicki, R. (eds.): *Research on Negotiations in Organizations*, Vol. 5. JAI Press: Greenwich, CT: 219–247.
- Brown, J. R.; Dev, C. S.; Lee, D.-J. (2000): Managing marketing channel opportunism: The efficacy of alternative governance mechanisms. *Journal of Marketing* 64(2): 51–65.
- Bryce, D. J.; Useem, M. (1998): The impact of corporate outsourcing on company value. *European Management Journal* 16(6): 635–643.
- Bstieler, L.; Hemmert, M. (2008): Developing trust in vertical product development partnerships: A comparison of South Korea and Austria. *Journal of World Business* 43(1): 35–46.
- Bund, M. (2000): *F&E Outsourcing: Planung—Kontrolle—Integration*. Springer: Wiesbaden.

C

- Calantone, R. J.; Stanko, M. A. (2007): Drivers of outsourced innovation: An exploratory study. *Journal of Product Innovation Management* 24(3): 230–241.
- Caniëls, M. C. J.; Gelderman, C. J. (2010): The safeguarding effect of governance mechanisms in inter-firm exchange: The decisive role of mutual opportunism. *British Journal of Management* 21(1): 239–254.
- Cao, Q.; Leggio, K. B. (2006): Real option appraisal in R&D outsourcing. In: Schniederjans, M. J.; Schniederjans, A. M.; Schniederjans, D. G. (eds.): *Outsourcing Management Information Systems*. Idea Group: Hershey, PA: 299–311.
- Carmines, E. G.; Zeller, R. A. (1979): *Reliability and Validity Assessment*. Sage University Paper Series on Quantitative Applications in the Social Sciences. Newbury Park, CA.
- Carson, S. J., Madhok, A.; Wu, T. (2006): Uncertainty, opportunism, and governance: The effects of volatility and ambiguity on formal and relational contracting. *Academy of Management Journal* 49(5): 1058–1077.
- Cartwright, S.; Cooper, C. L. (1993): The role of culture compatibility in successful organizational marriage. *Academy of Management Executive* 7(2): 57–70.
- Caudy, D. W. (2001): Using R&D outsourcing as a competitive tool. *Medical Device and Diagnostic Industry Magazine*. Retrieved from: <http://www.mddionline.com/article/using-rd-outsourcing-competitive-tool> [10/15/2015].
- Cavusgil, S. T.; Deligonul, S.; Zhang, C. (2004): Curbing foreign distributor opportunism: An examination of trust, contracts, and the legal environment in international channel relationships. *Journal of International Marketing* 12(2): 7–27.
- Charki, M. H.; Jossierand, E. (2008): Online reverse auctions and the dynamics of trust. *Journal of Management Information Systems* 24(4): 175–197.
- Chatterji, D. (1996): Accessing external sources of technology. *Research Technology Management* 39(2): 48–56.
- Chen, W.; Zhang, X.; Peng, C.; Xu, L. (2012): Supply chain partnership, knowledge trading and cooperative performance: An empirical study based on Chinese manufacturing enterprises. *Cambridge Journal of China Studies* 7(2): 129–149.
- Chen, Y.-H.; Wu, J.-J.; Chien, S.-H.; Shiah, Y.-C. (2014): Exploring the factors of inter-organizational knowledge sharing. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering* 8(7): 2155–2158.
- Cheng, J.-H.; Yeh, C.-H.; Tu, C.-W. (2008): Trust and knowledge sharing in green supply chains. *Supply Chain Management: An International Journal* 13(4): 283–295.
- Chiesa, V.; Manzini, R.; Pizzurno, E. (2004): The externalisation of R&D activities and the growing market of product development services. *R&D Management* 34(1): 65–75.
- Chin, W. W. (1998): The partial least squares approach to structural equation modeling. In Marcoulides, G. A. (ed.): *Modern methods for business research*. Lawrence Erlbaum Associates: Mahwah, NJ: 295–336.
- Claro, D. P.; Claro, P. B. O. (2008): Managing trust relationships: calculative, affective, belief and performance. *Brazilian Administration Review* 5(4): 289–303.
- Coleman, J. S. (1990): *Foundations of Social Theory*. Belknap Press: Cambridge, MA.

- Contractor, F. J.; Lorange, P. (2002): The growth of alliances in the knowledge-based economy. *International Business Review* 11(4): 485–502.
- Cook, J.; Wall, T. D. (1980): New work attitude measures of trust, organizational commitment and personal need non-fulfilment. *Journal of Occupational Psychology* 53(1): 39–52.
- Crosno, J. L.; Dahlstrom, R. (2008): A meta-analytic review of opportunism in exchange relationships. *Journal of the Academy of Marketing Science* 36(2): 191–201.
- Crosno, J. L.; Manolis, C.; Dahlstrom, R. (2013): Toward understanding passive opportunism in dedicated channel relationships. *Marketing Letters* 24(4): 353–368.
- Crowne, D. P.; Marlowe, D. (1964): *The Approval Motive: Studies in Evaluative Dependence*. Wiley: New York.
- Csikszentmihalyi, M. (1975): *Beyond Boredom and Anxiety*. Jossey-Bass: San Francisco, CA.
- Cullen, J. B.; Johnson, J. L.; Sakano, T. (2000): Success through commitment and trust: The soft side of strategic alliance management. *Journal of World Business* 35(3): 223–240.
- Cummings, L. L.; Bromiley, P. (1996): The Organizational Trust Inventory (OTI)—Development and Validation. In Kramer, R. M.; Tyler, T. R. (eds.): *Trust in Organizations—Frontiers of Theory and Research*. Sage: Thousand Oaks, CA: 302–330.
- Cunningham, P. A.; Fröschl, F. (1995): Outsourcing: Strategische Bewertung einer Informationsdienstleistung. *FAZ: Frankfurt am Main*.

D

- Dahlstrom, R.; Nygaard, A. (1999): An empirical investigation of ex post transaction costs in franchised distribution channels. *Journal of Marketing Research* 36(2): 160–170.
- Das, T. K. (2004): Time-span and risk of partner opportunism in strategic alliances. *Journal of Managerial Psychology* 19(8): 744–759.
- Das, T. K. (2006): Strategic alliance temporalities and partner opportunism. *British Journal of Management* 17(1): 1–21.
- Das, T. K.; Rahman, N. (2001): Partner misbehaviour in strategic alliances: Guidelines for effective deterrence. *Journal of General Management* 27(1): 43–70.
- Das, T. K.; Rahman, N. (2010): Determinants of partner opportunism in strategic alliances: A conceptual framework. *Journal of Business and Psychology* 25(1): 55–74.
- Das, T. K.; Teng, B.-S. (2000a): A resource-based theory of strategic alliances. *Journal of Management* 26(1): 31–61.
- Das, T. K.; Teng, B.-S. (2000b): Instabilities of strategic alliances: An internal tensions perspective. *Organization Science* 11(1): 77–101.
- Das, T. K.; Teng, B.-S. (2001): Trust, control, and risk in strategic alliances: An integrated framework. *Organization Studies* 22(2): 251–283.
- Das, T. K.; Teng, B.-S. (2003): Partner analysis and alliance performance. *Scandinavian Journal of Management* 19(3): 279–308.
- Deal, T. E.; Kennedy, A. A. (1982): *Corporate Cultures: The Rites and Rituals of Corporate Life*. Addison-Wesley: Reading, MA.

- Deci, E. L.; Koestner, R.; Ryan, R. M. (1999): A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin* 125(6): 627–668.
- Deci, E. L.; Koestner, R.; Ryan, R. M. (2001): Extrinsic rewards and intrinsic motivation in education: Reconsidered once again. *Review of Educational Research* 71(1): 1–27.
- Deeds, D. L.; Hill, C. W. L. (1999): An examination of opportunistic action within research alliances: evidence from the biotechnology industry. *Journal of Business Venturing* 14(2): 141–163.
- Demsetz, H. (1993): The theory of the firm revisited. In Williamson, O. E.; Winter, S. G. (eds.): *The Nature of the Firm: Origins, Evolution and Development*. Oxford University Press: Oxford: 159–178.
- Deutsch, M. (1958): Trust and suspicion. *Journal of Conflict Resolution* 2(4): 265–279.
- Deutsch, M. (1962): Cooperation and Trust: Some Theoretical Notes. In Jones, M. R. (ed.): *Nebraska Symposium on Motivation*. University of Nebraska Press: Lincoln, NE: 275–319.
- Dietz, G.; Den Hartog, D. N. (2006): Measuring trust inside organizations. *Personnel Review* 35(5): 557–588.
- Dirks, K. T.; Ferrin, D. L. (2001): The role of trust in organizational settings. *Organization Science* 12(4): 450–467.
- Dobni, D.; Ritchie, J. R. B.; Zerbe, W. (2000): Organizational values: The inside view of service productivity. *Journal of Business Research* 47(2): 91–107.
- Dolgui, A.; Proth, J. M. (2013): Outsourcing: Definitions and analysis. *International Journal of Production Research* 51(23–24): 6769–6777.
- Doney, P. M.; Cannon, J. P. (1997): An examination of the nature of trust in buyer-seller relationships. *Journal of Marketing* 61(2): 35–51.
- Doz, Y. L.; Hamel, G. (1998): *Alliance Advantage: The Art of Creating Value Through Partnering*. Harvard Business School Press: Boston, MA.
- Drucker, P. F. (1989): Sell the mailroom. *Wall Street Journal*, July 25, p. A16.
- Düttmann, B. (1989): *Forschungs- und Entwicklungskooperationen und ihre Auswirkungen auf den Wettbewerb*. Josef Eul Verlag: Bergisch Gladbach.
- Dwyer, F. R.; Schurr, P. H.; Oh, S. (1987): Developing buyer-seller relationships. *Journal of Marketing* 51(2): 11–27.
- Dyer, J. H.; Chu, W. (2000): The determinants of trust in supplier-automaker relationships in the U.S., Japan, and Korea. *Journal of International Business Studies* 31(2): 259–285.
- Dyer, J. H.; Singh, H. (1998): The relational view: Cooperative strategy and sources of inter-organizational competitive advantage. *Academy of Management Review* 23(4): 660–679.

E

- Ebert, T. A. E. (2009): Facets of trust in relationships– A literature synthesis of highly ranked trust articles. *Journal of Business Market Management* 3(1): 65–84.

- Eisele, J. (1995): Erfolgsfaktoren des Joint Venture-Management. Neue betriebswirtschaftliche Forschung Bd. 165. Gabler: Wiesbaden.
- Eisenhardt, K. M. (1989): Agency theory: An assessment and review. *Academy of Management Review* 14(1): 57–74.
- Ellig, J. (2001): Internal markets and the theory of the firm. *Managerial and Decision Economics* 22(4–5): 227–237.
- Emerson, R. M. (1962): Power-dependence relations. *American Sociological Review* 27(1): 31–41.
- Engels, F. (2007): Zum Spannungsfeld der Öffnung und Schließung von Unternehmensgrenzen: Eine ressourcenorientierte Perspektive am Beispiel von Projektnetzwerken. *Europäische Hochschulschriften*. Peter Lang: Frankfurt am Main.
- Ernst, D. (2000): Inter-organizational knowledge outsourcing: What permits small Taiwanese firms to compete in the computer industry? *Asia Pacific Journal of Management* 17(2): 223–255.
- Espino-Rodríguez, T. F.; Padrón-Robaina, V. (2006): A review of outsourcing from the resource-based view of the firm. *International Journal of Management Reviews* 8(1): 49–70.
- Etter, C. (2003): Nachgründungsdynamik neugegründeter Unternehmen in Berlin im interregionalen Vergleich. Dissertation, FU Berlin.

F

- Fey, C. F.; Beamish, P. W. (2001): Organizational climate similarity and performance: International joint ventures in Russia. *Organization Studies* 22(5): 853–882.
- Fey, C. F.; Birkinshaw, J. (2005): External sources of knowledge, governance mode, and R&D performance. *Journal of Management* 31(4): 597–621.
- Fine, C. H. (1998): *Clockspeed—Winning Industry Control in the Age of Temporary Advantage*. Perseus Books: Reading, MA.
- Fornell, C.; Larcker, D. F. (1981): Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research* 18(3): 382–388.
- Frank, R. H. (1988): *Passions Within Reason: The Strategic Role of the Emotions*. W. W. Norton & Company: New York.
- Frey, B. S. (1993): Motivation as a limit to pricing. *Journal of Economic Psychology* 14(4): 635–664.
- Frey, B. S.; Bohnet, I. (1995): Institutions affect fairness: Experimental investigations. *Journal of Institutional and Theoretical Economics* 151(2): 286–303.
- Furubotn, E. G.; Richter, R. (2000): *Institutions and Economic Theory: The Contribution of the New Institutional Economics*. University of Michigan Press: Ann Arbor, MI.

G

- Ganesan, S. (1994): Determinants of long-term orientation in buyer-seller relationships. *Journal of Marketing* 58(2): 1–19.
- Gans, J.; Stern, S. (2003): The product market and the market for “ideas”: Commercialization strategies for technology entrepreneurs. *Research Policy* 32(2): 333–350.
- Gassenheimer, J., Baucus, D.; Baucus, M. (1996): Cooperative arrangements among entrepreneurs: An analysis of opportunism and communication in franchise structures. *Journal of Business Research* 36(1): 67–79.
- Gassmann, O.; Enkel, E.; Chesbrough, H. (2010): The future of open innovation. *R&D Management* 40(3): 213–221.
- Gefen, D.; Karahanna, E.; Straub, D. W. (2003): Trust and TAM in online shopping: An integrated model. *MIS Quarterly* 27(1): 51–90.
- Gerpott, T. J. (2005): *Strategisches Technologie- und Innovationsmanagement*, 2. Aufl., Schäffer-Poeschel: Stuttgart.
- Gibbons, R. (1998): Incentives in organizations. *Journal of Economic Perspectives* 12(4): 115–132.
- Giffin, K. (1967): The contribution of studies of source credibility to a theory of interpersonal trust in the communication process. *Psychological Bulletin* 68(2): 104–120.
- Godin, B. (2006): The linear model of innovation: The historical construction of an analytical framework. *Science, Technology, & Human Values* 31(6): 639–667.
- Goetz, C. J.; Scott, R. E. (1981): Principles of relational contracts. *Virginia Law Review* 67(6): 1089–1150.
- Goldberg, V. P. (1976a): Toward an expanded economic theory of contract. *Journal of Economic Issues* 10(1): 45–61.
- Goldberg, V. P. (1976b): Regulation and administered contracts. *Bell Journal of Economics* 7(2): 426–448.
- Gooroochurn, N.; Hanley, A. (2007): A tale of two literatures: Transaction costs and property rights in innovation outsourcing. *Research Policy* 36(10): 1483–1495.
- Granovetter, M. (1985): Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91(3): 481–510.
- Grimpe, C.; Kaiser, U. (2010): Balancing internal and external knowledge acquisition: The gains and pains from R&D outsourcing. *Journal of Management Studies* 47(8): 1483–1509.
- Grossman, S.; Hart, O. (1986): The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy* 94(4): 691–719.
- Grzeskowiak, S.; Al-Khatib, J. A. (2009): Does morality explain opportunism in marketing channel negotiations? The moderating role of trust. *International Journal of Retail & Distribution Management* 37(2): 142–160.
- Guide, V. D. R.; Ketokivi, M. (2015): Notes from the Editors: Redefining some methodological criteria for the journal. *Journal of Operations Management* 37(July): v–viii.
- Gulati, R. (1995): Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of Management Journal* 38(1): 85–112.

- Gulati, R. (1998): Alliances and networks. *Strategic Management Journal* 19(4): 293–317.
- Gulati, R.; Gargiulo, M. (1999): Where do interorganizational networks come from? *American Journal of Sociology* 104(5): 1439–1493.
- Gulati, R.; Singh, H. (1998): The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *Administrative Science Quarterly* 43(4): 781–814.
- Gulati, R.; Sytch, M. (2008): Does familiarity breed trust? Revisiting the antecedents of trust. *Managerial and Decision Economics* 29(2–3): 165–190.

H

- Hackman, J. R.; Oldham, G. R. (1976): Motivation through the design of work: Test of a theory. *Organizational Behaviour and Human Performance* 16(2): 250–279.
- Hagedoorn, J. (2002): Inter-firm R&D partnerships: An overview of major trends and patterns since 1960. *Research Policy* 31(4): 477–492.
- Hair, J. F.; Hult, G. T. M.; Ringle, C. M.; Sarstedt, M. (2014): *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage: Thousand Oaks, CA.
- Hair, J. F.; Ringle, C. M.; Sarstedt, M. (2011): PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice* 19(2): 139–151.
- Hair, J. F.; Sarstedt, M.; Ringle, C. M.; Mena, J. A. (2012): An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science* 40(3): 414–433.
- Hajidimitriou, Y. A.; Sklavounos, N. S.; Rotsios, K. P. (2012): The impact of trust on knowledge transfer in international business systems. *Scientific Bulletin–Economic Sciences* 11(2): 39–49.
- Hamel, G. (1991): Competition for competence and inter-partner learning within international strategic alliances. *Strategic Management Journal* 12(S1): 83–103.
- Hart, O.; Moore, J. (1988): Incomplete contracts and renegotiation. *Econometrica* 56(4): 755–785.
- Hartmann, A. (2004): *Innovationsmanagement in Bauunternehmen: Entwicklung eines organisatorischen Gestaltungsmodells zur Generierung innovativer baulicher Lösungen*. vdf Hochschulverlag: Zürich.
- Hätönen, J.; Eriksson, T. (2009): 30+ years of research and practice of outsourcing—Exploring the past and anticipating the future. *Journal of International Management* 15(2): 142–155.
- Hauser, J.; Tellis, G. J.; Griffin, A. (2006): Research on innovation: A review and agenda for marketing science. *Marketing Science* 25(6): 687–717.
- Hawkins, T. G.; Knipper, M. G.; Strutton, D. (2009): Opportunism in buyer-supplier relations: New insights from quantitative synthesis. *Journal of Marketing Channels* 16(1): 43–75.
- Hawkins, T. G.; Wittmann, C. M.; Beyerlein, M. M. (2008): Antecedents and consequences of opportunism in buyer-supplier relations: Research synthesis and new frontiers. *Industrial Marketing Management* 37(8): 895–909.

- Heide, J. B. (1994): Interorganizational governance in marketing channels. *Journal of Marketing* 58(1): 71–85.
- Heide, J. B.; John, G. (1990): Alliances in industrial purchasing: The determinants of joint action in buyer-supplier relationships. *Journal of Marketing Research* 27(1): 24–36.
- Heide, J. B.; John, G. (1992): Do norms matter in marketing relationships? *Journal of Marketing* 56(2): 32–44.
- Heide, J. B.; Miner, A. S. (1992): The shadow of the future: Effects of anticipated interaction and frequency of contact on buyer-seller cooperation. *Academy of Management Journal* 35(2): 265–291.
- Heide, J. B.; Wathne, K. H.; Rokkan, A. I. (2007): Interfirm monitoring, social contracts, and relationship outcomes. *Journal of Marketing Research* 44(3): 425–433.
- Heide, J. B.; Wathne, K. H.; Rokkan, A. I. (2007): Interfirm monitoring, social contracts, and relationship outcomes. *Journal of Marketing Research* 44(3): 425–433.
- Helm, R.; Kloyer, M. (2004): Controlling contractual exchange risks in R&D interfirm cooperation—An empirical study. *Research Policy* 33(8): 1103–1122.
- Helm, R.; Peter, A. (1999): Erfolgsfaktoren von Joint Ventures: Ergebnisse der bisherigen empirischen Forschung und deren qualitative Prüfung. *Zeitschrift für Planung* 10(1): 27–46.
- Hennart, J.-F. (1988): A transaction costs theory of equity joint ventures. *Strategic Management Journal* 9(4): 361–374.
- Henseler, J., Ringle, C. M.; Sinkovics, R. R. (2009): The use of partial least squares path modeling in international marketing. *Advances in International Marketing* 20(1): 277–319.
- Herzberg, F. I.; Mausner, B.; Snyderman, B. B. (1959): *The Motivation to Work*. Wiley: New York.
- Hill, C. W. L. (1990): Cooperation, opportunism, and the invisible hand: Implications for transaction cost theory. *Academy of Management Review* 15(3): 500–513.
- Hitt, M. A.; Dacin, M. T.; Levitas, E.; Arregle, J.; Borza, A. (2000): Partner selection in emerging and developed market contexts: Resource-based and organizational learning perspectives. *Academy of Management Journal* 43(3): 449–467.
- Hoang, H.; Rothaermel, F. T. (2005): The effect of general and partner-specific alliance experience on joint R&D project performance. *Academy of Management Journal* 48(2): 332–345.
- Hofstede, G. H. (1980): *Culture's Consequences: International Differences in Work-Related Values*. Sage: Beverly Hills, CA.
- Hofstede, G. H. (1984): *Culture's Consequences: International Differences in Work-Related Values*, abridged edition. Sage: Newbury Park, CA.
- Howells, J. (1999): Research and technology outsourcing. *Technology Analysis and Strategic Management* 11(1): 17–29.
- Howells, J.; Gagliardi, D.; Malik, K. (2008): The growth and management of R&D outsourcing: Evidence from UK pharmaceuticals. *R&D Management* 38(2): 205–219.
- Huang, Y.-A.; Chung, H.-J.; Lin, C. (2009): R&D sourcing strategies: Determinants and consequences. *Technovation* 29(3): 155–169.

Hubbard, G. M. (1993): How to make that tough outsourcing decision work for you. *Facilities Design & Management* 12 (7): 46–49.

I

Inkpen, A. C. (1998): Learning and knowledge acquisition through international strategic alliances. *Academy of Management Executive* 12(4): 69–80.

J

Jap, S. D. (1999): Pie-expansion efforts: Collaboration processes in buyer-supplier relationships. *Journal of Marketing Research* 36(4): 461–475.

Jap, S. D.; Anderson, E. (2003): Safeguarding interorganizational performance and continuity under ex post opportunism. *Management Science* 49(12): 1684–1701.

Jap, S. D.; Ganesan, S. (2000): Control mechanisms and the relationship life cycle: Implications for safeguarding specific investments and developing commitment. *Journal of Marketing Research* 37(2): 227–245.

Jap, S. D.; Robertson, D. C.; Rindfleisch, A.; Hamilton, R. (2013): Low-stakes opportunism. *Journal of Marketing Research* 50(2): 216–227.

Jensen, M. C.; Meckling, W. H. (1976): Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3(4): 305–360.

Jenster, P.; Stener Pedersen, H.; Plackett, P; Hussey, D. (2005): *Outsourcing-Insourcing: Can vendors make money from the new relationships opportunities?* John Wiley & Sons: Chichester.

John, G. (1984): An empirical investigation of some antecedents of opportunism in a marketing channel. *Journal of Marketing Research* 21(3): 278–289.

Jones, G. R.; George, J. M. (2003): *Essentials of Contemporary Management* (3rd edn.). McGraw-Hill: New York.

Joshi, A. W.; Arnold, S. J. (1997): The impact of buyer dependence on buyer opportunism in buyer-supplier relationships: The moderating role of relational norms. *Psychology and Marketing* 14(8): 823–845.

Joshi, A. W.; Stump, R. L. (1999): Determinants of commitment and opportunism: Integrating and extending insights from transaction cost analysis and relational exchange theory. *Canadian Journal of Administrative Sciences* 16(4): 334–352.

K

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.

Katsikeas, C. S., Skarmeas, D.; Bello, D. C. (2009): Developing successful trust-based international exchange relationships. *Journal of International Business Studies* 40(1): 132–155.

- Kern, T.; Willcocks, L.; Van Heck, E. (2002): The winner's curse in IT outsourcing: Strategies for avoiding relational trauma. *California Management Review* 44(2): 47–69.
- Klein, B. (1980): Transaction cost determinants of "unfair" contractual arrangements. *American Economic Review* 70 (2): 356–362.
- Klein, B. (1985): Self-enforcing contracts. *Journal of Institutional and Theoretical Economics* 141(4): 594–600.
- Klein, B. (1996): Why hold-ups occur: The self-enforcing range of contractual relationships. *Economic Inquiry* 34(3): 444–463.
- Klein, B., Crawford, R. G.; Alchian, A. A. (1978): Vertical integration, appropriable rents, and the competitive contracting process. *Journal of Law and Economics* 21(2): 297–326.
- Klein, P. G. (1999): New institutional economics. Working Paper 0530, Department of Economics, University of Georgia.
Retrieved from: <http://encyclo.findlaw.com/0530book.pdf> [10/15/2015].
- Kloyer, M. (2005): Opportunismus und Institutionen in vertikalen Innovationskooperationen. In Schauenberg, B.; Schreyögg, G.; Sydow, J. (eds.): *Managementforschung 15: Institutionenökonomik als Managementlehre?* Gabler: Wiesbaden: 283–326.
- Kloyer, M. (2011): Effective control rights in vertical R&D collaboration. *Managerial and Decision Economics* 32(7): 457–468.
- Kloyer, M.; Helm, R. (2008): Contractual design of contract R&D: State-of-the-art of empirical research. In Meckl, R.; Rongping, M.; Fanchen, M. (eds.): *Technology and Innovation Management*. Oldenbourg Wissenschaftsverlag GmbH: München: 151–165.
- Kloyer, M.; Scholderer, J. (2012): Effective incomplete contracts and milestones in market-distant R&D collaboration. *Research Policy* 41(2): 346–357.
- Ko, D-G.; Kirsch, L. J.; King, W. R. (2005): Antecedents of knowledge transfer from consultants to clients in enterprise system implementations. *MIS Quarterly* 29(1): 59–85.
- Koen, P. A.; Ajamian, G. M.; Boyce, S.; Clamen, A.; Fisher, E.; Fountoulakis, S.; Johnson, A.; Puri, P.; Seibert, R. (2002): Fuzzy-front end: Effective methods, tools and techniques. In Belliveau, P.; Griffen, A.; Sorermeyer, S. (eds.): *The PDMA Toolbook for New Product Development*. John Wiley & Sons: New York: 5–36.
- Kogut, B. (1988): Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal* 9(4): 319–332.
- Kotabe, M.; Martin, X.; Domoto, H. (2003): Gaining from vertical partnerships: Knowledge transfer, relationship duration, and supplier performance improvement in the U.S. and Japanese automotive industries. *Strategic Management Journal* 24(4): 293–316.
- Kremic, T.; Tükel, O. I.; Rom, W. O. (2006): Outsourcing decision support: A survey of benefits, risks, and decision factors. *Supply Chain Management* 11(6): 467–482.
- Krishnan, R.; Martin, X.; Noorderhaven, N. G. (2006): When does trust matter to alliance performance? *Academy of Management Journal* 49(5): 894–917.
- Kronman, A. T. (1985): Contract law and the state of nature. *Journal of Law, Economics, and Organization* 1(1): 5–32.
- Kumar, N.; Scheer, L. K.; Steenkamp, J.-B. E. M. (1995): The effects of supplier fairness on vulnerable resellers. *Journal of Marketing Research* 32(1): 54–65.

- Kutschker, M. (1994): Strategische Kooperationen als Mittel der Internationalisierung. In Schuster, L. (ed.): *Die Unternehmung im internationalen Wettbewerb*. Erich Schmidt: Berlin: 121–157.
- Kwon, Y-C. (2008): Antecedents and consequences of international joint venture partnerships: A social exchange perspective. *International Business Review* 17(5): 559–573.

L

- Laaksonen, T.; Pajunen, K.; Kulmala, H. I. (2008): Co-evolution of trust and dependence in customer-supplier relationships. *Industrial Marketing Management* 37(8): 910–920.
- Lai, F., Tian, Y.; Huo, B. (2012): Relational governance and opportunism in logistics outsourcing relationships: Empirical evidence from China. *International Journal of Production Research* 50(9): 2501–2514.
- Lane, C. (2000): Introduction: Theories and issues in the study of trust. In Lane, C.; Bachmann, R. (eds.): *Trust Within and Between Organizations: Conceptual Issues and Empirical Applications*. Oxford University Press: Oxford: 1–30.
- Lane, P. J.; Salk, J. E.; Lyles, M. A. (2001): Absorptive capacity, learning, and performance in international joint ventures. *Strategic Management Journal* 22(12): 1139–1161.
- Lavie, D. (2006): The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of Management Review* 31(3): 639–658.
- Lawson, B.; Petersen, K. J.; Cousins, P. D.; Handfield, R. B. (2009): Knowledge sharing in interorganizational product development teams: The effect of formal and informal socialization mechanisms. *Journal of Product Innovation Management* 26(2): 156–172.
- Lee, Y.; Cavusgil, S. T. (2006): Enhancing alliance performance: The effects of contractual-based versus relational-based governance. *Journal of Business Research* 59(8): 896–905.
- Leiblein, M. J.; Miller, D. J. (2003): An empirical examination of transaction- and firm-level influences on the vertical boundaries of the firm. *Strategic Management Journal* 24(9): 839–859.
- Leiblein, M. J.; Reuer, J. J.; Dalsace, F. (2002): Do make or buy decisions matter? The influence of organizational governance on technological performance. *Strategic Management Journal* 23(9): 817–833.
- Leiner, D. J. (2013): SoSci Survey [Computer Software]. Retrieved from: <http://www.soscisurvey.com>
- Lewicki, R. J.; Bunker, B. B. (1996): Developing and maintaining trust in work relationships. In Kramer, R. M.; Tyler, T. R. (eds.): *Trust in Organizations: Frontiers of Theory and Research*. Sage: Thousand Oaks, CA: 114–139.
- Lewicki, R. J.; McAllister, D. J.; Bies, R. J. (1998): Trust and distrust: New relationships and realities. *Academy of Management Review* 23(3): 438–458.
- Lewis, J. M. (2013): *Academic Governance: Disciplines and Policy*. Routledge: New York.
- Liesbeskind, J. P. (1996): Knowledge, strategy, and the theory of the firm. *Strategic Management Journal* 17(Special Issue S2): 93–107.
- Likert, R. (1961): *New Patterns of Management*. McGraw-Hill: New York.

- Lin, H.-F. (2007): Effects of extrinsic and intrinsic motivation on employee knowledge sharing intentions. *Journal of Information Science* 33(2): 135–149.
- Liu, Y., Liu, T.; Li, Y. (2014): How to inhibit a partner's strong and weak forms of opportunism: Impacts of network embeddedness and bilateral TSIs. *Industrial Marketing Management* 43(2): 280–292.
- Liu, Y., Su, C., Li, Y.; Liu, T. (2010): Managing opportunism in a developing interfirm relationship: The interrelationship of calculative and loyalty commitment. *Industrial Marketing Management* 39(5): 844–852.
- Liu, Y.; Luo, Y.; Liu, T. (2009): Governing buyer–supplier relationships through transactional and relational mechanisms: Evidence from China. *Journal of Operations Management* 27(4): 294–309.
- Loewenstein, G. (1999): Because it is there: The challenge of mountaineering...for utility theory. *Kyklos* 52(3): 315–343.
- Lohmöller, J.-B. (1989): *Latent Variable Path Modeling with Partial Least Squares*. Physica-Verlag: Heidelberg.
- Louis, M. (1983): Culture: Yes. Organization: No. Paper Presented at the annual meeting of the Academy of Management, Dallas.
- Love, J. H.; Roper, S. (2002): Internal versus external R&D: A study of R&D choice with sample selection. *International Journal of the Economics of Business* 9(2): 239–255.
- Luo, Y. (2002a): Contract, cooperation, and performance in international joint ventures. *Strategic Management Journal* 23(10): 903–919.
- Luo, Y. (2002b): *Multinational Enterprises in Emerging Markets*. Copenhagen Business School Press: Copenhagen.
- Luo, Y. (2007): Are joint venture partners more opportunistic in a more volatile environment? *Strategic Management Journal* 28(1): 39–60.
- Luo, Y., Liu, Y.; Xue, J. (2009): Relationship investment and channel performance: An analysis of mediating forces. *Journal of Management Studies* 46(7): 1113–1137.

M

- MacDuffie, J. P. (2011): Inter-organizational trust and the dynamics of distrust. *Journal of International Business Studies* 42(1): 35–47.
- Macneil, I. R. (1978): Contracts: Adjustment of long-term economic relations under classical, neoclassical, and relational law. *Northwestern University Law Review* 72(6): 854–901.
- Madhavan, R.; Grover, R. (1998): From embedded knowledge to embodied knowledge: New product development as knowledge management. *Journal of Marketing* 62(4): 1–12.
- Makadok, R. (2001): Toward a synthesis of the resource-based and dynamic-capability views of rent creation. *Strategic Management Journal* 22(5): 387–401.
- Martinez-Noya, A.; Garcia-Canal, E.; Guillen, M. F. (2013): R&D outsourcing and the effectiveness of intangible investments: Is proprietary core knowledge walking out of the door? *Journal of Management Studies* 50(1): 67–91.
- Maslow, A. H. (1954): *Motivation and Personality*. Harper: New York.

- Masten, S. E. (1988): Equity, opportunism, and the design of contractual relations. *Journal of Institutional and Theoretical Economics* 144(1): 180–195.
- McAllister, D. J. (1995): Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal* 38(1): 24–59.
- McCarthy, I. P.; Silvestre, B. S.; Kietzmann, J. H. (2013): Understanding outsourcing contexts through information asymmetry and capability fit. *Production Planning & Control* 24(4–5): 277–283.
- McEvily, B.; Perrone, V.; Zaheer, A. (2003): Trust as an organizing principle. *Organization Science* 14(1): 91–103.
- McGregor, D. (1960): *The Human Side of Enterprise*. McGraw-Hill: New York.
- McIvor, R. (2005): *The Outsourcing Process: Strategies for Evaluation and Management*. Cambridge University Press: Cambridge.
- Mellewigt, T. (2003): *Management von Strategischen Kooperationen: Eine ressourcenorientierte Untersuchung in der Telekommunikationsbranche*. Deutscher Universitäts-Verlag/GWV Fachverlage GmbH: Wiesbaden.
- Ménard, C.; Shirley, M. M. (2008): *Handbook of New Institutional Economics*. Springer: Berlin.
- Meyer, U.; Leuppi, R. (1992): Outsourcing-ein neuer Megatrend in der Informatik. *io Management Zeitschrift* 61(4): 49–51
- Milgrom, P.; Roberts, J. (1992): *Economics, Organization and Management*. Prentice Hall: Englewood Cliffs, NJ.
- Miller, G. (2001): Why is trust necessary in organizations? The moral hazard of profit maximization. In Cook, K. S. (ed.): *Trust in Society*. Russell Sage Foundation: New York: 307–331.
- Miroshnik, V. (2013): *Organizational Culture and Commitment: Transmission in Multinationals*. Palgrave Macmillan: Houndmills, Basingstoke, Hampshire.
- Mohr, A. T. (2004): Trust, control, interaction and performance in IJVs – a taxonomy of German-Chinese joint ventures. *Duisburg Working Papers on East Asian Economic Studies* 71/2004, Universität Duisburg-Essen. Retrieved from: <https://duepublico.uni-duisburg-essen.de/servlets/DerivateServlet/Derivate-5611/AP71.pdf> [10/15/2015].
- Moorman, C.; Zaltman, G.; Deshpande, R. (1992): Relationships between providers and users of market research: The dynamics of trust within and between organizations. *Journal of Marketing Research* 29(3): 314–328.
- Morgan, N. A., Kaleka, A.; Gooner, R. A. (2007): Focal supplier opportunism in supermarket retailer category management. *Journal of Operations Management* 25(2): 512–527.
- Morgan, R. M.; Hunt, S. D. (1994): The commitment-trust theory of relationship marketing. *Journal of Marketing* 58(3): 20–38.
- Morris, D.; Hergert, M. (1987): Trends in international collaborative agreements. *Columbia Journal of World Business* 22(2): 15–21.
- Mossholder, K. W. (1980): Effects of externally mediated goal setting on intrinsic motivation: A laboratory experiment. *Journal of Applied Psychology* 65(2): 202–210.
- Murry, J. P.; Heide, J. B. (1998): Managing promotion program participation within manufacturer-retailer relationship. *Journal of Marketing* 62(1): 58–68.

Mysen, T., Svensson, G.; Payan, J. M. (2011): The key role of opportunism in business relationships. *Marketing Intelligence & Planning* 29(4): 436–449.

N

Nagin, D. S.; Rebitzer, J. B.; Sanders, S.; Taylor, L. J. (2002): Monitoring, motivation, and management: The determinants of opportunistic behavior in a field experiment. *American Economic Review* 92(4): 850–873.

Narula, R.; Duysters, G. (2004): Globalisation and trends in international R&D. *Journal of International Management* 10(2): 199–218.

Nickerson, R. S. (1999): Basic versus applied research. In Sternberg, R. J. (ed.): *The Nature of Cognition*. MIT Press: Cambridge, MA: 409–446.

Nooteboom, B. (1999): *Inter-firm Alliances: Analysis and Design*. Routledge: London.

Nooteboom, B. (2002): *Trust: Forms, Foundations, Functions, Failures and Figures*. Edward-Elgar: Cheltenham, UK; Northampton, MA.

Nuhn, B. (1987): *Eigen- und/oder Fremdforschung und –entwicklung als strategisches Entscheidungsproblem*. Ferber: Gießen.

Nunnally, J. C.; Bernstein, I. H. (1994): *Psychometric theory* (3rd edn.). McGraw-Hill: New York.

O

Odenthal, S. (1999): *Management von Unternehmensteilungen*. DUV/Gabler: Wiesbaden.

OECD (2015): *Frascati Manual: Proposed standard practice for surveys on research and experimental development*.

Oertel, H. A.; Abraham, H.-W. (1996): Internal und External Outsourcing–Praxis im Handel am Beispiel der Karstadt AG. In Koppelman, U. (ed.): *Outsourcing*. Schäffer-Poeschel: Stuttgart: 11–29.

O’Regan, N.; Sims, M. A.; Ghobadian, A. (2008): Does R&D really drive competitive advantage and performance? *International Journal of Manufacturing Technology and Management* 15(3-4): 376–403.

O’Reilly, C. A., III; Chatman, J.; Caldwell, D. F. (1991): People and organizational culture: A profile comparison approach to assessing person-organization fit. *Academy of Management Journal* 34(3): 487–516.

Oxford Learner’s Dictionaries Online (2016): Oxford University Press. Retrieved from: <http://www.oxforddictionaries.com/definition/english/cooperation> [03/16/2016].

Oxley, J. E. (1997): Appropriability hazards and governance in strategic alliances: A transaction cost approach. *Journal of Law, Economics and Organization* 13(2): 387–409.

P

- Paliszkiwicz, J. (2011): Inter-organizational trust: Conceptualization and measurement. *International Journal of Performance Measurement* 1(1): 15–28.
- Park S. H.; Ungson, G. R. (2001): Interfirm rivalry and managerial complexity: A conceptual framework of alliance failure. *Organization Science* 12(1): 37–53.
- Parkhe, A. (1993): Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal* 36(4): 794–829.
- Pausenberger, E. (1989): Zur Systematik von Unternehmenszusammenschlüssen. *Das Wirtschaftsstudium* 18(11): 621–626.
- Peters, T. J.; Waterman, R. H. (1982): *In Search of Excellence: Lessons from America's Best-Run Companies*. Harper & Row: New York.
- Peters, T. W. (2012): Alliance formation in emerging economies. A resource-based and agency-theoretic analysis. In Festling, M.; Royer, S. (eds.): *Schriftenreihe Internationale Personal- und Strategieforschung: Band 10*. Hampp: Mering.
- Petersen, K. J.; Handfield, R. B.; Lawson, B.; Cousins, P. D. (2008): Buyer dependency and relational capital formation: The mediating effects of socialization processes and supplier integration. *Journal of Supply Chain Management* 44(4): 53–65.
- Pfeffer, J. (1981): Management as symbolic action: The creation and maintenance of organizational paradigms. In Cummings, L. L.; Staw, B. M. (eds.): *Research in organizational behavior*, 3. JAI Press: Greenwich, CT: 1–52.
- Pfeffer, J.; Salancik, G. R. (1978): *The External Control of Organizations: A Resource Dependence Perspective*. Harper & Row: New York.
- Piachaud, B. S. (2002): Outsourcing in the pharmaceutical manufacturing process: An examination of the CRO experience. *Technovation* 22(2): 81–90.
- Pisano, G. P. (1990): The R&D boundaries of the firm: An empirical analysis. *Administrative Science Quarterly* 35(1): 153–176.
- Podolny, J. M. (1994): Market uncertainty and the social character of economic exchange. *Administrative Science Quarterly* 39(3): 458–483.
- Podsakoff, P. M.; MacKenzie, S. B.; Lee, J.-Y.; Podsakoff, N. P. (2003): Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology* 88(5): 879–903.
- Poppo, L.; Zhou, K. Z.; Li, J. J. (2015): When can you trust “trust”? Calculative trust, relational trust, and supplier performance. *Strategic Management Journal*, forthcoming. Retrieved from: <http://onlinelibrary.wiley.com/doi/10.1002/smj.2374/pdf> [01/30/2015].
- Poppo, L.; Zhou, K. Z.; Ryu, S. (2008): Alternative origins to interorganizational trust: An interdependence perspective on the shadow of the past and the shadow of the future. *Organization Science* 19(1): 39–55.
- Pothukuchi, V.; Damanpour, F.; Choi, J.; Chen, C. C.; Park, S. H. (2002): National and organizational culture differences and international joint venture performance. *Journal of International Business Studies* 33(2): 243–256.
- Pratt, M. G.; Ashforth, B. E. (2003): Fostering meaningfulness in working and at work. In Cameron, K. S.; Dutton, J. E.; Quinn, R. E. (eds.): *Positive Organizational Scholarship: Foundations of a new Discipline*. Berrett-Koehler: San Francisco, CA: 309–327.

- Prendergast, C. (1999): The provision of incentives in firms. *Journal of Economic Literature* 37(1): 7–63.
- Provan, K. G.; Skinner, S. J. (1989): Interorganizational dependence and control as predictors of opportunism in dealer-supplier relations. *Academy of Management Journal* 32(1): 202–212.
- Pruitt, D. G. (1981): *Negotiation Behavior*. Academic Press: New York.

Q

- Quinn, J. B. (1992): *Intelligent Enterprise: A Knowledge and Service Based Paradigm for Industry*. Free Press: New York.
- Quinn, J. B. (1999): Strategic outsourcing: Leveraging knowledge capabilities. *Sloan Management Review* 40(4): 9–21.
- Quinn, J. B. (2000): Outsourcing innovation: The new engine of growth. *Sloan Management Review* 41(4): 13–28.
- Quinn, J. B.; Hilmer, F. G. (1994): Strategic outsourcing. *Sloan Management Review* 35(4): 43–55.

R

- Reeve, J. (2009): Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist* 44(3): 159–175.
- Reeve, J.; Jang, H. (2006): What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology* 98(1): 209–218.
- Richards, M.; Yang, Y. (2007): Determinants of foreign ownership in international R&D joint ventures: Transaction costs and national culture. *Journal of International Management* 13(2): 110–130.
- Riedl, R.; Kepler, J. (2003): Begriffliche Grundlagen des Business Process Outsourcing. *Information Management & Consulting* 18(3): 6–10.
- Ring, P. S. (1996): Fragile and resilient trust and their roles in economic exchange. *Business & Society* 35(2): 148–175.
- Ringle, C. M., Wende, S.; Will, A. (2005): *SmartPLS 2.0. M3*. Hamburg: SmartPLS. Retrieved from: <http://www.smartpls.com>
- Robbins, S. P. (2001): *Organizational Behavior* (9th edn.). Prentice Hall: Upper Saddle River, NJ.
- Robson, M. J.; Katsikeas, C. S.; Bello, D. C. (2008): Drivers and performance outcomes of trust in international strategic alliances: The role of organizational complexity. *Organization Science* 19(4): 647–665.
- Rokkan, A. I., Heide, J. B.; Wathne, K. H. (2003): Specific investments in marketing relationships: Expropriation and bonding effects. *Journal of Marketing Research* 40(2): 210–224.

- Rommel, K.; Püschel, M. (1994): Outsourcing: Quantitative und qualitative Aspekte. In: Wagner, H. (ed.): Betriebswirtschaftslehre und Unternehmensforschung-Aktuelle problemorientierte Konzepte. Gabler: Wiesbaden: 119–134.
- Rönkkö, M. (2014): The effects of chance correlations on partial least squares path modeling. *Organizational Research Methods* 17(2): 164–181.
- Rose, D. C. (2011): *The Moral Foundation of Economic Behavior*. Oxford University Press: Oxford.
- Rotter, J. B. (1967): A new scale for the measurement of interpersonal trust. *Journal of Personality* 35(4): 651–665.
- Rousseau, D. M.; Sitkin, S. B.; Burt, R. S.; Camerer, C. (1998): Not so different after all: A cross-discipline view of trust. *Academy of Management Review* 23(3): 393–404.
- Roussel, P. A.; Saad, K. N.; Erickson, T. J. (1991): *Third Generation R&D: Managing the Link to Corporate Strategy*. Harvard Business School Press: Boston, MA.
- Roy, R.; Cross, N. (1983): *Design: Process and Products; Bicycles: Invention and Innovation*. Open University Press: London.
- Rupprecht-Däullary, M. (1994): *Zwischenbetriebliche Kooperation*. Springer: Wiesbaden.
- Ryan, R. M.; Deci, E. L. (2000a): Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology* 25(1): 54–67.
- Ryan, R. M.; Deci, E. L. (2000b): Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist* 55(1): 68–78.

S

- Sako, M.; Helper, S. (1998): Determinants of trust in supplier relations: Evidence from the automotive industry in Japan and the United States. *Journal of Economic Behavior & Organization* 34(3): 387–417.
- Sampson, R. C. (2007): R&D alliances and firm performance: The impact of technological diversity and alliance organization on innovation. *Academy of Management Journal* 50(2): 364–386.
- Sanner, L. (2005): Dependence and trust between suppliers and industrial customers. Working Paper Series, Working Paper No. 6, Örebro University. Retrieved from: <http://www.oru.se/PageFiles/15370/WP%206%2005.pdf> [04/17/2015].
- Santoro, M. D.; McGill, J. P. (2005): The effect of uncertainty and asset co-specialization on governance in biotechnology alliances. *Strategic Management Journal* 26(13): 1261–1269.
- Saxton, T. (1997): The effects of partner and relationship characteristics on alliance outcomes. *Academy of Management Journal* 40(2): 443–461.
- Schein, E. H. (1985): *Organizational Culture and Leadership: A Dynamic View*. Jossey-Bass: San Francisco, CA.
- Schein, E. H. (1992): *Organizational Culture and Leadership* (2nd edn.). Jossey-Bass: San Francisco, CA.
- Schermerhorn, J. R. (1975): Determinants of interorganizational cooperation. *Academy of Management Journal* 18(4): 846–856.

- Schlenker, B. R.; Helm, B.; Tedeschi, J. T. (1973): The effects of personality and situational variables on behavioral trust. *Journal of Personality and Social Psychology* 25(3): 419–427.
- Schmidt, W. H.; Posner, B. Z. (1983): *Managerial Values in Perspective*. American Management Association: New York.
- Schniederjans, M. J.; Schniederjans, A. M.; Schniederjans, D. G. (2005): *Outsourcing and Insourcing in an International Context*. M. E. Sharpe: Armonk, NY.
- Schoder, D.; Haenlein, M. (2004): The relative importance of different trust constructs for sellers in the online world. *Electronic Markets* 14(1): 48–57.
- Schwartz, B. (1990): The creation and destruction of value. *American Psychologist* 45(1): 7–15.
- Schweitzer, S. O. (2007): *Pharmaceutical Economics and Policy* (2nd edn.). Oxford University Press: New York.
- Schwyn, R. (1999): How to approach IT outsourcing. *Health Management Technology* 20(6): 28–31.
- Segal-Horn, S.; Faulkner, D. (1999): *The Dynamics of International Strategy*. International Thomson Business Press: London.
- Shapiro, C. (1983): Premiums for high quality products as returns to reputations. *Quarterly Journal of Economics* 98(4): 659–680.
- Shapiro, D. L.; Sheppard, B. H.; Cheraskin, L. (1992): Business on a handshake. *Negotiation Journal* 8(4): 365–377.
- Simon, H. A. (1957): *Models of Man: Social and Rational – Mathematical Essays on Rational Human Behavior in a Social Setting*. Wiley & Sons: New York.
- Simon, H. A. (1991): Organizations and markets. *Journal of Economic Perspectives* 5(2): 25–44.
- Singh, K. (2009): *Organizational Behaviour: Text and Cases*. Pearson Education: New Delhi.
- Skarmeas, D.; Katsikeas, C. S.; Schlegelmilch, B. B. (2002): Drivers of commitment and its impact on performance in cross-cultural buyer–seller relationships: The importer's perspective. *Journal of International Business Studies*, 33(4): 757–783.
- Söbbing, T. (2002). *Handbuch IT-Outsourcing: Rechtliche, strategische und steuerliche Fragen*. mitp-Verlag: Bonn.
- Soyer, A.; Kabak, Ö; Asan, U. (2007): A fuzzy approach to value and culture assessment and an application. *International Journal of Approximate Reasoning* 44(2): 182–196.
- Specht, G.; Beckmann, C. (1996): *F&E Management*. Schäffer-Poeschel: Stuttgart.
- Spector, P. E.; Brannick, M. T. (2011): Methodological urban legends: The misuse of statistical control variables. *Organizational Research Methods* 14(2): 287–305.
- Spence, M. (1973): Job market signaling. *Quarterly Journal of Economics* 87(3): 355–374.
- Spence, M.; Zeckhauser, R. (1971): Insurance, information, and individual action. *American Economic Review* 61(2): 380–387.
- Squire, B.; Cousins, P. D.; Brown, S. (2009): Cooperation and knowledge transfer within buyer-supplier relationships: The moderating properties of trust, relationship duration and supplier performance. *British Journal of Management* 20(4): 461–477.

- Sripada, C. S.; Stich, S. (2006): A Framework for the Psychology of Norms. In Carruthers, P.; Laurence, S.; Stich, S. (eds.): *The Innate Mind, Volume 2, Culture and Cognition*. Oxford University Press: Oxford: 280–301.
- Steinle, C., Schiele, H.; Ernst, T. (2014): Information asymmetries as antecedents of opportunism in buyer-supplier relationships: Testing principal-agent theory. *Journal of Business-to-Business Marketing* 21(2): 123–140.
- Stump, R. L.; Heide, J. B. (1996): Controlling supplier opportunism in industrial relationships. *Journal of Marketing Research* 33(4): 431–441.
- Svedin, L. M. (2009): *Organizational Cooperation in Crises*. Ashgate: Farnham, England.

T

- Tallman, S. B.; Phene, A. (2006): Structuring and restructuring alliances. In Shenkar, O.; Reuer, J. J. (eds.): *Handbook of Strategic Alliances*. Sage: Thousand Oaks, CA: 133–147.
- Tapon, F.; Cadsby, C. B. (1996): The optimal organization of research: Evidence from eight case studies of pharmaceutical firms. *Journal of Economic Behavior & Organization* 31(3): 381–399.
- Tapon, F.; Thong, M. (1999): Internal versus external R&D: A study of R&D choice with sample selection. *R&D Management* 29(3): 219–231.
- Telser, L. G. (1980): A theory of self-enforcing agreements. *Journal of Business* 53(1): 27–44.
- Thomas, K. W. (2000): *Intrinsic Motivation at Work: Building Energy and Commitment*. Berrett-Koehler: San Francisco.
- Tidström, A.; Ahman, S. (2006): The process of ending inter-organizational cooperation. *Journal of Business and Industrial Marketing* 21(5): 281–290.
- Ting, S.-C., Chen, C.-N.; Bartholomew, D. E. (2007): An integrated study of entrepreneurs' opportunism. *Journal of Business & Industrial Marketing* 22(5): 322–335.
- Tirole, J. (1986): Procurement and renegotiation. *Journal of Political Economy* 94(2): 235–259.
- Trice, H. M.; Beyer, J. M. (1993): *The Cultures of Work Organization*. Prentice Hall: Englewood Cliffs, NJ.
- Tripsas, M., Schrader, S.; Sobrero, M. (1995): Discouraging opportunistic behavior in collaborative R&D: A new role for government. *Research Policy* 24(3): 367–389.

U

- Un, C. A.; Cuervo-Cazurra, A.; Asakawa, K. (2010): R&D collaborations and product innovation. *Journal of Product Innovation Management* 27(5): 673–689.
- Uzzi, B. (1997): Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly* 42(1): 35–67.

V

- Vázquez, R., Iglesias, V.; Rodríguez-del-Bosque, I. (2007): The efficacy of alternative mechanisms in safeguarding specific investments from opportunism. *Journal of Business and Industrial Marketing* 22(7): 498–507.
- Veugelers, R.; Cassiman, B. (1999): Make and buy in innovation strategies: Evidence from Belgian manufacturing firms. *Research Policy* 28(1): 63–80.
- Vinzi, V. E.; Trinchera, L.; Amato, S. (2010): PLS path modeling: From foundations to recent developments and open issues for model assessment and improvement. In Vinzi, V. E.; Chin, W. W.; Henseler, J.; Wang, H. (eds.): *Handbook of Partial Least Squares: Concepts, Methods and Applications*. Springer: Berlin: 47–82.

W

- Wah, L. (1999): Making knowledge stick. *Management Review* 88(5): 24–29.
- Wang, Q.; Li, J. J.; Ross Jr., W. T.; Craighead, C. W. (2013): The interplay of drivers and deterrents of opportunism in buyer–supplier relationships. *Journal of the Academy of Marketing Science* 41(1): 111–131.
- Wang, X.; Yang, Z. (2013): Inter-firm opportunism: A meta-analytic review and assessment of its antecedents and effect on performance. *Journal of Business & Industrial Marketing* 28(2): 137–146.
- Wathne, K. H.; Heide, J. B. (2000): Opportunism in interfirm relationships: Forms, outcomes, and solutions. *Journal of Marketing* 64(4): 36–51.
- Weigelt, C. (2009): The impact of outsourcing new technologies on integrative capabilities and performance. *Strategic Management Journal* 30(6): 595–616.
- Wetter, J. J. (2011): *The impacts of research and development expenditures: The relationship between total factor productivity and U.S. gross domestic product performance*. Springer: New York.
- White, S.; Lui, S. S. (2005): Distinguishing costs of cooperation and control in alliances. *Strategic Management Journal* 26(10): 913–932.
- Whitener, E. M.; Brodt, S. E.; Korsgaard, M. A.; Werner, J. M. (1998): Managers as initiators of trust: An exchange relationship framework for understanding managerial trustworthy behavior. *Academy of Management Review* 23(3): 513–530.
- Williams, M. (2001): In whom we trust: Group membership as an affective context for trust development. *Academy of Management Review* 26(3): 377–396.
- Williamson, O. E. (1975): *Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization*. Free Press: New York.
- Williamson, O. E. (1979): Transaction-cost economics: The governance of contractual relations. *Journal of Law and Economics* 22(2): 233–261.
- Williamson, O. E. (1981): The economics of organization: The transaction cost approach. *American Journal of Sociology* 87(3): 548–577.
- Williamson, O. E. (1983): Credible commitments: Using hostages to support exchange. *American Economic Review* 73(4): 519–540.

- Williamson, O. E. (1985): *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. Free Press: New York.
- Williamson, O. E. (1991): Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly* 36(2): 269–296.
- Williamson, O. E. (1993a): Calculativeness, trust, and economic organization. *Journal of Law and Economics* 36(1): 453–486.
- Williamson, O. E. (1993b): Opportunism and its critics. *Managerial and Decision Economics* 14(2): 97–107.
- Williamson, O. E. (1996): *The Mechanisms of Governance*. Oxford University Press: Oxford.
- Williamson, O. E. (2000): The new institutional economics: Taking stock, looking ahead. *Journal of Economic Literature* 38(3): 595–613.
- Williamson, O. E.; Ouchi, W. G. (1981): The markets and hierarchies program of research: Origins, implications, prospects. In Van de Ven, A.; Joyce, W. F. (eds.): *Perspectives on Organization Design and Behavior*. Wiley & Sons: New York: 347–370.
- Wold, H. (1975): Path models with latent variables: The NIPALS approach. In Blalock, H. M.; Aganbegian, A.; Borodkin, F. M.; Boudon, R.; Cappechi, V. (eds.): *Quantitative Sociology: International Perspectives on Mathematical and Statistical Modeling*. Academic Press: New York: 307–357.
- Wong, K. K.-K. (2013): Partial least squares structural equation modeling (PLS-SEM): Techniques using SmartPLS. *Marketing Bulletin* 24: 1–32.
- Wrase, I. (2010): *Mitarbeitermotivation im Outsourcing unter besonderer Berücksichtigung des Facility Managements*. Gabler: Wiesbaden.
- Wu, F.; Sinkovics, R. R.; Cavusgil, S. T.; Roath, A. S. (2007): Overcoming export manufacturers' dilemma in international expansion. *Journal of International Business Studies* 38(2): 283–302.

X

- Xia, J. (2011): Mutual dependence, partner substitutability, and repeated partnership: The survival of cross-border alliances. *Strategic Management Journal* 32(3): 229–253.

Y

- Yang, X.; Ng, Y.-K. (1993): *Specialization and Economic Organization – A New Classical Microeconomic Framework*. Elsevier Science: Amsterdam.
- Yaqub, M. Z. (2009): Antecedents, consequences and control of opportunistic behavior in strategic networks. *Journal of Business & Economics Research* 7(2): 15–32.
- Young-Ybarra, C.; Wiersema, M. (1999): Strategic flexibility in information technology alliances: The influence of transaction cost economics and social exchange theory. *Organization Science* 10(4): 439–459.

Z

- Zaheer, A.; McEvily, B.; Perrone, V. (1998): Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance. *Organization Science* 9(2): 141–159.
- Zahn, E.; Barth, T.; Hertweck, A. (1998): Outsourcing unternehmensnaher Dienstleistungen in der Region Stuttgart: Ergebnisse einer empirischen Untersuchung. In Gassert, H.; Prechtel, M.; Zahn, E. (eds.): *Innovative Dienstleistungspartnerschaften: Neue Formen der Zusammenarbeit zwischen Industrie und Dienstleistern*. Schaeffer-Poeschel: Stuttgart: 109–137.
- Zand, D. E. (1972): Trust and managerial problem solving. *Administrative Science Quarterly* 17(2): 229–239.
- Zhao, Y.; Calantone, R. J. (2003): The trend toward outsourcing in new product development: Case studies in six firms. *International Journal of Innovation Management* 7(1): 51–66.
- Zhong, W.; Su, C.; Peng, J.; Yang, Z. (2014): Trust in interorganizational relationships: A meta-analytic integration. *Journal of Management* (August 12): 1–26. Retrieved from: <http://jom.sagepub.com/content/early/2014/08/07/0149206314546373.full.pdf+html> [09/20/2015].
- Zißler, M. (2011): *Technologietransfer durch Auftragsforschung: Empirische Analyse und praktische Empfehlungen*. Gabler: Wiesbaden.
- Zollo, M.; Reuer, J.; Singh, H. (2002): Interorganizational routines and performance in strategic alliances. *Organization Science* 13(6): 701–713.