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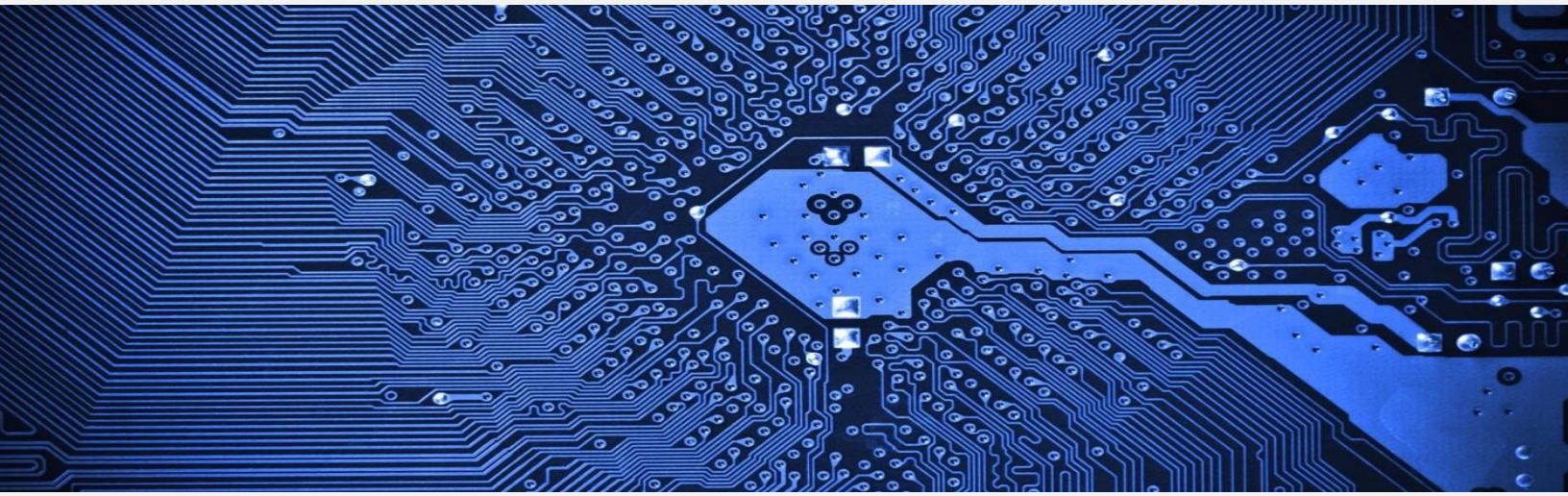

HOW TO BECOME MORE INNOVATIVE FROM ALLIANCE PORTFOLIOS

THE RELATIONSHIP BETWEEN ALLIANCE PORTFOLIO STRATEGY AND BUSINESS UNIT INNOVATION

MASTER THESIS – MASTER OF SCIENCE (MSC.) IN BUSINESS ADMINISTRATION

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PREFACE

This Master of Science (MSc.) in Business Administration study is about how a business unit's alliance portfolio diversity, relation-specific investments, and having a shared alliance vision, influence the business unit's level of innovation. My interest in writing a master dissertation on this topic emerged from my professional career, working as a management consultant and client engagement manager for a large and internationally operating IT company. In 10 years of engaging a wide range of clients, varying from locally operating small and medium businesses to Europe's largest and internationally operating enterprises and despite being different in almost every organizational characteristic, they all share one common challenge on their top management team's agenda: "how to become more innovative?".

My interest in innovation was further developed during the 2012-2014 part-time Master in Business Administration program. Since the kick-off on Thursday the 30th of August 2012, I have been part of interpersonal and group dynamics in order to recognize, assimilate, transform and apply new knowledge. Since that moment, 74 students from different backgrounds such as consultancy, finance, industry, IT, and healthcare, and who were carefully selected based on strict admission criteria, were forced to collaborate in order to achieve the required results. Whether they had to deliver an individual assignment, complete a Harvard Business Review business case or finalize a group project, working solitary was not an option in order to succeed. For nearly two years, me and my fellow students had to make personal choices with whom to collaborate and thus, inherently, whom to exclude. Although the grounds for this decision differed from person to person (e.g. personality, place of residency, industry sector, profit versus not-for-profit, reliability for delivering results, or highest grades), the decision was made based on the person's definition of success. Somewhere along the way, while reflecting on my participation in the program, I became intrigued by this necessity to choose with whom we collaborate in life in order to succeed. It was this insight that brought me to this Master Thesis' subject.

The 2012-2014 part-time Master in Business Administration was a great experience. During the program I have been surrounded by many great people both inside and outside the program. This Master Thesis would not be on the level as it currently is without the help and support of some of these people. First, I would like to thank some of my fellow students. Specifically I would like to thank Carien van den Hoek, Marcel Koeleman, Dieuwertje Smallenburg, Patrick Trickels, Thor Tummers, and Aylin Verburg for their support in collecting sufficient research data by introducing me to potential informants within their networks. Second, I would like to thank a few of my colleagues, in particular Tim van Soest, Paol Varekamp, Robert Voûte, and Chris van Zanten for providing the opportunity to get acquainted with this study's subject in practice through interviews. Third, all informants who participated in this research by sending back a filled in copy of the self-completion questionnaire are acknowledged for their time, help, and support. Fourth, I would like to thank the professional staff at the Rotterdam School of Management, Erasmus University for providing me the opportunity to experience such a high quality and level of education. The part-time Master in Business Administration program has been an unforgettable

experience. Specifically, Lia Hof and Brenda Molendijk-van Vossen for their infinite dedication to support students during the program. My co-reader Prof. Dr. Justin Jansen for his 'spot-on' feedback, providing me additional opportunities to increase the quality of this Master Thesis. In particular, I would like to thank my coach Assistant Prof. Dr. Raymond van Wijk for his guidance, and support. The door was always open and without his feedback this Master Thesis would have been very different to what it is today.

Finally, I would like to thank my friends and family. Without their unconditional support, patience and understanding I could not have finished the program. Special thanks go to Ilse Kester, Meike van Prooijen, and Yashvir Sewcharan for being much more than fellow students. Ilse for being the group's project manager during our International Project in Cape Town. Meike for the times we worked together on several assignments in which we continued to deliver results when it was needed the most. Yashvir, for being a friend, for reminding me what 'kindness' really means and who as well I need to thank for his support in collecting data for this Master Thesis. My parents, Mirto and Sjanie Oduber, unconditionally supporting me in whatever way they could. My fellow student, friend, and most important, brother Ralph Oduber for all the endless discussions about theory and theoretical insights, his support and for simply being there. It was an honor and privilege to experience this journey together. Last, but certainly not least, I wish to express my gratitude to a very special person in my life. Anouk Schepers, thank you for all the fun moments we shared in the class rooms and for getting to know you during the program. Since then, you have been there for me when I needed it the most, and you are the one who shows me balance by remembering me that there is more in life than a professional career. I hope we will experience many more moments together, regardless where we are on this beautiful planet.

R. P. (Robin) Oduber
Rotterdam, March 2015

"It is the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed."

- Charles Darwin (English naturalist, geologist and author of the book 'On the Origin of Species', 1859)

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THE RELATIONSHIP BETWEEN ALLIANCE PORTFOLIO STRATEGY AND BUSINESS UNIT INNOVATION

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ABSTRACT This study examines how a business unit's alliance portfolio diversity, relation-specific investments and a shared alliance vision across an alliance portfolio contribute to innovation, and how an alliance portfolio management capability does influence these relationships. Based on a self-completion questionnaire administered to managers of business units operating in designated Dutch 'top industries', who were responsible for the management of the business unit's alliances, this study's findings confirmed that alliance portfolio diversity shows an inverted U-shaped relationship. Relation-specific invests showed a negative result and having a shared alliance vision across an alliance portfolio positively contributes to a business unit's level of innovation.
Based on these results, this study illustrates how managers of business units, who are responsible for the management of its alliances, may create a competitive advantage by adjusting their alliance portfolio strategy in terms of diversity, relation-specific investments, and creating a shared alliance vision across their alliance portfolio.

KEY WORDS: alliances; alliance portfolio; business unit innovation; diversity; relation-specific investments; shared alliance vision; strategy

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CHAPTER 1
INTRODUCTION

Driven by a variety of forces such as globalization, development of technologies, increase in labor productivity in developed markets and shifts in economic activity between and within regions, the economic environment in which businesses operate today is changing rapidly. The current economic climate increases the pressure on business units to continuously increase their current performance and explore new ways of doing business in order to obtain and maintain a competitive advantage (Day & Wensley, 1988). Innovation is considered to be one of the most important methods for business units to achieve and prolong a competitive advantage (Jansen et al., 2006; Chesbrough, 2007; Van Wijk et al., 2011). The necessity for business units to innovate in order to sustain their competitive advantage has never been so important. In the 20th century, scholars argued that a business unit's internal bundle of resources is an important source for innovation (Barney, 1991). Due to the rapid proliferation of competence destroying and altering technologies, however, today's business units are being forced to maintain a wide variety of resources, such as knowledge and skills. Accordingly, only few business units

currently succeed in possessing all the resources required for successful innovation (Easterby-Smith and Lyles, 2011). As a consequence, the vast majority of business units develops a deficit in critical knowledge and skills within their own boundaries required in order to prosper and grow (Dussauge et al., 2000; Van Wijk, 2011).

Due to the aforementioned reason, many high performance business units today, have increasingly been engaged in different kinds of interorganizational collaborations (e.g. contractual partnerships, equity arrangements, and joint ventures) to improve their resource endowments (Eisenhardt & Schoonhoven, 1996; Sivadas & Dwyer, 2000; Hoffmann, 2007). As a results, many business units, particularly in dynamic industries such as the creative industry, energy, life sciences and health, and high tech, are embedded in a dense network of alliance partners (Hoffmann, 2007; Duysters et al., 2012). Consequently, the configuration of a business unit's network of alliances and the way in which the business unit guides its evolution become important strategic issues for business units that are engaged in so-called alliance portfolios (Goerzen & Beamish, 2005; Hoffmann, 2007; Ozcan & Eisenhardt, 2009).

Despite that the alliance literature has thoroughly researched the concept of alliances from a dyadic perspective, scholars have, only recently, stressed the presence of strategically important interdependencies among a business unit's dyadic alliances (Dyer and Singh, 1998; Gulati, 1998; Parise & Casher, 2003). Recent studies argue that the performance effects of alliance portfolios depend on several underlying mechanisms which need to be taken into consideration while determining an alliance portfolio strategy. Gulati et al. (2011) argue that: a) the interplay between a firm's wide-ranging and heterogeneous partners (*'reach')*, b) the value of the combinations of resources furnished by a firm's partners ('*richness*'), and c) the level of facilitation of resource flows by the firm's capabilities and quality of ties to its partners ('*receptivity*'), drive the benefits that a business unit obtain from its alliance network. Despite the valuable contributions of the aforementioned studies to the notion of the importance of alliance portfolios and the underlying mechanisms for driving performance, the alliance portfolio literature still shows ongoing debates and theoretical 'black holes' for further exploration.

Wassmer (2010) argues, based on a review covering more than a decade of alliance portfolio literature, that the reach dimension of a business unit's alliance portfolio is the locus of perhaps the most prominent ongoing debate in alliance portfolio literature. Scholars argue that in order to fully understand the impact of alliance portfolios on performance, other alliance portfolio factors, such as the diversity in alliance partners across a business unit's alliance portfolio (Sampson, 2007; Jiang et al., 2010; Phelps, 2010; Cui and O'Connor, 2012), may be most important in explaining the benefits that focal benefits units deduce from their alliance portfolio (Baum et al., 2000; Faems et al., 2005; Wassmer, 2010). For instance, alliances exist in a variety of forms such as joint ventures, licensing, cross-sector partnerships, and consortia (Parmigiani & Rivera-Santos, 2011). Previous studies, however, show different results when it comes down to the relationship between the diversity of a business unit's alliance partners and focal business unit's performance indicators (Jiang et al., 2010; Phelps, 2010; Duyster & Lokshin, 2011; Duysters et al., 2012).

Theoretical 'black holes' can be found while reviewing extant literature on both the alliance portfolio richness and receptivity dimensions. Despite the increasing importance of alliance portfolio configuration and management (Goerzen & Beamish, 2005; Hoffmann, 2007; Ozcan & Eisenhardt, 2009),

most previous alliance research on these dimensions is centered around the management of issues associated with, or within dyadic alliances (Hoffmann, 2007). First, concerning a business unit's alliance portfolio richness, the concept of relation-specific investments has been examined thoroughly on the dyadic level (e.g. Nooteboom, 1999; Jap & Ganesan, 2000; Dyer & Hatch, 2006). Little is known, however, about how it influences a focal business unit's performance indicators across an alliance portfolio (Wassmer, 2010; Gulati et al., 2011; Parmigiani & Rivera-Santos, 2011). Second, regarding an alliance portfolio's receptivity dimension, the same can be concluded for cognitive concepts, such as shared vision (e.g. Sinkula, 1997; Calantone et al., 2002; Hult et al., 2004; Li, 2005). Finally, concerning the management of alliance portfolios, extant literature has mainly focused on understanding a business unit's capability to manage dyadic alliances. Research addressing the concept of a business unit's capability to manage an alliance portfolio has recently started to accumulate (e.g. Sarkar et al., 2009; Schilke & Goerzen, 2010). Schilke & Goerzen's (2010) article concerning the second-order construct of alliance management capability, was one of the first that investigated and operationalized what actually constitutes a capability to effectively manage alliance portfolios. Despite their contribution by developing a theoretically sound alliance portfolio management capability measure, little is known, to date, about the potential effects of an alliance portfolio management capability in moderating the relationship between a business unit's alliance portfolio and level of innovation (Wassmer, 2010). What we do know however, based on a qualitative study concerning alliance portfolio management practices of large European companies, is that multi-business firms define and implement alliance portfolio strategies at the business unit level. This indicates that the management of alliance portfolios is mainly a strategic is on business unit level (Hoffmann 2005; 2007).

RESEARCH OBJECTIVE

This research examines how the diversity, relation-specific investments, and a shared alliance vision across a business unit's alliance portfolio, influences the business units level of innovation. Additionally, it seeks to clarify the potential effects of having an alliance portfolio management capability as a business unit on the relationship between the aforementioned alliance portfolio factors and business unit innovation. To this purpose, it draws on a sample of business units operating in designated Dutch 'top industries', which are engaged in a portfolio of alliances to investigate the aforementioned motivated and necessary broader portfolio perspective concerning the role of an alliance portfolio in business unit innovation. Following previous research, this study argues that a business unit's level of innovation is influenced by the configuration and management of a business unit's portfolio of alliances (e.g. Hoffmann, 2007). Hence, this study's main research question is:

Research question: *How do diversity, relation-specific investments and a shared alliance vision across an alliance portfolio contribute to innovation, and how does an alliance portfolio capability influence these relationships?*

CONTRIBUTION TO THE FIELD

THEORETICAL RELEVANCE

The strategic importance of a business unit's alliance portfolio and the way in which it manages the alliance portfolio's evolution is increasing as more and more business units are forced to become embedded in a dense network of alliance partners to improve their resource endowments. Most extant alliance literature, however, concentrates on the management of dyadic alliance relationships, neglecting that when a business unit is engaged in an alliance portfolio, challenges and issues arise beyond those of dyadic alliances. First, this study contributes to the ongoing debate concerning the diversity of an alliance portfolio by adding another case to theory building regarding alliance portfolio diversity (Eisenhardt & Graebner, 2007). Second, it attempts to close important gaps in extant literature by extending theory of relation-specific investments and shared alliance vision from dyadic alliances to an alliance portfolio perspective. Third, this study contributes to extant literature by examining the potential effects of alliance portfolio management capability in moderating the relationships between the aforementioned portfolio factors and innovation by applying a theoretically sound alliance portfolio management capability measure.

PRACTICAL RELEVANCE

While there is a lot of extant literature and knowledge regarding the phenomenon of strategic alliances, many organizations nowadays are engaged in multiple alliances simultaneously with various partners, forming portfolios of alliances. By revealing how diversity, relation-specific investments, and shared vision across an alliance portfolio contributes to innovation, and how an alliance portfolio management capability influences these relationships, this study contributes to assisting business units in defining and implementing their alliance management strategies centered around improving innovation. By doing so, this study may indirectly support business units in obtaining and maintaining a competitive advantage so to outmaneuver the direct competition (Jansen et al., 2006; Van Wijk et al., 2011).

THESIS OUTLINE

This research paper is organized as follows. In the next section, 'Literature Review', the main concepts which are subject to research in this study are further elaborated and conceptualized, hence hypotheses are developed regarding 1) alliance portfolio mechanisms, their underlying factors and their relation with business unit innovation and 2) the moderating effect of alliance portfolio management capability on the relationship between alliance portfolio mechanism determining factors and business unit innovation. In the following chapter, chapter 3, information is provided about the research method and data being used to test the hypotheses. In the next chapter of this study the analysis of the collected data is presented. Accordingly, the results are elaborated in the 'Discussions' section, where the limitations and contributions of this work is reviewed in the 'Future research' section. Finally, an elaboration of the conclusions of this master thesis is provided, ending with proper acknowledgements, provided in the 'Acknowledgements' section.

CHAPTER 2
LITERATURE REVIEW

BUSINESS UNIT INNOVATION

DEFINING BUSINESS UNIT INNOVATION

Competitive businesses are built upon pillars of innovation, knowledge, and networks. Innovation provides one of the most important methods for obtaining and maintaining a competitive advantage (Ireland et al., 2002) In order to become better in achieving and prolonging a competitive edge, i.e. become better performers, recent literature argues that business units need to be innovative.

Reflecting on its etymology, almost every definition in extant literature of innovation to date includes at its core the concept of "newness" (Gupta et al., 2007). Table 1 presents "more general" definitions of innovation.

Table 1: Definitions of innovation

Author	Definition
Schumpeter (1934)	"Carrying out of new combinations"
Tushmann & Moore (1982)	"New products and processes"
Van de Ven (1986)	"A new idea, which may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach."
Christensen (1997)	"New technologies that may be sustaining or disruptive"
Gupta et al. (2007)	"The production or emergence of a new idea"
Baregheh et al., (2009)	"..the multi-stage process whereby organizations transform ideas into new/improved products, services or processes, in order to advance, compete and differentiate themselves successfully in their marketplace."

The term innovation does, however, not have to refer to just an outcome (a new idea), but can also be a process, the process of how new ideas emerge (Hauser et al., 2006; Gupta et al., 2007). Many scholars attempted to understand the innovation process. Previous research on innovativeness in strategic journals often highlight two underlying innovation process: the exploration of new knowledge and the exploitation of existing knowledge. *Exploitative innovation* is building upon existing knowledge and extending existing products and services for existing customers and markets, where *exploratory innovation* is the pursuit of new knowledge and new product and services development for emerging customers and markets (Jansen et al., 2006). In order to become better in obtaining and maintaining a competitive edge, i.e. become better performers, recent literature argues that business units need to become ambidextrous (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2004; Raisch & Birkinshaw, 2008; Boumgarden et al., 2012; Jansen et al., 2012). In other words, business units have to balance high levels of exploratory and exploitative innovation simultaneously in different organizational units, i.e. business units (e.g. Tushman & O'Reilly, 1996, Benner & Tushman, 2003).

AMBIDEXTERITY

A wide variety of scholars (e.g. March, 1991; Benner & Tushman,2003; Gibson & Birkinshaw, 2004; Jansen et al., 2006) argue that maintaining an appropriate equilibrium between exploration and exploitation is critical to a business unit's survival and success. Tushman and O'Reilly (1996) conceptualized this need for an appropriately balanced capability in managing both evolutionary and

revolutionary change processes simultaneously as *ambidexterity* (Birkinshaw & Gupta, 2013), in which a sufficient level of exploitative innovation ensures short-term viability and a sufficient level of exploratory innovation ensures future viability (Levinthal & March, 1993). Based on this new concept, numerous studies have examined the effect of a business unit's ambidexterity on its performance (Junni, et al., 2013) and show that ambidextrous business units, achieve superior performance and sustained competitive advantage (e.g. Gibson & Birkinshaw, 2004; He and Wong, 2004; Lubatkin et al., 2006; Junni et al., 2013).

In light of this study's research objective to examine the relationship between a business unit's alliance portfolio and its level of innovation, ambidexterity can be realized through two different forms. On the one hand, business units may create structural ambidexterity, i.e. creating separate structures for different types of activities, by engaging in multiple alliances, each centered around different innovation processes. For example, their alliance portfolios consist of separate alliances in which some focus on the improvement of existing products and services (e.g. co-production alliances), and others are utilized for exploring new products and services (e.g. R&D alliances). According to Hoffmann (2005;2007), however, the locus for innovation is the business unit as it follows the go-to-market business strategy. Thus, somewhere along the process of facilitating alliance activity, business unit employees are required to make choices between alignment-oriented and adaption-oriented activities. Therefore, this study follows a contextual ambidexterity perspective on business unit innovation, meaning that both underlying processes are simultaneously present. Hence, this study defines business unit innovation as "*the extent in which a business unit simultaneously builds upon existing knowledge and extending existing products and services on the one hand, and pursuits new knowledge and new products and services development on the other hand*".

THE NEED FOR EXTERNAL RESOURCES

Following the resource-based view of the firm, a business unit's internal resources are an important source of competitive advantage (Barney, 1991). In other words, a large portion of the knowledge used in innovation resides in a business unit itself. Business units, however, are increasingly being forced to maintain a wide variety of knowledge and skills due to the proliferation of competence destroying and altering technologies. As mentioned before, the vast majority of business units cannot sustain this pressure on their own, resulting in their search for external sources of knowledge to prolong their competitive advantage. Business units can create knowledge by engaging in local and distant search (March, 1991). According to these latter studies, alliance portfolios are a mechanism for search and a medium for accessing resources and knowledge transfer, which are required inputs for innovation (Ingram, 2002).

Accordingly, going beyond the aforementioned internal approach to business unit innovation, recent studies show that business units which proactively scan their environments for knowledge and resources held beyond their boundaries, improve their innovativeness (Ettlie & Pavlou, 2006; Rothaermel & Alexandre, 2009). In doing so, business units need to choose their alliance partners, such that they fulfil the specific needs that come into existence from the business unit's innovation initiatives in terms of exploratory and exploitative innovation (Rowley et al, 2000). Therefore, this study advances by elaborating the phenomenon alliance portfolios.

ALLIANCE PORTFOLIOS

Innovation requires access and development of various types of knowledge and other types of resources (van Wijk et al., 2012). As a result of the importance and understanding of external resource bases, innovations that are not realized internally but through a collaborations among business units, are burgeoning (Dyer and Singh, 1998, Sampson, 2007). Scholars have increasingly examined this role of alliance portfolios in the context of innovation. Research shows that collaboration among alliance partners can facilitate organizational learning, and thus innovation. Alliance portfolios are able to facilitate gaining access to these required and valuable external knowledge and resources which were otherwise not available to the business unit (Sivadas & Dwyer, 2000; Lavie & Rosenkopf, 2006; Lin et al., 2012). By collaboratively levering existing knowledge on both sided of the dyadic relationships, alliance portfolios may contribute to a focal business unit's innovativeness.

THE RELATION BETWEEN ALLIANCE PORTFOLIOS AND UNIT INNOVATION THROUGH DIFFERENT LENSES

Firms enter into different forms of strategic alliances for a wide variety of reasons. Scholars examining alliance portfolios have drawn on different theoretical lenses, commonly used in strategic management research (Wassmer, 2010), to interpret these different motivation from different angels. As different theoretical paradigms each have their own prescriptions and beliefs, they offer distinct ways and perspectives on this study's objective. Based on extant literature, three theoretical lenses are considered to be the most suited in which theories are grounded to examine a business unit's utilization of alliance portfolios, its configuration and underlying factors. These are the resource-based view, social network theory, and organizational learning, including the exploration/exploitation framework (Wassmer, 2010).

RESOURCE-BASED VIEW OF THE FIRM

Based upon the resource-based view of the firm, scholars have considered alliance portfolios as the logical result of the need for business units to gain resources to complement their own resource endowments (Eisenhardt & Schoonhoven, 1996). It provides an explanation for why firms look beyond their boundaries for resources and capabilities required to continuously renew their fit to the ever-changing external environment (e.g. Madhok and Tallman, 1998). Resource-dependence of business units is a logical implication of their specialization in certain capabilities. Following the resource-dependence theory, business units engage in networks of alliances to be able to integrate their specialized capability at a system level into complete product and service offerings (Hoetker, 2006; De Man, 2008), leveraging scarce firm-specific resources through business relationships (Mudambi and Tallman, 2010).

When considering the consequences of this theoretical lens' for this study's central subject of business unit innovation, clarifies that the resource-dependence theory sees alliance portfolios as a medium to access a partner's resources and stock of knowledge. This matches the objective of exploiting complementarities (Grant & Baden-Fuller, 2004). However, interdependence may explain the formation alliances, it is not exclusive as not all opportunities to share interdependence across business units result in alliances (Gulati, 1998). Gulati (1998) argues that the resource-based theory of the firm ignores circumstances to overcome risks which are often related to alliances due to unpredictability and related costs to opportunistic behavior by a partner (e.g. moral hazards, slacking and holdups). Here the other theoretical lenses come into play by offering social context in which alliance networks are built, enabling business units to go beyond knowledge application, moving towards knowledge generation.

External learning perspectives provides another driver for alliance portfolios. Based on this concept, the social capital and organizational learning theoretical lenses consider that specialized business units may not have all the required and necessary knowledge to innovate and keep core competencies up-to-date, within their own boundaries. Business units' self-enforcing nature phenomena like 'myopia' and 'competency traps' (Levinthal & March, 1993; He & Wong, 2004), groupthink (Leonard-Barton, 1992), bounded rationality and organizational intertia (Tripsas & Gavetti, 2000), emphasize the need for "going beyond local search (Rosenkopf & Nerkar, 2001). Despite the fact that both social network theory and organizational learning theory take an external learning perspective, they differ fundamentally in the reasoning behind the perspective and the implications for alliance portfolios (Walker et al., 1997).

SOCIAL NETWORK THEORY

From a social capital point of view (Nahapiet & Ghoshal, 1998), business units need to build trusting, long-term relationships in order to obtain the benefits from knowledge and information sharing within a network, which can only be developed best by creating multiple ties among every actor within a social network (Walker et al., 1997; Dyer & Nobeoka, 2002). This 'social capital' among a business unit's alliance network partners, defined as "the sum of the actual and potential resources, embedded within, available through and derived from the network of relationships possessed by a business unit and its members (Bourdieu, 1986), results in relatively closed and dense relationships in which core and tacit knowledge can be exchanged. Here, the social network theory differs from the previously described resource-based view of the firm, as the value of social capital acts as a governance safeguard that impedes unpredictability and opportunistic behavior and enables reciprocity and equality among alliance partners (Walker et al., 1997). Literature based on this theoretical lens, however, often emphasizes that this point of view may result in 'groupthink' at an alliance portfolio level, resulting in an internally centered, conservative approach to innovation (i.e. self-enforcing nature on an alliance portfolio).

ORGANIZATIONAL LEARNING

In the organizational behavior field, the areas of organizational learning and the learning organization (Agyris, 1982; Senge, 1990) have similarly become significant foci of attention. From a resource-based view of the firm perspective, the ability to acquire and integrate knowledge (in other words, to learn) has increasingly been accepted as the most important and valuable resource of business units. Competition, in the context of this study's objective to gain and sustain a competitive advantage, is increasingly knowledge-based as business units strive to learn and develop capabilities faster than their competitors (Prahalad & Hamel, 1990; D'Aveni, 1994; Teece & Pisano, 1994). This change has led to a paradigm shift in the underlying motivation for alliances from a traditional resource or risk-sharing to learning oriented objectives (Hamel, 1991; Huber, 1991), discovering new opportunities and obtain new knowledge, i.e. external learning. Thus, rather than getting access to or an emphasis on the relationships between external sources of resources and knowledge, organizational learning is about the acquisition of knowledge by facilitating knowledge flows and the collective capability to learn (Lane & Lubatkin, 1998; Easterby-Smith& Lyles, 2011). Therefore, previous literature on organizational learning tends to emphasize collaboration rather than competition. This point of view is in line with a traditionally accepted distinction between organizational learning – that tends to concern itself with relationships, whereas strategy is more concerned with the relationship of a business unit with its external environment. As a result of this collaborative and collective capability, one of the widely cited "pitfalls"

of this theoretical lens is that alliances may lead to the diffusion of a business unit's strategic (in other words, distinctive and differentiated) assets and the appropriation of competencies and capabilities by a business unit's alliance partners (Jarillo & Stevenson, 1991). This pitfall, ironically, is mitigated by the resource-based view of the firm prescription of imperfect imitability: no other business unit will be able to obtain the valuable and rare resources of the focal business unit (Barney, 1991; Lavie, 2006).

Table 2 presents a summary of each of the aforementioned theoretical lenses' arguments, prescriptions and representative literature.

Table 2: Summary of theoretical paradigms for configuring alliance portfolios

Theoretical paradigm	Description	Prescriptions for innovation	Representative research
Resource-based view of the firm	Open systems theory which argues that few business units have all the resources needed to compete effectively in the current environmental dynamism. Business units seek access to necessary resources through alliances (Ireland et al., 2002).	Modular network: system-level integration of specialist knowledge. Business units engage in partnerships when they perceive critical strategic interdependence with other business units in their external environment, in order to obtain access essential and valuable resources not owned by the firm (Das & Teng, 2000). The objective is access to resources, and to knowledge through these resources, rather than knowledge acquisition or learning.	Eisenhardt & Schoonhoven, 1996; Lorenzoni & Lipparini, 1999; Ahuja, 2000a, 2000b; Chung et al., 2000; Ireland et al., 2002; Vassolo et al., 2004; Zaheer & Bell, 2005; Lavie, 2006;
Social network theory	A theory that suggests that the business unit's strategic actions are affected by the social context in which they and the business unit are embedded (Gulati, 1999).	Considers not only a business unit as a social network, but also that the environment in which it operates, is a network of other business units. This lens provides management scholars the ability to study relations between network actors. Social network theory is focused on ties between actors and often centered on how these ties facilitate knowledge transfer.	Powell et al., 1996; Walker et al., 1997; Tsai & Ghoshal, 1998; Gulati, 1999; Ahuja, 2000a, 2000b; Baum et al., 2000; Chung et al., 2000; Rowley et al., 2000; Stuart, 2000; Bae & Gargiulo, 2004; Goerzen & Beamish, 2005; Zaheer & Bell, 2005; Capaldo, 2007; Goerzen, 2007;
Organizational learning	Grounded on the idea that business units can learn and store knowledge over time, and that it is desirable to maximize the efficient use of knowledge within business units (Easterby-Smith & Lyles, 2011).	Business units must learn in order to be able to cope with changing and dynamic external environment. Learning must become a collective, i.e. reciprocal process. The objective of alliances is to acquire knowledge by facilitating knowledge flows (Easterby-Smith & Lyles, 2011).	Deeds & Hill, 1996; Powell et al., 1996; Gulati, 1999; Anand & Khanna, 2000; Stuart, 2000; George et al., 2001; Kale et al., 2002; Reuer et al., 2002; Draulans et al., 2003; Hoang & Rothaermel, 2005; Lavie & Miller, 2008; Van Wijk et al., 2011);

Based on the aforementioned and presented theoretical lenses in alliance portfolio literature, a number of conclusions can be drawn. First, the rationale for business units engaging in multiple alliances varies greatly. Second, business unit innovation through the aforementioned theoretical lenses, acknowledge the difference between its underlying exploration (generation) and exploitation (application) processes. Third, various approaches to build a portfolio of alliances each have their own strengths and weaknesses. Based on the aforementioned conclusions, this study advances in analyzing the relationship between a business unit's alliance portfolio and its level of innovation.

DEFINING AN ALLIANCE PORTFOLIO

Scientists from a broad range of theoretical backgrounds have investigated the alliance portfolio concept, leading to a variety of definitions and conceptualizations. Table 3 presents the three most generally used definitions.

Table 3: Definitions of alliance portfolio

Author	Definition
Baum et al. (2000), Rowley et al. (2000), Ozcan & Eisenhardt (2009)	a focal firm's egocentric alliance network (i.e. all direct ties with partner firms)"
Marino et al. (2002), Hoffmann (2005, 2007), Lavie (2007)	"the aggregate of all strategic alliances of a focal firm"
Simonin (1997), Anand & Khanna (2000), Kale et al. (2002), Reuer et al. (2002), Hoang & Rothaermel (2005)	"a focal firm's accumulated alliance experience (i.e., a firm's ongoing as well as past alliances)"

Following Wassmer (2010), who reviewed 20 years of alliance portfolio literature, future alliance portfolio studies should be clear about four domains when it comes down to defining an alliance portfolio, i.e. 1) the terminology used to describe different alliance-related phenomena, 2) the level of analysis, 3) the temporal perspective and 4) the scope of alliance types (Wassmer, 2010). Hence, this study advances by providing a brief elaboration for each of the aforementioned alliance portfolio dimensions, based on which a definition of alliance portfolio will be provided.

First, this study uses the term '*alliance portfolio'* and defines an alliance portfolio as "*all direct ties of a focal business unit with two or more alliance partners*" (e.g. Baum et al., 2000). Second, when it comes down the level of analysis, this study focuses on a focal business unit's alliance portfolio as business units may specialize in different industries or markets, each with its own idiosyncratic and path-dependent market dynamics that require different strategic targets and priorities (Gupta and Govindarajan, 1984; Hoffmann, 2005; 2007). Third, a definition should be clear about its temporal perspective, i.e. whether a business unit's portfolio of alliances includes only the current active alliances or also past alliances - and if the occasion arises in what period - that have become inactive at the moment of research. Although the purpose of this research paper is not to study how business units develop an alliance capability, it does adopt the definition of "*a focal business unit's present as well as its past alliance partners*", as one of the objectives of this research paper is in line with the theoretical lens of studying the alliance portfolio phenomenon from an organizational learning perspective. The effect of an alliance portfolio on innovation does comprise a process of organizational learning in which a business unit needs time to recognize, assimilate, maintain, reactivate, transmute, and apply new knowledge (van Wijk et al., 2011; Lichtenthaler, 2009). Learning through an alliance portfolio may enable the focal firm to obtain knowledge, skills and technologies it lacked at the alliance formation with one or more alliance partners (Parkhe, 1991) and this process takes time. Therefore, this study defines a portfolio of alliances as the firm's current active as well as its inactive past alliance partners over a three year period. Fourth, a

definition needs to be clear about its scope, i.e. whether or not to exclude certain types of alliances in their alliance portfolio definitions. As the objective of this study is to examine the relationship between an alliance portfolio mechanisms and business unit innovation, this study makes no exceptions in the type of alliances.

In summary, this research paper defines an alliance portfolio as "*all ties of a focal firm's business unit with two or more alliance partners over a period of three years* " (Baum et al., 2000) and conceptualizes an alliance portfolio as a focal firm's business unit's set of past as well as ongoing strategic alliances of all types in the aforementioned period.

ALLIANCE PORTFOLIO STRATEGY: TOWARDS A THEORETICAL FRAMEWORK

In order to maximize the potential innovation performance outcomes through a business unit's alliance portfolio, a business unit needs to conduct the fundamental task of multi-alliance management by formulating and implementing *portfolio strategy*, i.e. "*a strategy for the goal-oriented configuration and development of the alliance portfolio*" (Hoffmann, 2005; 2007). The alliance portfolio strategy determines the configuration and development of the alliance portfolio. During the alliance portfolio strategy formulation and implementation, attention needs to be paid to the underlying mechanisms that drive the potential innovation performance outcomes.

Previous literature on alliance portfolios suggests that a business unit's alliance portfolio is a multi-dimensional construct (Wassmer, 2010; Gulati et al., 2011). Wassmer (2010) identified and described four different dimensions. These dimensions are: 1) a size dimension determined by characteristics such as the focal business unit's number of alliances and alliance partners it is engaged in (Deeds & Hill, 1996; Ahuja, 2000a; Hoffmann, 2007), 2) a structural dimension constituted by characteristics such as density, breadth and the level of redundancy of a focal business unit's alliance portfolio (Gulati, 1999; Ahuja, 2000a; Hoffmann, 2007; Koka & Prescott, 2008), 3) a relational dimension characterized by the tie strength of each dyadic relationship within a business unit's alliance portfolio (Rowley et al., 2000; Hoffmann, 2007), and 4) a partner dimension aimed at specific partner-related characteristics (Stuart et al., 1999; Stuart, 2000; Lavie, 2007). These dimensions are in line with the aforementioned social capital perspective (Nahapiet & Ghoshal, 1998).

Gulati et al., (2011) propose three mechanisms which provide a new perspective by explaining how network resources contribute to business unit performances, e.g. business unit innovation. They suggest that a) the interplay between a business unit's wide-ranging and heterogeneous partners ('*reach')*, b) the value of the combinations of resources furnished by a business unit's partners ('*richness*'), and c) the level of facilitation of resource flows by the business unit's capabilities and quality of ties to its partners ('*receptivity*'), determines the benefits that the business unit obtains from its network (Gulati et al., 2011). Accordingly, this study advances by building a theoretical framework. Based in extant literature, Table 4 provides an overview of the alliance portfolio mechanisms and dimensions.

Table 4: Selected empirical studies regarding alliance portfolio's

Construct	Mechanisms	Dimensions	Definition	Indicator Variables
Alliance portfolio configuration	Reach *Gulati et al. (2011)*	**Volume / Size dimension** Koka & Prescott (2002) Wassmer (2010)	"the number of alliances a focal firm is engaged in at a given point in time" *Wassmer (2010)*	**Number of alliances** *(Shan et al., 1994; Deeds & Hill, 1996; Stuart et al., 1999; Stuart, 2000; Baum et al., 2000;Koka & Prescott, 2002)*
		Structural dimension Nahapiet & Ghoshal (1998) Inkpen & Tsang (2005) Wassmer (2010)	"the overall pattern of relationships between a focal firm and its direct and indirect alliance partners"	**Breadth** *(Phelps, 2010)* **Depth** *(George et al., 2001; Duysters & Lokshin, 2011)* **Network density** *(Phelps, 2010)* **Dispersion** *(Hoffmann, 2007; Cui & O'Connor, 2012)* **Redundancy** *(Hoffmann, 2007)*
		Information diversity Koka & Prescott (2002)	"the variety and to a somewhat lesser extent quantity of information that a firm can access through its relationships" Koka & Prescott (2002)	**Alliance portfolio diversity** *(Sampson, 2007; Jiang et al., 2010; Phelps, 2010; Cui and O'Connor, 2012)* **Functional heterogeneity / diversity** *(Jiang et al., 2010; Cui & O'Connor, 2012)* **Technological diversity** *(Koka & Prescott, 2002)*
		Partner dimension Wassmer (2010)	"the set of alliance partners to which a focal firm is connected" *Wassmer (2010)*	
	Receptivity *Gulati et al. (2011)*	**Relational dimension** Nahapiet & Ghoshal (1998) Inkpen & Tsang (2005) Wassmer (2010)	"those assets created and leveraged through relationships and actor bonds" *Nahapiet & Ghoshal (1998)*	**Trust** *(Nahapiet and Ghoshal, 1998; Inkpen & Tsang, 2005)* **Commitment** *(Gulati et al., 2011)* **Norms / Governance** *(Gulati et al., 2011)* **Tie strength / Intensity** *(Hoffmann, 2007)* **Tie multiplexity** *(Gulati et al., 2011)*
		Cognitive dimension Nahapiet & Ghoshal (1998) Inkpen & Tsang (2005)	"those resources providing shared representations, interpretations and systems of meaning among parties" *Nahapiet & Ghoshal (1998)*	**Shared language and codes** *(Cicourel, 1973; Arrow, 1974; Monteverde, 1995; Nahapiet & Ghoshal, 1998)* **Shared narratives** *(Orr, 1990; Nahapiet & Ghoshal, 1998)* **Shared goals and culture** *(Inkpen & Tsang, 2005)*
	Richness *Gulati et al. (2011)*	**Information richness** Koka & Prescott (2002)	"the quality and nature of information that a firm can access through its relationships" *Koka & Prescott (2002)*	**Relational rent** *(Dyer & Singh, 1998)* **Appropriated relational rent** *(Lavie, 2006)* **Appropriability** *(Gulati et al., 2011)*
Alliance portfolio management	Alliance management capability *Sivadas & Dwyer (2000)* *Hoffmann (2005)* *Schreiner et al. (2009)*	**Communication** Sivadas & Dwyer (2000) Schreiner et al. (2009)	"the formal as well as informal sharing of meaningful and timely information between firms" *Schreiner et al. (2009)*	
		Coordination Sivadas & Dwyer (2000) Hoffmann (2005) Schreiner et al. (2009)	"the ability to coordinate and manage interdependence between partners" *Schreiner et al. (2009)*	
		Trust / Bonding Sivadas & Dwyer (2000) Schreiner et al. (2009)	"a firm's ability to develop strong bonds with partners by consistently providing instrumental or expressive value to them" *Schreiner et al. (2009)*	
	Alliance portfolio management capability *Hoffmann (2005)* *Sarkar et al., (2009)* *Schreiner et al. (2009)* *Schilke & Goerzen (2010)*	**Partnering proactiveness** Sarkar et al. (2009) Schilke & Goerzen (2010)	"an organization's deliberate efforts to discover and act on new alliance opportunities" *Sarkar et al. (2009)*	
		Relational governance Sarkar et al. (2009)	"An organization's engagement in activities for the development of informal self-enforcing safeguards in their collaborative relationships" *Sarkar et al. (2009)*	
		Portfolio coordination Hoffmann (2005) Sarkar et al. (2009) Schilke & Goerzen (2010)	"An organization's engagement in integrating and synchronizing knowledge and activities across their alliances" *Sarkar et al. (2009)*	
		Alliance learning Schilke & Goerzen (2010)	"the extent of routines designed to facilitate knowledge transfer from alliance partners" *Schilke & Goerzen (2010)*	

REACH DIMENSION

A focal business unit's reach is "*the extent to which the business unit's alliance portfolio connects it to distant and diverse partners*" (Gulati et al., 2011) and encompasses three elements: 1) distance, including organization's portfolio size and structural position (e.g. Koka & Prescott, 2002; Wassmer, 2010), 2) difference, embodying organizational attributes (e.g Nahapiet & Ghoshal, 1998; Inkpen & Tsang, 2005), and 3) diversity, taking into account heterogeneity amongst a focal firm's business unit's alliance partners (Sampson, 2007; Jiang et al., 2010; Cui & O'Connor, 2012). Summarized, reach indicates the scope of the alliance portfolio that can furnish resources through their ties to the business unit (Gulati, 2011). A large body of previous literature examined various variables that determine a business unit's reach of its alliance portfolio, such as the number of alliances (e.g. Deeds & Hill, 1996; Baum et al., 2000), network density (e.g. Phelps, 2010) and alliance portfolio diversity (e.g. Sampson, 2007; Cui & O'Connor, 2012).

As elaborated before, scholars argue that in order to fully understand the impact of alliance portfolios on performance, diversity in alliance partners across a business unit's alliance portfolio (Sampson, 2007; Jiang et al., 2010; Phelps, 2010; Cui and O'Connor, 2012), may be most important in explaining the benefits that focal benefits units deduce from their alliance portfolio (Baum et al., 2000; Faems et al., 2005; Wassmer, 2010). For instance, alliances exist in a variety of forms such as joint ventures, licensing, cross-sector partnerships, and consortia (Parmigiani & Rivera-Santos, 2011). Previous studies, however, show different results when it comes down to the relationship between the diversity of a business unit's alliance partners and focal business unit's performance indicators (Jiang et al., 2010; Phelps, 2010; Duyster & Lokshin, 2011; Duysters et al., 2012). Therefore this study follows the abovementioned reasoning in examining the effect of alliance portfolio diversity on business unit innovation in order to contribute to the ongoing debate by adding another case to theory building regarding alliance portfolio diversity (Eisenhardt & Graebner, 2007).

ALLIANCE PORTFOLIO DIVERSITY AND BUSINESS UNIT INNOVATION

Business unit innovation profits from resource diversity as diversity increases the possible amount of new resources and potential knowledge combinations. Since resources and capabilities are likely to vary between different alliance partners, multiple relationships lead to diverse and non-redundant resources and information (Burt, 1980; 2009). More recent studies recognize these potential synergies that can be realized by access to diverse and valuable resources and argue that collaborating with diverse alliance partners provides possibilities for obtaining new knowledge that contributes to business unit innovation (Wuyts et al., 2004; Swaminathan & Moorman, 2009; Cui & O'Connor, 2012; Leeuw et al., 2014). Thus, superior business unit innovation performance can be realized by combining these diverse resources of partners in the alliance portfolio and exploiting complementarities and synergies (Leeuw at al., 2014).

These findings are supported by both the social network and organizational learning theories. From a social network theory perspective (Burt, 2009), a focal business unit should focus on alliance portfolio diversity by maximizing the proportion of bridges to more distant (i.e. non-redundant) business units, in order to increase its potential to generate innovations (Capaldo, 2007). By means of the aforementioned bridges, business units can obtain access to unconnected business units, and thereby closing so called 'structural holes' to obtain information advantages by brokering information flows (Kogut, 2000). In

other words, business units should seek partners with whom they can form idiosyncratic, non-redundant , or in other words diverse relationships to acquire new knowledge. From an organizational learning point of view, a higher degree of alliance portfolio diversity enhances creativity and learning (Cohen & Levinthal, 1990; Sampson, 2007). Based on the availability of diverse knowledge sources, which provide business units access to diverse problem-solving heuristics (Page, 2007), business units can increase the exploratory content of new knowledge combinations (Phelps, 2010).

Prior research also provides conflicting results regarding the effect of partner dissimilarity on knowledge transfer and innovation. For example, Burt (2009) argues that the most optimal network non-redundancy is determined by a 'budget equation' which has an upper limit set by the focal business unit's time and effort. In other words: the focal business unit has to balance the benefits obtained from diverse alliance partners on the one hand, with its available resources which are required to manage the relationships efficiently on the other. If the cost of these required resources surpass the predefined budget the focal business unit's ability to manage the relationships efficiently will decrease as it cannot support the required monitoring and control (Gulati and Singh, 1998). As a consequence the focal business unit may be unable to deal with the high level of alliance portfolio diversity (Hoffmann, 2005).

Based on the often highlighted pitfall of the social network theory, the groupthink phenomenon may occur when an alliance portfolio is too homogenous, leading to an internally-focused, conservative business strategy of the alliance partners who support each other in their 'myopia' (Levinthal & March, 1993). Furthermore, from an organizational learning standpoint, Ocasio (1997) suggests that high levels of alliance portfolio diversity may lead to an overflow of information. In addition, Koput (1997) suggests three reasons for the negative effect of information overflow on a business unit's innovativeness. First, the higher the level of alliance partner diversity the higher the amount of different ideas may reach the focal business unit, causing managers to have difficulty in choosing from and managing of these ideas (the absorptive capacity problem). Second, available resources and new ideas may reach the business unit at the wrong time and/or place to be fully exploited (the timing problem). Third, when the business unit has to deal with too many different ideas, few of them are taken seriously and receive the proper attention required for successful development and implementation (the attention allocation problem). Thus, the ability to take optimal advantage of learning opportunities may decline when alliance portfolio diversity increases (Koput, 1997; Leeuw er al., 2014). In this case, bounded rationality (March, 1978) limits the ability of business units to present optimal solutions to their alliance portfolio management challenges, indicating that each business unit has a certain cognitive limit which relates to the extent in which it can handle a certain degree of alliance portfolio complexity (Duysters & Lokshin, 2011). Therefore this study argues that because of the aforementioned advantages of an increasing level of alliance portfolio diversity, business units become more innovative until a certain inflection point, after which learning opportunities decline due to knowledge overload. Hence, this study hypothesizes:

Hypothesis 1: *A business unit's alliance portfolio diversity is related to business unit innovation in a curvilinear (inverted-U shaped) manner, meaning that as alliance portfolio diversity increases, business unit innovation first increases, and then decreases.*

RICHNESS DIMENSION

An alliance portfolio's richness is "*the inherent value derived from the attributes of network resources available to the firm*" (Gulati et al., 2011), which is strongly dependent on the specific configuration and attributes of the resources available from the focal business unit's alliance partners. The advantages of richness do not only come forward based on the potential utility of resources within the business unit's alliance network, but also from their scarcity – that is, their relative unavailability to competing business units (Barney, 1991). The ease with which a focal business unit can appropriate the added value of alliance portfolio resources, may impact the potential richness of those resources as well (Gulati, 2011).

The richness of an alliance portfolio resource will differ across business units, since value lies in the perception of the focal business unit. The same resource may be perceived as having a greater value to one business unit that to another. Hence, a business unit's alliance portfolio richness depends on the business unit's internal resource endowments and on the synergies, between a focal business unit's resources and those of its alliance partners (Gulati, 2011). Thus, to fully assess the richness of a business unit's alliance portfolio resources, a focal business unit needs to take into account possible complementarities that can emerge from combining its internal resources with those accessible via its relationships with alliance partners (Lavie, 2006). This emphasizes the role of relation-specific investments between a focal business unit and its alliance partners.

RELATION-SPECIFIC INVESTMENTS AND BUSINESS UNIT INNOVATION

Business units can derive relational rents by dedicating specific resources to alliance relationships and from complementarities between their resources and the resources of their alliance partners, for example by making relation-specific investments (Lavie, 2006). By joint idiosyncratic relation-specific investments of both the focal business unit and its alliance partner, relational rents may be extracted from relation-specific assets, knowledge-sharing routines, complementary resources and capabilities, and effective governance (Dyer and Singh, 1998). Extant research literature shows that relation-specific investments can function as economic hostages and as a signal of an alliance partner's willingness to cooperate (Gulati et al., 1994). By making relation-specific investments, business units have an opportunity to develop economic bonding relationships with particular alliance partners. The more dedicated resources and assets a business unit invests in specific alliance partners, the more likely that the business unit will accumulate partner-specific knowledge (von Hippel, 1994), thereby develop interorganizational routines (Nelson and Winter, 1982; Kang et al., 2009) that positively contributes to business unit innovation (Parmigiani, 2007). For example, large IT-consulting and IT system integration companies often use relationship-specific investments, e.g. invest heavily in adjusting their human resources and business processes to fit their alliance partners' routines, in order to develop and coevolve with their alliance partners. These relation-specific investments, together with partner-specific knowledge that the focal business unit has gained from the alliance, increase the likelihood of winning new and more valuable projects (Kang et al., 2009). Another argument is that the focal business unit, by making relation-specific investments, has the opportunity to develop multiple relationships with a specific alliance partner. As this works in both ways (in other words, both focal business unit to alliance partner and vice versa), such partner-specific knowledge may enable both alliance parties to create new capabilities, improve exchange efficiency accordingly, and thus, outperform competitors in future collaborations (Madhok, 2000).

But how does the above dyadic alliance perspective relate to an portfolio of alliances? Kang et al., (2009) argues that some focal business units perform relation-specific investments as a stepping stone for capturing potential positive economic spill-overs. For example, a relation-specific investment may provide positive influences on other ties within the collaboration with the specific alliances partner, or even on ties with other alliance partners . From an organizational learning point of view, a focal business unit's relation-specific investment may improve the economic incentive, i.e. obligations and expectations (Coleman, 1990; Nahapiet & Ghoshal, 1998), of their alliance partners to transfer knowledge and information to the business unit, or vice versa.

The aforementioned initiatives ensure long-term ongoing exchange relationships in which cooperative behaviors are rewarded, therefore fostering collaboration and reciprocity in future alliance initiatives (Barthélemy & Quélin, 2006). The unpredictability and opportunistic behavior of a focal business unit's alliance partners may be reduced if the value of these relation-specific investments exceed the short-term gains obtained through such alliance partners' behaviors (Telser, 1980). In line with Nahapiet and Ghoshal's view on obtaining intellectual capital through social capital (1998), relation-specific investments indicate a focal business unit's willingness to be vulnerable to another alliance partner, therefore increasing trust which, in turn, leads to an increased accessibility to social capital for the exchange of intellectual capital (Nahapiet & Ghoshal, 1998). Therefore this study argues that because of the aforementioned advantages of relation-specific investments in both dyadic alliance relations and within a portfolio of alliances, business units become more innovative by gaining learning advantages through relation-specific investments (Kang et al., 2009).

Hypothesis 2: *Reciprocal relation-specific investments between a focal business unit and its alliance partners is positively related to business unit innovation.*

RECEPTIVITY DIMENSION

A focal business unit's receptivity is "*the extent to which an organization can channel and leverage its accessible network resources across interorganizational boundaries*" (Gulati et al., 2011). In other words, receptivity thus governs the extent to which a focal business unit can obtain potential value of the resources accessible through its reach and richness of network resources. Whereas reach and richness indicate the alliance portfolio's potential value, receptivity has to do with the extraction of actual value from a business unit's alliance portfolio. There is no question that interorganizational relationships offer an opportunity structure, but the value exchange and value creation that these relationships ultimately perform depends on the actual flow of resources (Gulati et al., 2011). Few scholars have studied the conditions that support resource flows (Gupta & Govindarajan, 2000; Knott, 2003; Lavie, 2006). So, along with developing and managing high-quality relationships with alliance partners, receptivity entails processes that increase the effectiveness of resource flows across a business unit's alliance portfolio. This may be realized through by capabilities that increase the accessibility and utilization of alliance portfolio resources, such as absorptive capabilities (e.g. Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Kale et al., 2002; Schilke & Goerzen, 2010; Easterby-Smith& Lyles, 2011).

To summarize, an alliance portfolio's receptivity stems from processes and capabilities that jointly define the quality of a business unit's relationships and its ability to leverage resources within its alliance portfolio. This in turn determines whether the business unit can in fact access targeted alliance portfolio resources and appropriate their value. The concept of receptivity is therefore vital to explain why different business units, related to the same alliance partners and with access to the same alliance portfolio resources, extract dissimilar benefits (Gulati et al., 2011). This study focuses on a business unit's shared alliance vision with its alliance portfolio partners (Zaheer & Bell, 2005; Dyer & Hatch, 2006; Kang et al., 2009), and the capability to manage portfolio of alliances, i.e. an alliance portfolio management capability (Hoffmann, 2005; Sarkar et al., 2009; Schreiner et al., 2009; Schilke & Goerzen, 2010).

SHARED ALLIANCE VISION AND BUSINESS UNIT INNOVATION

The concept of shared vision is often used to refer to shared values and mutual goals and understanding in a cooperative relationship (Morgan & Hunt, 1994; Parsons, 2002; Li, 2005). In social capital literature, relational resources are discussed that provide "shared representations, interpretations, and systems of meaning" among social organizational network parties (Nahapiet & Ghoshal, 1998) and are labelled as shared vision (Tsai & Ghoshal, 1998).

Dougherty (1992) argued that a shared vision is essential to achieve innovations in social organizations consisting of separated and differentiated units. Having a shared vision has a positive effect on the willingness of such a differentiated social organizational network to consider and institutionalize opposing views and support the legitimacy of activities throughout the social organization (Subramaniam & Youndt, 2005). This ensures the acceptance of opposing or contrasting approaches of doing business by specialized and differentiated business units (Burgers et al., 2009), which in turn facilitates knowledge exchange (Inkpen & Tsang, 2005). This is also in line with Lane & Lubatkin's (1998) view that knowledge flows within a social organization, is argued to be facilitated by common practices in dominant logics and business (Lane & Lubatkin, 1998).

Interpreting these findings based on the prescriptions of the social network theory, which assumes that not only an organization is a social network, but also the environment in which it operates, this means that this also applies to a business unit's dyadic relationships with alliance partners and to its complete alliance portfolio. From this point of view, this study argues that a shared alliance vision generates alignment of goals and values which result into an increased access to and interaction between differentiated, i.e. in the resource-based view of the firm perspective's 'specialized', business units (Gupta & Govindarajan, 2000). A shared vision between a focal business unit and its alliance partners may overcome the boundaries between these differentiated and specialized units by institutionalizing a common language and mutual understanding (Tsai & Ghoshal, 1998). This is in line with Nahapiet & Ghoshal (1998) which argue that a shared vision is significantly important for effective communication, and facilitates knowledge exchange and new combinations of (pre-existing) knowledge bases (Nahapiet & Ghoshal, 1998). Their relational view on how intellectual capital is obtained through social capital (which can be placed in organizational learning theory as their study examines the same objectives), argues that a cognitive dimension, referring to resources within an social capital network that provide shared representations, interpretations, and systems of meaning, facilitates a common notion and understanding of collective goals (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998).

In other words, a shared alliance vision may facilitate knowledge flows, which are a requirement for business unit innovation (March, 1991; Ingram, 2002; Van Wijk, 2011). Hence this study hypothesizes:

Hypothesis 3: *A business unit's shared vision with its alliance partners is positively related to business unit innovation.*

THE MODERATING EFFECT OF ALLIANCE PORTFOLIO MANAGEMENT CAPABILITY

As mentioned before, alliances and alliance portfolios can be seen as important alternative sources to obtain required resources that are not available within a business unit (Das & Teng, 2000). As such, the coordination of alliances and alliance portfolios is a critical strategic domain that enables a business unit to adjust and optimize its resource base (Schilke & Goerzen, 2010). How the focal business unit coordinates these intertwined alliance relationships affects its performance (Hoffman, 2005) as coordination capabilities enhance knowledge exchange across organizational boundaries (Van den Bosch et al., 1999). As such, an alliance portfolio management capability captures "*the degree to which organizations possess relevant management routines that enable them to effectively manage their portfolio of strategic alliances*" (Schilke and Goerzen, 2010).

Managing a portfolio of alliances is a balancing act as it involves the management of a variety of co-exploration co-exploitation alliances (Parmigiani & Rivera-Santos, 2011). Therefore, in line with the work of previous scholars (e.g. Eisenhardt & Martin, 2000; Rothaermel & Deeds, 2006; Zollo & Winter, 2002), this study argues that a business units's alliance portfolio management capability is a 'dynamic capability'. This is because its capability may be considered as "*type of dynamic capability with the capacity to purposefully create, extend, or modify the business unit's resource base, augmented to include the resources of its alliance partners*" (Eisenhardt & Martin, 2000; Helfat et al., 2007; Schilke & Goerzen, 2010).

This study builds on Schilke and Goerzen's (2010) conceptualization of dynamic capability construct of alliance portfolio management capability, consisting of the aforementioned four generic types of routines. On an alliance portfolio level, two central coordination tasks van be differentiated: 1) interorganizational coordination, and 2) alliance portfolio coordination. While the first refers to "*the governance of individual alliances"*, the latter refers to "*the integration of all of a business unit's strategic alliances"* (Goerzen, 2005). Interorganizational coordination, i.e. coordination of dyadic relationships, guarantees that the relation with an alliance partner is governed efficiently and that the legitimacy of exchanges between the alliance partners is optimized (Kumar & Nti, 1998). Alliance portfolio coordination, on the other hand, is focused on the identification of interdependencies between the individual alliances, avoiding duplicate initiatives, and the production of synergies among the alliance portfolio partners (Hoffman, 2005; Schilke & Goerzen, 2010). As argued before, the way in which a business unit is capable of developing and guiding its alliance portfolio, is strategically important so to outmaneuver its competition (Hoffmann, 2005; 2007).

In a business environment whereas gaining and sustaining an competitive advantage is increasingly knowledge-based as business units strive to outlearn its completion, the potential for interorganizational learning is considered to be a crucial advantage of strategic alliances (Goerzen & Beamish, 2005). Simultaneously with knowledge transfer across a business unit's boundaries (Dyer & Nobeoka, 2000), the capability to effectively manage knowledge transfer from alliance partners plays is key to success (Mowery et al., 2002; Teece, 2007). The ability to learn across interorganizational boundaries has a positive effect on the degree in which resources are gained through alliance portfolios (Steensma, 1996). Thus, an interorganizational learning dimension cannot be ignored in the conceptualization of an alliance portfolio management capability.

A business unit's sensing routines consist of the ability to identify adequate alliance partners, understand the business unit's environment, market requirement and new possibilities to obtain valuable resources (Schilke & Goerzen, 2010). Schilke & Goerzen (2010) follow Sarkar et al. (2001) in subsuming these routines under the concept of alliance proactiveness, which is defined as "*the extent of routines to identify potentially valuable partnering opportunities*".

Finally, a business unit's "*extent of routines to modify alliances over the course of the alliance process*" is incorporated in the alliance portfolio management capability conceptualization, as in the current dynamic environment it is unrealistic to expect that alliance partners automatically come with a perfect alignment (Doz, 1996). The ever changing market conditions make the flexibility of an alliance as an organizational form a key advantage (Reuer & Zollo, 2000; Schilke & Goerzen, 2010).

ALLIANCE DIVERSITY

Despite that a diverse alliance portfolio provides access to alliance partners' resources, it does not automatically mean that these resources are effectively detected, transferred, and assimilated by the focal business unit (Hamel, 1991). For example, knowledge is often sticky and difficult to transfer (Szulanski, 1996), decreasing its potential for successful recombination (Galunic & Rodan, 1998). In line with this study's aforementioned hypothesis that alliance portfolio diversity has an inverted U-shaped relationship with business unit innovation, a higher level of diversity makes these challenges worse as a business unit's relative absorptive capacity in relation to its partners declines (Lane & Lubatkin, 1998). A greater alliance portfolio diversity decreases the chance that alliance partners share a mutual understanding, a shared language for collaboration, and a common approach to codify knowledge (Cohen & Levinthal, 1990), which is amplified by the fact that a higher alliance portfolio diversity increases the novelty and variety of tacit knowledge. In turn, high novelty and tacitness increase an alliance partner's uncertainty and moral hazards (Phelps, 2010).

The extent to which a firm can coordinate these aforementioned challenges on both dyadic alliance and alliance portfolio level, i.e. respectively interorganizational coordination and alliance portfolio coordination, mitigates some of the related costs and amplifies some of the advantages, thus positively moderates the effect of alliance portfolio diversity on business unit innovation. By identifying the interdependencies among a business unit's alliance partners, with the objective to maximize facilitating and minimizing constraining impacts, business units may increase their understanding of the implications of such interdependencies which enables them to utilize potential synergies (Parise & Casher, 2003), hence extents the positive effect of alliance portfolio diversity in maximizing business unit innovation.

Another key aspect of alliance portfolios is its dynamic nature. A business unit's portfolio configuration changes over time. For example: new ties with existing partners and and additional relationships with new alliance partners will be developed to address environmental opportunities. The more diverse a business unit's alliance portfolio, the more efforts and related costs are needed to adjust the alliance portfolio accordingly. The ability to modify alliances of the course the alliance life cycle, i.e. alliance transformation, the more effective and efficient this transformation process will be performed. In other words, a focal business unit with an increased alliance portfolio management capability is able to either transform a more diverse alliance portfolio with the same amount of effort, or transform the same alliance portfolio with a lesser amount of effort, and thus positively influence the relationship between alliance portfolio diversity and business unit innovation.

Hypothesis 4a: As a business unit's alliance portfolio management capability increases, the inflection point of the inverted u-shaped relationship between alliance portfolio diversity and business unit innovation postponed, such that similar diminishing returns will occur at higher levels of alliance portfolio diversity.

RELATION-SPECIFIC INVESTMENTS

In line with the social-network theory, business units engaged in a portfolio of alliances are embedded in a network of social relationships (Sahlman, 1990). The social-network theory and social-exchange theory provide a conceptual fundament for determining how dyadic alliances may be coordinated effectively. For example Larson (1992) studied network structures and found that business units that engaged in relatively stable, long-term relationships were characterized by multiple transactions and higher levels of cooperation and collaboration. Such relationships require coordination on both dyadic and portfolio level to timely and adequately response to potential signals for unpredictable and opportunistic behavior of the alliance partners, or to prevent issues with other alliance partners to have negative spill-over effects to the relationship with the specific partner. In other words, the higher the ability of a focal business unit to coordinate the dyadic relationship on its own and as an integral part of a larger social relationship network, the higher levels of cooperation and collaboration will be achieved.

Further, alliance portfolio coordination aims to allocate and utilize the focal business unit's limited pool of resources to alliance initiatives and project that allow maximal value exchange and value creation at moderate levels of risk (Schilke & Goerzen, 2005). For example, when a focal business unit has multiple alliance partners, issues and conflicts in one collaboration, e.g. project, can negatively impact other projects. The opposite applies to collaboration successes, which can benefit further joint initiatives with the same partner (Hoffman, 2005), and thus business units need to coordinate all the collaborative initiatives with the same partner. From a social network theory point of view, the same applies on a higher level of social networks, i.e. the alliance portfolio level (Doz & Hamel, 1998; Child & Faulkner, 1998). This combined with the sensing routines underlying a focal business unit's alliance portfolio management capability, results in a high alertness to external knowledge and environmental changes (Zaheer & Zaheer, 1997) and enables the business unit to understand to identify potentially valuable partnering opportunities with the same partner (Schilke & Goerzen, 2010). By recognizing intra-

organizational and interorganizational synergies, a focal business unit can create positive spill-overs of their relation-specific investments.

From an absorptive capacity point of view, business units often engage in alliance portfolios to acquire new knowledge and rent generating resources. A business unit's and alliance partners' learning capability explain the appropriation of rents in such alliances (Hamel, 1991; Kumar & Nti, 1998; Dussauge et al., 2000). A business unit's ability to recognize to sense new opportunities and to learn accordingly, i.e. alliance proactiveness and organizational learning respectively, accounts for the actual learning (Lane et al., 2001) and contributes to the rents it appropriates from its alliance portfolio (Lavie, 2006). Therefore, the higher a business unit's alliance portfolio management capability, the higher the proportion of relational rents appropriated by the focal business unit will be that contribute to its innovation activities. Thus, to summarize, a focal business unit's alliance portfolio management capability will positively moderate the effects of relation-specific investments on business unit innovation.

Hypothesis 4b: As a business unit's alliance portfolio management capability increases, the relationship between a business unit's reciprocal relation-specific investments across its alliance portfolio and business unit innovation gets stronger, such that similar levels of relation-specific investments yield a higher level of business unit innovation.

SHARED ALLIANCE VISION

On a dyadic level, alliance partners rarely pursue a shared alliance objective autonomously (Schilke & Goerzen, 2010). This creates the need for coordination as cooperation is only advisable when alliance partners have a shared vision. This concerns not only the goals and aspirations of the alliance, but also future developments within the industry in which the alliance is formed, and the impact of these developments on their own individual positions. Such a shared alliance vision enables alliance partners to resolve possible strategic issues and conflict effectively, especially in the later stages of the alliance life-cycle when alliance partners often have to redefine their initial strategies due to changes in their dynamic environments (Douma et al., 2000; Hoffman, 2005). In addition, alliance partners do not naturally have all of the mandatory information to align their own initiatives with the initiatives of their counterparts. Harmonization of these initiatives is important to achieve common alliance objectives. Therefore the higher a focal business unit's capability is to coordinate this on an interorganizational, i.e. dyadic, level, the effects of having a shared vision will be positively influenced by the extent to which the focal business unit has routines in place to coordinate activities and resources in conformance with this shared alliance vision (Schilke & Goerzen, 2005). On a portfolio level, this becomes even more apparent as the interdependencies between individual alliances for the focal business units become increasingly complex.

In addition, Parise and Casher (2003) argue that conflict reduction is a key advantage of the alliance portfolio management capability through its alliance portfolio coordination routines. As another important role of a business unit's alliance portfolio management capability is the monitoring and control the performance of 1) the entire alliance portfolio, and 2) the individual alliances or dyads

(Gemünden et al., 1996), it decreases the likelihood of issues and conflicts. Based on an alliance portfolio strategy, a business unit develops partial objective for each of the dyadic alliances within its portfolio (Hoffman, 2005; 2007). Whereas a shared alliance vision, a common understanding of goals and objectives between the business unit and an individual alliance partner, positively influences the focal business unit's level of innovation, the ability to monitor and evaluate the contribution of each alliance and the alliance portfolio to the business unit's success positively moderates this relationship (Hoffman, 2005). The higher a focal business unit's ability to monitor, evaluate, and if necessary transform its alliance partner and portfolio of alliances to guarantee its success, the more a shared alliance vision contributes to a business unit's level of innovation.

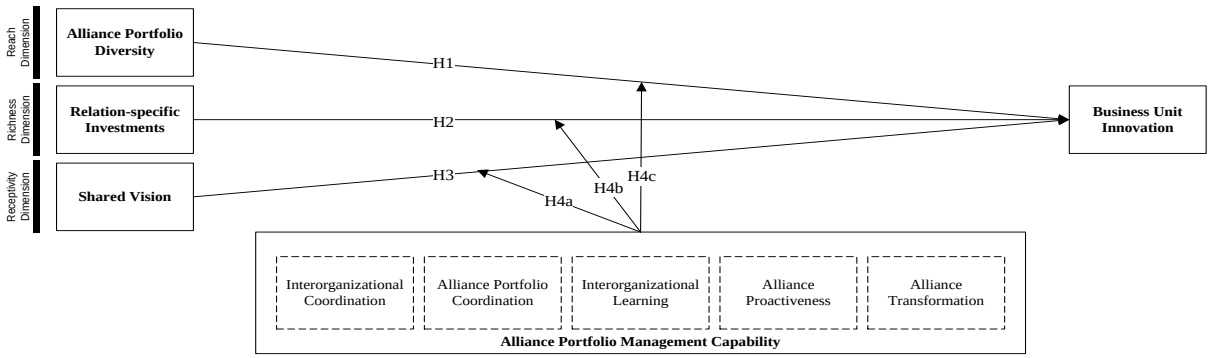
Based on Nahapiet and Ghoshal's study (1998), Yli-Renko et al. (2001) advances and emphasizes that a shared vision increases relative absorptive capacity (Lane & Lubatkin, 1998) in the knowledge assimilation process in the exchange dyad and enables business units to engage more into knowledge acquisition and exploitation (Li, 2005).

Hypothesis 4c: As a business unit's alliance portfolio management capability increases, the relationship between a business unit's shared alliance vision across its alliance portfolio and business unit innovation gets stronger, such that similar levels of shared alliance vision yield a higher level of business unit innovation.

THEORETICAL FRAMEWORK

In order to visualize the main structure of the research in this master thesis, a conceptual framework is presented. Based on the elaborated hypotheses in the previous paragraphs, the conceptual framework indicates the suggested relations between on one hand the factors that determine alliance portfolio configuration as antecedents and on the other business unit innovation as main dependent variable. Furthermore, the conceptual framework shows the influence of the moderating variable alliance portfolio management capability on the relation between alliance portfolio mechanism factors and business unit innovation (Figure 1).

Figure 1: Conceptual framework of master thesis



CHAPTER 3
RESEARCH DESIGN

To test this study's hypotheses relating to different alliance portfolio strategy approaches to business unit innovation and the effects of alliance portfolio management capability on this relationship, a self-completion questionnaire was administered to independently operating business units in the designated 'top industries' of the Netherlands.

SAMPLE

Following Yurdusev's (1993) distinction between a unit of analysis and a level of analysis, this study's entity to be studied, i.e. unit of analysis, is a single business unit within a multi-business organization or the entire organization if an organization did not have any specialized business units. The decision to focus on business units as the unit of analysis, was based on the argument that the definition and implementation of alliance portfolio strategy is mainly done at this level as the specific configuration of the alliance portfolio as it depends on the go-to-market business strategy (Hoffmann, 2005; 2007). Since this study's main context, i.e. level of analysis, concerns a business unit's alliance portfolio, Schilke and Goerzen's (2010) method was followed of employing specific selection criteria, designed to capture business units that are most likely to be engaged in multiple alliances, or more specifically, alliance portfolios.

The first criterion was based on the recognition that specific industries, including the creative industry, energy, life sciences and health, and high tech, are among the most prolific in engaging alliances (Grant & Baden-Fuller, 2004; Tomasello et al., 2004). Simultaneously, these industries were among the Dutch Government's designated 'top industries', supported and stimulated by the Dutch Government 'top industry approach' to collaborate across industries and functions in order to increase the global competitive power of the Netherlands (Government of the Netherlands, 2015). In addition, this level of analysis supported this study´s objective to investigate how business units can manage their portfolio of alliances to pursue innovation, as business units with different market orientations, show strong variety when it comes to innovation (Han et al., 1998). This made these industries an ideal focus for this study.

The second and final criteria was based on the recognition that managers, who are responsible for the management of alliance engagements on business unit level, often have certain functions. Following extant literature on alliance management, these functions can be 'dedicated' alliance functions, such as alliance manager, partner(ship) manager, alliance executive, and vice-president alliance. As extant literature shows that institutionalizing a 'dedicated alliance function' is not a common practice for all business units, other alliance management related functions, such as business unit managers and directors, (new) business development managers, sales manager and executives, and channel development managers were included (Dyer et al., 2001; Kale et al., 2002).

DATA COLLECTION

To gain a sufficient amount of cross-sectional data from a large number of informants for generalizability purposes, a survey approach was chosen (Bryman & Bell, 2011). The data collection was conducted using a sample frame consisting of 655 managers on business unit level who were responsible for the management of the business unit's alliance portfolio. Among these managers, 216 managers had 'dedicated' alliance functions. An additional of 439 managers were contacted based on the other aforementioned functions, which are often related to alliance management. This sampling frame was identified by means of the largest online business-oriented social network service used for professional networking.

Prior to administering the questionnaire, three extensive interviews were held with former alliance executives of different business units. These interviews were helpful in designing the questionnaire. A pre-test was conducted involving a review panel existing of 5 professional management practitioners with various tenures working at different business units to mitigate measurement error.

Table 5 Report Analysis

	Survey #1	Survey #2	Survey #3	Survey #2	Total	Total
	Alliance Manager	**Manager**	**Colleague**	**Colleague**	**Alliance**	**Colleague**
Sample Frame Alliances	216	439			655	
Sample Frame Colleagues			45	42		87
Non-response						
- unknown reason	130	204	2	314	334	316
- undeliverable	10	119	2	119	129	121
- reason provided	6	21	1	-	27	1
Missing Values	24	52	3	-	76	3
Colleague Version	1	1	N/A	N/A	2	N/A
Questionnaires returned	45	42	10	7	87	17
Key-informant criteria						
- alliance definition mismatch	N/A	5	N/A	N/A	5	N/A
- low self-reported knowledge	-	-	-	-	-	-
- no alliance portfolio (< 2 partners)	4	-	N/A	N/A	4	N/A
- response sets	-	1	-	-	1	-
- no matching pair	N/A	N/A	-	2	N/A	2
Outliers	3	3	N/A	N/A	6	N/A
Net Sample Alliances	**38 (19.0%)**	**33 (11.0%)**			**71 (14.2%)**	
Net Sample Colleagues			**10 (22.2%)**	**5 (11.9%)**		**15 (17.2%)**

To increase response rates, informants identified based on the first sample frame, received a hard copy of the questionnaire. A personalized covering letter, information flyer, a detailed instruction guide, a second version of the questionnaire for a colleague within the business unit, and a return envelope were enclosed with every copy of the questionnaire. The return envelope enabled informants to directly return back the questionnaires to the researcher. Informants identified based on the second sample frame, received a digital copy of the questionnaire, including a personalized covering e-mail, informational flyer and a detailed instruction guide. On every occasion, both groups of informants were informed that the questionnaire would be treated with confidentiality, were promised that they would receive a digital anonymous copy of the results on aggregated level, and a donation by the researcher of

€ 1,- per case to charity. Reminders to non-responding informants were issued within a four week interval after the initial administration.

To mitigate non-sampling error, informants were asked 5 questions to verify whether their interfirm relationships could be qualified as 'alliance', including: our inter-firm relationships are 1) close and focused on long-term collaboration, 2) reciprocally sharing resources, knowledge and capabilities, 3) going beyond 'value-exchange' and focus on 'value creation for both partners, 4) focused on enhancing the competitive position of each partner, and 5) maintaining each partner's individuality. In addition, informants had to specify the number of alliances in which their business unit was engaged, to verify whether their business unit was involved in a portfolio of alliances. Any informant with a negative answer on one or more of the aforementioned criteria was excluded from the final sample.

Table 6 **Sample descriptive statistics**

Firm	Company size	56,871.08	employees (average firm)		
	Firm inception	1974	(year of inception for average firm)		
Business Unit	R&D intensity	9.72%	(average business unit)	15.27	Std. Deviation
	Industry	1.41%	Food & Agriculture	7.04%	Life Sciences & Health
		5.63%	Chemicals	1.41%	Logistics
		40.85%	Creative Industry	2.82%	Horticulture & Environment
		7.04%	Energy	1.41%	Water
		32.39%	High Tech		
Informant	Self-reported knowledge	5.89	(average informant)		
	Tenure	5.15	Job experience	17.27	Industry experience
		9.20	Company experience		
	Job Title	21.10%	Alliance manager	21.10%	BU manager (general)
		8.50%	VP / Director alliances	15.50%	Sales & bus. development
		21.10%	Top management team	12.70%	Other
Alliance	# of alliances	13.61	(average number of alliances)	2.00	Minimum
	Alliance diversity			.54	Minimum
	Type of activity	17.90%	Co-marketing alliances	17.13%	Distribution alliances
		9.71%	Co-production alliances	5.06%	R&D alliances
	Organizational form	1.24%	Equity alliances		
	# of partners	9.35%	Multi-partner alliances		
	Partner types	4.41%	Competitors	3.21%	Non-industry partners
		11.08%	Suppliers	20.91%	International partners

Note: n = 71.

Together, the self-completion questionnaire resulted in 45 alliance managers 42 managers, totaling 87 returned self-completion questionnaires. Informants were excluded from further analysis due to a mismatch with the aforementioned definition of alliances (5), unsufficient alliance partners to be considered as a 'alliance portfolio' (4), and possible response set (1). In addition, informants of both versions showing extreme values were contacted to verify the validity and reliability of their cases. This

resulted in the exclusion of 6 additional cases. The net sample for the data analysis therefore consisted of 71 cases, indicating a response rate of 14.2%. Asking for second opinions resulted in 17 additional observations. 2 informants needed to be excluded from further analysis as they could not be matched with a related case from the same organization and business unit. This resulted in a net sample of 15 cases, indicating a response rate of 17.2% (see Table 5).

Upon completion, the final sample included 71 business units, of which 15 business units provided 'second opinions' for control purposes. The sample descriptive statistics are presented in Table 6. For the participating business units, official data was obtained from official sources concerning company size and the company's date of inception, such as fiscal year reports.

SAMPLING AND METHOD BIAS

To establish whether sampling and response bias was present in the sample, three tests were performed.

SAMPLING BIAS

First, to examine any differences in respondents forthcoming from the first and second sample frame, the responses of dedicated alliance management functions who responded on the hard copy version were compared to the responses of undedicated alliance management functions who responded based on digital version of the questionnaire. As extant literature argues that both types of alliance functions are utilized by organizations to manage interfirm relationships (Dyer et al., 2001; Kale et al., 2001; Kale et al., 2002), no significant differences between dedicated alliance management functions and undedicated alliance management functions were expected (H_0: $\mu_1 = \mu_2$ and H_a: $\mu_1 \neq \mu_2$). T-tests showed no significant differences based on *Environmental Dynamism*, *Alliance Portfolio Size*, *Alliance Portfolio Diversity*, *Alliance Portfolio Management Capability*, *Company Size*, and *R&D Intensity* (Table 7 presents t-test outcomes based on the corresponding Levene's test result). In addition, using an analysis of variance (ANOVA), F-statistics were obtained suggesting that business units utilizing dedicated alliance functions were not significantly different from business units utilizing undedicated alliance functions at $p < 0.05$. Thus, both the t-test and the ANOVA confirm uniformity between the two different samples, both obtained by using different sample strategies. These results suggest limited concerns about sampling bias.

Table 7 **Sampling Bias Analysis**

	Alliance Manager[a]		BU Manager[a]		Levene's Test		t-test for Equality of Means		
	Mean	SD[b]	Mean	SD[b]	F	Sig.	t	df	Sig. (2-tailed)
Env. Dynamism	5.63	0.81	5.51	0.91	.070	.792	.611	69	.543
Alliance Portfolio Size	13.44	26.41	13.77	26.41	.003	.957	-.053	69	.958
Alliance Portf. Diversity	0.75	0.08	0.75	0.09	.202	.655	-.075	69	.941
Alliance Port. Mgt. Cap.	5.27	0.65	5.36	0.58	.079	.779	-.578	69	.565
Company Size (ln)	8.12	3.54	8.31	3.43	.369	.545	-.229	69	.819
R&D Intensity	8.58	10.29	10.89	19.18	3.02	.087	-.633	69	.529

[a] Dedicated alliance function: $n = 36$; Undedicated alliance function: $n = 35$
[b] SD = standard deviation

NON-RESPONSE BIAS

Second, to examine any variances in respondents and non-respondents, early informants were compared with late informants (Armstrong & Overton, 1977). Respondents and non-respondents were examined by comparing the responses of those who responded to the first invitation to those who received one or more reminders. Again, t-tests and analysis of variance (ANOVA) showed no significant differences (see Table 8) at $p < 0.05$, this time based on *Environmental Dynamism*, *Tenure*, *Company Size* and *Company Age*, indicating that non-response bias was not an issue.

Table 8 **Non-Response Bias Aanalysis**

	Respondents[a]		Non-Respondents[a]		Levene's Test		t-test for Equality of Means		
	Mean	SD[b]	Mean	SD[b]	F	Sig.	t	df	Sig. (2-tailed)
Env. Dynamism	5.66	0.82	5.43	0.90	.027	.869	1.115	69	.269
Company Tenure	9.05	7.17	9.44	7.12	.023	.881	-.228	69	.820
Function Tenure	5.16	4.49	5.15	4.21	.090	.765	.010	69	.992
Industry Tenure	17.30	8.53	17.22	7.78	.181	.672	.036	69	.971
Company Size (ln)	7.86	3.42	8.78	3.52	.018	.894	-1.089	69	.280
Company Age	38.43	36.23	44.11	35.87	0.61	.806	-.644	69	.522

[a] Respondents: $n = 44$; Non-Respondents: $n = 27$
[b] SD = standard deviation

ONE-SIDED KEY INFORMANTS

Finally, consistent with previous alliance research (Parkhe, 1993; Saxton, 1997; Lambe et al. 2002), this study used one-sided key informants to increase response rates, meaning that data was collected from one side of the dyadic relationships within the alliance portfolio: the focal business unit. This approach is consistent with previous alliance literature (e.g. Yan & Gray, 2001; Heimeriks & Duysters, 2007; Duysters et al., 2012). Three measures were taken to estimate whether the choice for this approach resulted in response bias. First, the questionnaire included an item to assess the informant's self-reported knowledge about their business unit's alliance partners and its level of innovation on a 7-point Likert scale, ranging from 1 ("*Extremely Poor*") to 7 ("*Excellent*"), with a cut-off value of 3. The mean score for this item was 5.89, suggesting that this study's informants were very well informed (see Table 6). Second, informants were asked to provide information about their tenure to determine whether informants were qualified to participate in the research project. *Tenure* was measured by the number of years respondents work in the current *function*, *company* and *industry*. On average, informants had been employed in their current job for 5.15 years, were involved in the company for 9.20 years, and had 17.27 years of industry experience respectively, showing strong evidence that the selected informants were adequately experienced (see Table 6). Third, informants were asked to forward a second version of the self-completion questionnaire to a direct delegate within the business unit to validate the one-sided key informant data. To investigate differences in response scores between informant groups, a paired-samples t-test was conducted for *exploratory* and *exploitative innovation*, *environmental dynamism*, and *slack resources* (see Table 9).

Table 9 **Paired Samples Test**

		Paired Differences		t	df	Sig. (2-tailed)
		Mean	SD[b]			
Pair 1[a]	Exploratory innovation	-1.12	1.13	-3.85	14	.002
Pair 2[a]	Exploitative innovation	-0.42	1.40	-1.17	14	.261
Pair 3[a]	Environmental Dynamism	-0.37	0.87	-1.65	14	.121
Pair 4[a]	Slack Resources	-0.17	1.70	-0.38	14	.709

[a] Respondents: $n = 15$;
[b] SD = standard deviation

This is confirmed by the result of a t-test for differences using separate means for of both informant groups. The mean score of *exploratory innovation* was significantly different between primary and secondary informants (see table 9). An ANOVA used to test for differences in variance of opinion scores between primary informants (i.e. managers) and their delegate within the business unit showed no significant differences at $p < 0.05$, indicating that these subgroups can indeed be compared using the aforementioned (paired) t-tests. Both the paired and normal t-test show that primary informants (i.e. managers) may be positively biased about their business unit's level of *exploratory innovation*.

MEASUREMENT AND VALIDATION OF CONSTRUCTS

For measuring each of this study's concepts, measures were derived mainly from existing scales from scholars who conducted research in relevant theoretical domains to ensure construct validity, as all scales have been pre-tested by professional practitioners, validated based on empirical evidence and reviewed by peers prior to being published. Where applicable, existing scales were optimized to match the specific context of this study. Appendix I shows an overview of the used items and scales in this study.

DEPENDENT VARIABLES

BUSINESS UNIT INNOVATION

Business unit innovation, referring to the extent in which a business unit simultaneously builds upon existing knowledge and extending existing products and services for existing customers and markets on the one hand, and pursuits new knowledge and new products and services development for emerging customers and market on the other hand (Jansen et al., 2006). *Business unit innovation* was measured as the multiplicative interaction of exploratory and exploitative innovation, comprising the non-substitutable combination of both dimensions of innovation (Gibson & Birkinshaw, 2004). To measure *exploratory innovation*, this study followed the six-item scale of Jansen et al. (2006) to capture the extent to which business units departed from existing knowledge and pursue innovations for new customers or markets ($\alpha = 0.79$). One item was removed to improve the internal consistency of the scale from $\alpha = 0.77$ to $\alpha = 0.79$ (see Appendix I).To measure e*xploitative innovation*, this study used the six-item scale of Jansen et al. (2006) to ask informants to indicate the extent to which the business unit builds on existing knowledge and meet the needs of existing customers or markets. Here, one item was removed to optimize the scale's internal consistency from $\alpha = 0.82$ to $\alpha = 0.87$. The correlations between both underlying factors for this study's second-order *business unit innovation* construct were positive and

significant ($p < 0.01$), showing strong support for the reliability and validity of our measure for *business unit innovation*.

INDEPENDENT AND MODERATING VARIABLES

ALLIANCE PORTFOLIO DIVERSITY

Alliance portfolio diversity is a multi-dimensional concept that includes a wide variety of alliance and partner attributes (Wassmer, 2010). Hence, the concept was assessed by a multi-dimensional construct by examining the extent to which a firm's alliance portfolio varies in terms of 10 specific alliance and partner attributes (Duysters et al., 2012) To measure *alliance portfolio diversity* on business unit level, respondents were asked to indicate how many of their business unit's alliance partners could be characterized by the following attributes: type of activity ((1) co-marketing, (2) co-production, (3) distribution, (4) research & development), the organizational form (i.e., (5) equity alliances), the number of partners (i.e., (6) multi-partner alliances in which more than two partners collaborate), and the types of partners (i.e., (7) competitor, (8) supplier, (9) non-industry, and (10) international partners). The number of ties was computed based on attribute m as $n_{i,m}$ of firm i and the total number of ties aggregated over all attribute types ($m = 1 \ldots 10$) as n_i. The proportion of firm i's ties based on attribute m, out of the total number of ties, is denoted as $r_{i,m}$ and given by $r_{i,m} = n_{i,m} / n_i$. Each $r_{i,m}$ was squared, hence the sum was taken over all m and subtracted from 1, resulting in the index of *alliance portfolio diversity* APD, so that:

$$APD = 1 - \sum_{m=1}^{10} r_{i,m}^2$$

RELATION-SPECIFIC INVESTMENTS

To develop measures for *relation-specific investments* existing literature was carefully examined. None of the existing scales for *relation-specific investments* in the examined literature matched this study's objective of providing a broad, integrative and cross-industry perspective on the relationship between alliance portfolios and business unit innovation with respect to the diversity in alliance portfolio attributes. Such an objective demands a high level of generalizability and generic measures in contrast to the more specific existing measures of *relation-specific* investments, e.g. in the context of original equipment manufacturers (Kang et al., 2009), supplier-retailer relationships (Jap & Ganesan, 2000) and marketing-relationships (Rokkan et al., 2003). Building on Anderson & Weitz's (1992) scale for distributor's and supplier's idiosyncratic investments, a seven-item scale ($\alpha = 0.74$) was developed to measure the level of investment in the relationship by the business unit and the degree to which those investments are not redeployable to other relationships. Items were rephrased to match the business unit level of analysis.

SHARED ALLIANCE VISION

Shared alliance vision, referring to the extent in which the focal business unit has collective goals and shared aspirations with alliance partners within its alliance portfolio, was measured using a five-item scale from Burgers et al. (2009), building on Sinkula et al. (1997), of which the items were rephrased in order to match the business unit level of analysis ($\alpha = 0.61$). Any further attempts to increase the scale's internal consistency based on Cronbach's alpha, had negative effect on the scale's face validity.

ALLIANCE PORTFOLIO MANAGEMENT CAPABILITY

To find a suitable measure for *alliance portfolio management capability*, extant literature was thoroughly reviewed and analyzed to determine the suitability of existing scales. Although, in recent years, scholarly literature devoted a lot of attention to the conceptualization of alliance capability, it was primarily focused on the constituent skills required to successfully manage individual or so-called dyadic alliances (e.g. Sivadas & Dwyer, 2000; Schreiner et al., 2009; Wassmer, 2010). This study used the items of the five-dimensional second-order construct of Schilke & Goerzen (2010) as *Alliance portfolio management capability* is clearly a multi-dimensional construct which cannot be completely captured by a one-dimensional measure (Rothaermel & Deeds, 2006). Not only does Schilke & Goerzen's (2010) multi-dimensional construct measure the capability of managing both dyadic and multiple alliance relationships, it fitted perfectly with this study's organizational learning perspective. Schilke and Goerzen's (2010) 18 *alliance portfolio management capability* items were rephrased to match this study's business unit level of analysis, without impacting the phrasing of items as 'discrete practices' to account for the routine-based nature of the construct (Knott, 2003). Discriminant validity was established by conducting a principal component analysis (PCA) on the 18 items with oblique rotation (direct quartimin rotation), as the reflective is a theoretical ground for supposing that the factors correlate (Field, 2009). The Kaiser-Meyer-Olkin measure (.725) verified sampling adequacy for the analysis. Bartlett's test of sphericity χ^2 (153) = 474.10, $p < 0.001$, indicated that correlations between the items were sufficiently large for PCA. The PCA clearly replicated the expected five-factor structure as defined by Schilke and Goerzen (2010), with each factor having an eigenvalue greater than 1.0. A comparison based on a Monte Carlo simulation with 1000 replications confirmed this finding. Each item loaded clearly on its intended factor with factor loadings above .446 with cross-loadings below 0.304. One item loaded more strongly on *interorganizational coordination* instead of *portfolio coordination*, hence was moved as item to the former dimension. This resulted in five first-order dimensions, including 1) *interorganizational coordination* (α = 0.73), 2) *alliance portfolio coordination* (α = 0.77), 3) *interorganizational learning* (α = 0.79), 4) *alliance proactiveness* (α = 0.71), and 5) *alliance transformation* (α = 0.80). The correlations between the aforementioned underlying factors of the second-order *alliance portfolio management capability* construct were positive and significant ($p < 0.01$) for each of the factors, showing strong support for the reliability and validity of the measure.

CONTROL VARIABLES

In the empirical study, various relevant control variables were included to control for potential cofounding effects as they may influence the values of other variables and therefore elucidate variations in measures. Without control variables, the experiment could be more complicated and less valid as results are incomparable or cannot be interpreted sufficiently.

Extant literature argues that increasing levels of *environmental dynamism* reduces access to knowledge needed by managers to make critical decisions as it increases the inability of actors to assess both the present and future state of business accurately (Simerly & Li, 2000). In the context of business unit innovation and interorganizational collaboration the consequences are twofold: 1) it could have a negative effect on business unit innovation as it reduces the stability and predictability interfirm collaborations (Simerly & Li, 2000) e.g. alliances within a business unit's alliance portfolio and 2) it could have a positive effect on business unit innovation as firms need to pursue new types of competitive

approaches that transcend traditional strategies (Hamel, 1996; 1998; Porter, 1998) to eliminate the static competitive advantages of other firms (D'Aveni, 1994). To control for the effect, *environmental dynamism* was included in the self-completion questionnaire. It's original five item structure, used from Jansen et al. (2006), was reduced to four items to increase the internal consistency of the scale from $\alpha = 0.78$ to $\alpha = 0.79$. *Environmental dynamism* measures the rate of change and the instability of the external environment.

S*lack resources* can increase exploratory search and positively influence innovation performance (Jiang et al., 2010). A four-item scale from Danneels (2008), drawing on the literature on organizational slack, was used to measures the extent to which slack resources are available to the business unit. The original measure assesses the informant's perception of the availability of slack resources within the firm. Items were rephrased in order to match the business unit level of analysis. Two items were removed based on a result of the pretest and a Cronbach's alpha tests to increase the internal consistency of the scale from $\alpha = 0.51$ to $\alpha = 0.73$ (see appendix I).

Company size can potentially be of influence as larger organizations may have more resources available to invest in innovation initiatives, but simultaneously may lack the flexibility to explore as large firms are less likely to provide a responsive, risk-taking and rewarding context required for the development of innovations (Cohen & Levin, 1989; Chandy & Tellis, 2000). Subjective data obtained by the respondents was replaced by objective facts and figures based on fiscal year 2014 results. The average size of the organizations in the final sample was almost 64,000 employees, varying greatly with a standard deviation of over 113,834. To normalize the distribution, company size was measured by the natural logarithm (ln) of the number of full-time employees for each participating organization based on the results reported in their 2014 fiscal year reports.

Company age, measured by the number of years from the organization's inception, since previous studies argue that older units may have a higher level of rigidness, and thus show an increasing divergence between organizational competence and current environmental demands (Autio et al., 2000). Older business units may have developed so-called 'competency traps' as they have developed a "dominant logic" (Autio et al., 2000) that narrows their pursuit to opportunities which are suited to their existing competencies (Cohen and Levinthal, 1990). The average age of the participating organizations in the final sample was almost 39 years, but varying greatly with a standard deviation of 34.5.

Extant literature shows that *R&D intensity* is positively related with innovation output (Ahuja & Katila, 2001). *R&D intensity* was measured as the percentage of the business unit's full-time employees that are dedicated to R&D (Deeds, 2001). The average percentage of employees within the business unit dedicated to R&D was 13.35% with a standard deviation of 23.03.

ANALYSIS

This study used several methods for data analyses. First, T-tests and analysis of variance (ANOVA) were used to control for sampling and method bias. Were the t-test controls for significant differences in means, the ANOVA was used to control for significant differences in variances. This study used multiple linear regression analyses for hypotheses testing.

Second, a principal component analysis was conducted to control for the discriminant validity of Schilke & Goerzen's (2010) measure for alliance portfolio management capability. An oblique oblique rotation (direct quartimin rotation) was chosen as factor rotation method, as the reflective is a theoretical ground for supposing that the factors correlate (Field, 2009).

Third, multiple regression modelling was done based on several methods in order to obtain the best fit with the data. The 'stepwise' method was used for exploratory model building as scholars argue that this many important methodological issues out of the hands of subjectivity, leaving less room for error. In addition, hierarchical and forced entry methods, however, were used to account for theoretical importance of models and the risk of over-fitting and under-fitting (Fields, 2009). The potential for multicollinearity was thoroughly explored. First, none of the correlations presented in Appendix I are above the $\alpha = 0.80$ threshold (Field, 2009), suggesting no signs of multicollinearity issues. Second, prior to the creation of the interaction terms for models 4, 5, 6, and 7 , the independent variables were mean centered to reduce multicollinearity (Aiken & West, 1991). Third, variance inflations factors (VIF) were calculated to assess each of the regression equations. The highest VIF level for individual variables were less than 1.7 without the any of the interaction effects and less than 2.8 for two-way and three-way (interaction) terms, which are all well below the suggested cut-off value of 10 (Neter et al., 1990; Mason and Perreault, 1991) and 5 (Menard, 2002; Field, 2009). Overall, these results suggest that multicollinearity is not a concern.

Fourth, outliers were controlled for by means of both boxplots and regression residuals. Preliminary boxplot analyses resulted in 9 outliers. Finally, 6 were removed from the dataset, after confirming that their case did not match this study's target sample by verifying the cause of extreme values with the informants by telephone. Final outlier analyses was conducted based on standardized residuals, resulting in values between -2.301 and 2.061, which are well accepted values (Fields, 2009) to conclude that the model fitted the data well. A normal P-P Plot of the standardized regression residuals supported this conclusion. Overall, these results suggest that outliers were not a concern in the final multiple linear regression model.

Finally, the assumptions of linearity of the model was more thoroughly checked by a plot of the standardized residuals (*ZRESID) against the standardized predicted values (*ZPRED). The plots showed an evenly dispersed and random array of cases, suggesting that heteroscedasticity was not an issue.

CHAPTER 4
RESULTS

Table 10 presents the descriptive statistics and bivariate correlations.

Table 10 Means, Standard Deviations, and Correlations

		Mean	*St. dev.*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
1.	Business unit innovation	25.55	8.90										
2.	Alliance portfolio diversity	00.75	0.86	-.319**									
3.	Relation-specific investments	04.70	0.90	-.047	-.070								
4.	Shared alliance vision	05.14	0.68	-.253*	-.052	-.247*							
5.	Alliance portfolio management capability	05.16	0.61	-.380**	-.042	-.316**	-.228†						
6.	Environmental dynamism	05.57	0.86	-.103	-.194	-.116	-.213†	-.004					
7.	Slack resources	03.15	1.32	-.071	-.074	-.206†	-.103	-.127	-.092				
8.	Company size	08.21	03.46	-.268*	-.083	-.157	-.045	-.279*	-.295*	-.102			
9.	Company age	40.59	35.94	-.003	-.068	-.095	-.096	-.117	-.148	-.028	-.473***		
10.	R&D intensity	09.72	15.27	-.259*	-.045	-.045	-.161	-.136	-.099	-.035	-.137	-.159	

Note: *n* = 71. Number in parentheses on the diagonal are Cronbach's alphas of the composite scales.
† p<0.10, * p<0.05, ** p<0.01, *** p<0.001 (2-tailed)
[a] Natural logarithm of full-time employees

Table 11 presents the multiple regression analyses and results for business unit innovation.

Table 11 Results of regression analyses – Effects on business unit innovation

	Business unit innovation						
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*
Intercept	19.583**	28.440***	26.607***	26.364***	24.776***	25.066***	26.047***
Main effects							
Alliance portfolio diversity [b]		-.088	-.106	-.095	-.083	-.076	-.062
Alliance portfolio diversity squared [b]		-.368**	-.314*	-.316*	-.342**	-.350**	-.347**
Relation-specific investments [b]		-.033	-.125	-.133	-.193	-.191	-.216†
Shared alliance vision [b]		-.238*	-.206†	-.208†	-.200†	-.203†	-.186†
Moderator							
Alliance portfolio management capability (APMC)			-.257*	-.251*	-.402*	-.399*	-.391*
Interaction effects							
Alliance portfolio diversity * APMC [b]				-.042	-.118	-.114	-.150
Alliance portfolio diversity squared * APMC [b]					-.214	-.213	-.206
Relation-specific investments * APMC [b]						-.022	-.120
Shared alliance vision * APMC [b]							-.218†
Control variables							
Environmental dynamism	-.167	-.009	-.004	-.002	-.002	-.002	-.019
Slack resources	-.046	-.106	-.096	-.103	-.148	-.148	-.146
Company size[a]	-.373**	-.260*	-.181	-.183	-.148	-.153	-.159
Company age	-.191	-.230†	-.215†	-.215†	-.197†	-.197†	-.209†
R&D intensity	-.220†	-.215*	-.188†	-.195†	-.197†	-.196†	-.172
Adjusted R^2	-.115*	-.284***	-.329***	-.319***	-.328***	-.317***	-.345***
Δ adjusted R^2		-.169*	-.045**	-.010*	-.009	-.011	-.028†

Note: *n* = 71. Standardized regression coefficients (betas) are reported
† p<0.10, * p<0.05, ** p<0.01, *** p<0.001 (2-tailed)
[a] Natural logarithm of full-time employees
[b] Mean-centered

The baseline Model 1 only includes the intercept and control variables. Model 2 introduces the independent variable effects, including the hypothesized inverted U-shaped relationship between alliance portfolio diversity and business unit innovation. Accordingly, Model 3 adds the moderator variable's direct effect on business unit innovation. Finally, models 4 to 7 introduce the moderating variable's effects on each of the independent variables, including a three-way interaction term to examine the moderating effect on the hypothesized inverted U-shaped relationship between alliance portfolio diversity and business unit innovation. The interaction terms are introduced on a step-by-step basis. The results of the final model, i.e. Model 7 in Table 11, are discussed.

The hypothesized inverted U-shaped relationship between alliance portfolio diversity and business unit innovation (Hypothesis 1) was supported as the *standardized β-value* for the mean centered and squared alliance portfolio diversity term in Table 11 (Model 7) is negative and significant (β = -.347, p < 0.01). The coefficient for relation-specific investments was negatively and significantly related to business unit innovation (β = -.216, p < 0.10).

Accordingly, Hypothesis 2, which posited that relation-specific investments aimed on specific alliance partners within a business unit's alliance portfolio had a positive effect on the business unit's level of innovation, was not supported. The argument used for a positive relationship was based on the possibility that a focal business unit's relation-specific investments could function as a stepping stone for capturing potential positive economic spill-over effects concerning other ties within the dyadic relationships. It could be that possibilities for economic spill-over effects on other ties within the relationship were not present in this study's sample. To examine this, a post hoc analyses was performed. Table 12 shows the result in terms of the average size of a business unit's alliance portfolio and the total average number of ties for each business unit.

Table 12 Results of post hoc analyses – alliance portfolio size

	Min	*Max*	*Mean*	*SD*[a]
Alliance portfolio partner size	2	150	13.61	25.69
Alliance portfolio ties size	5	320	35.10	56.60

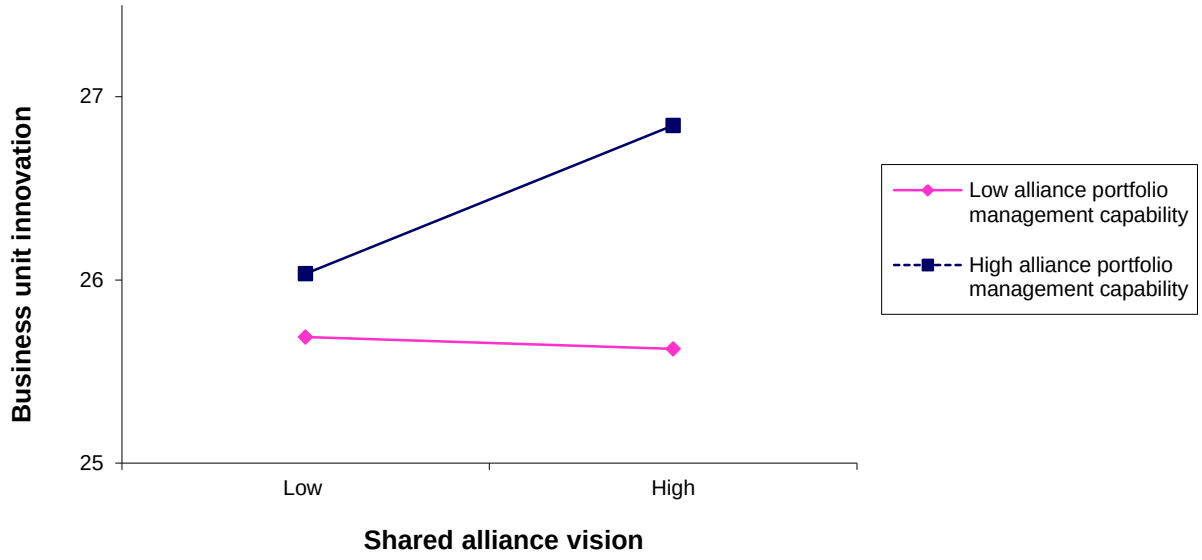
Note: n = 71;

[a] SD = standard deviation

From Table 12 can be concluded that the average number of ties for each of the participating business unit in average was 2-3 ties (2.69) per alliance partner. This may indicate that, on average, the potential of a relation-specific investment on one tie, i.e. relationship, with a specific alliance partner has an average potential economic spill-over effect to one or two other ties within the alliance partner. This relatively low alliance network density indicator may indicate the viability of this explanation.

Regarding having collective goals and shared aspirations as a focal business unit with alliance partners within its alliance portfolio, Hypothesis 3 predicted that having a shared alliance vision would contribute to business unit innovation and is supported by showing a positive and significant coefficient (β = .186, p < 0.10). As shown in Figure xxx, the relationship between a shared alliance vision and innovation is much stronger when alliance portfolio management capability is high (i.e. one s.d. below mean).

Figure 2 The moderating effect of alliance portfolio management on shared alliance vision and business unit innovation



In addition to the direct effects of a business unit's alliance strategy attributes on achieving business unit innovation, this study argued that their impact will be most noticeable when occurring in concert with an alliance portfolio management capability. Hypothesis 4a posited alliance portfolio management capability to positively moderate the relationship between alliance portfolio diversity and business unit innovation. Using a three-way interaction term to examine the moderation effect of the hypothesized curvilinear relationship, the inverted U-shaped relationship was not significant (β = -.206, ns.), hence not supporting Hypothesis 4a. Contrary to the hypothesis, the predicted synthesis of alliance portfolio management capability and relation-specific investments was not significant (β = -.120, ns.) and thus not supporting Hypothesis 4b. The interaction effect between shared alliance vision and alliance portfolio management capability is positively and significantly related to business unit innovation (β = .218, p < 0.10), supporting Hypothesis 4c. The plot of the interaction is presented in Figure 2 Consistent with Hypothesis 4c, Figure 2 shows a positive relationship between shared alliance vision and business unit innovation when alliance portfolio management capability is high. In addition, table xxx presents another significant result, concerning a direct effect of a business unit's alliance portfolio management capability on its level of innovation.

These results present indications that having an alliance portfolio management capability is an important capability to both directly and indirectly positively influence innovation. In order to obtain a better understanding of this capability, post hoc analyses were conducted in terms of possible mediation effects of a business unit's alliance portfolio management capability on the relationship between relation-specific investments and business unit innovation. First a multivariate analysis was performed to check if both relation-specific investments and business unit innovation, as well as alliance portfolio management capability, are correlated. Table 10 shows that all variables are correlated, except relation-specific investments and business unit innovation, and thus suggesting that there is no mediation effect.

An addition multiple linear regression analysis (presented in Table 13) shows, however, how two variables have a significant effect on a business unit's level of alliance portfolio management capability.

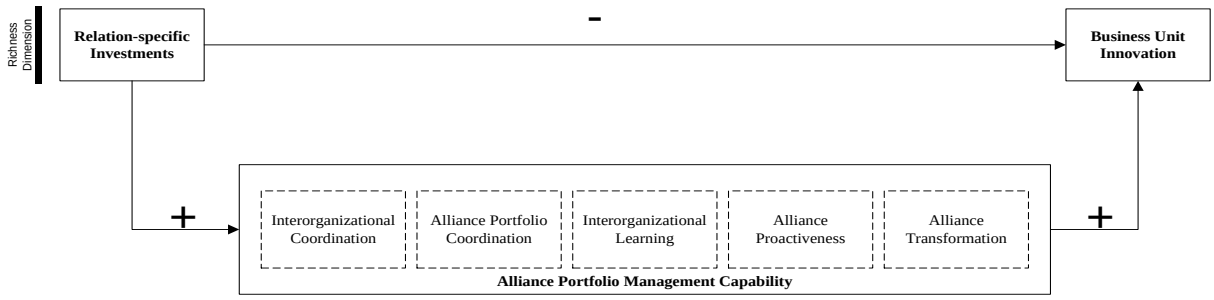
Table 13 Results of regression analyses – Effects on exploratory innovation

	Alliance portfolio management capability
Intercept	3.698
Main effects	
Alliance portfolio diversity (APDiv)	.024
Relation-specific investments (RSInvest)	.330**
Shared alliance vision (SVision)	.119
Control variables	
Environmental dynamism	.023
Slack resources	.040
Company size[a]	-.327*
Company age	.028
R&D intensity	.087
Adjusted R^2	.139
Δ adjusted R^2	.000

Note: *n* = 71. Standardized regression coefficients (betas) are reported
† p<0.10, * p<0.05, ** p<0.01, *** p<0.001 (2-tailed)
[a] Natural logarithm of full-time employees

First, the coefficient for company size is negative and significant (β = -.327, p < 0.05). The other important antecedent of a business unit's alliance portfolio management capability is relation-specific investments, which has a positive and significant coefficient t in the OLS-regression model as presented in table xxx (β = .330, p < 0.01). Considering the fact that relation-specific investments had a negative and significant coefficient on business unit innovation (β = .216, p < 0.10; Table 11), the dynamics between a business unit's relation-specific investments, its alliance portfolio management capability and its level of innovation, show an interesting situation. Specifically, two different routes of relationships have been found in this study. First, relation-specific investments showed a negative and significant coefficient on business unit innovation (disconfirming Hypothesis 2). Second, relation-specific investments showed a positive and significant coefficient on a business unit's alliance portfolio management capability, which in turn showed a positive and significant coefficient on business unit innovation. Figure 3 shows this relationship graphically.

Figure 3: Indirect effect of relation-specific investments on business unit innovation



CONTROL VARIABLES

Model 7 (Table 11) also shows some effects of control variables on business unit innovation. First, the coefficients of the control variables are moderately consistent through all the models, indicating a moderate robustness of the results. Second, in contrast to the expectation, company age has a positive and significant effect on business unit innovation (β = .209, p < 0.10). So, whereas previous studies argue that older business units may have a higher level of rigidness, limit their pursuit to opportunities which are suited to their existing competencies, and develop learning impediments, such as organizational routines, that hamper their ability to innovate (Cohen and Levinthal, 1990; Autio et al., 2000), this study shows that older business units have an advantage over their younger peers. The finding that older business units are better capable of innovating, is in line with the more contradictory results of Sorensen and Stuart (2000). Their study showed that older business units one the hand have to deal with a decline in fit between organizational capabilities and environmental demands, but on the other hand build up a competence to produce new innovations based on a growing experience with a set of organizational routines that leads to gains in efficiency (Sorensen and Stuart, 2000).

Other control variables worth mentioning are slack resources, company size and R&D intensity. Slack resources shows a positive effect on business unit innovation (β = .146) indicating that the availability of additional resources to the business unit, which are not consumed by the necessity of the continued daily operations, may positively influence the search for innovation opportunities (Danneels, 2008, Jiang et al., 2010). This positive effect is in line with Bourgeois' definition of slack resources (1981) as "a cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change".

Company size shows a negative effect on business unit innovation (β = -.159). This effect is in line with previous studies, showing that larger firms may lack the flexibility to explore. The theory of s-curves suggests that this may be mainly due to three reasons: a) perceived incentives: incumbents may perceive smaller incentives to innovate than emerging firms as they derive significant rents from existing products and/or services, b) organizational filters: cognitive structures that enable incumbents to focus efficiently on their current challenges by screening out information unrelated to the incumbent's core business and c) organizational routines: procedures to safeguard an efficient execution of repetitive tasks of manufacturing and distribution of large quantities of the current products or services (Chandy & Tellis, 2000).

R&D intensity shows a positive effect on business unit innovation (β = .172). The effect indicates that business that invest in R&D are better capable of innovating, which is in line with 'absorptive capacity' literature. Business units not only invest in R&D to pursue innovation directly, but also to develop and maintain a broader capability to assimilate and exploit new knowledge to commercial ends (Cohen & Levinthal, 1990). This concept, better known as absorptive capacity (Cohen and Levinthal, 1990), is an important driver for innovation (Lane & Lubatkin, 1998; Tsai, 2001, Jansen et al., 2005; Van Wijk et al., 2008). Despite the effects of these aforementioned control variables, these results cannot be presented or accepted as findings as the effects were not sufficiently significant (p > 0.10).

CHAPTER 5
DISCUSSION AND CONCLUSION

Although research on the influence of interorganizational collaboration on firm performance is burgeoning, this study was motivated by important limitations of extant literature on these type of partnerships. Despite conceptual and qualitative reviews of the proliferating concept of alliance portfolios (Gulati, 1998; Kale & Singh, 2009; Wassmer, 2010; Parmigiani and Rivera-Santos, 2011; Phelps, 2012), there has been little systematically scientific application and therefore empirical evidence of what actually constitutes the management of an alliance portfolio on business unit level, especially in relation to innovation performance. This study addressed these limitations by investigating the influence of alliance portfolio diversity, relation-specific investments, and shared alliance vision on the degree of business unit innovation. In addition it examined the influence of an alliance portfolio management capability on these relationships. The results of this study are summarized in Table 14.

Table 14 Hypotheses and results

Hypothesis	*Independent variable*	*Dependent variable*	*Theory*	*Observation*	*Result*
1.	Alliance portfolio diversity	Business unit innovation	∩	∩	Accepted
2.	Relation-specific investments	Business unit innovation	+	-	Rejected
3.	Shared alliance vision	Business unit innovation	+	+	Accepted
4a	Alliance portfolio management capability and alliance portfolio diversity	Business unit innovation	+	ns.	Rejected
4b	Alliance portfolio management capability and relation-specific investments	Business unit innovation	+	ns.	Rejected
4c	Alliance portfolio management capability and shared alliance vision	Business unit innovation	+	+	Accepted

This study drew on alliance literature from a resource-based view of the firm, social network theory and organizational learning perspective to predict that a business unit's alliance portfolio diversity has an inverted U-shaped relationship with its level of innovation. Despite that an increased level of alliance portfolio diversity increases the number, variety, and novelty of potential resource combinations, excessive levels of alliance portfolio diversity impedes a business unit's ability to recognize, assimilate and utilize knowledge in its alliance portfolio. The present study supports the above argument by empirically showing the predicted curvilinear relationship between a business unit's alliance portfolio diversity and its level of innovation.

Specifically, this study's results suggest that having access to alliance partners' diverse resources and knowledge has positive effects on business unit innovation in terms of its underlying exploratory and exploitative innovation processes. Access to a diverse set of alliance partners increases the likelihood of having access to diverse knowledge domains that are new to the focal business unit, but relate to its pre-existing knowledge. Such access enables a focal business unit to develop new knowledge associations, linkages and combinations which are fundamental requirements for innovation initiatives (Schumpeter, 1939; Vanhaverbeke et al, 2009). For a business unit's exploratory innovation it is required to search for new alternatives and diversion from the unit's pre-existing knowledge, e.g. in problem-solving processes. The variety in resources, for instance knowledge, in a diverse alliance portfolio offers a business unit the possibility to increase the exploratory content of new knowledge combinations (Phelps, 2010).

An important question then arises: "*what is the optimum level of a business unit's alliance portfolio diversity to maximize its level of innovation?*" In other words, where lies the inflection point upon which a business unit receives diminishing returns from the diversity of its alliance portfolio? Based on the multiple linear regression prediction formula, the level of alliance portfolio diversity can be calculated based on its inflection point. This is the point where the gradient of the exponential formula is '0'. The value of alliance portfolio diversity is 0.78. This value, however, needs to interpreted with care. Following the absorptive capacity literature. Absorptive capacity refers to one of a business unit's fundamental learning processes (Lane et al., 2006) and is considered as a business unit's ability to value, assimilate, and apply knowledge (Cohen & Levinthal, 1990; Kim, 1998), which can be developed by organizational learning through prior experiences. This means that the more experience a focal business unit has, the better its ability to recognize, acquire and transform valuable information, thereby lowering the Type II costs of alliance diversity (Parkhe, 1991). In other words, business unit's with more organizational learning through prior experience, have a higher level of absorptive capacity, and may be better in handling higher levels of diverse knowledge sources to recognize, acquire, and transform valuable information. Thus, the point of diminishing returns for the positive effects of an alliance portfolio level of diversity on business unit innovation, varies among business units (Parkhe, 1991; Lyles & Salk, 1996; Lane & Lubatkin, 1998; Lane et al., 2006).

This study expected that a higher level of relation-specific investments by the focal business unit would initially contribute to its level of innovation as the more dedicated resources and assets a business unit invests in specific alliance partners, the more likely its accumulation of partner-specific knowledge (von Hippel, 1994). From an alliance portfolio perspective, this study argued that some focal business unit's relation-specific investments could function as stepping stone for capturing potential positive economic spill-overs (Kang et al., 2009). The hypothesized positive relationship was developed on the basis of an integration of the resource-based view of the firm, the social network theory, and the organizational learning theory. The present study failed to find this positive relationship and rather showed a significant linear, negative relationship between a business unit's relation-specific investments and business unit innovation.

There are several possible explanations for this contradictory finding, which are neither individually nor collectively an exhaustive explanation. First, advancing on the arguments being used to develop this study's hypothesis, it could be possible that the expected economic spill-over effects of relation-specific investments on other ties, both with the same as well as with different alliance partners, was not found in the alliance portfolios of the business units present in our sample.

Second, from a resource-based view of the firm perspective, a business unit is a bundle of specialized resources and focuses on rents stemming from owners of scarce resources that are firm specific (Teece et al., 1997). Whereas relation-specific investments do contribute to a sustained competitive advantage due to its increased value, rareness, imitability, and non-substitutability (Barney, 1991) and thus result in relational rents on a dyadic level (e.g. Anderson & Weitz, 1992; Rokkan et al., 2003; Kang et al., 2009), it further specializes already scarce resources by attaching them to specific alliance partners. This makes the focal business unit more dependent on its specific alliances partner. Although this may be propels a focal business unit to the performance frontier for a specific alliance partner based on this relation-specific investments, it does however result in a trade-off with its other alliance partners (Dyer and

Hatch, 2006). A business unit may get caught in its own relation-specific performance frontier due to resources that have become difficult to transfer.

A third explanation emerges from transaction cost economics (TCE) theory based on the argument that managers should not make relation-specific investments unless sufficient economic safeguards have been implemented. Without strategic countermeasures by the focal business unit to manage the transaction partners' financial payoffs via economic safeguards, relation-specific investments increase transactional hazards and the business unit's dependency on its transaction partners, which may yield negative effects on its level of innovation (Williamson, 1996). This is in line with Jap & Ganesan (2000) who found that a retailer's one-sided specific-investments are negatively related to the commitment of its supplier, as it exposes itself to possible exploitation by the partner.

This study predicted a positive relationship of a focal business unit's degree of having a shared alliance vision with its alliance partners, based on the argument that a shared alliance vision generates alignment in goals and values on both dyadic and portfolio level (Dougherty, 1992; Gupta & Govindarajan. 2000; Inkpen & Tsang, 2005; Subramaniam & Youndt, 2005; Van Wijk et al, 2011).

This study's finding that this prediction is indeed positive and significant, indicates that having a common reciprocal understanding of each actor's objectives and goals, increases the value of the contributions by the alliance partner's resources (Gulati et al., 2011). This results follows Hoffman's (2007) argument that what really matters is not the success or failure of each dyadic alliance within a business unit's alliance portfolio, but that the business unit will reach its strategic goals and objectives by means of its alliances. In order to achieve this, business units need to place the structure and strategic orientation of its complete alliance portfolio at the centre of its attention (Hoffman, 2007). Accordingly, it is then up to the business unit to translate and fragment its business and alliance portfolio strategies into dyadic alliance strategies. Hence, by generating alignment of goals and values between the focal business unit in the one hand, and it's alliance partners on the other, it indirectly increases the value of the available resources within its network.

Where the aforementioned argument by Hoffman (2007) is more or less focused on the focal business units influence on the value of resources available to the business unit, Gulati et al. (2011) provides another contributing perspective on having a shared alliance vision. In terms of having a reciprocal understanding of the actors' objectives and goals, richness may entail a mutual discovery that goes beyond solely scanning for value added collaborations. It encompasses the ability by both actors to identify potential value-creation opportunities based on the complementarities between both actors and their resources (Gulati et al., 2011). Thus, a business unit that finds an ideal partner is one thing, enabling alliance partners to seek for new value added collaborations is another.

Most of the interaction effects were insignificant. The interaction effect between shared alliance vision and alliance portfolio management capability, however, was positive and significant in relation to business unit innovation. This indicates that the higher a business units capability to coordinate both dyadic alliances and its alliance portfolio, learn from its alliance partners, spot opportunities and transform its initial collaborations to its changing environment, the higher the effect of having a shared alliance vision on the unit's level of innovation. This finding supports extant literature in arguing that

orchestration is a crucial capability associated with richness (Gulati et al., 2011) as it entails a business unit's ability to integrate the available resources within an alliance portfolio with both each actor's resources and with its own resources. By more effective and efficient resource combinations a business unit is able to reach higher synergies, and thus increases the value of its network resource endowments even more. In other words, a business unit can achieve higher levels of innovation by developing an alliance portfolio management capability so it can leverage the positive effect of having a shared alliance vision with alliance partners within its alliance portfolio.

Another finding of this study is the direct effect of a business unit's alliance portfolio management capability on its level of innovation. The finding that alliance portfolio management capability is positively related to a business unit's level of innovation, is an important factor which cannot be left unnoticed. This is in line with Reus and Lamont's findings concerning cultural differences. They argue that, while cultural differences taxes integration capabilities, it elevates learning opportunities that can only be utilized with strong integration capability. This study found a similar effect concerning a business unit's alliance portfolio management capability.

Alliance portfolio management capability is considered to be a dynamic capability, which consist of "the capacity to purposefully create, extend, or modify a business unit's resource base, augmented to include the resources of its alliance partners" (Helfat, 2007). This study draws on a sample consisting of 71 cross-industry business units, mostly residing and operating in the creative industries (e.g. consultancy and marketing firms) and high tech, which are both considered to be industries with high levels of other types of collaborations, such as customer interactions, training & certification programs, seminars, and industry exhibitions. Thus, having the capability as a business unit to value, assimilate, and transform external knowledge, contributes to a higher level of business unit innovation, regardless whether the external source is a portfolio of alliances, or non-alliance relationships. This is an important finding, as it underlines and emphasizes the important role of an alliance portfolio management capability, despite this study's non-significant results on most of the interaction effects, to enable a business unit to acquire, assimilate, and transform knowledge in order to exploit it through its level of business unit innovation.

MANAGERIAL IMPLICATIONS

Specifically, managers planning to increase their business unit's competitive advantage through achieving higher levels of innovation, should start with exploring the limits of their business unit's ability to manage alliance portfolio diversity and developing an alliance portfolio management capability. As the ability to coordinate, learn from, scan and transform both dyadic and multiple alliances is further developed, business unit innovation can directly be increased as the business unit becomes more capable of managing external sources of knowledge, potentially including non-alliance knowledge sources. In addition, such a dynamic capability enables business units to leverage the positive effects of having shared goals and objectives with their alliance partners.

Overall, this study's findings clearly show that innovating business units' alliance portfolio strategy in terms of reach, richness, and receptivity mechanism factors can have a significant effect on their

innovativeness. Based on the fact that factors such as the diversity of a business unit's alliance portfolio, the level of relation-specific investments, having a shared alliance vision and even the development of an alliance portfolio management capability mostly lie in the hands of the focal business unit and sphere of influence, this study's results show that business units can increase their innovativeness by defining and executing an alliance portfolio strategy based on reach, richness and receptivity mechanism factors. Accordingly, these results support the value of an action-oriented strategy to the development and configuration of alliance portfolios. In combination with the dynamic capability oriented approach in terms of alliance portfolio management capability, this study provides a more ambidextrous perspective on alliance portfolios, interorganizational learning and business unit innovation in contrast to the more traditional and separated exploratory-exploitative innovation approaches.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Although this study advances new insights in the management of a business unit's alliance portfolio and its underlying mechanisms, it is not without limitations. which may provide potential directions for future research.

First, regarding the scope of this study's conceptual framework, an important limitation emerges which addresses the need for business units to allocate sufficient levels of internal resources to create value, i.e. innovate. For example, business units often allocate management resources and designate so-called dedicated functions (Kale et al., 2002; Kale & Singh, 2007). In addition, developing interorganizational relationships by a business unit entails mutual understanding between a business unit and its alliance partners. Therefore, a successful alliance portfolio management capability depends not only on what the alliance portfolio can offer to the business unit, but vice versa, as well on what the business unit can offer to its alliance portfolio. Thus, future research may examine antecedents of alliance portfolio management capability in relation to a business unit's alliance portfolio success. In addition, while continuing on this argument and given this the focus on business unit innovation, this study investigated the synergetic effects among multiple alliance partners. To obtain an even better understanding of the interdependencies among alliance partners within a business unit's alliance portfolio, scholars may examine the competing effect among alliance partners. As mentioned before, the limited alliance management resources allocated by the focal business unit, makes multiple alliances and alliance partners compete for attention and support (Parise & Casher, 2003; Cui & O'Connor, 2012). Futher, excluded from the scope of this study's conceptual framework is that business units may focus or center on a certain typologies of alliance portfolio strategies, that inherently require different types of alliances (Rothaermel & Deeds, 2004; Hoffman, 2007). For example, if a business unit's deliberate attempt is to actively shape its environment according to its strategic interests, then its objective requires a 'co(re)-exploration alliance', whereas a business unit that wants to stabilize its environment and cooperates to refine and leverage established competitive advantages, requires '(co-)exploitation alliances (Hoffman, 2007; Parmigiani & Rivera-Santos, 2011). Although this study has clear motivations which support the underlying objective of this study, it controlled for environmental dynamism, and it used a temporal view (i.e. a period of three years) in which it is likely that business units needed a combination of both strategies in combination support by extant literature on so-called *hybrid strategies*

(Hoffman, 2007), it does however show an important additional limitation. Therefore, future research may be interested in examining the influence and different conditions of a co-exploratory, a co-exploitative or the adapting strategy between them (Hoffman, 2005; 2007). The same argument applies to this study's conceptualization of business unit level, in terms of a combination of exploratory and exploitative innovation (Jansen et al., 2006). Future research may be focused on the influence of this study's reach, richness, and receptivity mechanism factors on these underlying and generally considered conflicting innovation processes (Levinthal & March, 1993; Jansen et al., 2006).

Second, concerning sample and sample size, the cross-industry sample used in this study largely consisted of business units operating in the creative industry (e.g. consultancy and marketing firms) and high tech (e.g. IT system integrators, electronic hardware, and software companies). As most of the other industries were represented by a few business units, we should be careful with drawing statistical inferences that are valid and reliable for a other whole industries based on this study's low number of informants. Future research is mandatory to assess the findings based on a broader sample in order to increase the generalizability and explanatory power of the results. In addition, the same conclusion can be drawn based on this study's two independent samples, i.e. alliance managers and general business unit managers. Alliance and business unit managers were identified by means of a free subscription to the largest online business-oriented social network service used for professional networking, showing limited results, i.e. a non-exclusive list of business contacts. Thus, the used sample for this study, inherently, does not have a full non-probabilistic nature and was quite small (n = 71). Future research with more resources and budget should focus on a more exclusive list of alliance managers and/or business unit managers, for example by purchasing a professional subscription to the aforementioned online business-oriented social network service in order to achieve a more probabilistic and larger sample to increase the generalizability and explanatory power of the results.

Third, in light of previous research that shows high correlations between subjective and objective measures of innovation (e.g. Jansen et al., 2012), this study used a survey-based approach. An important limitation emerges as such data is perceptual in nature and has received some criticism for using subjective measures to assess a business unit's performance, e.g. in terms of business unit innovation and alliance portfolio management capability. A paired-samples t-test and a t-test for differences were performed to control for possible biased results, showed some concern that primary informants (i.e. business unit managers) may be positively biased about their business unit's level of exploratory innovation. Therefore, future studies should consider using more integrative and sophisticated measures for exploratory innovation that combine both objective and subjective measurements to exclude possible biases in performance measures (e.g. Jansen et al., 2012). Finally, this study used relation-specific investments to measure "the level of investment in the relationship by the business unit and the degree to which those investments are not redeployable to other relationships". This definition is a unilateral approach in contrast to the bi-directional potential of these relation-specific investments (Anderson & Weitz, 1992). Scholars in future research may be interested in examining the bilateral effects of relation-specific investments on a business unit's level of innovation.

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APPENDIX I: MEASUREMENT SCALES

Table 15 Measurement scales

		α	Mean	SD
Relation-specific investment (Anderson & Weitz, 1992)		.735		
RSInvest1	If we switch to other alliance partners, we would lose a lot of the investments we've made in our current alliances		5.39	1.368
RSInvest2	It will be difficult for us to recoup investments made in our current alliances, if we switch to other alliance partners		5.10	1.197
RSInvest3	If we decide to stop representing our alliance partners, we will have a lot of trouble redeploying our resources presently serving our alliances		4.01	1.728
RSInvest4	We have made substantial investments in personnel dedicated to our alliance partners		4.94	1.557
RSInvest5	We have made an additional effort to align ourselves with our alliance partners in the customer's mind		5.34	1.133
RSInvest6	We have invested a great deal in building up our alliance partner's businesses		4.92	1.371
RSInvest7	We have made substantial investment to create reporting systems that are similar to our alliance partners		3.23	1.700
Shared alliance vision (Burgers et al., 2009, based on Sinkula, 1997)		.613		
SVision1	There is a commonality of purpose in all of our individual alliances between us and our alliance partner(s)		5.54	0.939
SVision2	There is total agreement in all of our individual alliances between us and our alliance partner(s)		4.70	1.224
SVision3	Our alliance partner(s) in all of our individual alliances are committed to the goals of our business unit		4.62	1.087
SVision4	Our alliance partner(s) in all of our individual are enthusiastic about our business unit's goals and mission		5.24	1.087
SVision5	Our business unit shares its ambitions and its vision with our alliance partner(s) in all of our alliances		5.59	1.050
Alliance portfolio management capability (Schilke & Goerzen, 2010)				
Interorganizational coordination		.733		
APIC1	Our business unit´s alliance activities with our alliance partners are well coordinated		5.25	1.052
APIC2	We ensure that our work is synchronized with the work of our alliance partners		5.08	1.092
APIC3	There is a great deal of interaction with our alliance partners		5.58	1.037
APPC1	Our business unit ensures an appropriate coordination among the alliance activities of our different alliance partners		5.46	0.842
Alliance portfolio coordination		.767		
APPC2	We determine areas of synergy among our alliance partners [a]		5.68	0.968
APPC3	We ensure that interdependencies between our alliance partners are identified		5.38	0.781
APPC4	We determine if there are overlaps between our different alliance partners		5.48	1.067
Interorganizational learning		.785		
APIL1	We have the capability to learn from our alliance partners [a]		5.73	0.894
APIL2	We have the managerial competence to absorb new knowledge from our alliance partners		5.49	0.908
APIL3	We have adequate routines to analyze the information obtained from our alliance partners		4.56	1.328
APIL4	We can successfully integrate our existing knowledge with new information acquired from our alliance partners		5.11	1.063
Alliance proactiveness		.705		
APAP1	We strive to be ahead of our competition by entering into alliance opportunities		6.01	1.007
APAP2	We often take the initiative in approaching firms with alliance proposals		5.18	1.302
APAP3	Compared to our competitors, we are far more proactive and responsive in finding and ´going after´ partnerships		4.62	1.258
APAP4	We actively monitor our environment to identify partnership opportunities		5.30	1.061
Alliance Transformation		.797		
APAT1	We are willing to put aside contractual terms to improve the outcome of our alliances		4.13	1.912
APAT2	When an unexpected situation arises, we would rather modify an alliance agreement than insist on the original terms		4.87	1.756
APAT3	Flexibility, in response to a request for change, is characteristic of our alliance management process		5.10	1.657

Table 15 Measurement scales (continued)

		α	Mean	SD
Business unit innovation				
Exploratory innovation (Jansen et al., 2006)		.787		
Explr1	Our business unit accepts demands that go beyond existing products and services		5.20	1.203
Explr2	Our business unit invents new products and services		4.90	1.523
Explr3	Our business unit experiments with new products and services in its local market		5.14	1.376
Explr4	We commercialize products and services that are completely new to our business unit		4.66	1.463
Explr5	Our business unit frequently utilizes new opportunities in new markets		4.63	1.386
Explr6	Our business unit regularly uses new distribution channels [a]		3.42	1.480
Exploitative innovation (Jansen et al., 2006)		.872		
Expl1	Our business unit frequently refines the provision of existing products and services		5.01	1.115
Expl2	Our business unit regularly implements small adaptions to existing products and services		5.31	1.294
Expl3	Our business unit introduces improved, but existing products and services for its local market		5.08	1.471
Expl4	Our business unit improves its provision's efficiency of products and services		4.99	1.325
Expl5	Our business unit increases economies of scale in existing markets [a]		4.70	1.428
Expl6	Our business unit expands services for existing clients [a]		5.46	1.08
Environmental dynamism (Dill, 1958; Volberda & Van Bruggen, 1997; Jansen et al, 2006)		.789		
EnvD1	Environmental changes in our local market are intense		5.27	1.276
EnvD2	Our clients regularly ask for new products and services		5.30	1.126
EnvD3	In our local market, changes are taking place continuously		5.65	1.001
EnvD4	In a year, nothing has changed in our market [R]		6.07	0.946
EnvD5	In our market, the volumes of products and services to be delivered change fast and often [a]		4.42	1.317
Slack resources (Danneels, 2008)		.725		
SRes1	All available resources are locked up in current projects [R]		3.06	1.501
SRes2	My firm has a reasonable amount of resources in reserve, available to the business unit		3.25	1.471
SRes3	We have ample discretionary financial resources, available to the business unit [a]		3.86	1.407
SRes4	We can always find the 'manpower' to work on special project [a]		4.52	1.575

[R] = reversed item
[a] = item deleted