UNIVERSITY OF CATANIA

PHD IN ECONOMICS AND MANAGEMENT

Strategic alliances: value creation and appropriation mechanisms, configuration, and portfolio evolution

SUPERVISOR
Giovanni Battista Dagnino

PHD THESIS
Giulio Ferrigno

Academic Year 2016-2017

CONTENTS

INTRODUCTION

CHAPTER I

VALUE CREATION AND VALUE APPROPRIATION IN STRATEGIC ALLIANCES: IDENTIFYING AND RESOLVING THE TENSIONS

CHAPTER II

UNDERSTANDING R&D ALLIANCE CONFIGURATION USING FUZZY SET ANALYSIS

CHAPTER III

EXPLORING ALLIANCE PORTFOLIO CHARACTERISTICS: EVIDENCE FROM ERICSSON CASE STUDY

INTRODUCTION

1. PREMISE

The engagement of firms in a wide array of strategic alliances has become a ubiquitous phenomenon in today's business landscape (Contractor & Lorange, 2002; Gulati, 1998; Wassmer, 2010). Over the last decade, a remarkable increase in alliances has characterized several key technology industries such as computer hard- and software, telecommunications, electronics, pharmaceuticals, and air transportation, among the others. In fact, a survey conducted by Vantage Partners shows that nearly two thirds of the 230 companies interviewed have more alliances than six years ago (Strategic Alliance Magazine, 2015).

Given the evidence above, although foundational works on the definition of alliances and their typology appeared in the late 1980s (Ghemawat, Porter, & Rowlinson, 1986; Porter & Fuller, 1986), research on alliances has not reached the status of maturity (Hoffman, 2007). Additionally, while a myriad of alliance studies have proliferated in the strategic management field, there are several lines of inquiry, such as management, configuration, and evolution of alliances, that need to be carefully examined (Wassmer, 2010).

The present dissertation aims to tackle a few key aspects of strategic alliances. More specifically, it aims to be helpful in unpacking three key aspects of strategic alliances; i.e., value creation and value appropriation mechanisms, alliance configuration, and the evolution of alliance portfolios. In the section that follows, we provide the reasons justifying the decision to study strategic alliances.

2. RESEARCH MOTIVATIONS

As earlier mentioned, the aim of this dissertation is to study three key aspects of strategic alliances; i.e., value creation and value appropriation mechanisms, alliance configuration, and the evolution of alliance portfolios. The choice to focus on strategic alliances can be motivated because of three main reasons.

First, strategic alliances are economically relevant in a number of industries. Since over 30% of firms' annual research expenditures tie up in alliance relationships (Ernst, 2004), strategic alliances have become widespread in technology-intensive industries (Mowery, Oxley, & Silverman, 1996).

Second, strategic alliances are a central part of most firms' competitive and growth strategies (Gomes-Casseres, 1998; Kale & Singh, 2009). In fact, prior research shows that these collaborative agreements account for almost 26% of companies' revenues in 2007–08 (Kale, Singh, & Bell, 2009).

Last but not least, strategic alliances are an essential chunk of firms' strategies involved in these collaborative relationships (Hoffman 2007). Accordingly, their relevance imply strategic considerations of the various partners involved (Dagnino & Ferrigno, 2015; Lazzarini, 2007), and the synergies and structural ties that stem from the presence of multiple collaborative relationships per time (Gulati, 1998; Jiang et al 2010). Given the relevance above, recent studies on alliances advocate the need for additional investigation on this line of inquiry (Wassmer, 2010).

3. OBJECTIVES OF THE RESEARCH

The object of this dissertation is to provide a better understanding of strategic alliances with a specific focus on value creation and value appropriation mechanisms, alliance configuration, and the evolution of alliance portfolios. In more detail, the purpose of the dissertation is threefold:

(I) to summarize the existing alliance research around value creation and value appropriation processes, which are the two distinct, dynamic and interrelated processes underlying alliance partners' performance. In doing so, it aims to shed lights on the theoretical underpinnings that explain the key value creation and value appropriation mechanisms that lie beneath the two processes. In addition, it aims to clarify the interdependence between the two processes, thereby advancing a contribution that conceptually tackles the need to treat value creation and value appropriation jointly (e.g., Di Minin and Faems, 2013; Lepak et al., 2007);

(II) to rejoin the challenge to explore the relationship between R&D alliances and alliance partners' innovation performance, by relying on the theoretical lens of the knowledge-based view of the alliances (Grant & Baden-Fuller, 2004; Vasudeva & Anand, 2011). Specifically, by adopting this theoretical lens we challenge the issue to identify the major factors that lead alliance partners to achieve high innovation performance by means of R&D alliances. Additionally, a challenge of the research is to revamp a key research stream in the alliance literature (i.e., alliance configuration) by examining the combinatory effects that inevitably occur among these factors;

(III) to explore the features that epitomize alliance strategy with regards to the management of alliance portfolio. In particular, the dissertation aims to undertake an investigation

of the existing body of research on alliance portfolio management in order to elucidate its main features. In addition, the dissertation is aiming to complement extant research with an investigation of these features in a case study (Ericsson) in order to provide insights on alliance strategy, from the managerial point of view (Hoffman, 2005).

4. STRUCTURE OF THE DISSERTATION

As previously illustrated, this dissertation aims to study three key aspects of strategic alliances; i.e., value creation and value appropriation mechanisms, alliance configuration, and the evolution of alliance portfolios. The investigation of each of these three aspects will be tackled in a specific chapter of the study. As result, the structure of this dissertation reflects the three key chapters it contains. More specifically, the structure of the dissertation is organized as follows:

- Chapter I: "Value Creation and Value Appropriation in Strategic Alliances: Identifying and Resolving the Tensions";
- Chapter II: "Understanding R&D Alliance Configuration Using Fuzzy Set Analysis";
- Chapter III: "Exploring Alliance Portfolio Characteristics: Evidence from Ericsson Case Study".

Although each chapter of the dissertation is basically aimed to supply the reader a complete and exhaustive essay that can be read separately from the others because of its specific research question, methodology applied, and contributions to the strategic management field, the three chapters jointly allow this Dissertation to investigate strategic alliances in three fashion ways. First, by relying on the three chapters this Dissertation tries to explore

strategic alliances from *different but complementary levels of analysis*. In chapter one it investigates strategic alliances at firm level. In chapter two it analyzes strategic alliances at alliance level (e.g., R&D alliances). Finally, in chapter three it looks at strategic alliances from a portfolio perspective (alliance portfolio level).

Second, by drawing on the three chapters this Dissertation tries to take advantage from using three *different but complementary methodological approaches*. In more detail, in chapter one I use a theoretical approach to identify the value creation and value appropriation mechanisms in strategic alliance literature. In chapter two I apply a quali-quantitative approach by performing a Qualitative Comparative Analysis to explore how firms configure their R&D alliances to achieve high innovation performance. Finally, in chapter three I use a qualitative approach to explore how Ericsson's portfolio evolved over time.

Last but not least, basing on the three chapters this Dissertation tries to examine strategic alliances from a *theoretical point of view*. More specifically, in chapter one it offers a complete picture of the theoretical lenses used in strategic alliances, while in chapter two it extends a specific theoretical lens, which is the KBV of the alliances.

In the following sections, we briefly summarize the key elements of each of the chapters of the dissertation.

4.1. Chapter I: Value Creation and Value Appropriation in Strategic Alliances: Identifying and Resolving the Tensions

Chapter one aims to explore the interdependence between value creation and value appropriation processes in current strategic alliance literature. More specifically, this

chapter offers a systematic review of the literature on value creation and value appropriation mechanisms so as to identify the rationale under which specific value creation mechanisms and specific value appropriation mechanisms are (more or less) effective.

Drawing on the Web of Science database, we collect an initial sample of 110 articles published in leading management journals between May 1988 and July 2017. Then, by analyzing whether these articles pertain to the understanding to value creation and/or value appropriation mechanisms in strategic alliances, we extract a final sample of 50 articles, which will be carefully scrutinized under various aspects, including study type, research topic and question, theoretical underpinnings, levels of analysis, research design, variables, empirical setting, findings, and key contributions.

Based a such in-depth analysis of the articles, we will be able to identify the most studied value creation and value appropriation mechanisms in alliance literature as well as their independences. In addition, this analysis will lead us to delve into the theoretical perspectives used so far to provide a theoretically-grounded discussion of the rationale of value creation mechanisms, value appropriation mechanisms, and interdependences among them.

On this ground, the chapter presents a discussion of the theoretical perspectives used to explain the mechanisms underlying the interdependence between value creation and value appropriation processes. Additionally, by identifying key research questions and opportunities, the chapter aims to highlight existing gaps in the extant literature and outlines a research agenda that stimulates future research concerning the interdependence

between value creation and value appropriation processes in strategic alliances. Table 1 offers an overview of the chapter one.

Table 1. Overview of chapter one

Purpose	To offer a systematic review of the literature on value creation and value appropriation processes in strategic alliances and identify the mechanisms, rationales and theoretical underpinnings explaining the interdependence between value creation and value appropriation
Research question	What are the value creation and value appropriation mechanisms underlying value creation and value appropriation processes? What are the interdependences among them?
Method	Review of the literature
Methodological details	Conceptual map, theoretical review, research agenda
Sample	110 articles (net 50 articles) published between 1988 and 2017 in major leading journals
Findings	The chapter provides a conceptual map that unpacks the respective enabling mechanisms of value creation and appropriation and explicates the interdependence between these two outcomes. As it summarizes extant research on value creation and value appropriation in strategic alliances, this chapter is helpful to advances new directions for future research.
Research Limitations	Not present because it is a review of the literature
Main contributions/ Originality	- It identifies a theoretically robust foundation from which to examine the conditions under which specific value creation mechanisms and specific value appropriation mechanisms are (more or less) effective; - It contributes to identifying and resolving the tensions that result from the interdependence between value creation and value appropriation; - It proposes a menu of directions for future studies that will be of interest to scholars and students who wish to approach this fertile, promising, and relatively underexplored area of study.

4.2. Chapter II: Understanding R&D Alliance Configuration Using Fuzzy Set Analysis

Chapter two aims to develop a more nuanced understanding of R&D alliance configurations and their implications for firm innovation performance. Specifically, in this chapter we investigate the combinatory effects of the drivers behind high innovation performance of R&D alliances.

To tackle this question, we explore the existing alliance literature and adopt the knowledge-based view of alliances (Grant & Baden-Fuller, 2004; Vasudeva & Anand, 2011) to identify the drivers of R&D alliances alliance configuration that affect alliance partners' innovation performance.

Next, using a method grounded in fuzzy set Qualitative Comparative Analysis (fsQCA) we examine which R&D alliance configurations provide sufficient conditions for firms to achieve high innovation performance. More specifically, this chapter applies a fuzzy set analysis to 33 R&D alliances formed in the year 2010 and their impact on the innovation performance of 75 telecom firms worldwide. We collect alliance data by using the Factiva database and firms' innovation performance by utilizing the QPAT and OECD World Bank databases (Baglieri, Cesaroni and Orsi, 2014).

The findings of the fuzzy set analysis suggest that three alternative R&D alliance configurations offer sufficient conditions to achieve high innovation performance: 1) an alliance configuration with high partner age; 2) an alliance configuration with extensive partner experience and no strategic orientation; and 3) an alliance configuration with extensive partner experience and a horizontal structure.

Given the results of the fuzzy set analysis, the chapter aims to provide a theoretical discussion of these findings and their implications for the knowledge-based view of alliances. In doing so, we develop three propositions that, taken together, provide arguments that support the advancement of knowledge-based view of alliances on R&D alliances. Additionally, we furnish an important managerial implication for alliance managers and entrepreneurs willing to realize high innovation performance by means of R&D alliances. Accordingly, this study shows that these actors may achieve high

innovation performance in three alternative ways: 1) by involving old partners in R&D alliances; 2) by engaging partners with experience in doing R&D alliances that are not strategic; and 3) by involving competitors with experience in doing R&D alliances. Table 2 provides an overview of the chapter two.

Table 2. Overview of chapter two

Purpose	Exploring the combinatory effects of the drivers behind high innovation performance of R&D alliances
Research question	What R&D alliance configurations lead firms involved in R&D alliances to achieve high innovation performance?
Method	Qualitative Comparative Analysis
Methodological details	fsQCA; fuzzy set-membership; sufficiency test; Boolean expressions
Sample	33 R&D alliances cases of the telecom industry in year 2010
Findings	The chapter identifies three alternative R&D alliance configurations leading firms involved in R&D alliances to achieve high innovation performance: 1) an alliance configuration with high partner age; 2) an alliance configuration with extensive partner experience and no strategic orientation; 3) an alliance configuration with extensive partner experience and a horizontal structure.
Research Limitations	- It does not assess the relevance of other partner attributes, such as partner diversity; - It assumes that high innovation performance is fully explained by the number of patents that alliance partners bring to the market; - It explores the alliance configurations with explicit reference to a limited period of time; - It provides insights that are relevant for a specific context: R&D alliances in the world's telecom industry.
Main contributions/ Originality	- It offers a better awareness of the individual factors underlying the innovation performance of firms involved in R&D alliances. Specifically, we identify two groups of drivers: (a) partner attributes (size, age, and experience) and (b) alliance characteristics (strategic orientation, and structure); - It suggests that firms involved in R&D alliances can take three specific approaches to achieve high innovation performance; - It provides evidence that the implementation of fuzzy set analysis is helpful for detecting the combinatory effects of the key configuration factors in the R&D alliances context; - It conveys an important implication for alliance managers handling R&D alliances and are willing to achieve high innovation performance.

4.3. Chapter III: Exploring Alliance Portfolio Characteristics: Evidence From Ericsson Case Study

Chapter three aims to expand our comprehension of the alliance portfolio management phenomenon by conducting a longitudinal qualitative study that elucidates how firms manage their alliance portfolios over time. Specifically, we ask: what are the alliance portfolio characteristics that epitomize alliance portfolio management? And, how can firms manage such alliance portfolio characteristics over time?

To address this research question, the chapter delves into alliance portfolio management literature to unveil the main features epitomizing the management of alliance portfolios. In doing so, the chapter also shows that these alliance portfolio characteristics are critical for alliance portfolio management as these three features of alliance portfolio present both benefits and challenges to the focal firm.

Then, the chapter explores the importance of these alliance portfolio characteristics by conducting a representative alliance portfolio case study in the telecom industry; the Ericsson alliance portfolio (i.e., Ericsson alliance portfolio, the portfolio of a world-leading provider of communications technology and services). In particular, we collect data from multiple sources to examine how this firm, which plays a key role in the telecom industry (Di Minin and Bianchi, 2011), has managed its alliance portfolio characteristics over a period of two-decade (1994 – 2014). In doing so, we split the 21 years period under scrutiny into three temporal phases (i.e. phase I, 1994-2000; phase II, 2001-2007; and phase III, 2008-2014) in order to facilitate the comparison among the relevance of Ericsson's alliance portfolio characteristics over time. The results of the chapter will enable us to show that Ericsson has changed its alliance portfolio strategy over time by accruing the benefits and

learning from the challenges that stem from high levels of alliance portfolio diversity (phase I) as well as high levels of alliance portfolio size (phase II). In doing so, Ericsson has progressively changed its alliance portfolio strategy by shifting from an alliance portfolio diversity strategy (phase I) to an alliance portfolio size strategy (phase II), to alliance portfolio internationalization strategy (phase III). Table 3 provides an overview of the chapter three.

Table 3. Overview of chapter three

Purpose	To detect how firms handle their alliance portfolios over time
Research question	What are the alliance portfolio characteristics that epitomize alliance portfolio management? How can firms manage such alliance portfolio characteristics over time?
Method	Longitudinal Qualitative Study
Methodological details	Theoretical sampling justification, triangulation of facts from multiple sources, and temporal bracketing strategy
Sample	Ericsson's alliance portfolio over a twenty years period from 1994 to 2014
Findings	By decomposing Ericsson's alliance portfolio into three temporal phases: phase I (from 1994 to 2000); phase II (from 2001 to 2007); and, phase III (from 2008 to 2014), this chapter juxtaposes the relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization over time. The results of the analysis leads to highlight two important aspects. First, alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization present different levels of relevance across the three temporal phases. Second, the different levels of relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization across the three temporal phases are the result of Ericsson's alliance portfolio strategy performed in "trial and error" fashion way.
Research Limitations	- It provides insights on alliance portfolio management that are bounded to the multiple possible interpretations of the evidence that might occur in a single case study; - It does not investigate whether other alliance portfolio structural characteristics such as alliance portfolio density, alliance portfolio cohesion, and alliance portfolio centrality, might be also relevant or not for the management of alliance portfolio; - It does not examine the relationships between the three alliance portfolio characteristics and the focal firm's performance.
Main contributions/ Originality	- It provides a more comprehensive understanding of alliance portfolio characteristics by focusing on specific features that epitomize alliance portfolio management; - It explores the importance of these alliance portfolio management main characteristics in a representative firm's alliance portfolio; - It shows how Ericsson has managed its alliance portfolio over time by leveraging on the benefits that are associated with the specific features that epitomize alliance portfolio management; - It advances a couple of relevant managerial implications that allow managers to face the challenge of managing multiple alliance per time.

5. REFERENCES

Contractor, F. J., & Lorange, P. (2002). The growth of alliances in the knowledge-based economy. *International Business Review*, 11(4), 485-502.

Baglieri, D., Cesaroni, F., & Orsi, L. (2014). Does the nano-patent 'Gold rush'lead to entrepreneurial-driven growth? Some policy lessons from China and Japan. *Technovation*, 34(12), 746-761.

Dagnino, G.B., & Ferrigno, G. (2015). The Strategic Management of Multipartner Alliances: Uncovering the Triadic Alliance Problem. In Das T.K (Ed.), *Managing Multipartner Strategic Alliances*. Charlotte, NC: Information Age Publishing: 135-169.

Di Minin, A., & Bianchi, M. (2011). Safe nests in global nets: Internationalization and appropriability of R&D in wireless telecom. *Journal of International Business Studies*, 42(7), 910-934.

Di Minin, A., & Faems, D. (2013). Building Appropriation Advantage. *California Management Review*, 55(4), 7-14.

Ernst, D. (2004). Envisioning collaboration. In J. Bamford, B. Gomes-Casseres, & M. Robinson (Eds.), *Mastering alliance strategies*. San Francisco: Jossey-Bass.

Ghemawat, P., Porter, M. E., & Rawlinson, R. A. (1986). Patterns of international coalition activity. *Competition in global industries*, 345-366.

Gomes-Casseres, B. (1998). Do you really have an alliance strategy?. *Strategy & Leadership*, 26(4), 6-11.

Grant, R. M., & Baden-Fuller, C. (2004). A knowledge accessing theory of strategic alliances. *Journal of Management Studies*, 41(1), 61-84.

Gulati, R. (1998). Alliances and networks. *Strategic Management Journal*, 19: 293-318.

Hoffmann, W. H. (2005). How to manage a portfolio of alliances. *Long Range Planning*, 38(2), 121-143.

Hoffman W.H. (2007). Strategies for managing a portfolio of alliances. *Strategic Management Journal,* 28: 827-856.

Jiang, R. J., Tao, Q. T., & Santoro, M. D. (2010). Alliance portfolio diversity and firm performance. *Strategic Management Journal*, 31(10), 1136-1144.

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

Kale, P., Singh, H., & Bell, J. (2009). Relating well: Building capabilities for sustaining alliance networks. In P. Kleindorfer & Y. Wind (Eds.), *The network challenge: Strategies for managing the new interlinked enterprise*. London,UK: Pearson Press.

Lazzarini, S. G. (2007). The impact of membership in competing alliance constellations: Evidence on the operational performance of global airlines. *Strategic Management Journal*, 28(4), 345-367.

Lepak, D. P., Smith, K. G., & Taylor, M. S. (2007). Value creation and value capture: a multilevel perspective. *Academy of Management Review*, 32(1), 180-194.

Mowery DC, Oxley JE, & Silverman BS. (1998). Technological overlap and interfirm cooperation: implications for the resource-based view of the firm. *Research Policy,* 27(5): 507–523.

Porter, M. E., & Fuller, M. B. (1986). Coalitions and Global Strategy. In M. E., Porter (Ed.) *Competition in global industries*. Cambridge, MA: Harvard University Press.

Strategic Alliance Magazine (2015). *Alliance capability, leading the way through disruption*. Q2: 16-21.

Vasudeva, G., & Anand, J. (2011). Unpacking absorptive capacity: A study of knowledge utilization from alliance portfolios. *Academy of Management Journal*, 54(3), 611-623.

Wassmer, U. (2010). Alliance portfolios: A review and research agenda. *Journal of Management*, 36(1), 141-171.

CHAPTER I

VALUE CREATION AND VALUE APPROPRIATION IN STRATEGIC ALLIANCES: IDENTIFYING AND RESOLVING THE TENSIONS[1]

Abstract

How firms create and how firms appropriate value by means of alliances are key questions that, during the past three decades, have been explored by many scholars from management and other disciplines. Some scholars have examined how firms may leverage mechanisms, such as resource combinations, asset specificity, commitment, and trust, to create value from their alliances. In parallel, other scholars have investigated how factors such as bargaining power, isolating mechanisms, competition, and absorptive capacity to explain which firms appropriate more or less value from their alliances. However, due to potential confusion about the respective meaning and conditions of value creation and value appropriation, the drivers and consequences of the two phenomena remain somewhat unclear. Furthermore, because there are separate streams of research about value creation and value appropriation, the interdependence between these phenomena requires further attention. The purpose of this paper is to provide a robust foundation from which to identify and resolve tensions inherent in researching and managing value creation and value appropriation, as concerns strategic alliances.

Key words: value creation, value appropriation, value tensions, strategic alliances.

[1] The present chapter has been elaborated together with Professor Giovanni Battista Dagnino (University of Catania) and Professor Xavier Martin (Tilburg University).

1. INTRODUCTION

An issue that is attracting wide attention in strategic management concerns how firms can enhance their performance by means of strategic alliances, and the tensions and tradeoffs this entails (Gnyawali, He, & Madhavan, 2006; Gulati, 1998; Wassmer, 2010). Most scholarship dealing with this fundamental problem has addressed one or both distinct but interrelated key questions: (a) how firms create value by means of strategic alliances; and (b) how firms appropriate value from strategic alliances. Though both shape the outcome of strategic alliances, value creation and value appropriation are thus viewed as distinct concepts and processes (Coff, 1999; Lepak, Smith, & Taylor, 2007). The difference between value creation and value appropriation is akin to the one between common and private benefits (Khanna, Gulati, & Nohria, 1998). The value creation process influences the potential magnitude of the value a firm can derive via alliances (common benefits). Firms form alliances to create value that that could not otherwise be developed (Dyer & Singh, 1998). Conversely, value appropriation influences the amount of the newly created value that a focal firm is able to capture. Value appropriation indicates two aspects: (a) the distribution of common benefits between alliance partners; and (b) the ability of partners to unilaterally obtain resources or skills from the other partners.

Although these two distinct processes have been of profound interest in alliance research, the literature on value creation and value appropriation presents two significant limitations. First, some latent confusion exists about the meanings of value creation and value appropriation, and consequently the key mechanisms underlying the two processes are still unclear; some studies dealing with value creation use arguments pertinent to value appropriation, and vice versa. Therefore, the selection and effectiveness of value creation

and value appropriation mechanisms needs to be unbundled. Second, due to the partitioning of most studies into separate streams, extant research strains to explain the tensions between and interdependence among value creation and value appropriation. At first blush there is a clear sequence, in that value must be created before it can be appropriated; yet the expectation of appropriation differences should affect value creation behavior, and vice versa. Furthermore, mechanisms that favor one outcome may limit the other. Therefore, the interdependence and potential reciprocal causation between value creation and value appropriation processes require attention. Overall, the field has yet to develop a robust theory about whether and when each mechanism is effective in explaining how firms create value and/or appropriate value by means of strategic alliances.

The aim of this paper is to provide a foundation upon which to identify and resolve value tensions occurring in strategic alliances between value creation and value appropriation processes. For this purpose, we conduct a systematic review of the literature on value creation and value appropriation mechanisms and thereby we identify the conditions under which specific value creation mechanisms and specific value appropriation mechanisms are (more or less) effective. Accordingly, we address the extant confusion concerning the meanings of value creation and value appropriation mechanisms. For this purpose, we develop a conceptual map that unpacks the respective enabling mechanisms of value creation and appropriation and explicates the interdependence between these two outcomes. Specifically, we identify four value creation mechanisms (i.e., resource combinations, asset specificity, commitment, and trust) and explain how these mechanisms explain value created in alliances. In parallel, we extract four value appropriation mechanisms (i.e., bargaining power, isolating mechanisms, competition, and

absorptive capacity) and discuss how these mechanisms drive firms to capture the amount of the newly created value in alliances. We then examine the interdependence between value creation mechanisms and value appropriation mechanisms. Finally, we discuss research avenues that may be explored in future studies to enrich the understanding of the determinants of, and interdependence between, value creation and value appropriation.

This paper aims to make three contributions. First, while some scholars have advocated a strong need to treat value creation and value appropriation in a joint fashion (e.g., Lepak et al., 2007), progress in that direction has been slow. By reviewing and elaborating on the literature on dimensions and antecedents of value creation and value appropriation, we are able to address the interdependence between the two value-related processes underlying alliance outcomes. Second, by comparing the key mechanisms of value creation and value appropriation, we help identify and minimize issues of theorizing and interpretation that might occur when research is focused exclusively on either issue (whether value creation or value appropriation). Third, by identifying a structured and comprehensive set of research opportunities for future studies, we aim to stimulate the advancement of research on value creation and value appropriation. We provide researchers with a reasoned array of promising research directions.

2. CONCEPTUAL BACKGROUND

Before discussing the mechanisms between value creation and value appropriation, it is important to review foundations and definitions of both concepts, lest they be conflated and apparent interdependencies result from conflated concepts. On this basis, we can also identify what causes tensions between value creation and appropriation, and under what

conditions. ***Value creation*** in alliances has been studied by scholars from various fields, in particular finance, supply chain management, and innovation management. As could be expected, fields tend to differ in how they conceptualize value creation. Starting with finance, and subsequently adopted in some studies in other fields, an alliance is thought to create value if changes in the parent firm's stock price are positive. Hence, value creation is examined from a shareholders' point of view (Hanvanich, Richards, Miller, & Cavusgil, 2005; Merchant & Schendel, 2000). However, even from a finance perspective,it is common to assume that value creation is associated with returns gained by both firms, as evidence suggests often happens in alliances (Anand & Khanna, 2000). From a supply chain perspective (Butler & Batt, 2014; Murphy & Schindler, 2011), instead, strategic alliances create value when they extend previous relationships among actors located in different levels of the same value chain (i.e., supplier-customer relationships), or between actors operating in the same stage of the value chain (i.e., horizontal alliances). Typical measures pertain to quality, relationship satisfaction, and various forms of mutual gains. Meanwhile, for innovation scholars, alliances produce value when they are associated with innovation not otherwise possible. This is measured for instance by the generation of patents in quantity or quality which firms could not have generated absent the alliance. Importantly, such benefits may be measured at the dyadic level too (Belderbos, Cassiman, Faems, Leten, & Van Looy, 2014; Ritala & Hurmelinna Laukkanen, 2009).

Although various perspectives are used to study value creation, in examining alliances one particularly influential and "home-grown" perspective is the relational view (Dyer & Singh, 1998). According to this view, alliances that involve relation-specific assets, knowledge-sharing routines, complementary resources/capabilities, and effective

governance mechanisms are source of value creation to the partners involved. Further, the creation of value by means of alliances has been studied with regards to the interdependencies among alliance partners (Lavie, 2007; Mindruta, 2013; Wassmer & Dussauge, 2011). When these interdependencies produce common benefits, strategic alliances create value. Common benefits are defined as those that accrue to both partners in an alliance from the joint learning that both firms experience as a consequence of being part of an alliance (Khanna et al., 1998, p. 195), or from the associated efficiencies (Hennart, 1988).

Adopting the common view of value creation as common benefits, we will look at value creation mechanisms as collective processes which generate common benefits that are available to be shared by all the partners in an alliance (Lavie, 2007, p. 1191). These mechanisms, in turn, produce relational rents that cannot be generated independently by individual partners in an alliance (Dyer & Singh, 1998).

Although scholars have steadily advocated the need to study how firms can capture value by means of strategic alliances (Dyer & Singh, 1998; Oxley & Silverman, 2008), authors have long focused their attention almost exclusively on the process of value creation rather than on the process of value appropriation (Lavie, 2007). Consequently, only recently has alliance research started to dedicate attention to the value appropriation process. Therefore, the concept of value appropriation presents less definitional variety than the one of value creation. Some scholars typify ***value appropriation*** as the distribution of the relational rents (common benefits) created by means of alliances (Adegbesan & Higgins, 2010). They base their reasoning on the fact that partners capture an asymmetric distribution of rents. For instance, if alliance partners (partner A and partner B) create a

value of 100, partner A captures 60 % of this value, while partner B captures the remaining 40%. In parallel, other authors (Hamel, 1991; Khanna et al., 1998) adopt a broader perspective by arguing that the concept of value appropriation also relates to obtaining the knowledge and skills of the other partner(s). Khanna et al., (1998) specifically associate value appropriation with private benefits. Private benefits are those that a firm can earn by picking up skills from its partner and applying them to its own operations in areas that are not related to the alliance activities (Khanna et al., 1998, p. 195). Hence, the notion of value appropriation pinpoints two key aspects: (a) the distribution of common benefits among the alliance partners, especially where it is asymmetric; and (b) the ability of a partner to single-handedly earn skills from the other partner. We follow this expanded definition of value appropriation, which is also very similar to other definitions of value appropriation in a wide variety of contexts, including alliances (Di Minin and Faems, 2013). Accordingly, we will look at value appropriation mechanisms as processes that determine the distribution of common benefits to the individual partners, as well as the capacity of partners to unilaterally extract private benefits that are unavailable to other partners (Lavie, 2007, p. 1191).

The existence of asymmetries between partners in value obtained from an alliance is not unexpected, and can normally be anticipated to some extent (Hennart, 1988). However, tensions between value creation and value appropriation are prone to occur when uncertainty is present in an alliance. The literature on alliances distinguishes between environmental and behavioral sources of uncertainty (Das & Teng, 2000a). Whereas partners can only wait and adapt to environmental uncertainty as it manifests itself, behavioral uncertainty generates a more complex set of tensions between alliance partners

(Das & Teng, 2000b). Behavioral uncertainty refers to the difficult to anticipate and understand the actions of an alliance partner (Krishnan, Martin, & Noorderhaven, 2006). Several studies have shown that the exposure to behavioral uncertainty depends on the ability of each partner to further private interests at the expense of collaborative interests (Khanna et al., 1998; Park & Ungson, 2001). This varies along the stages of the alliance lifecycle, such as including (i) initializing stage, (ii) processing stages, and (iii) reconfiguring stages (Zajac & Olsen, 1993). Under uncertainty, and specifically behavioral uncertainty, alliance partners need to dedicate efforts to establish cooperation for generating joint value, but these efforts may hinder other efforts to claim that value to the detriment of the other partner (Lax & Sebenius, 1986). It follows that tensions exist in strategic alliances between value creation and value appropriation processes.

In the next section, we shall identify more precisely the value tensions in strategic alliances. Specifically, we argue that value tensions result from the interdependence of the two distinct, dynamic, and interrelated processes of value creation and value appropriation. Building on this, we will subsequently attempt to resolve the value tensions by explicating the respective mechanisms of value creation and value appropriation.

3. IDENTIFYING THE TENSIONS IN THE VALUE CREATION AND VALUE APPROPRIATION LITERATURE

Tensions between value creation and value appropriation, and potential gaps and inconsistencies from the largely literatures addressing each, occur because of the combination of two things: (i) value creation and value appropriation are two distinct, dynamic, and interrelated processes; and (ii) interdependence and reciprocal causation exist among these processes. We consider each point in turn.

Why are value creation and value appropriation two distinct, dynamic, and interrelated processes? Value creation and value appropriation are distinct since the source or partner that creates a value increment may or may not be able to capture or retain the value in the long run (Lepak et al., 2007). The difference relates with the distinction between common and private benefits (Khanna et al., 1998). Value creation determines the potential magnitude of the value available for all alliance partners (common benefits). Conversely, value appropriation refers to the amount of the newly created value that a focal firm is able to capture.

Beyond these definitional distinctions, value creation and value appropriation are dynamic and interrelated processes. Although relatedness may appear evident where the "distribution of common benefits" part of value appropriation is concerned, this is also relevant as far as private benefits are concerned. Each firm's learning incentives are driven by their expected pay-offs, and the structure of payoffs that each participant expects is complex and changing over time (Khanna et al., 1998).

Since the processes are dynamic and interrelated, alliance scholars find it difficult to distinguish value creation from value appropriation processes. This is because the former may overlap with the latter over time, thereby generating conceptual and empirical ambiguity about what part of value process is effectively under investigation. Furthermore, the propensity to examine value creation and value appropriation separately has produced some latent confusion about the respective mechanisms underlying either or both processes; i.e., some studies dealing with value creation use arguments pertinent to value appropriation, and vice versa.

Besides their overlapping dynamics, there exist inherent interdependencies and reciprocal effects among value creation and value appropriation processes. Interdependence and reciprocal causation arise because value creation influences value appropriation process and vice versa. In one direction, how much value is created plays an important role in determining how that value is distributed (MacDonald & Ryall, 2004). Although this may seem self-evident when assuming that the value created creates a ceiling on how much value appropriated (MacDonald & Ryall, 2004), we note that this effect is more complex than it seems, given the potential for private benefits. But it remains that the value jointly created is one antecedent of value appropriated. In the opposite direction, value creation in alliances is dependent on anticipated value appropriation since the value each partner expects to receive determines their effort and incentives to contribute (Adegbesan & Higgins, 2010). In this sense, the expectation of value appropriation influences value creation.

Although the reciprocal pathways just described imply a positive relationship between value creation and value appropriation, this need not be the case. For instance, an unexpectedly high level of value created may either exacerbate or reduce a partner's expectation of the share of returns, depending on its attention or satiation. Conversely, the expectation of high private benefits may reduce a partner's incentive and attention to generate joint value, and thus reduce overall value creation.

Notwithstanding the interesting implications of these overlapping and potentially compensative relationships, most extant research fails to explain or even take into account the interdependence between value creation and value appropriation, because studies are partitioned into either the study of value creation or the study of value appropriation.

4. RESOLVING THE TENSIONS IN THE VALUE CREATION AND VALUE APPROPRIATION LITERATURE

To advance the understanding of these tensions, in the next section we conduct a systematic review of the literature on value creation and value appropriation in strategic alliances. A thorough analysis of this literature will allow us to identify the specific mechanisms underlying value creation and value appropriation respectively, and thus make clearer the conditions for their interdependence.

4.1. Methodology

To resolve the tensions above, we conduct an extensive literature review on value creation and value appropriation. Our goal is to identify mechanisms that are specific to each, and thus better separate the concepts of value creation and value appropriation and understand the contingencies that relate them. Towards this goal, we conducted a systematic search for articles in the management and economics realms using the Web of Science database. Although one earlier review limited to alliance portfolios used a 20-year time span (Wassmer, 2010), we go back further, to 1988 (the earliest year of structured Web of Science records). This is to encompass the immediate aftermath of the foundational works on the definition of alliances and their typology that appeared in the late 1980s (e.g., Ghemawat, Porter, & Rowlinson, 1986; Porter & Fuller, 1986).

In identifying keywords for this search, we searched specifically for articles reporting *alliance* and either *value creation* or *value appropriation*. Following Wassmer (2010), we also searched for synonymous or related terms such as *value generation* and *value capture* as well as *joint venture*, *coalition*, *collaboration*, *cooperation*, *agreement*, *inter-firm*

relationship, and *inter-organizational relationship*. Upon completion of the complete search (on June 17, 2017), this yielded an overall set of 1034 papers. Then, in accordance with previous studies (Picone, Dagnino, & Minà, 2014; Shi, Sun, & Prescott, 2011), we filtered the sample by using four criteria: (i) language (English); (ii) document types (article); (iii) research areas (business economics); and (iv) source titles. We include in the review papers published in premier management journals such as *Academy of Management Journal, Academy of Management Perspectives, Academy of Management Review, Administrative Science Quarterly, Management Science, Journal of International Business Studies, Journal of Management Studies, Organization Science, and Strategic Management Journal*[2]. These criteria gave us a set of 110 articles, published between May 1988 and July 2017. This span of years indicates, as expected, that research on value creation and value appropriation started developing soon after the early descriptive research on alliances was published, and this validates our effort to extend the search window.

Two of the present authors then further analyzed the titles and abstracts of the articles to determine whether they were relevant to understand value creation and value appropriation in alliances. These authors evaluated the articles separately, thus ensuring inter-rated independence and conservative agreement. For the cases in which a title or abstract was not conclusive about the relevance of the article, the article was read by both authors to determine whether it should be included in the review (Wassmer, 2010). To ensure internal and external validity of article assessment, we involved in this evaluation

[2] Although most scientific knowledge about alliance research resides in top journals' articles, we have performed a bibliometric inspection in order to explore whether collected works reference a common work in their bibliographies (Podsakoff, MacKenzie, Podsakoff, & Bachrach, 2008) that is of fundamental importance to value tensions research but is published in minor journals. Results from this inspection confirm we have not missed significant information (see appendix for more details).

process two other strategy scholars. Specifically, the evaluation of the articles was cross-validated by a PhD student specializing in alliances (to ensure internal validity), and by a post-doctoral scholar who works in the issue of diversification, a different area of interest from alliances (to ensure external validity).

We decided to rule out 60 articles from our analysis since they are articles focused on value creation or appropriation in contexts different from alliances, or focused on alliances but not on value creation or value appropriation. As a net result, we investigate alliance research on the mechanisms of, and tensions between, value creation and value appropriation on a final sample of 50 articles.

We read, coded and categorized the articles as follows. We coded each article by looking at study type (i.e., theoretical, empirical, or practitioner oriented), research topic and question, theoretical underpinnings, levels of analysis (i.e., dyadic, constellation, network, or portfolio level), research design, variables (i.e., independent, dependent, moderator, mediator and control variables), empirical setting, findings, and key contributions.

We used this coding for three key reasons: (1) to elaborate a summary of the articles and to identify the value creation mechanisms, the value appropriation mechanisms, and their interdependence; (2) to carefully examine the key assumptions, assumed or demonstrated causal mechanisms, and key findings; (3) to single out and evaluate the theoretical underpinnings that relate to (or could relate to) specific value creation mechanisms and/or specific value appropriation mechanisms. Given the importance of this coding, we follow a similar approach to James, Leiblein & Lu (2013) and submit, in Table 1, a comprehensive summary of the articles examined, their theoretical underpinnings and

inherent key assumptions, and their key contributions to our understanding of value creation (Panel A) and value appropriation mechanisms (Panel B).

Table 1. Representative papers on how firms create value from alliances

Panel A - Focus on Value Creation Mechanims

	Study	Theoretical Underpinning	Key Assumptions	Key Findings/Contributions	Value Creation Mechanism
1	Anand, Khanna (2000)	Organizational Learning	Firms learn to learn from alliances; heterogeneity in alliance capabilities persist over time; the potential for firm learning depends on the extent of ambiguity or complexity of contingencies facing alliance partners; ex post performance is predicted by the market; no distinction whether learning occurs by firms getting better at screening their alliance partners, or because they get better at interfacing with these partners	Firms learn to create more value as they accumulate experience in joint venturing, whereas there is no evidence that firms learn to create value as they accumulate experience in licensing; learning effects appear to exist especially in R&D and production joint ventures but not in marketing joint ventures; learning effects are stronger in R&D joint ventures than they are in other forms of joint ventures	Firm experience, firm learning, Alliance type
2	Barringer, Harrison (2000)	Transaction Costs Economics, Resource Dependency, Strategic Choice, Stakeholder Theory, Organizational Learning, Institutional Theory	Business alliances are not a result of personal ties between key decision makers	Simple cost/benefit analysis is insufficient; the six theories are not exhaustive; none of the six theories are holistic; they each explain relationship formation from a narrow point of view	Interorganizational relationships types
3	Colombo (2003)	Transaction Costs Economics, Competence perspective	Learning-related motivations are more important in technological alliances than in alliances that concentrate on production and commercial activities	In technological alliances divergence in partner's technological specialization leads to form equity forms	Commitment
4	Cullen, Johnson, Sakano (1995)	Commitment Theory	No distinction among expectations of nonfinancial outcomes for IJV; different control behaviors produce more commitment for different partners	The development of commitment is largely a function of the perceived benefits of the relationship i.e., satisfaction and economic performance	Commitment
5	Das, Teng (1996)	Integrated risk perspective	Risky situations are related to a perception of risk	Given cooperation, equity alliances lead to control risk relating to cooeperation, while nonequity alliances minimize non-performance hazards	Trust, Alliance type
6	Dyer (1996a)	Transaction Costs Economics	Institutional/contracting environment, industry uncertainty/volatility, and product/task interdependence do not influence the efficacy of transaction-specific investments as a source of competitive advantage	Value chain asset specificity influences quality, speed of new product development, inventory costs and profitability	Asset Specificity

7	Dyer (1996b)	Transaction Costs Economics	Governance structures are necessary when transactors make specialized investments due to the opportunism problem	Effectively aligning governance structures with transactions result in efficiency advantages; however, hybrid governance may be more efficient than hierarchical governance under conditions of uncertainty; transaction costs do not necessarily increase with an increase in asset specificity; trust is a highly efficient governance mechanism which minimizes transaction costs	Asset Specificity, Trust
8	Dyer, Singh (1998)	Relational View	Isolating mechanisms such as causal ambiguity, time compression diseconomies, interorganizational asset interconnectedness, partner scarcity and resource indivisibility and instituional environment do not preserve the rents generated by alliance partners	Relational rents are possible when alliance partners combine, exchange, or invest in idiosyncratic assets, knowledge, and resources/capabilities, and/or they employ effective governance mechanisms that lower transactions costs or permit the realization of rents through the synergistic combination of assets, knowledge, or capabilities	Asset Specificity, Resource Combination
9	Hamel (1991)*	Transaction Costs Economics, Strategic Position	Few alliances are perfectly and perpetually collusive; a firm choosing to collaborate with a present or potential competitor does not indicate that it no longer harbor a competitive intent vis-à-vis its partner	Not all partners are equally adept at learning; asymmetries in learning alter the relative bargaining power of partners; stability and longevity may be appropriate metrics of partnership success, partners may have both collaborative and competitive aims, thereby determining learning outcomes	Resource Combination, Trust
10	Holm, Eriksson, Johanson (1999)	Social Network Theory	There is a causal chain relationship from business network connection to the creation of value in a relationship	Building and sustaining of mutual commitment are critical in developing interfirm value-creating workflow systems	Commitment
11	Isobe, Makino, Montgomery (2000)	Not clearly indicated	There are not survivor bias for the performance consequences of technology transfer; there is no difference between performance of foreign entry strategy into different emerging regions and home country contexts; transferrers do not valuate the transfers of technological knowledge	Resource commitment to technology transfer influences the speed of entry in JVs attained superior economic performance	Commitment
12	Johnson, Korsgaart, Sapienza (2002)	Exchange Theory, Justice Theory	Strong mutual commitment between IJVs and their parents does not foster fairer decision-making procedures	In IJVs that have established transparently fair decision-making procedures, organizational commitment to the IJV and its parents is greater and, as a result, more effective implementation of strategic decisions is likely to occur	Commitment

13	Khanna, Gulati, Nohria (1998)*	Organizational Learning	There are stages of learning; each firm is able to infer, at least to some extent, how far along its partner is in its own learning process	Private and common benefits within alliances are those that accrue to individual firms within the alliance and collectively to all participants in the alliance; the relative scope of a firm within an alliance helps to identify the ratio of private and common benefits; value creation and value appropriation are interconnected and change over time	Relative scope of a firm within an alliance
14	Lado, Boyd, Hanlon (1997)	Resource Based Theory, Game Theory, Socio-Economics	Differences in environmental context, organizational form, and stage in organizational life cycle do not influence the capacity of firms to develop and exploit rent-yielding organizational competencies through cooperation and competition	Syncretic rent-seeking behavior explains how firms can generate economic rents and achieve superior, long-run performance through simultaneous competition and cooperation	Trust and Reciprocity
15	Lane, Salk, Lyles (2001)*	Organizational Learning	Each organization has a certain ability to learn from other organizations	Prior knowledge acquired from foreign parents is not weakly associated with current learning; trust is not related to learning but is instead related to performance	Absorptive Capacity, Trust
16	Lavie (2007)*	Resource Based View, Social Network Theory	Focal firm leverages resources from partners	Dominant partners can facilitate joint venture creation	Resource Combination
17	Lepak, Smith, Taylor (2007)*	Industrial Organization Economics, Dynamic Capabilities, Social Network Theory, Strategic HRM	Value creation and value appropriation processes do not occur at inter-firm level of analysis	Both value creation and value appropriation processes are contingency phenomena that are highly dependent on the source that initiatives the activity	Levels of Analysis
18	MacDonald, Ryall (2004)*	Industrial Organization Economics, Resource Based View, Game Theory	Information, agency, transaction costs, configuration of productive resources, institutional structure, and regulation do not influence the maximum value that can be produced	Uniqueness, inimitability, bargaining power and competition imply value appropriation	Feasibility, Stability
19	Madhavan, Gnyawali, He (2004)*	Social Network Theory	Attributes at multiple levels do not influence a firm's network moves and resulting structural tendencies	In triads clustering and countering are potential drivers of value creation and value appropriation in triadic alliances	Clustering
20	Merchant, Schendel (2000)	Industrial Organization Economics, Transaction Costs, Information Economics	Inter-partner trust and industry-specific factors do not influence on firms' expected JV performance	JV-based shareholder value is influenced by variables in firms' task-related, competitive and structural contexts but not by factors in partner-related and institutional contexts	Partner-venture business relatedness, Pursuit of R&D-oriented activity, Equity ownership and Firm size

21	Mindruta (2013)	Matching Theory	The model discounts search costs, the potential initial uncertainty about the match value, and institutional impediments to the formation of public-private partnerships	Anticipating synergistic gains and competing to ally with better partners leads to sorting in the market, which, in turn, explains why certain firm-scientist alliances create more value and enjoy higher innovation performance	Resource Combination
22	Sarkar, Aulakh, Madhok (2009)	Intellectual legacy of network resources, Social Capital	Alliance portfolio management capability consists of three collaborative rent-creating dimensions: partnering proactiveness, relational governance, portfolio coordination	Alliance function does not impact value in the alliance portfolio; variance in process-based capabilities to manage alliance portfolio explains performance heterogeneity among firms; partnering proactiveness, relational governance, portfolio enhance the overall value of alliance portfolio	Partnering Proactiveness, Relational Governance, Portfolio Coordination
23	Sinha, Cusumano (1991)	Game Theory	Expected value of the cost is known; the purpose of R&D is to reduce cost	Complementarity skills and resources influence a firm's decision to participate in an RJV; firms can increase their chances of success in R&D by combining research personnel	Resource Combination
24	Soh (2010)	Social Network Theory, Technology Management Theory	Ethernet open standard technology does not provide opportunities for start-up and established firms alike to collaborate and explore different market segments	Strategic maneuvering through competing alliance networks leads to enhanced innovation performance and positive feedback within the technological community	Resource Combination
25	Tsai, Ghoshal (1998)	Social Network Theory	There are no other levels of analysis than business unit level	Social interaction, a manifestation of the structural dimension of social capital, and trust, a manifestation of its relational dimension, are related to the extent of interunit resource exchange, which in turn have an effect on product innovation	Resource Combination, Trust, Social interaction
26	Wang, Zajac (2007)	Resource Based View, Knowledge Based View of the firm	Prior general experience in alliances or acquisition implies greater alliance and acquisition capabilities, and that prior partner-specific experience implies greater partner knowledge	The value of resources and knowledge cannot be assessed only at a focal-firm level, since value depends in part on the match of such resources and knowledge with those resources and knowledge held by specific potential partners	Resource Combination

27	Wassmer, Dussauge (2011)	Resource Based View	Ex post performance is predicted by the market; alliance formation are significant enough events that lead investors to reconsider their evaluations of the involved firms	Synergistic combinations of network resources and substitutability of resource combinations between the focal firm and its partners affect positively and negatively the value created by a new horizontal alliance formation	Resource Combination

*Studies that investigate both value creation and value appropriation

Table 1. Representative papers on how firms create and appropriate value from alliances

Panel B - Focus on Value Appropriation Mechanims

	Study	Theoretical Underpinning	Key Assumptions	Key Findings/Contributions	Value Appropriation Mechanism
1	Adegbesan, Higgins (2011)	Strategic Factor Market Theory	Alliances include an explicit division of responsabilities and benefits	Value appropriation varies across alliance partners, partner types and individual firms; scarcity premium, bargaining ability, and superior complementarity impact value appropriation	Scarcity Premium, Bargaining Ability, Superior Complementarity
2	Garud, Kumaraswamy (1993)	Competitive Dynamics	Firms can always enable access to their technologies	Firms providing rivals easy access to their technological knowledge can appropriate returns through the continual introduction of new products which stem from alliance networks involving competitors	Competition
3	Gimeno (2004)	Transaction Cost Economics, Social Exchange Theory	Firms maintain alliance relations to govern transactions	Alliance cospecialization demands greater relational exclusivity; alliance cospecialization reduces intranetwork competition and increase internetwork competition; alliance cospecialization is a critical contingency that determines the direction of alliance formation and the competitive evolution of an alliance network	Competition, Exclusivity
4	Hamel (1991)*	Organizational Learning	Few alliances are perfectly and perpetually collusive; a firm choosing to collaborate with a present or potential competitor does not indicate that it no longer harbor a competitive intent vis-à-vis its partner	Not all partners are equally adept at learning; asymmetries in learning alter the relative bargaining power of partners; stability and longevity may be appropriate metrics of partnership success, partners may have both collaborative and competitive aims, thereby determining learning outcomes	Bargaining Power, Absorptive Capacity
5	Inkpen, Beamish (1997)	Bargaining Power Theory, Resource Dependence Theory	IJV instability can be controlled by firms	Shifts in the balance of bargaining power occur when partners of an IJV acquire sufficient knowledge and skills to eliminate a partner dependency and make the IJV bargain obsolete	Bargaining Power
6	Khanna, Gulati, Nohria (1998)*	Organizational Learning	There are stages of learning; each firm is able to infer, at least to some extent, how far along its partner is in its own learning process	Private and common benefits within alliances are those that accrue to individual firms within the alliance and collectively to all participants in the alliance; the relative scope of a firm within an alliance helps to identify the ratio of private and common benefits; value creation and value appropriation are interconnected and change over time	Relative scope of a firm within an alliance
7	Kim (2015)	Evolutionary Theory, New Institutional Economics	Internationalization is a process of acquiring knowledge from international markets via various governance structures;	Geographical scope of knowledge acquisition is a source of value appropriation by creating isolating mechanisms; value appropriation is closely related with the nature of the value creation	Isolating Mechanisms

			patent citations are associated with knowledge flow		
8	Lane, Salk, Lyles (2001)*	Organizational Learning	Each organization has a certain ability to learn from other organizations	Ability to understand external knowledge and ability to assimilate it are interdependent yet distinct from ability to apply the knowledge	Absorptive Capacity
9	Lavie (2007)*	Bargaining Power Theory, Game Theory	Relative partner profitability and alternatives, bilateral and multilateral competition influence focal firm market performance	Dominant partners can affect firm performance as a result of excessive appropriation of that value	Bargaining Power, Competition
10	Lazzarini (2007)	Not clearly indicated	No distinction between formal and informal multilple-firm associations	Large members have a superior bargaining position to influence collective strategies in such a way to increase their internationalization of traffic coming from other members; an increase in the size of an explicit constellation allows a carrier to capture a larger amount of aggregate traffic, at the cost of a smaller relative capacity	Bargaining Power
11	Lepak, Smith, Taylor (2007)*	Bargaining Power Theory, Resource Based View	Competitors unable to retain value as end users benefit from the lower prices brought by increased competition; competitors replicate or imitate firms' new product	Both value creation and value appropriation processes are contingency phenomena that are highly dependent on the source that initiatives the activity	Competition, Isolating Mechanisms, Bargaining Power
12	MacDonald, Ryall (2004)*	Industrial Organization Economics, Game Theory	Information, agency, transaction costs, configuration of productive resources, institutional structure, and regulation do not influence the maximum value that can be produced	Uniqueness, inimitability, bargaining power and competition imply value appropriation	Bargaining Power, Competition
13	Madhavan, Gnyawali, He (2004)*	Social Network Theory	Attributes at multiple levels do not influence a firm's network moves and resulting structural tendencies	Clustering and countering are potential drivers of value creation and value appropriation in triadic alliances	Countering
14	Nagarajan, Sosic (2007)	Game Theory	Every member of a coalition charges the same retail price; every coalition in the market simultaneously and noncooperatively sets its own price	If products are highly substitutable, this defection leads to instability and lower profits for the firm; with lower levels of substitutability, the firm may pull itself out of the grand coalition and enjoy higher profits	Competition
15	Nam, Gruca, Tracy (2010)	Ecological View	Specialist PSFs do not have the possibility to form parallel alliances to access the same pool of referral arrangements	Niche overlap between specialist PSFs in their home market or in the generalist PSF's market affect their involvement in as well as the total amount of resources they dedicate to referral alliances	Competition
16	Park, Russo (1996)	Transaction Cost Economics	There are no different patterns of time dependency	The presence of competition between joint venture partners outside of the agreement impairs chances for the operation's chance of survival	Competition, Bargaining Power, Absorptive Capacity

17	Polidoro, Ahuja, Mitchell (2011)	Social Network Theory	Tie dissolution does not affect tie formation	Value of network embeddedness in promoting stability in interfirm relationships depends on economic incentives to behave opportunistically	Competition, Absorptive Capacity
18	Shankar, Bayus (2003)	Resource Based View	Network effects are equal across competitors in every industry	Network effects are asymmetric; firms with a smaller customer network have higher network strength than firms with larger customer base	Isolating Mechanisms
19	Silverman, Baum (2002)	Transaction Costs Economics, Resource Based View, Competitive Dynamics	Structural holes, cumulative alliance experience, network centrality and technology network position do not enhance firms benefits from the alliances of rival firms	Competitive intensity a firm experiences increases with the number of alliances that its rival form; firms benefit from the alliances of rival firms with which they collaborate	Competition
20	Tong, Reuer (2010)	Industrial Organization Economics	Aggregate impact of joint ventures on industry profitability	Firms should adopt a contingent approach when they evaluate the competitive implications of joint ventures; industry profitability depends on horizontal alliances, non-horizontal alliances, domestic alliances, international ventures, and structure of the industry	Competition
21	Vasudeva, Anand (2011)	Organizational Learning	Differences in partners' technological capabilities are reflected in their patents	Optimal use of knowledge from alliance portfolios occurs under a medium level of technological diversity; there is a trade-off between learning requirements involving firms' latitudinal and longitudinal absorptive capacities; firms leverage on two alternative approaches (i.e., telescopic and panoptic) for optimizing knowledge use from alliance portfolios	Absorptive Capacity
22	Yan, Gray (1994)	Negotiations perspective	Government does not influence on JV performance	Control in JV is not unilaterally chosen by one or the other partner, but it is a result of bargaining; the interaction between informal control mechanisms and formal control structure influences JV performance	Bargaining Power
23	Yu, Subramanian, Cannella (2013)	Industrial Organization Economics, Resource Based View	Cooperation and competition are separate and distinct construct	Global competitive intensity influences alliance formation by rivals; host country and competitive intensity in the host country strengthen the influence of global competitive intensity on alliance formation; however, host government restrictions weaken this influence	Competition

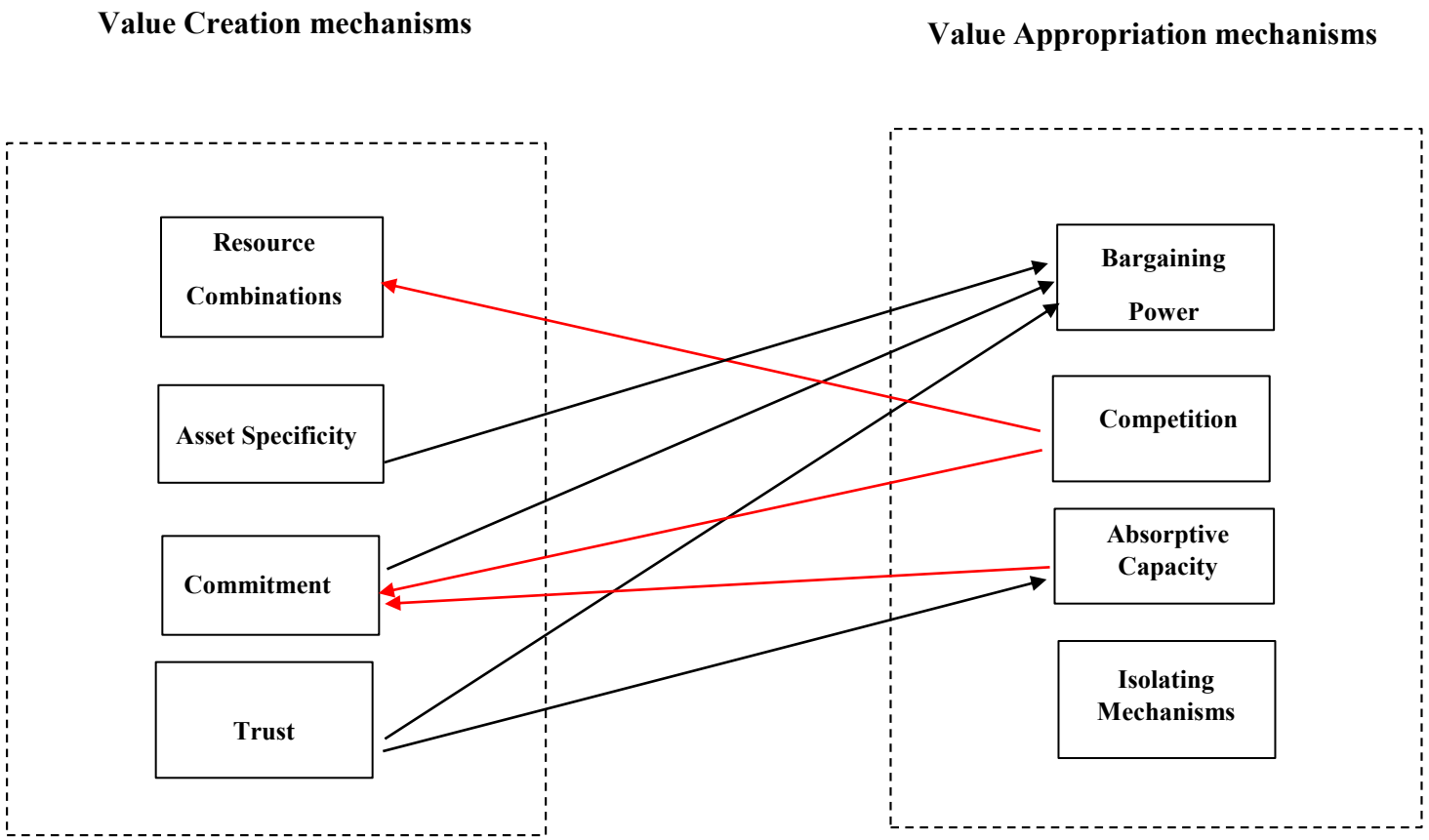
*Studies that investigate both value creation and value appropriation

As Table 1 shows, the theoretical literature on value creation and value appropriation in alliances is fragmented, with several disciplines contributing to the field (Barringer & Harrison, 2000). The fragmented nature of the literature reflects the multifaceted nature of the interdependence between value creation and value appropriation, which involves a mixture of different yet interconnected value creation and value appropriation mechanisms. In the next section we provide a conceptual map that elucidates the most used value creation and value appropriation mechanisms, and their interdependences.

4.2. Conceptual map of value creation and value appropriation mechanisms

From reviewing extant literature on value creation and value appropriation in alliances (first stage), we gain an understanding of the definitions as discussed in section 2. We now propose a conceptual map (see Figure 1) that may be used subsequently evaluate the tensions in the literature. This conceptual map is composed of two main parts: (1) value creation mechanisms; i.e., resource combinations, asset specificity, commitment, and trust; (2) value appropriation mechanisms; i.e., bargaining power, isolating mechanisms, competition, and absorptive capacity; plus (3) linkages indicating interdependence between value creation and value appropriation mechanisms.

Figure 1. Conceptual roadmap: Value Creation mechanisms, Value Appropriation mechanisms and their interdependence



Note: black arrow indicates value creation influence on value appropriation; red arrow, instead, the reversing effect.

In rest of this next section, we provide a robust theoretical discussion of what these mechanisms and their interdependences are. In doing so, we discuss the theoretical underpinnings explaining the rationales of these constructs, their limitations and why they are not sufficient to clarify the value tensions in alliances[3]. The key elements of this discussion are summarized in Table 2.

Table 2. Theoretical underpinnings exploring value creation and value appropriation mechanisms

Value Creation			Value Appropriation		
Mechanism	Theoretical Underpinning	Study	Mechanism	Theoretical Underpinning	Study
Resource Combinations	Game Theory	Sinha, Cusumano (1991)	Bargaining Power	Bargaining Power Theory	Inkpen, Beamish (1997); Lavie (2007); Lepak, Smith, Taylor (2007)
	Knowledge Based View of the firm	Wang, Zajac (2007)		Industrial Organization Economics	MacDonald, Ryall (2004)
	Matching Theory	Mindruta (2013)		Negotiations perspective	Yan, Gray (1994)
	Relational View	Dyer, Singh (1998)		Organizational Learning	Hamel (1991)
	Resource Based View	Lavie (2007); Wang, Zajac (2007); Wassmer, Dussauge (2011)		Resource Dependence Theory	Inkpen, Beamish (1997)
	Social Network Theory	Lavie (2007); Soh (2010); Tsai, Ghoshal (1998)		Strategic Factor Market Theory	Adegbesan, Higgins (2011)
	Strategic Position	Hamel (1991)		Transaction Cost Economics	Park, Russo (1996)
	Technology Management Theory	Soh (2010)	Competition	Bargaining Power Theory	Lavie (2007); Lepak, Smith, Taylor (2007)

[3] We acknowledge that prior research has examined the theoretical underpinnings explaining value creation in alliances (Barringer & Harrison, 2000). The authors reviewed extant literature on interorganizational relationships, which is a wider literature than alliances. As a result, there are some theoretical underpinnings, such as Institutional Theory, Resource Dependence, Strategic Choice, and Stakeholder Theory, which do not result from our review. In parallel, our review shows that some others, such as Competence Perspective, Exchange Theory, Justice Theory, KBV of the firm, Matching Theory, Resource Based View, Social Network Theory and Technology Management Theory, have been used after Barringer & Harrison'study to explain value creation in alliances.

	Transaction Costs Economics	Hamel (1991)		Competitive Dynamics	Garud, Kumaraswamy (1993); Silverman, Baum (2002)
Asset Specificity	Relational View	Dyer, Singh (1998)		Ecological View	Nam, Gruca, Tracy (2010)
	Transaction Costs Economics	Dyer (1996a); Dyer (1996b)		Game Theory	Lavie (2007); MacDonald, Ryall (2004); Nagarajan, Sosic (2007)
Commitment	Competence perspective	Colombo (2003)		Industrial Organization Economics	MacDonald, Ryall (2004); Tong, Reuer (2010) Yu, Subramanian, Cannella (2013)
	Commitment Theory	Cullen, Johnson, Sakano (1995)		Resource Based View	Silverman, Baum (2002); Yu, Subramanian, Cannella (2013)
	Exchange Theory	Johnson, Korsgaart, Sapienza (2002)		Social Exchange Theory	Gimeno (2004)
	Social Network Theory	Holm, Eriksson, Johanson (1999)		Social Network Theory	Lepak, Smith, Taylor (2007); Polidoro, Ahuja, Mitchell (2011)
	Transaction Costs Economics	Colombo (2003)		Transaction Cost Economics	Gimeno (2004); Park, Russo (1996); Silverman, Baum (2002)
Trust	Game Theory	Lado, Boyd, Hanlon (1997)	Absorptive Capacity	Organizational Learning	Hamel (1991); Lane, Salk, Lyles (2001); Vasudeva, Anand (2011)
	Integrated risk perspective	Das, Teng (1996)		Social Network Theory	Polidoro, Ahuja, Mitchell (2011)
	Organizational Learning	Hamel (1991); Lane, Salk, Lyles (2001)		Transaction Cost Economics	Park, Russo (1996)
	Resource Based Theory	Lado, Boyd, Hanlon (1997)	Isolating Mechanisms	Bargaining Power Theory	Lepak, Smith, Taylor (2007)
	Social Network Theory	Tsai, Ghoshal (1998)		New Institutional Economics	Kim (2015)
	Socio-Economics	Lado, Boyd, Hanlon (1997)		Resource Based View	Lepak, Smith, Taylor (2007); Shankar, Bayus (2003)
	Transaction Costs Economics	Dyer (1996b); Hamel (1991)			

4.3 Value creation mechanisms

After defining value creation mechanisms, we proceed to identify what these mechanisms are and how alliance partners may use them to create value. From this analysis, we conclude that value creation depends on four key mechanisms: (a) resource combinations; (b) asset specificity; (c) commitment; and (d) trust.

Resource Combinations

Resource combinations have received a great deal of attention in the alliance literature on value creation. In a nutshell, the alliance literature argues that resource combinations occur when alliance partners combine their scopes, resources, or capabilities to jointly achieve, in an effective way, new strategic opportunities that they could not accomplish independently (Dyer & Singh, 1998; Richardson, 1972). We approach resource combinations by relying on the two theories that have widely explored this value creation mechanism in alliances: RBV (Barney, 1991) and Social Network theory (Burt, 1992).

RBV suggests that synergistic resource combinations take place when alliance partners have complementary yet scarce resources (Lavie, 2007; Wang & Zajac, 2007). Moreover, this theory has been helpful in providing evidence of resource combinations not only residing in the single alliance, but also emerging within alliance portfolio (Wassmer & Dussauge, 2011). In spite of its intuitive appeal, RBV's focus on alliance partners' tangible and intangible resources (Barney, 1991) neglects to consider other important sources of resource combinations, such as structural properties of alliances. In addition, another assumption is that each partner easily recognizes the potential value of combining resources, without incurring in search costs, transactions costs, and coordinating costs.

Social Network Theory overcomes some of these assumptions by proposing that focal firms that are more centrally positioned within alliance networks can better attract alliance partners that possess complementary products, and combine more resources to enhance value creation (Soh, 2010). Furthermore, this theory results valuable in that it provides insights regarding how social relations inform resource combinations (Tsai & Ghoshal, 1998). In fact, Social Network Theory provides evidence that informal social relations and tacit social arrangements facilitate productive resource combinations enabling value creation in alliances. Despite these merits, a few assumptions limit its erga omnes applicability. A weakness of the theory is that it assumes that firms have strategic cooperative intent to acquire and share knowledge broadly. Additionally, common standardization goals are considered widely acknowledged and promoted.

Asset Specificity

Asset specificity has also gained consideration in the alliance literature on value creation. Briefly, the alliance literature considers asset specificity as the vehicle through which alliance partners generate relational quasi-rents (Aoki, 1988). Accordingly, extant research shows that alliance partners obtain economic rents "when they convert general assets (such as money, raw materials, commodities, general people skills) into specific assets and capabilities" (Schoemaker & Amit, 1994, p. 28). The rationales for this value creation mechanism are mainly rooted in two theories: TCE (Williamson, 1985); and relational view (Dyer and Singh, 1998).

TCE focuses on how alliance partners should organize their boundary spanning activities in a way to minimize the sum of their production and transaction costs (Barringer

& Harrison, 2000). Given this focus, this theory advocates that alliance partners willing to make relation/transaction-specific investments in specialized assets boost their productivity (Asanuma, 1989; Dyer, 1996b Dyer & Ouchi, 1993). TCE also states that three categories of asset specificity boost alliance partner productivity (Dyer, 1996a): 1) site specificity, because of inventory and transportation costs (Dyer, 1996a); 2) physical asset specificity, because of improvements in the quality of partner products (Clark & Fujimoto, 1991; Nishiguchi, 1994); and 3) human specificity, because of partners' accumulated information, language, and know-how (Asanuma, 1989). Despite its contributions to understanding asset specificity, TCE's focus on costs and efficiency impedes to take into account the perceived fairness of a potential alliance partner (Ring & Van de Ven, 1994). Moreover, it is assumed that corporate cultures of alliance partners meld together (Barringer & Harrison, 2000).

The Relational view considers network and dyad of firms as unit of analysis for explaining relational rents (Lavie, 2006). This theory complements TCE rationales for asset specificity by arguing that relational rents generated through asset specificity are realized through duration of safeguards against opportunism as well as through volume of interfirm transactions enabling alliance partners' exchange of information and know-how (Dyer & Singh, 1998). However, due to lack of empirical testing, much of the wisdom emanating from relation view is accepted on faith.

Commitment

Commitment has likewise captured interest in the alliance literature on value creation. Concisely, alliance literature defines commitment as "the belief in and acceptance of

organizational goals and values, a willingness to exert effort on behalf of the organization, and a desire to maintain organizational relationship" (Johnson, Korsgaart, & Sapienza, 2002, p.1143; Mowday et al., 1982). Drawing on this definition, extant research has found that commitment drives superior performance of joint ventures (Isobe, Makino, & Montgomery, 2000), reduces opportunistic behaviors of alliance partners (Beamish & Banks, 1987), and increases the desire for continued interactions with alliance partners (Shamdasani & Sheth, 1995). Given the importance of commitment to value creation in alliances, several theories have investigated this value creation mechanism: Commitment theory (Becker, 1960); Competence perspective (Winter, 1987); Justice Theory (Lind & Tyler, 1988); Social Network Theory (Burt, 1992); and TCE (Williamson, 1975, 1985). Albeit these theories have explored commitment, none of them extensively positions the rationale for this value creation mechanism. Additionally, some arguments of one theory lead to opposite implications of other theories. For instance, *Commitment Theory* argues that commitment is a function of partners' perceived benefits from the relationship, such as satisfaction and economic performance (Cullen, Johnson, & Sakano, 1995). Interestingly, *TCE* concludes the opposite (Colombo, 2003). In fact, TCE argues that more commitment implies a reduction in transactions costs of the alliances (Beamish & Banks, 1987). This finding is also contended by *Competence Perspective*, which brings the consideration of firms' idiosyncratic capabilities into the governance question, thereby providing a noteworthy complementary addition to more traditional rationales of commitment based on TCE (Colombo, 2003).

Moving to the other theoretical perspectives, *Justice Theory* singles out different levels of organizational commitment – i.e., IJV commitment, local parent commitment, and

foreign parent commitment - in IJV top management teams and suggests that these levels of commitment depend on some joint decision-making processes, such as procedural justice (Johnson, Korsgaart, & Sapienza, 2002). Finally, *Social Network Theory* introduces the concept of mutual commitment to alliance literature (Holm, Eriksson, & Johanson, 1999) and suggests that mutual commitment, seen as the willingness by both partners to make short-term sacrifices to achieve long-term benefits in business network relationships (Anderson & Weitz, 1992; Dwyer, Schurr, & Oh, 1987), might reinforce mutual partners' dependence leading to value creation. Interestingly, in spite of few exceptions (Holm, Eriksson, & Johanson, 1999), this theory suffers lacks of empirical testing.

Trust

Trust has acquired a notable importance in the alliance literature on value creation. In few words, alliance literature argues that trust serves as an ongoing social control mechanism and risk reduction device (Gulati, 1995; Florin, 1997) that breeds economic rents in alliances. For instance, it lessens uncertainty between partners' behaviors (Ring &Van de Ven, 1994), and it functions as integrative mechanism that creates and sustains cooperation within and between alliance partners (Lado, Boyd, & Hanlon, 1997). The rationales for this value creation mechanism are mainly rooted in three theoretical perspectives: Integrated-risk perspective (Das & Teng, 1996); Organizational Learning (Hamel, 1991); and TCE (Williamson, 1985). Despite common relevance, there is a divergence in the crux of arguments that these theories use to explain the rationales for trust.

Integrated-risk perspective suggests that when alliance partners build a mutual sense of trust, their concerns over opportunistic behavior, risks, and behavioral uncertainty

tend to decrease (Das & Teng, 1996). Moreover, they can cooperate as if the future were more certain (Zajac & Olsen, 1993). This theory also disentangles two categories of trust: 1) cognition-based trust, which depends on confidence from partners' competence; and 2) affected-based trust, which derives from feelings of closeness and goodwill (Ring & Van de Ven, 1994).

Organizational Learning envisions trust as element of absorptive capacity (Lane, Salk, & Lyles, 2001). Given its focus on knowledge exchange and transfer, this theory suggests that trust determines the extent of knowledge exchanged in alliances and the efficiency through which it exchanged. Additionally, this theory argues that two dimensions of trust are relevant for learning: 1) willingness to risk vulnerability; and 2) confidence that one partner will desist from taking advantage of other partner's vulnerabilities. Taken together, these dimensions suggest that trust makes alliance partners willing to share and exchange information that may make them vulnerable (Mayer, Davis, & Schoorman, 1996).

TCE argues that trust is a highly efficient governance mechanism that minimizes transaction costs (Dyer, 1996b) that would otherwise be sustained in building governance mechanisms to safeguard against partner opportunism (Barney & Hansen, 1994; Hill, 1990).

4.4 Value appropriation mechanisms

After defining value appropriation mechanisms, we proceed to identify how is possible for alliance partners to leverage them to appropriate value. From the thorough analysis of the

literature, it appears that value appropriation depends on four key mechanisms: (a) bargaining power; (b) isolating mechanisms; (c) competition; and (d) absorptive capacity.

Bargaining Power

Bargaining power has received important recognition from the alliance literature on value appropriation. In fact, extant research considers this value appropriation mechanism as the main factor that determines the distributions of rents vis-à-vis the alliance partner (Adegbesan, 2009; Hamel, 1991). Bargaining power is deemed as the ability to positively change the terms of the agreement, win accommodations from partners, and influence the outcomes of alliance negotiations (Yan & Gray, 1994). Extant research indicates that a strong bargaining ability determines a greater share of pie splitting control rights relative to partner(s)(Adegbesan & Higgins, 2010). The rationales for a strong bargaining ability can be positioned along two theoretical perspectives: Bargaining Power Theory (Bacharach & Lawler, 1984); and Resource Dependence Theory (Pfeffer & Salancick, 1978).

Bargaining Power Theory suggests that a strong bargaining ability depends on availability of alternatives. Specifically, when the alliance partner has more alternatives (Lavie, 2007) to pursue similar objectives with other firms, its bargaining power is stronger than that one of the other(s) alliance partner. Additionally, this theory claims that the control of bigger stakes in the alliance is a negative indicator of the bargaining ability as it reveals the attachment and the dependence of the partner on the alliance and its outcomes (Inkpen & Beamish, 1997). Put it simply, if a firm has more stakes than its partner in the alliance, then its bargaining power is weaker since the outcomes of the alliance are more critical to its performance. In spite of its persuading arguments, this theory does not

consider the extent to which each partner contributes to the alliance. Moreover, this theory takes for granted that partners possess and bring similar resources to the alliance.

Resource Dependence Theory advances different yet complementary arguments to those emphasized above. Given its focus on dependence as source of power for the alliance partner controlling key resources (Pfeffer, 1981), this theory asserts that the contribution of critical resources credits power in the alliance, thereby claiming that what each partner brings to the alliance is also a relevant factor determining a strong bargaining ability (Harrigan & Newman, 1990). Furthermore, Resource Dependence Theory pinpoints that a partner who contributes resources that are very costly or impossible for other partners to replace (Root, 1988, p. 76), and critical to the alliance success (Harrigan & Newman, 1990), benefits a strong bargaining power. Albeit its valuable contributions, this theory assumes that there are no changes leading to obsolescence in bargaining power. However, bargaining power shifts are regular (Inkpen & Beamish, 1997), lower the need for cooperation between the partners, and are a source of instability, often leading to the dissolution of the alliance (Das & Teng, 2000b).

Competition

Competition has also assumed remarkable attention from the alliance literature on value appropriation. Competition in alliances, whose intensity can arise at any point of a joint venture evolution (Yu & Cannella, 2007) and could prompt partners to face high risk of dissolution (Park & Russo, 1996), refers to the degree of overlapping between alliance partners resource niches (Hannan & Freeman, 1989). Extant research has found that this value appropriation mechanism increases the ratio of unilateral private benefits to

collaborative common benefits (Khanna et al., 1998), and makes alliance partners prone to internalize the focal firm's intangible assets as well as to improve their competitive positions vis-à-vis the other partner(s) (Hamel, 1991). Given the importance of competition to value appropriation in alliances, four theories have mostly investigated it: Competitive Dynamics (Gnyawali & Madhavan, 2001); Game Theory (Shapley, 1971); Industrial Organization Economics (Porter, 1981); and TCE (Williamson, 1985).

Competitive Dynamics suggests that when a firm encourages its partner rivals to access its technologies, the appropriation returns can augment through the continuous such development of new technologies and products (Garud & Kumaraswamy, 1993); otherwise, rivals will find a way to replicate such technologies (Lepak et al., 2007). Additionally, this theory claims that firms benefit from collaborating with competitors because alliance network competition can augment the competitive significance of these alliances (Silverman & Baum, 2002).

Game Theory focuses on the set of equilibrium payoffs for alliance partners and advises that, when they are competitors, alliance partners trade off the size of the total profit (common benefits) of the alliance vs. their allocation of the total pie (private benefits) (Nagarajan & Sosic, 2008). Moreover, this theory recommends that two levels of competition can shape both common and private benefits (Lavie, 2007): (a) bilateral competition; and (b) multilateral competition. Indeed, firms may increase their value appropriation capacity by thwarting partners that operate in the same industry and have superior bargaining power or by allying with multiple partners to neutralize each partner's bargaining power. Additionally, game theory proposes that these levels of competition

might depend on marginal product, minimum residual and minimum total value (MacDonald & Ryall, 2004).

Industrial Organization Economics argues that industry characteristics affect firms' competitive intensity which leads to value appropriation (Yu, Subramanian, & Cannella, 2013). Moreover, this theory shows that alliances with rivals can increase market competition and diminish industry profitability (Tong & Reuer, 2010).

TCE shows that competition may prompt partners to face high risk of dissolution. In fact, alliances between rivals are commonly hazardous since competitive goals encourage partners to act opportunistically and capture key technologies and know-how (Park & Russo, 1996). Notwithstanding that, this theory offers two solutions that shape such view of risky competition (Gimeno, 2004). First, firms may create alliances with its rivals' partners to leverage on the network benefits of its rivals. Second, such firms may develop countervailing alliances with other partners who deal with similar treats.

Absorptive Capacity

Absorptive capacity has likewise gained extensive acknowledgement from alliance literature on value appropriation. Absorptive capacity refers to the ability of firms to understand, assimilate, and exploit external knowledge (Cohen & Levinthal, 1990). Although a few scholars have attempted to offer an explanation for the relevance of this value appropriation mechanism, by drawing on other theories, such as Social Network Theory (Polidoro, Ahuja, & Mitchell, 2011) and TCE (Park & Russo, 1996), alliance literature conveys that one theory results particularly exhaustive in explaining the rationales for absorptive capacity: Organizational Learning (Hamel, 1991). The reasons

underlying this belief dwell in the argument that firms often enter alliances with the expectation of learning new knowledge and acquiring external rent generating resources (Lavie, 2006, p. 645). Basing on this belief, alliance literature shows that distinctive learning capabilities of the firm and its partners explain the distribution of rents in alliances (Dussauge, Garrette, & Mitchell, 2000; Hamel, 1991; Kumar & Nti, 1998). As mentioned above, absorptive capacity refers to three distinctive learning capabilities: 1) understanding; 2) assimilating; and 3) exploiting external knowledge (Cohen & Levinthal, 1990). We approach the theoretical discussion about absorptive capacity by pinpointing how *Organizational Learning* clarifies how firms can develop such distinctive learning capabilities to appropriate value from their alliances. First, Organizational Learning argues that firms can develop the ability to understand external knowledge when they recognize valuable information and knowledge (Wang & Zajac, 2007) from a particular partner in a specific relationship (Dyer & Singh, 1998; Lavie, 2006). Similarly, Lane et al., (2001) found that the relatedness of the partners' businesses and the similarity of the problems and priorities they face represent the most important factors that facilitate the recognition of new knowledge. Second, Organizational Learning shows that assimilating external knowledge involves the firm's ability to connect the new knowledge with the existing knowledge residing in the organization. The theory advocates that this ability may be developed when firms are sufficiently flexible and adaptable to embrace the new knowledge. Along this learning process, Hamel (1991) suggests that designing interfirm routines that facilitate information sharing and increase overlapping knowledge bases among alliance partners helps in making the assimilation of new knowledge more effective.

Last, Organizational Learning indicates that applying external knowledge is the ability of the firm to spread the new knowledge within the organization, to integrate it within the organization's activities, and to generate new knowledge from it (Lane et al., 2001). Developing this ability involves competence in training and personnel development (Lane et al., 2001) as well as building alternative approaches to optimize the use of knowledge (Vasudeva & Anand, 2011).

Isolating Mechanisms

Isolating mechanisms have acquired a notable importance in the alliance literature on value appropriation. In few words, alliance literature argues that isolating mechanisms refer to a set of barriers that impede the flow of knowledge across firms (Lippman & Rumelt, 1992), thereby leading to increased value appropriation from alliances. More specifically, isolating mechanisms include any knowledge, physical, or legal barrier that may obstruct imitation and prevent replication of any knowledge, assets, and activities performed by other firms (Lepak et al., 2007)[4]. The rationales for isolating mechanisms as value appropriation mechanism can be positioned across three theoretical perspectives: Bargaining Power Theory (Bacharach & Lawler, 1984); New Institutional Economics (Coase, 1937); and RBV (Barney, 1991);

[4] Dyer & Singh (1998) state that a further isolating mechanism may prevent value appropriation of alliance partner; i.e., partner scarcity. Specifically, they argue that relational rents may be difficult to imitate because potential alliance partners with the necessary complementary resources and relational capability are rare (Dyer & Singh, 1998: 673). We deem that partner scarcity cannot be considered as an isolating mechanism since we believe that the rareness of resources and capabilities possessed by a potential alliance partner refers to the alliance formation pre-phase and thus to value creation mechanisms (specifically, resource combination). Actually, it does not refer to a phase where alliance is formed and value creation has to be distributed and protected among alliance partners.

RBV indicates that isolating mechanisms prevent the outbound diffusion of rents by limiting the imitability, substitutability, and transferability of strategic resources (Barney, 1991; Lavie, 2006). As a result, RBV argues that isolating mechanisms allow alliance partners to protect the flow of knowledge circulating within the alliance by means of imitation from other firms, thereby securing the appropriation of rents to alliance partners. They include any knowledge, physical, or legal barrier that may obstruct imitation and prevent replication of any knowledge, assets, and activities performed by other firms (Lepak et al., 2007). However, alliance literature pinpoints that problems of imitation may arise also owing to alliance partners learning (Hamel, 1991).

Bargaining Power Theory complements such arguments by exploring problems learning and changes in bargaining power. Indeed, Yan & Gray (1994) showed, for instance, that US firms have limited learning from their Chinese partners because they are cautious in transferring their technologies to their joint ventures and keep the key technological secrets firmly in their hands, because these technologies were low in transparency. However, BPT does not suggest how isolating mechanisms can be applied in order to protect a firm's resources from partners' potential learning. Safeguards agreement rooted in TCE may provide additional insights.

New Institutional Economics attempts to address this question by exploring the determinants of isolating mechanisms. More specifically, this theory advances that causal ambiguity and uniqueness are two elements that influence the creation of isolating mechanisms (Lippman & Rumelt, 1982). Additionally, Kim (2015) extends this contribution by finding that these two sources of isolating mechanisms depends on geographical scope of knowledge acquisition.

4.5 Interdependence between value creation and value appropriation mechanisms

The interdependence underlying value tensions in strategic alliances refers to the dual cause-and-effect relationship between value creation mechanisms and value appropriation mechanisms. Such dual cause-and effect relationship consists in the fact that not only (a) value creation influences value appropriation, but also (b) value appropriation influences value creation.

The alliance literature provides several examples of how value creation influences value appropriation. For instance, Khanna et al., (1998) found that value creation determines the potential magnitude of the value available for all alliance partners (common benefits). Similarly, MacDonald & Ryall (2004) stress that the amount of value created plays a key role in determining how that value is distributed among alliance partners.

In parallel, the alliance literature also offers evidences of the opposite relationship. In a nutshell, the alliance literature asserts that value creation in alliances is dependent on anticipated value appropriation since the value each partner expects to receive determines their effort and incentives to contribute (Adegbesan & Higgins, 2010). In this sense, the expectation of value appropriation influences value creation. As an example, Polidoro et al., (2011) argue that the imbalance of benefits that partners obtain from the alliance linkage can affect the amount of resources they allocate to the joint venture and increase competition between them. Likewise, Park & Russo (1996) show that incentives to act opportunistically motivate actions that threaten and frequently undermine the creation of value via joint ventures.

Beyond these general interdependences, we now dig deeper into the alliance literature on value creation and value appropriation to provide a detailed theoretical discussion of what the interdependences between value creation and value appropriation mechanisms are. In doing so, we discuss how the theoretical underpinnings used so far contribute to the understanding of the rationales of the interdependences between value creation and value appropriation mechanisms.

The rationales on how value creation mechanisms influence value appropriation mechanisms can be positioned within three theoretical perspectives: Organizational Learning (Hamel, 1991); Resource Dependence Theory (Pfeffer & Salancick, 1978); and TCE (Williamson, 1985).

Organizational Learning provides insights indicating that commitment influences absorptive capacity. Indeed, in their seminal work on learning races, Khanna et al., (1998) discuss three potential pathologies (i.e., 1) three-lagged fallacy; 2) the reluctant loser; and 3) the hesitant winner) that elucidate the potential connection between resource commitments and the likelihood that a partner might capitalize on its learning advantage. Furthermore, Organizational Learning claims that trust has an impact on absorptive capacity. Basing on this theory, Lane, Salk & Lyles (2001) argue that two dimensions of trust (i.e., 1) partners' willingness to risk vulnerability, and 2) forbearance, the confidence that alliance partner desist from exploiting other partners' vulnerabilities) influence the willing all alliance partners share and exchange valuable secret information and tacit knowledge that may make them vulnerable.

Resource Dependence Theory offers explanations regarding commitment's influence on bargaining power. Given its focus on resource dependences, this theory

indicates that resources and capabilities committed by the partners to a joint venture were a major source of bargaining power (Inpken & Beamish, 1997). Drawing on this finding, the theory proposes that when a partner commits major resources and capabilities in the alliance, its chances to appropriate most of the value created may augment.

TCE affirms that value creation mechanisms may influence negatively value appropriation mechanisms. This is the case of the relationship between asset specificity and bargaining power. Drawing on this theory, indeed, Dyer (1996a) analyzed investments in specific assets leading to boost productivity and add value to the alliance. One of the insights the author derived from this study was that the incentive to make these investments was moderated by the fact the more specialized a resource becomes, the lower is its value in alternative uses, and thus the lower its availability of alternatives. As the availability of alternatives is one of the major drivers of the bargaining power, it is reasonable to conclude that asset specificity affects negatively bargaining power.

After discussing the rationales for value creation mechanisms' influence on value appropriation, we approach the discussion of the reverse relationship. Alliance literature on value creation and value appropriation suggests that three theoretical perspectives have explained the rationales for value appropriation mechanisms' influence on value creation mechanisms: Ecological View (James, 1993); Industrial Organization Economics (Porter, 1981); and Integrated Risk Perspective (Das & Teng, 1996).

Ecological View of competition provides an intuitive explanation of how competition influences resource commitment. In particular, this theory affirms that the level of niche overlap in the home market of a specialist professional services firm may affect the level of resources that might be allocated in an alliance with a generalist

professional services firm in another geographic market (Nam et al., 2010). This condition in turn suggests that specialist professional services firms, whose home markets have high levels of niche overlap among rivals, are more likely to have the slack resources necessary for creating and maintaining alliances with generalist firms outside the home market.

Industrial Organization Economics indicates that competition affects resource combinations. More specifically, this theory asserts that increased competition augments the likelihood that resource combinations, that alliance partners will generate, will in turn replicate the effects of partners resource deployments in creating value in the alliance (Merchant & Schendel, 2000).

Integrated Risk Perspective advocates that perceived levels of absorptive capacity might affect negatively commitment. Given its focus on risks perceived by alliance partners, this theory proposes that, when an alliance partner perceives that other partners are willing to absorb its superior knowledge and technology, the amount of resources committed in the alliance decreases (Das & Teng, 1996).

5. RESEARCH AGENDA ON VALUE CREATION AND VALUE APPROPRIATION

Drawing on a careful review of the literature on value creation and value appropriation mechanisms in strategic alliances, this paper provides an improved understanding of value tensions in alliances. Specifically, we advance a conceptual map that portrays the interdependence between four key value creation mechanisms (i.e., resource combinations, asset specificity, commitment, and trust), and four value appropriation mechanisms (i.e., bargaining power, isolating mechanisms, competition, and absorptive capacity).

The analysis of the extant literature on value creation and value appropriation in alliances also reveals some areas that require further attention as promising and important research questions still needs to be tackled. In this section, we garner a research agenda (see Figure 2) of key issues in three areas of inquiry where additional investigation is needed. The rejoinder to these questions is likely to enrich our understanding of the interdependence between value creation and value appropriation mechanisms in alliance literature, as well as to stimulate the advancement of the debate on value creation and value appropriation in strategic alliances.

Specifically, Figure 2 portrays three areas of future research opportunities on value tensions between value creation and value appropriation mechanisms in strategic alliances: (1) the antecedents of value creation and value appropriation mechanisms; (2) the interdependence between and within value creation mechanisms and value appropriation mechanisms; and (3) the measures of value creation and value appropriation mechanisms.

5.1. Antecedents of value creation and value appropriation mechanisms

As concerns the antecedents of value creation and value appropriation mechanism, we propose three unexplored areas that might influence them. They are as such: (i) levels of analysis; (ii) partners attributes; and (iii) the environment.

The first area of research that deserves to be investigated refers to the level of analysis. Various levels of analysis (constellation, network, and portfolio) might influence value creation and/or value appropriation mechanisms and consequently affect the value tensions in alliances. To date value creation mechanisms, value appropriation mechanisms, and their interdependence have been explored almost uniquely at the dyadic level (Anand

& Khanna, 2000). In fact, while in the last two decades alliance scholars have extended the scope of value tensions to other levels of analysis – a proliferation of studies, respectively, on constellations (Lazzarini, 2007), networks (Gulati, 1998), and portfolio levels (Wassmer, 2010) has emerged-, these studies present two key limitations. First, they focus solely on either value creation mechanisms or value appropriation mechanisms, thereby overlooking the crucial importance of their interdependence. Second, they fall short to explore how some peculiarities emerging from constellations, networks, and alliance portfolio may influence *simultaneously* both value creation and value appropriation mechanisms. Therefore, it would be interesting to scrutinize how and to what extent the characteristics of the three levels of analysis (constellation, network, and portfolio) influence value creation mechanisms, value appropriation mechanisms, and their reciprocal interdependence.

A second intriguing line of research pertains to partners' attributes. Partner attributes (size, experience, and age) might change the value tensions in alliances. While extant studies have shown how larger, more experienced, and older partners may influence (sometimes positively, other times negatively) value creation mechanisms (Anand & Khanna, 2000; Khanna et al., 1998; Mindruta, 2013; Wang & Zajac, 2007), or value appropriation mechanisms (Lazzarini, 2007; Sinha & Cusumano, 1991; Wassmer & Dussauge, 2011), their interdependence remains a fertile area to explore. Hence, an attractive line of research is to investigate how partner attributes (size, experience, and age) might affect the nature of the interdependence between value creation and value appropriation mechanisms, and hence value tensions in alliances.

Last, little attention has been paid to the impact of environmental issues on value tensions in alliances. The importance of this antecedent has been claimed earlier by Dyer (1996b, p. 289), when the author argues that institutional/contracting environment, industry uncertainty or volatility, and product/task interdependence influence transaction specific investments as a source of competitive advantage. To our knowledge, no study on this issue has been performed. Actually, whereas Ang (2008) has studied how industry level technological intensity moderates how coopetition influences firm growth, the generalizability of this study loses significance when other characteristics of the environment, such as the industry context and technological change, are not included in the analysis. We thus believe that alliance scholars should explore how and to what extent these two characteristics of the environment (i.e., industry and technology change) affect value creation and value appropriation mechanisms, as well as their crucial interdependence.

5.2. Interdependence between and within value creation mechanisms and value appropriation mechanisms

As concerns the interdependence between value creation and value appropriation mechanisms, we suggest three areas of research that might offer a better understanding of this intricacy. First, we are aware that the interdependence between value creation and value appropriation mechanisms might be integrated by means of the inclusion of other value creation and value appropriation mechanisms. The conceptual map we propose shows that four key value creation mechanisms (i.e., resource combinations, asset specificity, commitment, and trust) help firms create value by way of strategic alliances. However, the explanatory power that these mechanisms have of value creation processes might be enhanced or reduced by the existence of other mechanisms, such as "intent to

learn" and "pre-commitment." Intent to learn is the propensity of partners to view collaboration as a learning opportunity (Hamel, 1991; Hamel, Doz, & Prahalad, 1989). Pre-commitment is a commitment device by which a partner strengthens its position in a strategic alliance by cutting off options to make its threats more credible (Schelling, 1966). Future studies may consider to examine how and to what extent these two integrative mechanisms may help firms generate value, as well as to appreciate whether and how they hamper or facilitate the interdependence between value creation and value appropriation mechanisms.

As regards value appropriation mechanisms, the relative urgency of a partner to initiate an alliance might enhance the value appropriation process. Actually, relative urgency refers to a firm's stronger need to initiate an alliance compared to the one of its partner. In fact, the higher a firm's need to start an alliance, the lower the probability that this firm may appropriate more rents than its partners.

Second, the interdependence between value creation and value appropriation mechanisms may be studied from a specific focus on the dual causal-and-effect relationship between such mechanisms. Our analysis shows that at least one or more value creation mechanism(s) influence one or more value appropriation mechanism(s). Specifically, we found that commitment and asset specificity influence the bargaining position of each partner. It would be interesting to investigate whether the other two value creation mechanisms (resource combinations and trust) may influence the firm's capacity to appropriate the value it created. We also argue that at least one or more value appropriation mechanism(s) influence one or more value creation mechanism(s). In particular, competition and isolating mechanisms affect value creation for the future. It would be

important to detect whether and how the other two value appropriation mechanisms (such as bargaining power and absorptive capacity) may affect value creation in the future.

Third, by analyzing the interdependence among value creation mechanisms and the one among value appropriation mechanisms, alliance scholars could make the interdependence between value creation and value appropriation mechanisms more intelligible. Research on the interdependence between value creation and value appropriation mechanisms would benefit from the inspection of the cause-and-effect relationship among value creation mechanisms, as well as from the one among value appropriation mechanisms. Put it simply, value creation mechanisms may affect each other, thereby making it relevant to carry out research on value tensions. While extant research shows that asset specificity is contingent to the interdependences and complementarities of resources (Dyer, 1996b; Mindruta, 2013), other relationships among value creation mechanisms are yet to be explored. As finally regards how value appropriation mechanisms affect each other, Yan & Gray (1994) show that isolating mechanisms moderate changes in bargaining power. Exploring the interdependence within value appropriation mechanisms is an equally important research area that remains to address.

5.3 Measures of value creation and value appropriation mechanisms

Research on the interdependence between value creation and value appropriation mechanisms may also benefit from the development of appropriate measures. This may occur in three ways. First, alliance scholars may operationalize the interdependence between value creation and value appropriation mechanisms. To our knowledge, no existing study has measured jointly value creation and value appropriation mechanisms.

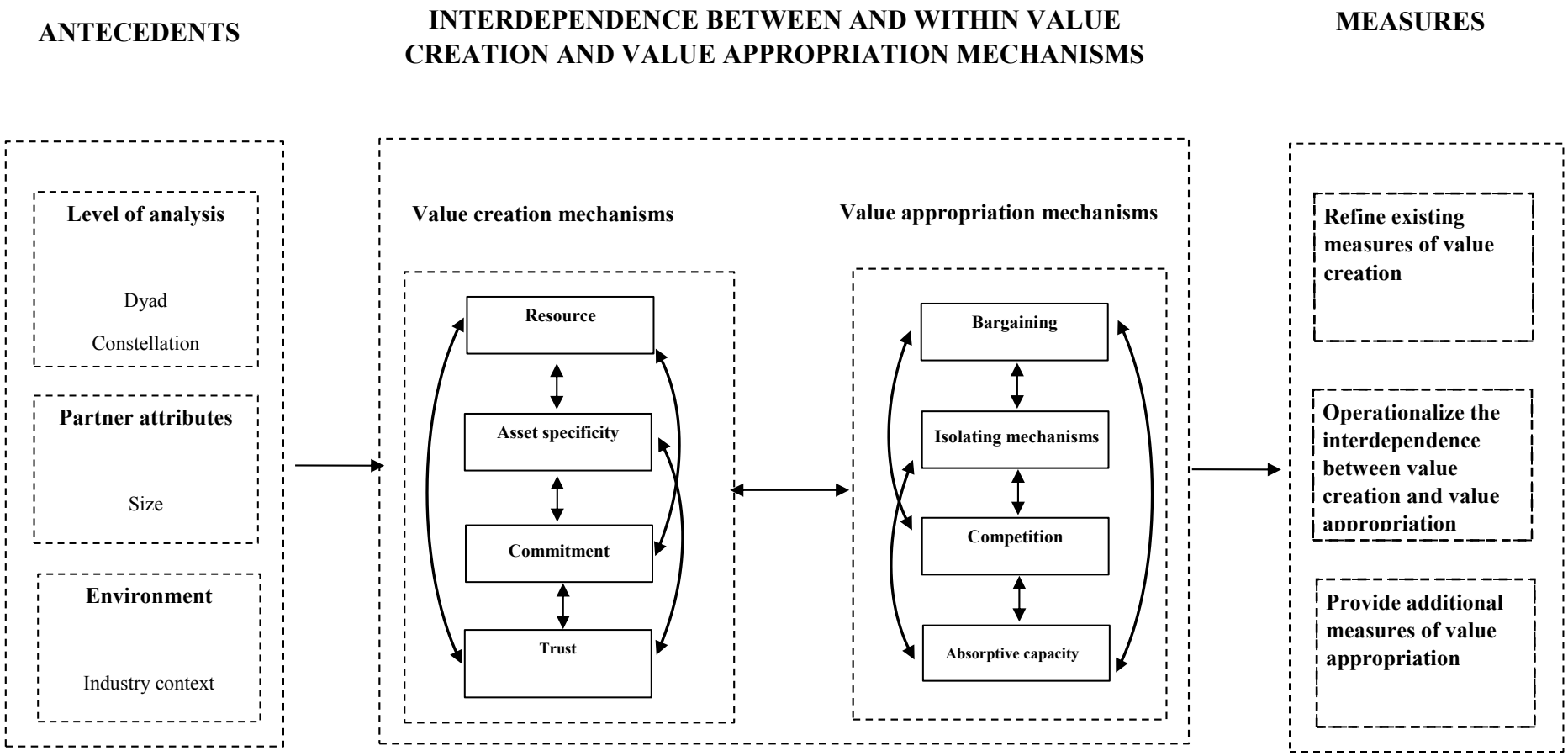
Focusing either on value creation or value appropriation mechanisms, therefore extant research falls short to draw generalizations either on value creation and value appropriation mechanism interdependence, or on value tensions. Endogeneity problems due to reverse causation, that emerge when only one part of the value tension is measured (value creation or value appropriation), inevitably occur. To circumvent these problems, future research should put efforts in measuring the relationship between value creation and value appropriation mechanisms. Since both types of mechanisms are dynamic, interrelated, and change over time, while we acknowledge that this is not an easy task, we encourage scholars to pursue this direction actively.

Second, alliance scholars may craft better measures of value creation mechanisms. Hitherto a range of studies has measured the creation of value by using event study methodology (Anand & Khanna, 2000; Wassmer & Dussauge, 2011). Specifically, they ground value creation measures on the estimation of abnormal stock market returns of the alliance in a period ranging 200 days surrounding the alliance announcement. However, the limitation of this methodology is that such studies have operationalized value creation by focusing uniquely on the value of only one partner. As a consequence, these studies uncover only a part of the story. The implementation of a matching model (Mindruta, 2013) might be a germane promising approach to calculate value creation for both partners thereby resolving the issue at hand. Other appropriate measures may be surveys and questionnaires (see Holm, Eriksson, & Johansson, 1999) especially designed to compute value creation mechanisms for alliance partners.

Last but not least, alliance scholars could develop additional measures of value appropriation mechanisms. Adegbesan & Higgins (2010) provide a good measure of value

appropriation. The authors measure the distribution of gains between alliance partners by identifying the pie-splitting control rights, which reflect the ex ante allocation of value between partners. Pie-splitting control rights are a good measure of value appropriation since they confer ownership and control over activities and intermediate outputs that directly affect the allocation of portions of the overall value created by an alliance. Notwithstanding that, this measure is not helpful in keeping into account the collection of Intellectual Property assets each alliance partner can bring to the alliance (Di Minin and Faems, 2013). Moreover, this mesure refers to value appropriation as a whole process falling short to underscore the role of the specific mechanisms of value appropriation. Consequently, scholars should aim to develop distinct measures of each value appropriation mechanism.

Figure 2. Research agenda on value tensions between value creation and value appropriation mechanisms in strategic alliances



6. MANAGERIAL IMPLICATIONS

This study offers several managerial implications. First, alliance managers ought to pay attention to the concrete processes of value creation and value appropriation. While value creation refers to the processes leading to the generation of common benefits available to share by all the partners in an alliance, value appropriation relates to the processes determining the distribution of common benefits to the individual alliance partners, and to the capacity of the individual partners to capture private benefits that are unavailable to other partners.

Second, in order to manage the processes of value creation and value appropriation in strategic alliances more effectively, executives should ascertain the existence of, as necessary mandate the development of, and ensure the fruitful leverage of the mechanisms underlying, respectively, alliance value creation and value appropriation. Specifically, we pinpoint that four key mechanisms, such as resource combinations, asset specificity, commitment, and trust, allowing firms to generate value in strategic alliances, while another four mechanisms, namely bargaining power, isolating mechanisms, competition, and absorptive capacity, preside over value extraction in the same context.

Third, our study calls executives' attention to the fact that the processes of value creation and value appropriation, far from being at odd with each another, are in fact in a potentially virtuous loop. Minding this will allow alliance managers to treat value creation and value appropriation processes in a joint fashion, so as to launch and take profit from a sequence of value creation and value appropriation loops, while anticipating and resolving the emerging tensions among them that our study also identifies.

Fourth, although alliance executives are nowadays pretty well acquainted with the use of a dedicated alliance function, that is usually planned and implanted in the business organization to share and leverage prior alliance management experience and know-how (Dyer, Kale and Singh, 2001), our research encourages them to see it in an expanded fashion. In such way, the dedicated alliance function turns into a strategic device to cope simultaneously with the intricacies given by the joint management of value creation and value appropriation processes in the initiation and evolution of an alliance or an alliance portfolio.

7. CONCLUSIONS

This study has aimed to make several contributions with implications for future research. First, starting from a systematic review of the literature, we identify a theoretically robust foundation from which to examine the conditions under which specific value creation mechanisms and specific value appropriation mechanisms are (more or less) effective. Thus, we resolve the extant confusion regarding the respective meanings of value creation and value appropriation mechanisms.

Second, this study contributes to identifying and resolving the tensions that result from the interdependence between value creation and value appropriation. We developed a conceptual map of the tensions between value creation and value appropriation mechanisms that is helpful to anticipate and systematically manage these tensions, and enable a virtuous cycle of value creation and appropriation. This map, in turn, may contribute to advancing research in related fields and topics of study which likewise exhibit tensions – for instance, between incentives and control in and between organizations.

Last but not least, by identifying and presenting an agenda of research opportunities for subsequent studies, we stimulate the advancement of research in this complex area. In particular, we propose a menu of directions for future studies (organized under the categories of antecedents, interdependence, and measures of value creation and value appropriation) that will be of interest to scholars and students who wish to approach this fertile, promising, and relatively underexplored area of study.

8. APPENDIX: BIBLIOMETRIC ANALYSIS

In order to enhance the robustness of our articles search, and thus to pull out conclusions about the linkages of value creation and value appropriation mechanisms, we performed a bibliometric analysis. We did so to explore whether collected works reference a common work in their bibliographies (Podsakoff, MacKenzie, Podsakoff, & Bachrach, 2008), that is of fundamental importance to value tensions research although it is published in academic journals that are usually not included in the list of the leading ones.

We extracted 3,114 references from our final sample of 50 articles. Then, we ordered such references and calculated how often each reference was included in the reference lists of the 50 articles. We summarize the most frequent references and list references that were cited more than 10 times.

Results from this bibliometric analysis confirm that our sample and the conclusions we draw from it, do not suffer from missing information bias concerning value tensions research in strategic alliances. In particular, no study that is highly cited, important for 0value tensions research was excluded from our sample. Indeed, the most frequent

references, reported by Table 1, are milestones of strategic management research (Barney, 1991) or related fields (Burt, 1992), or feature themselves in our article sample (Hamel, 1991). Thus, after running this analysis, we can argue with some confidence that our sample is representative of value creation and value appropriation literature in strategic alliance research.

Appendix. Articles most frequently cited on value creation and value appropriation

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17* (1), 99–120.	16
Burt, R. S. (1992). *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.	
Cohen, W., & Levinthal, D. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, *35*, 128–152.	13
Dyer, J. H., & Singh, H. (1998). The relational view: cooperative strategies and sources of interorganizational competitive advantage. *Academy of Management*	
Gulati, R. (1995). Does familiarity breed trust? The implications of repeated ties for contractual choices in alliances. *Academy of Management Journal*, *38* (1),	13
Gulati, R. (1998). Alliances and networks. *Strategic Management Journal*, *19* (4), 293–318.	11
Hamel, G. (1991). Competition for competence and interpartner learning with international strategic alliances. *Strategic Management Journal*, Summer Special	12
Khanna, T., Gulati, R., & Nohria, N. (1998). The dynamics of learning alliances: competition, cooperation, and relative scope. *Strategic Management Journal*,	12
Kogut, B. (1988). Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal*, *9* (4), 319–322.	18
Kogut, B. (1989). The stability of joint ventures: reciprocity and competitive rivalry. *Journal of Industrial Economics*, *38*, 1–16.	12
Nelson, R. R., & Winter, S. G. (1982). *An Evolutionary Theory of Economic Change*. Cambridge, MA: Belknap Press of Harvard University Press.	12
Parkhe, A. (1993). Strategic alliance structuring: a game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal*,	14
Pfeffer, J., & Salancik, G. R. (1978). *The External Control of Organizations*. New York: Harper & Row.	12
Porter, M. E. (1980). *Competitive Strategy*. New York: Free Press.	11
Powell, W., Koput, K., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology.	10
Wernerfelt, B. (1984). A resource based view of the firm. *Strategic Management Journal*, *5* (2), 171-180.	10
Williamson, O. E. (1985). *The Economic Institutions of Capitalism*. New York: Free Press.	11

Note: The frequency indicates how many times the article was cited in the other articles of the sample. The table lists articles that were cited at least 10 times.

9. REFERENCES

Adegbesan, J. A. (2009). On the origins of competitive advantage: strategic factor markets and heterogeneous resource complementarity. *Academy of Management Review, 34* (3), 463–475.

Adegbesan, J. A., & Higgins, M. J. (2010). The intra-alliance division of value created through collaboration. *Strategic Management Journal*, *32*, 187-211.

Anand, B. N., & Khanna, T. (2000). Do firms learn to create value? The case of alliances. *Strategic Management Journal*, *21*, 295-315.

Anderson, E., & Weitz, B. (1992). The use of pledges to build and sustain commitment in distribution channels. *Journal of Marketing Research*, 18-34.

Ang, S. H. (2008). Competitive intensity and collaboration: impact on firm growth across technological environments. *Strategic Management Journal*, *29*, 1057-1075.

Aoki, M. (1988). *Information, Incentives, and Bargaining in the Japanese Economy. New York:* Cambridge University Press.

Asanuma, B. (1989). Manufacturer-supplier relationships in Japan and the concept of relation-specific skill. *Journal of the Japanese and International Economies, 3*, 1-30.

Bacharach, S. B., & Lawler, J. L. (1984). *Bargaining: Power, Tactics, and Outcomes*. San Francisco, CA: Jossey-Bass.

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

Beamish, P. W., & Banks, J. C. (1987). Equity joint ventures and the theory of the multinational enterprise. *Journal of International Business Studies*, Summer, 1–16.

Becker, H. S. (1960). Notes on the concept of commitment. *American Journal of Sociology*, *66,* 32-40.

Belderbos, R., Cassiman, B., Faems, D., Leten, B., & Van Looy, B. (2014). Co-ownership of intellectual property: exploring the value-appropriation and value-creation implications of co-patenting with different partners. *Research Policy*, *43* (5), 841–852.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Harvard University Press.

Butler, B., & Batt, P. J. (2014). Re-assessing value (co)-creation and cooperative advantage in international networks. *Industrial Marketing Management, 43* (4), 538–542.

Clark, K. B., & Fujimoto, T. (1991). *Product Development Performance*. Boston: Harvard Business School Press.

Coff, R.W. (1999). When competitive advantage doesn't lead to performance: the resource-based view and stakeholder bargaining power. *Organization Science*, *10*, 119-133.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly, 35*, 128-152.

Coleman, J. S. (1990). *Foundations of Social Theory*. Cambridge, MA: Harvard University Press.

Cullen, J. B., Johnson, J. L., & Sakano, T. (1995). Japanese and local partner commitment to IJVs: psychological consequences of outcomes and investments in the IJV relationship. *Journal of International Business Studies*, *26*, 91-115.

Das, T. K., & Teng, B. S. (2000a). A resource-based theory of strategic alliances. *Journal of Management, 26* (1), 31–61.

Das, T. K., & Teng, B. S. (2000b). Instabilities of strategic alliances: an internal tensions perspective. *Organization Science*, *11* (1), 77–101.

Di Minin, A., & Faems, D. (2013). Building appropriation advantage. *California Management Review,* 55(4), 7-14.

Dussauge, P., Garrette, B., & Mitchell, W. (2000). Learning from competing partners: outcomes and durations of scale and link alliances in Europe, North America, and Asia. *Strategic Management Journal, 21* (2), 99–126.

Dyer, J. H. (1996a). Specialized supplier networks as a source of competitive advantage: evidence from the auto industry. *Strategic Management Journal, 17*, 271-292.

Dyer, J. H. (1996b). Does governance matter? Keiretsu alliances and asset specificity as sources of Japanese competitive advantage. *Organization Science*, *7*, 649-666.

Dyer, J. H., Kale, P., & Singh, H. (2001). How to make strategic alliances work. *MIT Sloan Management Review*, *42* (4), 37.

Dyer, J. H., & Ouchi, W. G. (1993). Japanese style business partnerships: giving companies a competitive edge. *Sloan Management Review, 35* (1), 51-63.

Dyer, H. D., & Singh, H. (1998). The relational view: cooperative strategy and sources of inter-organizational competitive advantage. *Academy of Management Review*, *23* (4), 660–679.

Dwyer, F. R., Schurr, P. H., & Oh, S. (1987). Developing buyer-seller relationships. *Journal of Marketing, 51* (April), 11–27.

Ghemawat, P., Porter, M. E., & Rowlinson, R. A. (1986). Patterns of international coalition activity. In M. E. Porter (Eds.), *Competition in global industries*, Boston MA: Harvard University Press.

Gnyawali, D. R., He, J., & Madhavan, R. (2006). Impact of co-opetition on firm competitive behavior: an empirical examination. *Journal of Management*, *32* (4), 507-530.

Gulati, R. (1995). Social structure and alliance formation pat terns: a longitudinal analysis. *Administrative Science Quarterly*, *40,* 619-665.

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

Gulati, R., Khanna, T., & Nohria, N. (1994). Unilateral commitments and the importance of process in alliances. *Sloan Management Review*, *35* (3), 61.

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

Hamel, G., Doz, Y., & Prahalad, C. K. (1989). Collaborate with your competitors and win. *Harvard Business Review*, *67*(1), 133-139.

Hannan, M. T., & Freeman, J. (1987). The ecology of organizational foundings: American labor unions, 1836-1985. *American Journal of Sociology*, *92*, 910-943.

Hanvanich, S., Richards, M., Miller, S. R., & Cavusgil, S. T. (2005). Technology and the effects of cultural differences and task relatedness: a study of shareholder value creation in domestic and international joint ventures. *International Business Review*, *14* (4), 394-414.

Harrigan, K. R., & Newman, W. H. (1990). Bases of interorganization cooperation: propensity, power, persistence. *Journal of Management Studies, 27,* 417-434.

Hennart, J. F. (1988). A transaction costs theory of equity joint ventures. *Strategic Management Journal*, *9* (4), 361-374.

Holm, D. B., Eriksson, K., & Johanson, J. (1999). Creating value through mutual commitment to business network relationships. *Strategic Management Journal, 20* (5), 467-486.

Inkpen, A. C., & Beamish, P.W. (1997). Knowledge, bargaining power, and the instability of international joint ventures. *Academy of Management Review*, *22* (1), 177–202.

Isobe, T., Makino, S., & Montgomery, D. B. (2000). Resource commitment, entry timing, and market performance of foreign direct investments in emerging economies: the case of Japanese international joint ventures in China. *Academy of Management Journal*, *43 (*3), 468-484.

James, S. D., Leiblein, M. J., & Lu, S. (2013). How firms capture value from their innovations. *Journal of management, 39*(5), 1123-1155.

Khanna, T., Gulati, R., & Nohria, N. (1998). The dynamics of learning alliances: competition, cooperation, and relative scope. *Strategic Management Journal*, *19* (3), 193–210.

Kim, M. (2015). Geographic scope, isolating mechanisms, and value appropriation. *Strategic Management Journal*. DOI: 10.1002/smj.2356.

Kogut, B. (1988). Joint ventures: Theoretical and empirical perspectives. *Strategic Management journal*, *9*(4), 319-332.

Kogut, B. (1989). The stability of joint ventures: reciprocity and competitive rivalry. *The Journal of Industrial Economics*, 183-198.

Krishnan, R., Martin, X., & Noorderhaven, N. G. (2006). When does trust matter to alliance performance. *Academy of Management Journal*, *49*, 894-917.

Kumar, R., & Nti, K. O. (1998). Differential learning and interaction in alliance dynamics: a process and outcome discrepancy model. *Organization Science*, *9* (3), 356–367.

Lane, P. J., Salk, J. E., & Lyles, M. A. (2001). Absorptive capacity, learning, and performance in international joint ventures. *Strategic Management Journal*, *22*, 1139–1161.

Lavie, D. (2006). The competitive advantage of interconnected firms: an extension of the resource-based view. *Academy of Management Review*, *31* (3), 638–658.

Lavie, D. (2007). Alliance portfolios and firm performance: a study of value creation and appropriation in the U.S. software industry. *Strategic Management Journal*, *28,* 1187-1212.

Lax, D. A., & Sabenius, J. K. (1986). The manager as negotiator: bargaining for cooperative and competitive gain. New York: Free Press.

Lazzarini, S. G. (2007). The impact of membership in competing alliance constellations: evidence on the operational performance of global airlines. *Strategic Management Journal*, 28, 345-367.

Lepak, D. P., Smith, K. G., & Taylor, M. S. (2007). Value creation and value capture: a multilevel perspective. *Academy of Management Review*, *32* (1), 180-194.

Lippman, S. A., & Rumelt, R. P. (1982). Uncertain imitability: an analysis of interfirm differences in efficiency under competition. *Bell Journal of Economics, 13* (2), 418-438.

MacDonald, G., & Ryall, M. D. (2004). How do value creation and competition determine whether a firm appropriates value? *Management Science*, *50* (10), 1319–1333.

Merchant, H., & Schendel, D. (2000). How do international joint ventures create shareholder value? *Strategic Management Journal*, *21* (7), 723–737.

Mindruta, D. (2013). Value creation in university-firm research collaborations: A matching approach, *Strategic Management Journal*, *34*, 644–665.

Mitchell, W., & Singh, K. (1996). Entrenched success: The reciprocal relationship between alliances and business sales. Proceedings *of the Academy of Management,* 31-35.

Morris, J., & Sherman, J. D. (1981). Generalizability of an organizational commitment model. *Academy of Management Journal*, *24*, 512-526.

Mowday, R.T., Porter, L.W., & Steers, R. M. (1982). *Employee–organizational linkages: the psychology of commitment, absenteeism, and turnover*. New York: Academic Press.

Murphy, J. T., & Schindler, S. (2011). Globalizing development in Bolivia? Alternative networks and value-capture challenges in the wood products industry. *Journal of Economic Geography*, 1–25.

Nagarajan, M., & Sošić, G. (2008). Game-theoretic analysis of cooperation among supply chain agents: review and extensions. *European Journal of Operational Research*, *187* (3), 719-745.

Nam, I., Gruca, T. S., & Tracy, R. (2010). The effects of competition on referral alliances of professional service firms. *Organization Science*, 21, *216–231.*

Nelson, R. R., & Winter, S. G. (1992). *An evolutionary theory of economic change*. Harvard University Press.

Nishiguchi, T. (1994). *Strategic Industrial Sourcing.* New York: Oxford University Press.

Oxley, J. E., & Silverman, B. S. (2008). Inter-firm alliances: a new institutional economics approach. In *New Institutional Economics: A Guidebook*, E. Brousseau & J. M. Glachant (Eds). New York: Cambridge University Press.

Park, S. H., & Russo, M. V. (1996). When competition eclipses cooperation: an event history analysis of joint venture failure. *Management Science*, *42* (6), 875–890.

Park, S. H., & Ungson, G. R. (2001). Inter-firm rivalry and managerial complexity: a conceptual framework of alliance failure. *Organization Science*, 12 (1), 37-53.

Parkhe, A. (1993). Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation. Academy of *M*anagement *J*ournal*,* 36 (4), 794-829.

Perry, M. K. (1989). Vertical integration. In R. Schmalensee & R. Willig (Eds.), *Handbook of Industrial Organization* Amsterdam: North Holland.

Pfeffer, J., & Nowak, P. (1976). Joint ventures and interorganizational interdependence. *Administrative Science Quarterly*, *21*, 398–418.

Pfeffer, J., & Salancik, G. R. (1978). *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper & Row.

Picone, P. M., Dagnino, G. B., & Minà, A. (2014). The origin of failure: a multidisciplinary appraisal of the hubris hypothesis and proposed research agenda. *Academy of Management Perspectives*, *28* (4), 447–468.

Podsakoff, P. M., MacKenzie, S. B., Podsakoff, N. P., & Bachrach, D. G. (2008). Scholarly influence in the field of management: a bibliometric analysis of the determinants of university and author impact in the management literature in the past quarter century. *Journal of Management*, *34*(4), 641-720.

Polidoro, F., Ahuja, G., & Mitchell, W. (2011).When the social structure overshadows competitive incentives: the effects of network embeddedness on joint venture dissolution. Academy of Management Journa*l,* 54 (1), 203-223.

Porter, M. E., & Fuller, M. B. (1986). Coalitions and global strategy. In M. E. Porter (Ed.), Competition in Global Industries. Cambridge, MA: Harvard University Press.

Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative science quarterly*, 116-145.

Reichers, A. E. (1985). A review and reconceptualization of organizational commitment. *Academy of Management Review*, *10*, 465-476.

Richardson, G. B. (1972). The organization of industry. *Economic Journal*, 82(327), 883–896.

Ritala, P., & Hurmelinna-Laukkanen, P. (2009). What's in it for me? Creating and appropriating value in innovation-related coopetition. *Technovation*, *29*, 819-828.

Root, F. R. (1988). Some taxonomies of international cooperative arrangements. In F. J. Contractor & P. Lorange (Eds.), *Cooperative strategies in international business* Lexington, MA: Lexington Books.

Schelling, T. C. (1966). Arms and Influence. New Haven, CN: Yale University Press.

Shoemaker, P. Amit (1994). Investment in strategic assets industry and firm level perspectives. *Advances in Strategic Management. JAI Press, Grenwich A*, *10*.

Shamdasani, P. N., & Sheth, J. N. (1995). An experimental approach to investigating satisfaction and continuity in marketing alliances. *European Journal of Marketing*, *29* (4), 6-23.

Shi, W. S., Sun, J., & Prescott, J. E. (2012). A temporal perspective of merger and acquisition and strategic alliance initiatives review and future direction. *Journal of Management*, *38*, 164-209.

Sinha D. K., & Cusumano, M. A. (1991). Complementary resources and cooperative research: a model of research joint ventures among competitors. *Management Science*, 37 (9), 1091-1106.

St John, C. H., & Harrison, J. S. (1999). Manufacturing-based relatedness, synergy, and coordination. *Strategic Management Journal*, *20* (2), 129–145.

Tanriverdi, H., & Venkatraman, N. (2005). Knowledge relatedness and the performance of multibusiness firms. *Strategic Management Journal*, *26* (2), 97–119.

Vasudeva, G., & Anand, J. (2011). Unpacking absorptive capacity: a study of knowledge utilization from alliance portfolios. *Academy of Management Journal*, *54* (3), 611–623.

Yan, A., & Gray, B. (1994). Bargaining power, management control, and performance in United States–Chinese joint ventures: a comparative case study. *Academy of Management Journal*, *37* (6), 1478–1517.

Yu, T., & Cannella, A. A., Jr. (2007). Rivalry between multinational enterprises: an event history approach. *Academy of Management Journal*, *50* (3), 663-84.

Wang, L., & Zajac, E.J. (2007). Alliance or acquisition? A dyadic perspective on interfirm resource combinations. *Strategic Management Journal*, *28*, 1291–1317.

Walker, G., Kogut, B., & Shan, W. (1997). Social capital, structural holes and the formation of an industry network. *Organization Science*, *8*, 109-125.

Wassmer, U. (2010). Alliance portfolio: A review and research agenda. *Journal of Management*, *36*, 141-171.

Wassmer, U., & Dussauge, P. (2011). Network resource stocks and flows: how do alliance portfolios affect the value of new alliance formations? *Strategic Management Journal*, *33* (7), 871–883.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, *5*(2), 171-180.

Williamson, O. E. (1985). *The Economic Institutions of Capitalism.* New York: Free Press.

Zajac, E. J., & Olsen, C. P. (1993). From transaction cost to transaction value analysis: implications for the study of interorganizational strategies. *Journal of Management Studies, 30*, 131-145.

REFERENCES TO ARTICLES NOT INCLUDED IN TABLE 1

Ang, S. H. (2008). Competitive intensity and collaboration: Impact on firm growth across technological environments. *Strategic Management Journal*, 29(10), 1057-1075.

Gnyawali, D. R., & Madhavan, R. (2001). Cooperative networks and competitive dynamics: A structural embeddedness perspective. *Academy of Management Review*, 26(3), 431-445.

Harrigan, K. R. (1988). Joint ventures and competitive strategy. *Strategic Management Journal*, 9(2), 141-158.

Lacetera, N. (2009). Different missions and commitment power in R&D organizations: Theory and evidence on industry-university alliances. *Organization Science*, 20(3), 565-582.

Park, S. H., & Zhou, D. (2005). Firm heterogeneity and competitive dynamics in alliance formation. *Academy of Management Review*, 30(3), 531-554.

CHAPTER II

UNDERSTANDING R&D ALLIANCE CONFIGURATION USING FUZZY SET ANALYSIS[5]

Abstract

Because R&D alliances are an important means for fostering firm innovation performance, research has investigated their key drivers. However, the importance of combinatory effects among R&D alliance drivers and their implications for firm innovation performance have been largely underestimated. Drawing on the knowledge-based view of alliances, we investigate R&D alliance configurations of factors affecting high innovation performance in the allied firms, first selecting two groups of factors: (a) partners' attributes (size, age, and experience) and (b) alliance characteristics (strategic orientation and structure). Then, using fuzzy set Qualitative Comparative Analysis, we dissect the configurations of these factors in 33 R&D alliances formed by 75 telecom firms worldwide. We find that high innovation performance is obtained by older R&D alliance partners and by leveraging extensive partner experience. These types of alliances are more effective when the R&D alliance has no strategic orientation or when it involves competitors. Drawing on these findings, we submit a set of propositions with implications for the knowledge-based view of alliances.

Key words: knowledge-based view of alliances; R&D alliance drivers and configurations, qualitative comparative method (QCA).

[5] The present chapter has been elaborated together with Professor Giovanni Battista Dagnino (University of Catania) and Nadia Di Paola (University of Naples Federico II).

1. INTRODUCTION

R&D alliances are intensively used by firms operating in high technology industries (George et al., 2001) and serve as an important means for fostering firm innovation performance (Faems et al., 2005). For example, R&D alliances allow firms to access a greater collection of information types (Lahiri and Narayanan, 2013) and to leverage such knowledge to confront technological discontinuities (Vasudeva and Anand, 2011). Drawing upon the importance that R&D alliances have assumed in innovation performance for firms today, extant research has examined the innovation performance implications of a variety of individual factors driving R&D alliances, including the partners' attributes and the alliance characteristics (Inkpen and Beamish, 1997; Stuart, 2000).

At the same time, recent scholarly works on alliances consider alliance configurations to be a central research stream of alliance research (Wassmer, 2010). An alliance configuration is a comprehensive concept comprising multiple dimensions. The configuration of a focal firm's alliance essentially determines (1) the quality, quantity, and diversity of information and resources to which the focal firm has access; (2) the efficiency of its access to these information and resources; and (3) the flexibility or stability of the focal firm's position in the alliance (Hoffmann, 2007: 834). Despite the prominence of alliance configurations in today's alliance inquiries (Wassmer, 2010), extant research has fallen short of developing a clear understanding of R&D alliance configurations and their implications for firm innovation performance. In addition, research has largely underestimated whether the presence of combinatory effects from R&D alliance drivers has an influence on firm innovation performance. Thus, exploring whether these combinatory effects create an R&D alliance configuration that allows firms to

achieve high innovation performance will help us to develop our understanding of R&D alliances' influence on firm innovation performance.

The aim of this paper is to acquire better knowledge of this underrated but nonetheless important aspect of alliance investigation. Specifically, we ask the following: what R&D alliance configurations lead firms involved in R&D alliances to achieve high innovation performance? This research question is interesting to explore since, as mentioned earlier, R&D alliances and their configurations are relevant to firm innovation performance (Faems et al., 2005; George et al., 2001). To tackle this question, we rely on a knowledge-based view (henceforth, KBV) of alliances (Grant and Baden-Fuller, 2004; Vasudeva and Anand, 2011) to identify the drivers of R&D alliances. We single out two main groups of drivers: (a) partners' attributes (size, age, and experience) and (b) alliance characteristics (strategic orientation and structure). Then, using a method grounded in fuzzy set Qualitative Comparative Analysis (henceforth, fsQCA) (Fiss, 2007, 2011; Grandori and Furnari, 2008; Ragin, 2008), we examine which R&D alliance configurations provide sufficient conditions for firms to achieve high innovation performance. Specifically, we explore the configurations of 33 R&D alliances formed in the year 2010 and their impact on the innovation performance of 75 telecom firms worldwide. We collect alliance data by using the Factiva database and firms' innovation performance by utilizing the QPAT and OECD World Bank databases.

The findings of the fuzzy set analysis suggest that three alternative R&D alliance configurations offer sufficient conditions to achieve high innovation performance: 1) an alliance configuration with high partner age; 2) an alliance configuration with extensive partner experience and no strategic orientation; and 3) an alliance configuration with extensive partner

experience and a horizontal structure. Drawing on these findings, this study offers three propositions that expand the breadth of the KBV of alliances.

The study is structured as follows. Section two reviews the KBV and its relevance for the configuration of R&D alliances. Section three explores the existing alliance literature and uses the KBV of alliances to identify the drivers of R&D alliance configurations. Section four shows the fsQCA methodology that we use. Section five presents the empirical results. Section six discusses the findings of the study and offers three propositions to support the KBV of R&D alliances. Section seven highlights the conclusions of the study, assesses its limitations, and provides a few directions for future research.

2. THEORETICAL BACKGROUND

2.1 From the knowledge-based view of the firm to the knowledge-based view of the alliance

Emerging as an outgrowth of the resource-based view (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984), the knowledge-based view of the firm (Grant, 1996b; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995; Spender, 1996) offers an answer to issues concerning the existence, the boundaries, and the internal organization of firms (Foss, 1996). In contrast to the resource-based view, which claims that the competitive advantage of firms resides in the possession of resources that are rare, inimitable, valuable, and non-substitutable, the KBV emphasizes that only one type of firm resource might be considered both strategic and a source of competitive advantage – knowledge (Grant, 1996b; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995; Spender, 1996) – and that it is different from other types of resources (Granstrand, 2000).

According to the KBV, firms must possess two types of knowledge to achieve a competitive advantage: (a) explicit knowledge and (b) tacit knowledge. While tacit knowledge refers to knowing how to do something, explicit knowledge relates to knowing about facts and theories. The distinction between these two different types of knowledge is important, as the means of integrating them within the firm organization vary greatly (Grant, 1996b). While both types of knowledge are necessary to achieve a competitive advantage, the KBV of the firm also argues that the possession of explicit and tacit knowledge does not by itself mean that firms are able to invent, develop, and bring their products to the market. In fact, the KBV suggests that firms' performance heterogeneity is based on the best possible fit between the knowledge they possess (both explicit and tacit), their knowledge domains, and the knowledge the products require (Grant and Baden-Fuller, 2004). Firms possess different stocks of knowledge, and their innovation performance differs based on their ability to create and integrate their knowledge to identify and use technology-based advantages.

In environments characterized by high uncertainty, where rapid technological change, shorter product life cycles, increased costs and risks in product development increase the pace of competition among firms, the KBV suggests that firms need to create and integrate their knowledge by forming a wide set of collaborative agreements with other partners (Sampson, 2007). Alliances contribute to increased efficiency in knowledge application, especially when there is uncertainty over future knowledge requirements and where new products will yield early-mover advantages (Grant and Baden-Fuller, 2004). Firms often search for different types of alliances to create, integrate, and commercialize knowledge in a timely and cost-efficient manner (Grant and Baden-Fuller, 2004). The KBV suggests that these types of alliances,

including manufacturing, marketing, and R&D alliances, may be the bedrock upon which firms build their innovation performance.

Building on previous research, in the next section, we will apply the KBV to understand why firms form R&D alliances to achieve innovation performance. To the best of our knowledge, very few previous studies have used this approach.

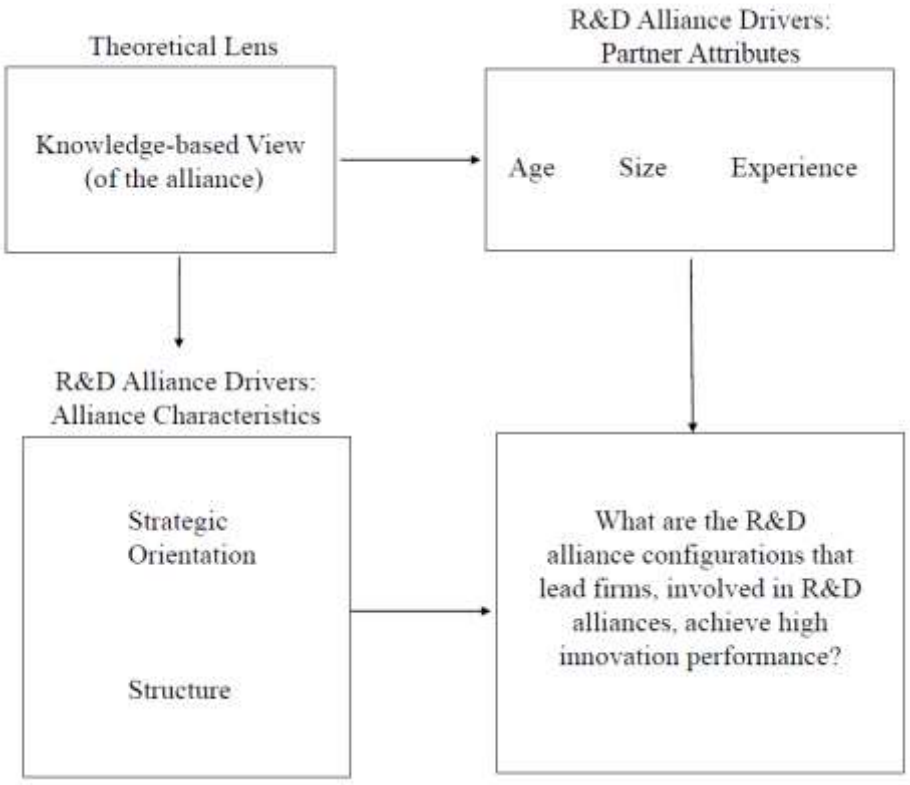
2.2. From the knowledge-based view of the alliance to the knowledge-based view of *R&D alliances*

Recent studies in the KBV domain have shown that firms prioritize the formation of R&D alliances because the knowledge base of many industries (especially hi-tech industries) is complex and rapidly changing (Cesaroni, Di Minin, and Piccaluga, 2004). Therefore, firms find it increasingly hard to nurture all of the scientific knowledge required in-house. Accordingly, firms need to leverage knowledge from their R&D collaborations to confront technological discontinuities (Vasudeva and Anand, 2011), to benefit from accelerated growth rates (Powell et al., 1996), and to adopt exploration and exploitation strategies (Cesaroni, Di Minin, and Piccaluga, 2005). According to the KBV, R&D alliances provide firms with access to a broad variety of information types (Lahiri and Narayanan, 2013). Additionally, these R&D collaborations allow firms to expand their technical knowledge base because each alliance partner has a unique knowledge base and purposely maintains this knowledge base even when forming R&D alliances (Grant, 1996a). Based on this logic, the KBV of alliances suggests that firms form R&D alliances to gain the right to access external knowledge (Caner and Tyler, 2015), which in turn will allow them to achieve and sustain innovation performance (Bae and

Gargiulo, 2004; Faems et al., 2005; Katila and Ahuja, 2002; Quintana-Garcia and Benavides-Velasco, 2011).

In the section that follows, we draw upon the KBV of alliances to identify the drivers of R&D alliances that affect firm innovation performance. Then, we apply a fuzzy set analysis to 75 telecom firms worldwide to explore the combinatory effects of these factors and to identify which configurations of R&D alliances lead firms to achieve high innovation performance. Figure 1 summarizes the elements of our framework and illustrates the main research question of the study.

Figure 1. Key elements of our framework and research question of the study



3. DRIVERS OF R&D ALLIANCES

Drawing on the KBV of the alliance (Grant and Baden-Fuller, 2004; Vasudeva and Anand, 2011), we examined the R&D alliance literature to dissect the drivers of R&D alliances that affect firm innovation performance. We noticed that a number of factors can determine the innovation performance of firms involved in R&D alliances, including the partners' attributes and the alliance characteristics (Baum et al., 2000; Inkpen and Beamish, 1997; Stuart, 2000). Having thoroughly considered the relevance that each individual factor might hold for the KBV of the alliance, we propose that partners' attributes can be subsumed into three attributes: partner size, partner age, and partner experience. As mentioned earlier, the key premise of the KBV of the alliance is that gaining knowledge access is the primary motivation for initiating knowledge-based alliances, such as R&D alliances (Grant and Baden-Fuller, 2004). Based on this assumption, we note that gaining knowledge access depends on the specific partner's attributes, which in turn determine the knowledge domain possessed by the partner that can be accessed through the R&D alliance. First, extant research shows that partner size influences the amount of valuable knowledge that can be accessed by the other alliance partners (Lahiri and Narayanan, 2013). Second, since younger firms have higher failure rates than older firms (Stinchcombe, 1965), partner age determines whether the knowledge that can be accessed through R&D alliances is limited in time. Finally, studies indicate that firms with greater alliance experience develop accessible tacit knowledge in doing alliances and are thus more likely to succeed (Anand and Khanna, 2000; Lyles, 1988). Given their grounding in the KBV

of the alliance, we consider that these three factors (partner size, partner age, and partner experience) well represent access to valuable knowledge offered by partners' attributes[6].

Keeping our focus on the key premise of the KBV of the alliance, we also propose that alliance characteristics can be characterized by two attributes: strategic orientation and alliance structure. First, since extant research suggests that access to knowledge depends on the alliance partners' intentions and their commitment to the alliance (Das and Teng, 1998), the strategic orientation of the alliance determines the scope of knowledge that can be accessed through R&D alliances. Second, since firms' ability to access different types of knowledge depends on whether (or not) they form vertical or horizontal relationships (Inpken and Beamish, 1997), the structure of the alliance affects the knowledge that can be accessed through the formation of an R&D alliance (George et al., 2001). Given their relevance for the KBV of the alliance, we argue that two alliance characteristics (i.e., strategic orientation and alliance structure) well explain the access to knowledge offered by alliance characteristics. In the sub-sections that follow, we use the KBV of R&D alliances to develop the link between each of these factors and the innovation performance of firms involved in R&D alliances.

[6] We acknowledge that alliance studies drawing on the KBV examine additional features of partner characteristics. For instance, previous studies found that partner proximity is another partner characteristic that might be relevant to the scope of knowledge that can be accessed through R&D alliances. Although we recognize the importance of exploring this aspect and its impact on firms' innovation performance, we believe that the analytical treatment of partner proximity requires the treatment of various forms of proximity, such as geographical proximity, cultural proximity (Gill and Butler, 2003), organizational proximity (Meisters and Werker, 2004), institutional proximity (Kirat and Lung, 1999), technological proximity (Greunz, 2003) and social proximity (Bradshaw, 2001). Thus, for reasons of empirical parsimony, we do not include proximity in our study.

3.1 Partner attributes

Size

According to the KBV of the alliance, the first partner attribute that influences the innovation performance of firms involved in an R&D alliance relates to partner size: larger partners often endow valuable resources that enhance firms' performance (Lahiri and Narayanan, 2013). Larger partners' resources, including tangible and intangible assets such as human resources, financial assets, marketing efforts, R&D investments, and reputation, can potentially be accessed by the focal firm through its alliance with them (Lavie, 2007). However, some studies have found that larger partners have more *visibility* (Lubatkin et al., 2006) in the market and more *bargaining power* than smaller firms. These advantages allow larger partners to appropriate more knowledge from R&D alliances, thereby benefitting their innovation performance.

Age

A second partner attribute that has an impact on firms' innovation performance is the age of the partner they involve in their R&D alliances. Some studies have found that older firms have more advantages than young firms (Littler and Sweeting, 1985). These benefits reside, for instance, in the knowledge base that older partners can bring from their established effective work roles and relationships (Brüderl and Schüssler, 1990). According to the KBV of the alliance, since older firms have lower failure rates than younger firms (Stinchcombe, 1965), the knowledge that established partners can share in R&D alliances is not limited in time. By contrast, other studies have found that allying with younger firms is more beneficial than partnering with older firms. In fact, partnering with younger firms could enable the creation of more knowledge in R&D alliances because, for instance, these partners have minimum costs

of redundancy, conflict, and complexity (Baum et al., 2000). Additionally, allying with younger partners allows the firm to circumvent problems from the knowledge rigidities of ageing and risk-aversion (Aldrich and Auster, 1986, Leonard-Barton, 1992). These problems could hinder new product development, thereby affecting firms' innovation performance.

Experience

A third partner attribute that affects firms' innovation performance refers to partner experience. According to the KBV of the alliance, partners that have more experience can bring the knowledge that they have accumulated by forming previous alliances into the R&D alliance. Notably, some studies have found that partners with more alliance experience had, on average, more knowledge on how to leverage innovations from their previous alliances (Duysters et al., 2012). Additionally, other studies show that alliance partners with more experience develop routines to combine their knowledge with previous and current alliance partners (Anand and Khanna, 2000). This, in turn, increases their absorptive capacity (Bouncken and Fredrich, 2016; Cohen and Levinthal, 1990) and positively affects their performance (Mulotte, 2013).

3.2 Alliance characteristics

Strategic orientation

According to the KBV of the alliance, the first characteristic that is considered crucial to firm innovation performance relates to the strategic orientation of the R&D alliance (Hitt et al., 1995; Serapio and Cascio, 1996). The strategic orientation of the alliance indicates the direction that alliance partners intend to pursue and reflects the general characteristics of the alliance and of the partners (Das and Teng, 1998). Since the strategic orientation informs the understanding of partners' intentions and their commitment to the alliance, the formation of an R&D alliance

with a strategic orientation implies that alliance partners will commit and invest their knowledge to develop new and complex technologies, thereby influencing their innovation performance.

Structure

However, there is another alliance characteristic that drives firms' innovation performance. Drawing on the KBV of the alliance, some studies have found that a companion alliance characteristic important for firm innovation performance is the structure of the R&D alliance (George et al., 2001). The structure of the alliance can include both horizontal and vertical relationships. Horizontal relationships involve partners that generate knowledge in the same business area; conversely, vertical relationships are those in which the production of knowledge includes upstream and downstream partners (George et al., 2001). According to the KBV of the alliance, the structure of R&D alliances informs the firms' ability to access different types of knowledge to combine with those they already possess and signals the firms' motivation to form and commit resources to the alliance. Additionally, Inkpen and Beamish (1997) argue that horizontal relationships indicate power sharing and interdependence, while vertical relationships entail power asymmetry. Last, the stability of the relationship and the ability to accomplish strategic objectives are affected by the structure of the alliance (Contractor and Lorange, 1988; Kogut, 1988).

4. METHOD: FUZZY SET QUALITATIVE COMPARATIVE ANALYSIS

4.1 The model

This study aims to identify R&D alliance configurations that lead firms involved in R&D alliances to achieve high innovation performance. To address this research problem, we

employed fsQCA to test the relationship between the factors driving R&D alliances and firm innovation performance. We adopt fsQCA for two reasons. First, fsQCA has recently gained prominence across several research fields (Rihoux et al., 2013), including management research (Wagemann et al., 2016), because it presents various advantages in detecting causal patterns (Fiss, 2007). Accordingly, fsQCA is uniquely suitable for detecting the configuration of attributes, as it allows an advanced assessment of how different causes combine together to affect the relevant outcomes (Fiss, 2007; Ragin, 1987, 2000), such as firm and alliance performance. In this study, we used fsQCA to detect how combinatory effects and the equifinality of the different combinations of partner attributes and alliance characteristics affect firms' innovation performance. Specifically, we relied on these combinatory effects to identify configurations of R&D alliances that lead firms to achieve high innovation performance. To the best of our knowledge, no previous study has used this method to explore combinatory effects in the alliance domain.

Second, fsQCA overcomes the considerable challenges that both qualitative case-oriented research and quantitative variable-oriented methods face in assessing equifinality. By using fsQCA, we analyzed an extensive number of different combinations of elements (i.e., one of the major challenges for qualitative case-oriented research), and this allowed us to strip away elements that are not involved with the outcomes (i.e., one of the major challenges for quantitative variable-oriented methods). Given the two motives above, we believe that fsQCA is a suitable method for examining data and achieving findings that may allow us to advance our knowledge of R&D alliance configurations.

4.2 Case and data selection

Case selection in QCA usually implies purposive sampling (Fiss, 2009; Ragin, 2000), and accordingly we selected cases of R&D alliances formed worldwide in the telecom industry during the year 2010. The alliance data for this study were downloaded from the Factiva database, which contains data comprising worldwide business information, including R&D alliances, from 1994 onwards. This database well exemplifies the richness of information that alliance scholars can use in the current research environment (Lavie, 2007). Specifically, using this database, we accessed a vast amount of qualitative data that we used to perform QCA analyses. Factiva provides access to thousands of sources in 28 languages from nearly 200 countries and 35 years of articles, analysts' reports, press releases, partner listings, manager interview transcripts, and tweets for our R&D alliance cases. This massive amount of data offered notable opportunities to consciously extrapolate several qualitative aspects for our R&D alliance cases, including the key general information about partners and the purpose and form of their alliances (dyadic, triadic, or multipartner). Additionally, we collected 35 transcripts of interviews with key managers that were directly involved in the alliance cases. Given the richness of information and data, we believe that the Factiva database is well suited for the current study.

The data collected led us to identify all the R&D alliances formed in the worldwide telecom industry in the year 2010. Specifically, we identified a total set of 34 R&D alliance cases formed by 77 telecom firms worldwide, although we dropped one alliance case for missing data. The final set of cases consisted of 33 R&D alliance cases (of which 27 are dyadic, 5 are triadic, and 1 is a multipartner alliance) formed by 75 telecom firms worldwide with a broad geographical mix (31 of the 75 telecom firms are American, 18 are based in Asia, and

the remaining 26 are headquartered in Europe)[7]. Table 1 provides descriptive data for these 33 R&D alliance cases as reported in the Factiva database.

Table 1. Description of cases.

R&D Alliance	Purpose	Form
1	Develop a major capacity and capability expansion for mobile phone brand	D
2	Develop applications for smartphones in South Korea	D
3	Build a mobile payment network using smartphone and near field communication (NFC) technology	T
4	Foster technological growth and expansion for U.S.A- based service and manufacturing businesses	D
5	Develop an LTE mobile broadband technology	D
6	Engineering services to enable the access to dependable and uninterrupted wireless satellite communications	D
7	Develop a range of Ovi Life Tools services in India	D
8	Develop complete pre-paid billing operations support systems	T
9	Develop modem technologies for HSPA+/LTE (Evolved High-Speed Packet Access / Long-Term Evolution)	D
10	Develop a multimode platform that connects LTE/HSPA+, 3G and GSM networks, devices and modules	D
11	Develop a global Long Term Evolution (LTE) technology	D
12	Integrate their cellular phone businesses to make a full-scale entry into Asia and other overseas markets	D
13	Advance CMOS scaling and assess new technologies	D
14	Provide cutting-edge mobile applications to the marketplace	D
15	Create a new open source software for mobile phones and iPad-style tablet computers	M
16	Jointly develop optimized solutions combining alliance partners' processor IP, graphics, and videos	D

[7] After taking into account the number of cases contained in our dataset, we confidently examined the five conditions of the model, consistent with Marx and Dusa's (2011) findings (Misangyi, 2016).

17	Develop a wearable lightweight device with one-touch access to an emergency assistance call center	T
18	Jointly develop new Android-based hardware products for the home, mobile and personal product categories	D
19	Offer high-performance, cost-efficient mobility solutions backed by local engineering and support services in China	D
20	Expand capacity amid growing demand	D
21	Develop WCDMA, CDMA and LTE telecommunications systems	D
22	Jointly develop and offer a mobile solution designed specifically to address the public safety market in the United States	D
23	Collaborate on a live FDD-LTE trial in Taiwan in a move to advance the development of new generation mobile broadband	D
24	Jointly develop a device that functions as a building block for any fiber management requirement	D
25	Develop CDMA2000 femtocell products to improve coverage, add capacity, increase data throughput and enhance the end user's wireless experience while	D
26	Expand network coverage and enhance network quality for 2G and 3G services	D
27	Develop and support Motorola's software enabled short message service (SMS) and multi-media messaging service (MMS) messaging solutions	D
28	Accelerate the adoption of global machine-to-machine (M2M) deployments	T
29	Develop a mobile device management solution	D
30	Reinforce partners' brand and increasing their global competitiveness	D
31	Deliver a wide range of services to accelerate the growth of a premier mobile phone-delivered education service	D
32	Develop M2M products and services in the future	T
33	Provide technologies for handheld products that operate on the CDMA2000, WCDMA and 4G/LTE cellular standards	D

Source: Factiva database.

D: Dyadic (R&D alliance with two partners), T: R&D alliance with three partners), M: multipartner (R&D alliance with more than three partners).

The Factiva database was not the only database we used in our fuzzy set analysis. As outlined earlier, the basic goal of this study is to identify R&D alliance configurations that lead firms

involved in R&D alliances to achieve high innovation performance. Based on this research issue, we selected appropriate data to measure firm innovation performance. In particular, we used an extensive and updated source of patent information at the global level: the QPAT database. The QPAT database contains records from patent offices throughout the world (Baglieri, Cesaroni and Orsi, 2014). These can be searched in a variety of different languages, which allowed us to consolidate our research process. Additionally, this patent database gives access to the patent families of the firms engaged in our alliance cases. Consequently, by using this database, we were able to perform a citation search not only on a subject patent but also on every other member of its patent family. This condition allowed us to gather a much broader set of results for our alliance cases. Given its appropriateness for studying patent information worldwide, we consider the QPAT database to be a well-matched database for this study. Using the QPAT database, we collected the patents filed by the 75 telecom firms worldwide from 2011 to 2013.

In the next subsection, we will illustrate how we used the collected information to compute partner attributes and alliance characteristics.

4.3. Partner attributes measures

Size

Previous alliance portfolio configuration studies used the total number of employees of the partners involved in an alliance as a proxy for firm size (Lahiri and Narayanan, 2013). We acknowledge that this measure has some limitations. For instance, Hart and Oulton (1996) argued that the number of employees does not include the number of part-time workers. Additionally, we are aware that other measures, such as the firms' total assets, sales, and market

value of equity, could be used to operationalize firm size. However, since our alliance set is populated by large telecom firms worldwide, we believe that the total number of employees is an appropriate measure for computing firm size. Because the number of partners might affect the computation of this measure (as it occurs when an alliance is formed by more than two partners, i.e., 18% of our cases), we averaged the total number of employees per partner to calculate partner size per alliance.

Age

We computed the age of alliance partners as the number of years since founding as suggested in the literature (Baum et al., 2000). We are aware that the number of partners might affect the computation of the measure. As a consequence, we used the average age among the partners to calculate the partner age per alliance.

Experience

We calculated partner experience by measuring the number of alliances they formed prior to the focal alliance. Specifically, we considered the average number of alliances formed by the partners prior to the alliance event. Data contained in the Factiva alliance database allowed us to go back as early as 1994 to compute this variable.

4.4 Alliance characteristics measures

Strategic orientation

The proportion of alliances that were referred to as 'strategic' in press releases was used as our measure of strategic orientation, as suggested by Lavie (2007). To operationalize this relevant factor, we used a crisp-set condition with dichotomous variables (Frazier et al., 2016): 1 if the

alliance was described as strategic, and 0 if the alliance was not described as strategic in the alliance announcement.

Structure

As regards alliance structure, we coded the 33 alliances we selected according to two labels: (a) horizontal alliances and (b) vertical alliances. While we are aware that prior studies recognize the existence of other alliance structures, such as knowledge generating alliances and knowledge attracting alliances (George et al., 2001; Hagedoorn and Schakenraad, 1994; Kotabe and Swan, 1995), after thorough reflection, we decided to codify alliance structure as a crisp-set condition (1 if a horizontal alliance vs. 2 if a vertical alliance). In such a way, we managed to obtain two benefits: first, we minimized the range of codification to 2 codes (i.e., 1 if a horizontal alliance vs. 2 if a vertical alliance) rather than using 4 codes (i.e., 1 if a horizontal alliance vs. 2 if a vertical alliance vs. 3 if a knowledge generating alliance vs. 4 if a knowledge attracting alliance). Second, we reduced the likelihood of subjectivity problems emerging in the coding procedure.

4.5 Innovation measure

To measure innovation performance, previous alliance studies have adopted various innovation indicators, such as R&D intensity, number of patents, new innovation output rates (Baglieri and Cesaroni, 2013; Shan et al., 1994), and new product development (Deeds and Hill, 1996). We selected the number of patents as a proxy for measuring innovation performance for two reasons. First, the number of patents filed provides a good measure of new knowledge generation (Benassi and Di Minin, 2009). Accordingly, some authors argued that patents measure something "above and beyond R&D inputs, a creation of an underlying knowledge

stock" (Hall et al., 1986: 265). Second, the wide availability of patent data in many technology industries (Arora and Gambardella, 1994), including the worldwide telecom industry, makes patents an accessible and reliable proxy of firm innovation performance (Baglieri and Cesaroni, 2013). Given the two reasons above, we used the number of patents as a measure of firm innovation performance (Benassi and Di Minin, 2009). Specifically, we computed the number of patents filed after the alliance formation. Since the patent publication process may take years, we counted the number of patents filed by the alliances between 2011 and 2013 (see Deeds and Hill, 1996; Mowery et al., 1996).

4.6 Calibration

Previous QCA studies indicate that the initial step of performing a thorough fuzzy set analysis is to calibrate the measures (Franbach et al., 2016; Ragin, 2008) to obtain membership scores ranging between 0 (full non-membership) and 1 (full membership). We calibrated the measures as follows. For partner attributes (size, age, and experience), we searched for three qualitative anchors (full membership, full non-membership, and crossover point) to calibrate the set. To do so, we performed a cluster analysis to base the calibration upon the internal distribution of cases and to search for discontinuities. Alliance characteristic measures were set as crisp-set conditions. We assessed their membership scores by using 0.9 for full membership, 0.1 for full non-membership, and 0.5 for the crossover point as qualitative anchors.

As regards innovation measures, we decided to perform a theory-driven calibration in order to define the three qualitative anchors (Fiss et al., 2013). Specifically, Mittal et al. (2013) found that differences in patent activity occur among countries. Applying this insight to our alliance cases, we externally calibrated the anchors (full membership, full non-membership,

and crossover point) by taking into account the number of patents of the country of residence of each alliance partner. We collected these data from the OECD World Bank database from 2011 to 2013. For each country, the database takes into account firms operating in the following technology domains and IPC, referring to the telecom industry: H01P, H01Q, H01S, H03B, H03C, H03D, H03H, H03 M, H04B, H04J, H04K, H04 L, H04 M, H04Q, G01S, G08C, and G09C. We evaluated the qualitative anchor for full membership 1 by considering the highest number of patents that, according to the OECD World Bank database, were produced in one of the countries of residence of the firms involved in our alliance dataset.

Correspondingly, for the qualitative anchor for full non-membership 0, we used the lowest number of patents that, according to the external source, were generated in one of the countries of residence of the firms involved in our set. Finally, we assessed the qualitative anchor for the crossover point 0.5 by taking into account the average number of patents generated in the countries of residence of the firms in the dataset engaged in our alliance cases (in our set 2739.69 patents). Table 2 offers a detailed illustration of the calibration rules and membership scores.

Table 2. Constructs, calibration and membership scores

Construct	Calibration rule	Membership score
High innovation performance (inn)	If inn < 58.0	0 (full non-membership)
	If inn = 2739.69	0.5 (cross-over point)
	If inn > 10141.0	1 (full membership)
Large partner size (siz)	If siz < 70104.65	0 (full non-membership)
	If siz = 121595.67	0.5 (cross-over point)
	If siz > 188750.0	1 (full membership)
High partner age (age)	If age < 32.75	0 (full non-membership)
	If age = 58.00	0.5 (cross-over point)
	If age > 131.75	1 (full membership)
Extensive partner experience (exp)	If exp < 5.25	0 (full non-membership)
	If exp = 11.00	0.5 (cross-over point)
	If exp > 23.25	1 (full membership)

Strategic orientation (str)	If str < 0.1	0 (full non-membership)
	If str = 0.5	0.5 (cross-over point)
	If str > 0.9	1 (full membership)
Horizontal structure (hor)	If hor < 0.1	0 (full non-membership)
	If hor = 0.5	0.5 (cross-over point)
	If hor > 0.9	1 (full membership)

In the following section, we present the results of the fuzzy set analysis.

5. RESULTS

5.1. fsQCA analysis

The calibrated dataset was tested for necessity and, as Table 3 shows, no condition passed the consistency threshold of 0.90 for a necessary condition (Legewie, 2013).

Table 3. Necessity test

	High innovation performance	
	Consistency	Coverage
Large partner size (siz)	0.151	0.562
~ Large partner size (siz)	0.161	0.675
High partner age (age)	0.419	0.960
~ High partner age (age)	0.071	0.184
Extensive partner experience (exp)	0.332	0.885
~ Extensive partner experience (exp)	0.114	0.346
Strategic orientation (str)	0.142	0.262
~ Strategic orientation (str)	0.393	0.818
Horizontal structure (hor)	0.395	0.360
~ Horizontal structure (hor)	0.658	0.680

The truth table without the remainders (i.e., the combinations of conditions that are not associated with any case in the dataset) has 13 rows. Each row in the table (see Table 4) corresponds to a configuration of conditions that we draw from our sample[8].

Table 4. Truth table without the remainders

High innovation	Large	High partner	Extensive	Strategic	Horizontal	Number
0	0	0	0	1	0	1
0	0i	0	0	1	1	5
0	0	0	1	1	0	1
0	1	0	0	0	1	2
1	0	0	1	0	1	1
1	0	1	0	0	0	2
1	0	1	0	0	1	1
1	0	1	1	0	0	2
1	0	1	1	0	1	1
1	0	1	1	1	0	1
1	1	1	0	0	0	1
C	0	0	0	0	0	8
C	0	0	0	0	1	7

C: contradictory rows[9].

Table 5 presents the results of the fuzzy set analysis for sufficiency by using the typical notation as suggested by Ragin and Fiss (2008). Our sufficiency test used a consistency threshold of 0.85 and a frequency threshold of 1 (Ragin, 2008). As Table 5 shows, we found that three alliance configurations offered sufficient conditions to achieve high innovation performance in R&D alliances.

[8] After taking into account the number of cases contained in our dataset, we confidently examined the five conditions of the model, consistent with Marx and Dusa's (2011) findings (Misangyi, 2016).

[9] The table includes two contradictory rows that contain mixed outcomes, meaning that they are neither sufficient for the presence of the outcome nor sufficient for its absence (Grofman and Schneider, 2009).

Table 5. Sufficient configuration for high innovation performance, consistency and coverage

High innovation performance f{Large partner size, High partner age, Extensive partner experience, Strategic orientation, Horizontal structure	Consistency	Coverage
Solution path1: high partner age	0.960	0.419
Solution path2: extensive partner experience * ~strategic orientation	0.966	0.271
Solution path3: extensive partner experience * horizontal structure	0.972	0.137

Specifically, the Boolean expressions of the solutions read as follows: 1) an alliance configuration with high partner age is sufficient to generate high innovation performance (coverage score: 0.419; consistency score: 0.960); 2) an alliance configuration with extensive partner experience and no strategic orientation is sufficient to achieve high innovation performance (coverage score: 0.271; consistency score: 0.966); and 3) an alliance configuration with extensive partner experience and a horizontal structure is sufficient to achieve high innovation performance (coverage score: 0.137; consistency score: 0.972).

As outlined earlier, in the next section, we will discuss these findings and their implications for the KBV of alliances. However, before turning to this discussion, we believe it is important to show the complementary analyses we have performed to check the robustness of the findings of this study.

5.2. Robustness checks: Regression analysis

To obtain a richer representation of the phenomenon under investigation, i.e., what configurations of R&D alliances lead firms to achieve high innovation performance, we integrated the QCA findings with a regression analysis. The combination of these two countervailing approaches offered us four distinct benefits (Bailyn, 1977). First, integrating QCA with regression analysis allows us to quantify the (qualitative) results of the QCA and to assess the representativeness of the entire QCA solution (Meuer and Rupietta, 2016). Second, it allows us to control for alternative explanations, thereby circumventing one of the QCA's most important weaknesses: the limitation in the number of conditions (5 in this study) that could be included in the model. Third, the combination of qualitative and quantitative methods provides opportunities to benefit from the strengths (and circumvent the weaknesses) of both methods in a single study (Meuer and Rupietta, 2016). Finally, integrating the QCA with statistical analysis fortifies the grounds for clarifying the theoretical contribution we claim in the next section of the study (Fiss, et al., 2013). Given the motives mentioned above, we believe that performing regression analysis is an affordable approach to integrate QCA findings.

We integrated the QCA findings by reporting summary statistics and performing a correlation analysis among the five conditions (drivers) underlying the R&D alliance configurations (Franbach et al., 2016). Tables 6 and 7 present the properties of the measures and list the results of the correlation matrix of innovation performance (i.e., as concerns alliance partner size, partner age, partner experience, strategic orientation, and horizontal structure) to ensure that there were no correlation effects among the five conditions.

Table 6. Properties of measures

Variable	Obs	Mean	Std. Dev.	Min	Max
1. inn	33	3776.84	5973.71	0	26736
2. siz	33	52745.51	53686.95	35	210500
3. age	33	35.86	38.24	1.5	155.5
4. exp	33	5.55	6.65	0	29
5. str	33	.24	.43	0	1
6. hor	33	1.48	.51	1	2

Table 7. Correlation matrix of measures

Variable	1. inn	2. siz	3. sen	4. exp	5. str	6. hor
1. inn	1.000					
2. siz	0.2371	1.000				
3. age	0.5033	0.3147	1.000			
4. exp	0.3070	0.1736	0.6275	1.000		
5. str	−0.3128	−0.3474	−0.1162	−0.1070	1.000	
6. hor	−0.0447	0.1330	−0.2755	−0.2905	0.1243	1.000

6. DISCUSSION

The aim of this study was to explore how firms achieve high innovation performance by configuring R&D alliances. To effectively tackle the research issue, we used the KBV of the alliance to elucidate the individual factors that affect the innovation performance of firms involved in R&D alliances. Taking this theoretical lens, we identified five drivers of R&D alliances: (1) partner size, (2) partner age, (3) partner experience, (4) strategic orientation, and (5) alliance structure. Then, by using QCA on a set of 33 alliances formed within the worldwide telecom industry in 2010, we searched for the best performing alliance configuration for these factors.

The findings of the fuzzy set analysis suggested that three alliance configurations offer sufficient conditions to achieve high innovation performance in R&D alliances: 1) an alliance configuration with high partner age; 2) an alliance configuration with extensive partner experience and no strategic orientation; and 3) an alliance configuration with extensive partner experience and a horizontal structure. In the sub-sections that follow, we draw on these findings to advance three propositions that broaden the scope of the KBV of alliances.

6.1 Partner age and innovation performance

The first alliance configuration that leads firms involved in R&D alliances to achieve high innovation performance is represented by high partner age. According to the KBV, older firms offer more advantages than young firms because they already operate in the market (Littler and Sweeting, 1985). Moreover, older firms can bring established effective work roles and relationships to the alliance (Brüderl and Schüssler, 1990). However, previous research shows that allying with an older partner has its limitations. For instance, older firms may suffer from the inertia and rigidity associated with ageing and from risk aversion (Aldrich and

Auster, 1986; Leonard-Barton, 1992), which could limit their propensity to create new knowledge.

Additionally, older firms can manipulate the flow of knowledge that can be leveraged because they might have more bargaining power in the alliance. Hence, while older partners might bring their knowledge and their established relationships into the R&D alliance, the production of new knowledge can be hindered by the inertia, rigidity and bargaining power of older partners (Sampson, 2004). *This study shows that an alliance configuration with a high partner age leads firms involved in R&D alliances to achieve high innovation performance*. Specifically, our findings allow us to propose an explanation offering a solution to overcome the limitations associated with the presence of older partners. First, when an R&D alliance is formed by older partners, inertia and rigidity problems do not occur because alliance partners establish various networks of relationships to circumvent the costs of redundancy (Aldrich and Auster, 1986). Moreover, they access *complementary* competences by forming R&D alliances with older partners. This insight is supported by observations of joint research collaborations between two older partners, such as that formed by Renesas and Nokia:

"*In line with our ongoing efforts to strengthen our business structure, the transferring wireless modem technology and the innovation power and expertise of Nokia's employees will perfectly complement our core competences and serve as the key driving forces in growing our mobile business in the global market" (President of Renesas Electronics, Press Release, 6 July, 2010)*

Second, because both alliance partners were older, the creation of new knowledge stemming from the R&D alliance was not impeded by the asymmetrical bargaining power that an older partner could leverage vis-à-vis the younger partner (Sampson, 2004). Accordingly, in this instance, the alliance partners had no interest in bringing conflicts or complexity to the alliance. Given the insights that we draw from the findings of this study, we generate the following proposition:

Proposition 1). The presence of older partners in the alliance is a sufficient condition for obtaining high innovation performance through R&D alliances.

6.2. Partner experience, strategic orientation, and innovation performance

As discussed earlier, the best configuration to generate and bring more patents to the market, thereby achieving high innovation performance, was given by the presence of a higher partner age. However, we are aware that the presence of high partner age was a sufficient, but not necessary, condition. Additional patterns of configurations resulting from the combination of other factors allowed firms to achieve the same results in terms of innovation performance, which means that partner age was not the only relevant factor. Accordingly, alternative configurations were implemented by firms involved in R&D alliances to achieve high innovation performance. Here, we focus our attention on the required configuration of high partner age and no strategic orientation.

Partner experience and innovation performance

According to the KBV, firms need to create, integrate, and commercialize the tacit and explicit knowledge they possess in order to compete successfully in the market in which they operate. However, Sampson (2007) showed that the several technological shocks prompted over the last two decades have intensified the pace of competition among firms. Thus, firms increasingly face difficulties in creating and integrating their knowledge in a timely and cost-efficient manner. Studies related to the KBV of the alliance have answered this challenge by pinpointing the importance of partner experience. According to these studies, firms with more alliance experience learn how to develop routines that combine the knowledge of previous alliance partners with that of current alliance partners (Anand and Khanna, 2000). This, in turn, increases their ability to leverage knowledge from their alliances to achieve high innovation performance (Di Minin, Zhang, and Gammeltoft, 2012; Duysters et al., 2012). Thus, the KBV of alliances shows that learning from previous alliances is beneficial to firm

innovation performance (Di Minin and Zhang, 2010), thereby suggesting that partner experience is a prominent aspect that epitomizes R&D alliances.

However, other studies also argue that the importance of developing experience from previous alliances could taper off in subsequent alliances, thereby contributing less to R&D alliance innovation performance (Hoang and Rothaermel, 2005). Once firms develop and establish routines and procedures to generate and integrate knowledge from earlier alliance experiences, they inevitably become *trapped* in this competency (Hamel, 1991; Leonard-Burton, 1992; Levitt and March, 1988). In fact, through a continued focus on similar alliance experiences, firms increasingly tend to invest less effort in exploring new alliance activities that may allow additional learning. As a result, firms limit their opportunity to develop tacit knowledge in R&D alliances with other potential partners (Deeds and Hill, 1996; Silverman and Baum, 2002). This condition affects, in turn, subsequent alliance activity, and over time the knowledge gathered from previous alliances depreciates (Darr et al., 1995). This situation particularly occurs in the presence of alliances with a strategic orientation.

This study contributes to this issue by showing that *the absence of a strategic orientation in R&D alliances plays a contingent role in the knowledge traps that may emerge from partner experience in subsequent alliance activities*. In particular, we argue that firms with more alliance experience benefit from the formation of R&D alliances with no strategic orientation. By forming R&D alliances with no strategic orientation, these firms explore new opportunities with their alliance partners. This, in turn, drives them to develop new knowledge, which adds to the knowledge they have already accumulated from previous alliances. This insight was evident in R&D alliances with no strategic orientation formed by two firms with high experience, such as the one between Ericsson and Motorola:

"*High speed mobile broadband and LTE based technology provide new opportunities for the public safety sector... LTE enables a number of new applications and video communication from the site of accident to the communication central...Improved situation awareness empowers efficient decisions, secure assets and property and may in the end, save lives" (Ericsson's vice president and head of radio networks, Press Release, 7 September 2010)*

Given the insights we draw from the findings of this study, we submit the following proposition:

Proposition 2a). The experience of alliance partners is a sufficient condition for obtaining high innovation performance through R&D alliances when the alliances have no strategic orientation.

Strategic orientation and innovation performance

As previously argued, the absence of a strategic orientation plays a contingent role in the knowledge traps that might emerge from partner experience in subsequent alliance activities. However, our findings provide an additional insight for the KBV of alliances. Specifically, they show that the absence of a strategic orientation is also a key driver of innovation performance for the second type of R&D alliance configuration (i.e., an alliance configuration with extensive partner experience and no strategic orientation) emerging in this study. This finding appears to contrast with the evidence of prior empirical research showing that the presence of a strategic orientation in R&D alliances is crucial to alliance partners' innovation performance (Hitt et al., 1995; Serapio and Cascio, 1996). According to the KBV of the alliance, the strategic orientation of the alliance informs the understanding of partners' intentions and their commitment to the alliance. In fact, when the alliances in which they are involved have a strategic orientation, firms commit to and invest their resources in developing new and complex technologies that, in turn, lead to the generation of radical innovations. Conversely, firms engaged in R&D alliances with no strategic orientation struggle to develop new knowledge that can positively impact the innovation performance of the alliance.

The results of this study suggest that *partner experience plays a contingent role in the difficulties that firms address in developing new knowledge from alliances with no strategic orientation.* Specifically, we argue that firms forming alliances with no strategic orientation may develop new knowledge by leveraging partner experience. According to the KBV of the

alliance, partner experience allows firms involved in R&D alliances to deepen their knowledge on how to leverage innovation from their alliances (Duysters et al., 2012). In addition, firms with more alliance experience develop routines and procedures that lead to the knowledge of prior and current alliance partners being combined (Anand and Khanna, 2000). In this study, we posit that firms benefit from partner experience when they form alliances with no strategic orientation. Specifically, we suggest that firms forming alliances with no strategic orientation cross-learn how to leverage innovation from the experience of their partners. They absorb knowledge from the partner that has experience engaging in alliances with a strategic orientation, combine this knowledge with that they already possess, and develop routines to address the challenges that characterize their businesses. This insight was also apparent in the R&D alliances with no strategic orientation formed by two firms with high experience, such as LG-Nortel and Acton Technology:

"The establishment of this joint venture will significantly enhance LG-Nortel's presence in North America... Businesses have more complex communications challenges than ever, and the combination of our companies' respective strengths will provide an unparalleled opportunity to help them meet those challenges" (LG-Nortel's Chief Executive Officer, Press Release, 28 January 2010)

Given the insights we draw from the findings of this study, we offer the following proposition:

Proposition 2b). The absence of a strategic orientation for the alliance is a sufficient condition for obtaining high innovation performance through R&D alliances when the alliance partners have extensive experience in forming R&D alliances.

6.3. Partner experience, alliance structure, and innovation performance

Configuration two above is a sufficient but not necessary condition to achieve high innovation performance. Accordingly, here we highlight the importance of a third best configuration that is implemented by firms involved in R&D alliances to achieve high

innovation performance. Specifically, this configuration results from the *combinatory effects* of high partner experience and horizontal alliances.

Partner experience and innovation performance

The third alliance configuration that allows partners to achieve high innovation performance relates to the combination of high partner experience and a horizontal alliance. We have already discussed how high partner experience leads to high innovation performance when R&D alliances have no strategic orientation. Additionally, the findings of our fuzzy set analysis show that firms with high partner experience achieve high innovation performance when they form horizontal alliances. As a result, this study suggests that *the horizontal structure of R&D alliances plays a contingent role influencing the knowledge traps that could emerge from partner experience in subsequent alliance activities*. When firms are engaged in horizontal alliances, they have access to the resources and knowledge that their *partners-competitors*[10] share in R&D alliances (Dussauge et al., 2000). This condition, in turn, allows the firms to create new knowledge stemming from collaboration with their partners-competitors, thereby overcoming the knowledge traps that might emerge from the partner's experience in subsequent alliance activities. This insight was evident in the horizontal alliances formed by two partners-competitors, such as the one shaped by Deutsche Telekom and France Telecom:

"*By drawing on the resources of Deutsche Telekom and France Telecom, and on an experienced management and staff in the United Kingdom, we are confident that we will leverage on identified synergies and generate significant value for our shareholders" (France Telecom's Chief Executive Officer, Press Release, 2 March 2010).*

Given the insights we draw from the findings of this study, we advance the following proposition:

[10] For partners-competitors, we refer to partner firms of a horizontal alliance that are also competitors in a product market.

Proposition 3a). The experience of alliance partners is a sufficient condition for obtaining high innovation performance through R&D alliances when the alliances are organized in a horizontal structure.

Alliance structure and innovation performance

According to the KBV of the alliance, horizontal alliances oftentimes bring various benefits to firms involved in R&D alliances (Bae and Gargiulo, 2004). For instance, firms may benefit from the power sharing and interdependence that distinguish horizontal alliances from vertical alliances (Inkpen and Beamish, 1997). In fact, since partners face similar technological changes that characterize the market in which they operate, the partners in horizontal alliances potentially benefit from a broader flow of knowledge than they would access in a vertical relationship. Moreover, firms collaborate with a competitor to reduce competition in the market. However, the KBV also suggests that the structure of the alliance is a signalling mechanism for the amount of knowledge that alliance partners intend to commit to the alliance (George et al., 2001). In horizontal alliances, firms are less prone to share their knowledge because of the risk of igniting a learning race (Hamel, 1991). This condition, in turn, affects the stability of the relationship, as well as the partners' ability to accomplish the strategic objectives of the alliance (Contractor and Lorange, 1988; Kogut, 1988).

The results of this study suggest that *partner experience plays a contingent role in the (in)stability of horizontal R&D alliances*. Specifically, we argue that firms forming horizontal R&D alliances make their alliances more stable by leveraging partner experience. We posit that partner experience allows firms to overcome the learning race problem that epitomizes horizontal R&D alliances. Firms with more alliance experience usually bring some technical expertise that enables them to circumvent instability in the alliance. The horizontal R&D alliance formed by Ericsson and LG-Nortel supports this insight:

"LGE is pleased to have Ericsson as a new partner in this joint venture… Ericsson will provide global industry experience and technical expertise that will benefit both customers and employees. We look forward to a fruitful future collaboration" (LG Electronics' Chief Executive Officer, Press release, 21 April 2010).

Given the insights that we draw from the findings of this study, we advance the following proposition:

Proposition 3b). The horizontal structure of the alliance is a sufficient condition for obtaining high innovation performance through R&D alliances when the alliance partners have extensive experience in forming R&D alliances.

7. CONCLUSION

Despite its relevance for firm innovation performance, understanding the R&D alliance configurations that lead the allied firms to achieve high innovation performance is a research issue that extant alliance research has largely overlooked (Faems et al., 2005). In this study, we embraced the KBV of the alliance (Grant and Baden-Fuller, 2004; Vasudeva and Anand, 2011) to shed new light on the individual factors that affect the innovation performance of firms involved in R&D alliances. More precisely, we identified five drivers of R&D alliances: (1) partner size, (2) partner age, (3) partner experience, (4) strategic orientation, and (5) structure. Then, we conducted a qualitative comparative case study of 33 R&D alliances formed in the worldwide telecom industry in the year 2010. The findings of the fuzzy set analysis clearly show that three alternative alliance configurations guided the firms involved in these alliances to achieve high innovation performance: 1) an alliance configuration with a high partner age; 2) an alliance configuration with extensive partner experience and no strategic orientation; and 3) an alliance configuration with extensive partner experience and a horizontal structure. Finally, we developed three propositions that, taken together, provide arguments that enhance the KBV of the alliance.

This study offers three contributions that support the advancement of knowledge-based research on R&D alliances and one managerial implication. First, we supply a classificatory contribution. By drawing on the KBV of the alliance, we acquired a better awareness of the individual factors underlying the innovation performance of firms involved in R&D alliances. Specifically, we identified two groups of drivers: (a) partner attributes (size, age, and experience) and (b) alliance characteristics (strategic orientation, and structure).

Second, we contribute by prioritizing the (combinatory) effects of factors. By examining the presence of combinatory effects among these individual factors and their impact on firm innovation performance, we have enriched our understanding of the influence that these factors have on the high innovation performance of firms involved in an alliance. Specifically, by conducting a fuzzy set analysis, we have learned that some factors are more important than others. We have found that three alternative combinations of factors (i.e., partner age and partner experience combined with the absence of a strategic orientation for the alliance or with the presence of a horizontal structure of the alliance) have a major impact on the high innovation performance of the firms involved in an alliance. Correspondingly, partner size and the presence of a strategic orientation for the alliance have a minor impact on the high innovation performance of the firms involved in an alliance. This result suggests in turn that firms involved in R&D alliances can take three specific approaches to achieve high innovation performance.

Third, we offer a methodological contribution. We used fuzzy set analysis to examine the relationship between the factors required to configure R&D alliances and the combined effects that lead to high innovation performance. By looking at the findings reported above, we can argue that this method is helpful for detecting the combinatory effects of the key configuration factors in the R&D alliances context.

Last, but not least, this understanding also conveys an important implication for alliance managers and entrepreneurs. In fact, if alliance leaders want to achieve high

innovation performance, they should bear in mind that some factors, such as partner age and partner experience (especially when they are combined with the absence of a strategic orientation or the horizontal structure of the R&D alliance) are more important than other factors, such as partner size or the presence of a strategic orientation.

7.1 Limitations and future research

While this study contributes to our understanding of R&D alliance configuration, a number of limitations should be noted. First, we acknowledge that alliance scholars have stressed the importance of other partner attributes, such as partner diversity (De Leeuw et al., 2014). Since in the current study, we did not assess the relevance of this partner attribute, future studies should complement our understanding of R&D alliance configurations by including partner diversity in their analysis.

Second, the findings of this study are based on the assumption that high innovation performance is fully explained by the number of patents that alliance partners bring to the market. In fact, we are aware that other indicators influence high innovation performance, including R&D intensity, new innovation output rates (Shan et al., 1994), and new product development (Deeds and Hill, 1996). Hence, we call for studies that extend the scope of this one by using other measures of high innovation performance.

Third, we are conscious that we applied fsQCA to explore alliance configurations in a specific context: R&D alliances in the world's telecom industry. Future studies should investigate alliance configurations in other areas, including manufacturing or marketing alliances, where other combinatory effects might occur. In addition, future research might be conducted in industrial contexts that are different from the telecom industry; these could use our study as a fruitful benchmark.

Fourth, we explored the alliance configurations with explicit reference to a limited period of time. We recognize that extending the timeline might allow future studies to also look at processes helpful to understanding how things evolve over time (Gehman et al. 2017).

Last but not least, we investigated R&D alliance configurations by considering alliances cases. We acknowledge that firms are increasingly tending to form not only single alliances but a collection of alliances, usually termed alliance portfolios. For this reason, our line of inquiry should be complemented with an alliance portfolio perspective (Wassmer, 2010), where other factors leading to firm innovation performance might emerge from the combination of alliances in which a firm is involved. Hence, we call for additional research that explores how firms configure their alliances from a portfolio perspective. Specifically, we ask what other alliance configuration(s), if any, could emerge within an alliance portfolio?

8. REFERENCES

Aldrich H and Auster ER (1986) Even dwarfs started small: Liabilities of age and size and their strategic implications. *Research in Organizational Behavior* 8: 165-198.

Anand BN and Khanna T (2000) Do firms learn to create value? The case of alliances. *Strategic Management Journal* 21(3): 295-315.

Arora A and Gambardella A (1994) The changing technology of technological change: General

and abstract knowledge and the division of innovative labour. *Research Policy* 23(5): 523-532.

Bae J and Gargiulo MG (2004) Partner substitutability, alliance network structure, and firm profitability in the telecommunications industry. *Academy of Management Journal* 47(6): 843-859.

Baglieri D and Cesaroni F (2013) Capturing the real value of patent analysis for R&D strategies. *Technology Analysis & Strategic Management*, 25(8), 971-986.

Baglieri D, Cesaroni F, and Orsi L (2014) Does the nano-patent 'Gold rush'lead to entrepreneurial-driven growth? Some policy lessons from China and Japan. *Technovation*, 34(12), 746-761.

Bailyn L (1977) Research as a cognitive process: Implications for data analysis. *Quality and Quantity* 11(2): 97-117.

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

Baum JA, Calabrese T and Silverman BS (2000) Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology. *Strategic Management Journal* 21(3): 267-294.

Benassi M, & Di Minin A (2009). Playing in between: patent brokers in markets for technology. *R&D Management*, 39(1), 68-86.

Bouncken RB and Fredrich V (2016) Business model innovation in alliances: Successful configurations. *Journal of Business Research* 69(9): 3584-3590.

Bruderl J and Schussler R (1990) Organizational mortality: The liabilities of newness and adolescence. *Administrative Science Quarterly* 35(3): 530-547.

Caner T and Tyler BB (2015) The effects of knowledge depth and scope on the relationship between R&D alliances and new product development. *Journal of Product Innovation Management* 32(5): 808-824.

Cesaroni F, Di Minin A, and Piccaluga A (2004) New strategic goals and organizational solutions in large R&D labs: lessons from Centro Ricerche Fiat and Telecom Italia Lab. *R&D Management*, 34(1), 45-56.

Cesaroni F, Di Minin A, and Piccaluga A (2005) Exploration and exploitation strategies in industrial R&D. *Creativity and Innovation Management*, 14(3), 222-232.

Cohen WM and Levinthal DA (1990) Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly* 35(1): 128-152.

Contractor FJ and Lorange P (1988) Why should firms cooperate? The strategy and economics basis for cooperative ventures. *Cooperative Strategies in International Business*: 3-30.

de Leeuw T, Lokshin B and Duysters G (2014) Returns to alliance portfolio diversity: The relative effects of partner diversity on firm's innovative performance and productivity. *Journal of Business Research* 67(9): 1839-1849.

Darr ED, Argote L and Epple D (1995) The acquisition, transfer, and depreciation of knowledge in service organizations: Productivity in franchises. *Management Science* 41(11): 1750-1762.

Das TK and Teng BS (1998) Between trust and control: Developing confidence in partner cooperation in alliances. *Academy of Management Review* 23(3): 491-512.

Deeds DL and Hill CW (1996) Strategic alliances and the rate of new product development: an empirical study of entrepreneurial biotechnology firms. *Journal of Business Venturing* 11(1): 41-55.

Di Minin A, and Zhang J (2010) An exploratory study on international R&D strategies of Chinese companies in Europe. *Review of Policy Research*, 27(4), 433-455.

Di Minin A, Zhang J, and Gammeltoft P (2012). Chinese foreign direct investment in R&D in Europe: A new model of R&D internationalization?. *European Management Journal*, 30(3), 189-203.

Dussauge P, Garrette B and Mitchell W (2000) Learning from competing partners: Outcomes and durations of scale and link alliances in Europe, North America and Asia. *Strategic Management Journal* 21(2): 99-126.

Duysters G, Heimeriks KH, Lokshin B, et al. (2012) Do firms learn to manage alliance portfolio diversity? The diversity-performance relationship and the moderating effects of experience and Capability. *European Management Review* 9(3): 139-152.

Faems D, Van Looy B and Debackere K (2005) Interorganizational collaboration and innovation: Toward a portfolio approach. *Journal of Product Innovation Management* 22(3): 238-250.

Fiss PC (2007) A set-theoretic approach to organizational configurations. *Academy of Management Review* 32(4): 1180-1198.

Fiss PC (2011) Building better causal theories: A fuzzy set approach to typologies in organization research. *Academy of Management Journal*, 54(2): 393-420.

Fiss PC, Marx A and Cambré B (2013) Configurational theory and methods in organizational research: Introduction. In: Lounsbury M (Ed.) *Research in the Sociology of Organization*. Bingley, UK: Emerald Group Publishing Limited, pp, 1-22.

Fiss PC, Sharapov D and Cronqvist L (2013) Opposites attract? Opportunities and challenges for integrating large-N QCA and econometric analysis. *Political Research Quarterly* 66(1): 191-198.

Foss NJ (1996) Knowledge-based approaches to the theory of the firm: Some critical comments. *Organization Science*, 7(5): 470-476.

Frambach RT, Fiss PC and Ingenbleek PT (2016) How important is customer orientation for firm performance? A fuzzy set analysis of orientations, strategies, and environments. *Journal of Business Research* 69(4): 1428-1436.

Frazier ML, Tupper C and Fainshmidt S (2016) The path(s) to employee trust in direct supervisor in nascent and established relationships: A fuzzy set analysis. *Journal of Organizational Behavior* 37: 1023-1043.

Gehman, J, Glaser VL, Eisenhardt KM, et al. (2017) Finding Theory-Method Fit: A Comparison of Three Qualitative Approaches to Theory Building. *Journal of Management Inquiry*, Forthcoming

George G, Zahra SA, Wheatley KK, et al. (2001) The effects of alliance portfolio characteristics and absorptive capacity on performance: A study of biotechnology firms. *Journal of High Technology Management Research*, 12(2): 205-226.

Grandori A and Furnari S (2008) A chemistry of organization: Combinatory analysis and design. *Organization Studies* 29(3): 459-485.

Granstrand O (2000) The shift towards intellectual capitalism-the role of infocom technologies. *Research Policy* 29(9): 1061-1080.

Grant RM (1996a) Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organization Science* 7(4): 375-387.

Grant RM (1996b) Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(2): 109-122.

Grant RM and Baden-Fuller C (2004) A knowledge accessing theory of strategic alliances. *Journal of Management Studies* 41(1): 61-84.

Grofman B and Schneider CQ (2009) An introduction to crisp set QCA, with a comparison to binary logistic regression. *Political Research Quarterly* 62(4): 662-672.

Hagedoorn and Schakenraad J (1994) The effect of strategic technology alliances on company performance. *Strategic Management Journal* 15(4): 291-309.

Hall BH, Griliches Z and Hausman JA (1986) Patents and R and D: Is there a lag? *International Economic Review 2*7(2): 265-283.

Hamel G (1991) Competition for competence and interpartner learning within international strategic alliances. *Strategic Management Journal* 12(1): 83-103.

Hart PE and Oulton N (1996) Growth and size of firms. *Economic Journal* 106(438): 1242-1252.

Hitt MA, Tyler BB, Hardee C, et al. (1995) Understanding strategic intent in the global marketplace. *Academy of Management Executive* 9(2): 12-19.

Hoang H and Rothaermel FT (2005) The effect of general and partner-specific alliance experience on joint R&D project performance. *Academy of Management Journal* 48(2): 332-345.

Hoffmann WH (2007) Strategies for managing a portfolio of alliances. *Strategic Management Journal* 28(8): 827-856.

Inkpen AC and Beamish PW (1997) Knowledge, bargaining power, and the instability of international joint ventures. *Academy of Management Review* 22(1): 177-202.

Katila R and Ahuja G (2002) Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal* 45(6): 1183-1194.

Kogut B (1988) Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal* 9(4): 319-332.

Kotabe M and Swan SK (1995) The role of strategic alliances in high-technology new product development. *Strategic Management Journal* 16(8): 621-636.

Kogut B and Zander U (1992) Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science* 3(3): 383-397.

Lahiri N and Narayanan S (2013) Vertical integration, innovation, and alliance portfolio size: Implications for firm performance. *Strategic Management Journal* 34(9): 1042-1064.

Lavie D (2007) Alliance portfolios and firm performance: A study of value creation and appropriation in the US software industry. *Strategic Management Journal* 28(12): 1187-1212.

Legewie N (2013) An introduction to applied data analysis with qualitative comparative analysis. Forum Qualitative Sozialforschung/Forum: *Qualitative Social Research* 14(3). Retrieved from http://nbn-resolving.de/urn:nbn:de:0114-fqs1303154.

Leonard-Barton D (1992) Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal* 13(1): 111-125.

Levitt B and March JG (1988) Organizational learning. *Annual Review Of Sociology* 14(1): 319-338.

Littler DA and Sweeting RC (1985) Radical innovation in the mature company. *European Journal of Marketing* 19(4): 33-44.

Lubatkin MH, Simsek Z, Ling Y, et al. (2006) Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of Management* 32(5): 646-672.

Marx A and Dusa A (2011) Crisp-set qualitative comparative analysis (csQCA), contradictions and consistency benchmarks for model specification. *Methodological Innovations Online* 6(2): 103 - 148.

Meuer J and Rupietta C (2016) Integrating QCA and HLM for multilevel research on organizational configurations. *Organizational Research Methods*. DOI: 10.1177/1094428116665465.

Misangyi VF (2016) Institutional complexity and the meaning of loose coupling: Connecting institutional sayings and (not) doings. *Strategic Organization*, 14(4): 407-440.

Mittal SK, Momaya KS and Agrawal S (2013) Longitudinal and comparative perspectives on the competitiveness of countries: Learning from technology and the telecom sector. *JCC: The Business and Economics Research Journal* 6(2) 235-256.

Momaya K (2008) Evaluating country competitiveness in emerging industries: Learning from a case of nanotechnology. *Journal of international Business and Economy* 9(1): 37-58.

Mowery DC, Oxley JE and Silverman BS (1996) Strategic alliances and interfirm knowledge transfer. *Strategic Management Journal* 17(2): 77-91.

Mulotte L (2013) Do experience effects vary across governance modes? Evidence from new product introduction in the global aircraft industry, 1948-2000. *Organization Science* 25(3): 757-775.

Nonaka I and Takeuchi H (1995) *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford: Oxford University Press.

Peteraf MA (1993) The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal* 14(3): 179-191.

Powell WW, Koput KW and Smith-Doerr L (1996) Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly* 41(1): 116-145.

Quintana-Garcia C and Benavides-Velasco CA (2011) Knowledge organisation in R&D alliances: its impact on product innovation. *Technology Analysis & Strategic Management* 23: 1047-1061.

Ragin CC (1987) *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Berkeley: University of California Press.

Ragin CC (2000) *Fuzzy-Set Social Science*. Chicago, IL: University of Chicago Press.

Ragin CC (2008) *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. Chicago, IL: University of Chicago Press.

Ragin CC and Fiss PC (2008) Net effects analysis versus configurational analysis: An empirical demonstration. In Ragin CC (Ed.) *Redesigning social inquiry: Fuzzy sets and beyond*. Chicago, IL: University of Chicago Press, pp. 190-212.

Rihoux B, Álamos-Concha P, Bol D, et al. (2013) From niche to mainstream method? A comprehensive mapping of QCA applications in journal articles from 1984 to 2011. *Political Research Quarterly* 66(1): 175-184.

Sampson RC (2004) Organizational choice in R&D alliances: Knowledge-based and transaction cost perspectives. *Managerial and Decision Economics* 25(6-7): 421-436.

Sampson RC (2007) R&D alliances and firm performance: The impact of technological diversity and alliance organization on innovation. *Academy of Management Journal* 50(2): 364-386.

Serapio MG and Cascio WF (1996) End-games in international alliances. *Academy of Management Executive* 10(1): 62-73.

Shan W, Walker G and Kogut B (1994) Interfirm cooperation and startup innovation in the biotechnology industry. *Strategic Management Journal* 15(5): 387-394.

Silverman BS and Baum JA (2002) Alliance-based competitive dynamics. *Academy of Management Journal* 45(4): 791-806.

Spender JC (1996) Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal* 17(2): 45-62.

Stinchcombe AL (1965) *Organizations and Social Structure*. Handbook of Organizations, 44(2), 142-193.

Stuart TE (2000) Interorganizational alliances and the performance of firms: A study of growth and innovation rates in a high-technology industry. *Strategic Management Journal* 21: 791-811.

Vasudeva G and Anand J (2011) Unpacking absorptive capacity: A study of knowledge utilization from alliance portfolios. *Academy of Management Journal* 54(3): 611-623.

Wagemann C, Buche J and Siewert MB (2016) QCA and business research: Work in progress or a consolidated agenda? *Journal of Business Research* 69(7): 2531-2540.

Wassmer U (2010) Alliance portfolios: A review and research agenda. *Journal of Management* 36(1): 141-171.

Wernerfelt B (1984) A resource-based view of the firm. Strategic Management Journal 5(2): 171-180.

CHAPTER III

EXPLORING ALLIANCE PORTFOLIO CHARACTERISTICS: EVIDENCE FROM ERICSSON CASE STUDY

Abstract

Managing alliance portfolios has become a necessary condition for firms' competitiveness. Previous alliance literature has provided a comprehensive understanding about how firms manage individual alliances. However, extant alliance research has not well developed a crystallized understanding about how firms can manage their alliance portfolios. Drawing on the available alliance portfolio management literature this chapter unveils three main features that characterize the management of an alliance portfolio: i.e., (a) alliance portfolio size; (b) alliance portfolio diversity; and (c) alliance portfolio internationalization. Moreover, it shows the evidence of these three key characteristics of alliance portfolio in a representative alliance portfolio case study of the telecom industry; Ericsson's alliance portfolio. I conclude the chapter by discussing theoretical and managerial implications and proposing future research directions for alliance portfolio literature.

Key words: alliance portfolio management, strategic alliances, case study.

1. INTRODUCTION

To survive in today's competitive setting, firms are involved in dozens, sometime even hundreds, of strategic alliances per time. The number of strategic alliances that firms are required to establish to compete in the market in which they operate puts the challenge to manage simultaneously these collaborative agreements (Wassmer, 2010). Evidence from the computer industry confirms this insight. For instance, IBM has to manage more than 100 alliances with various partners over the globe (Parise & Casher, 2003). This insight is also accompanied by the fact that nowadays strategic alliances assume more often the feature of temporary organizations that no long last forever (Bakker & Knoben, 2014). Accordingly, some scholars have shown that almost 50% of strategic alliances fail within two years (Reuer & Arino, 2003) and that very few of them are enduring (Gomes-Casseres, 2015).

Thus, how to manage multiple strategic alliances per time has become a necessary condition for firms' competittivenss. In the attempt to advance a solution to this critical challenge strategy scholars have suggested that the bundle of alliances in which a firm is involved should be considered from a portfolio perspective (Parise & Casher, 2003). These scholars have argued that firms must give more attention to the performance of their entire alliance portfolios rather than to the one of singular strategic alliances (Bamford, Gomes-Casseres, & Robinson, 2003). Because of the synergies and cause-and-effect relationship among alliances that are and might be originated within (Hoffman, 2007; Sarkar, Aulakh & Madhok, 2009) and from the alliance portfolio (Wassmer & Dussauge, 2012), firms must place the structure as well as the strategic orientation of their entire alliance portfolios at the center of their interests. In this vein, some scholars have conducted a number of empirical studies that analyze the relationship between alliance portfolios and firms performance. However, scant attention has been devoted heretofore to how firms can manage the bundle of alliances in which they are necessarily involved. Extant alliance research has not well

developed a crystallized understanding about how firms can manage their alliance portfolios. Recently, Sarkar et al. (2009) found that firms adopting a dedicated alliance function do not successfully manage the performance of their alliances. In the attempt to join this debate, the present chapter aims to enlarge the comprehension of the alliance portfolio management phenomenon by conducting a qualitative study that might help to shed light on how firms can handle their alliance portfolios. Drawing on alliance portfolio management literature, I identify three main alliance portfolio characteristics that are considered relevant for alliance portfolio research: (a) *alliance portfolio size* - the number of partners or alliances to which a firm is connected at a given point in time (Wassmer, 2010); (b) *alliance portfolio diversity* – the degree of variance in partners, alliances, and resources the focal firm has access to via its multiple alliances links (Jiang, Tao & Santoro, 2010); and (c) *alliance portfolio internationalization* – the degree of foreign partners in a firm's collection of immediate alliance relationships (Lavie & Miller, 2008). Then, I explore the importance of these three alliance portfolio characteristics by conducting a representative alliance portfolio case study of the telecom industry; Ericsson alliance portfolio (i.e., Ericsson alliance portfolio, the portfolio of a world-leading provider of communications technology and services). Specifically, I collect a massive amount of primary and secondary information about the bundle of alliances formed by Ericsson from 1994 to 2014 and analyze how this firm has managed alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization over time.

This chapter aims to offer three contributions. First, it seeks to shed light on the three specific features of the alliance portfolio to provide a more comprehensive understanding of alliance portfolio characteristics (alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization). Second, by tapping into Ericsson's alliance portfolio longitudinal case study, this chapter tries to explore the importance of these three alliance

portfolio management main characteristics in a representative firm's alliance portfolio, thereby showing how firms manage their alliance portfolios over time.

Finally, drawing on Ericsson's alliance portfolio case study, this chapter tries to show how a firm has managed its alliance portfolio over time by leveraging on the benefits that are associated with alliance portfolio size, alliance diversity and alliance portfolio internationalization. In doing so, this study tries to contribute to those streams of alliance portfolio literature that posit that these three main characteristics are critical for alliance portfolio management phenomenon as they present both benefits and challenges for the management of an alliance portfolio.

The chapter is organized as follows. First, I review alliance portfolio management literature and identify three main features (alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization) that characterize alliance portfolio phenomenon. Then, I provide evidence of these three alliance portfolio characteristics by analyzing Ericsson's alliance portfolio and examining how this firm has managed these alliance portfolio characteristics in the last two decades. Finally, I conclude the study by discussing the theoretical and managerial implications of this study to alliance portfolio literature and suggesting a few research questions that might stimulate more research on this line of inquiry.

2. ALLIANCE PORTFOLIO MANAGEMENT: MAIN FEATURES AND CHARACTERISTICS EXTRACTED FROM THE LITERATURE

The commitment of firms in managing simultaneously multiple strategic alliances has become a necessity in today's competitive setting (Parise & Casher, 2003). Indeed, in the last decade many of the world's largest firms have over 20% of their assets and invest over 30% of their annual research funds in multiple alliance activities (Ernst, 2004). In addition, a survey conducted in 2007-2008 by Alliance partners to Fortune 1000 CEOs shows that alliances account for almost one third of their firms' revenues (Kale, Singh, & Bell, 2009). Others

studies report that this paid off is even bigger. For instance, Feder (2001) argues that IBM gains almost 40% of its revenues by means of alliances of diverse types.

Therefore, what it emerges from alliance research is that alliances play a central role in most firms' competitive and growth strategies (Kale & Singh, 2009). Accordingly, alliances help firms to reinforce their competitive position by increasing their market power (Kogut, 1991), achieving efficiency (Ahuja, 2000), opening up to new or critical resources or capabilities (Rothaermel & Boeker, 2008), gaining access to new markets (Garcia-Canal, Duarte, Criado, & Llaneza, 2002), or sustaining radical and incremental innovation (Oerlemans, Knoben and Pretorius, 2013).

Given the importance that alliances nowadays take for firms' strategies as they are increasingly used as strategic arrangements between firms (Ahuja, 1996; Anderson, 1990; Hergert & Morris, 1987), an issue that has attracted attention in alliance literature refers to how these collaborative agreements can be managed (Hoffman, 2007). How can firms manage their alliances? The answer that alliance scholars give to this research question finds collocation in the concept of *dedicated alliance function*. Alliance studies show that firms developing within their organization a function that is dedicated to manage their alliance activities might gain several benefits. This is true at least for those alliances that involve two partners (Dyer, Kale & Singh, 2001; Kale & Singh, 2009; Kale, Dyer & Singh, 2002). Indeed, the presence of a dedicated alliance function allows firms to: 1) learn and leverage both explicit and tacit lessons from previous and current alliances; 2) keep firms' stakeholders well-informed of alliance activities; 3) ameliorate internal coordination; and 4) maintain control in the evaluation of alliance performance (Kale et al. 2002).

While alliance studies have stressed the importance of a dedicated alliance function in managing dyadic alliances (Kale et al., 2002), recently others have found that firms developing a dedicated alliance function might fall short to manage the alliances when these collaborative arrangements involve more than two partners (Dagnino & Ferrigno, 2015) or

when the dedicated alliance function is used to manage the whole alliance portfolio (Sarkar, et al., 2009).

As regards multipartner alliances, Dagnino & Ferrigno (2015) found that, when alliances involve three partners, the dedicated alliance function is barely appropriate to manage the complexities that emerge from four key aspects that epitomize this kind of alliances: 1) actor mindframes; 2) governance structure; 3) alliance learning problems and conflict management; and 4) strategic and operational problems. Drawing on a specific triadic alliance case study (i.e., the 3SUN Alliance between Enel Green Power, Sharp, and STMicroelectronics), the authors propose also that such complexities can be managed when firms, involved in this kind of alliances, develop a set of contingent triadic alliance mechanisms that may be re-aligned to the design and installment of a flexible structure. Specifically, the authors surmise that firms involved in a triadic alliance should form a flexible structure, created ad hoc for the triadic alliance, that: 1) fosters - in formal and informal ways - the dialogue among the three partners key managers; and 2) insures the rotation of partners in taking key roles pertaining to strategic and operational decisions.

Moving the focus to alliance portfolios, alliance research has not well developed a crystallized understanding about how firms can manage the bundle of alliances in which they are necessarily involved. Recently, Sarkar et al. (2009) found that firms adopting a dedicated alliance function do not successfully manage the performance of their alliances. Beyond this finding, the authors do not suggest any additional solution to the question under scrutiny. In the attempt to join this debate, the present chapter aims to enlarge the comprehension of the alliance portfolio management phenomenon. In doing so, this study explores the alliance portfolio literature and discloses three main features that characterize alliance portfolios: (a) *alliance portfolio size* - the number of partners or alliances to which a firm is connected at a given point in time (Wassmer, 2010); (b) *alliance portfolio diversity* – the degree of variance in partners, alliances, and resources the focal firm has access to via its multiple alliances links

(Jiang et al., 2010); and (c) *alliance portfolio internationalization* – the degree of foreign partners in a firm's collection of immediate alliance relationships (Lavie & Miller, 2008). Each of these alliance portfolio characteristics will be discussed below.

2.1. Alliance portfolio size

Alliance portfolio size is the first main feature that epitomizes alliance portfolio phenomenon. Alliance portfolio scholars conceive alliance portfolio size in two different ways: a) the number of partners to which a focal firm is connected to (Hoffman, 2007); or b) the number of alliances a focal firm is engaged in at a given point in time (Wassmer, 2010).

Independently from the definition chosen or the dimension examined, what it matters to the purpose of this study is that alliance portfolio research shows that the number of partners or alliances to which the focal firm is related to poses a trade-off for the focal firm.

On the one hand, alliance portfolio research argues that a larger alliance portfolio offers a handful of advantages that might be beneficial to the focal firm. Accordingly, alliance scholars have found that a larger alliance portfolio allows the focal firm to: 1) leverage external knowledge from more than one alliance (Lahiri & Narayanan, 2013); 2) learn to acknowledge the explanatory effects of its outcomes (Sampson, 2007); and 3) develop a more comprehensive understanding of the diverse knowledge bases of its partners over time (Deeds, Decarolis, & Coombs, 2000).

On the other hand, alliance portfolio research states that managing a larger alliance portfolio brings with it a set of challenges for the focal firm: 1) searching, identifying and transferring resources across a larger alliance portfolio become more difficult (Duysters, Kok & Vaandrager, 1999); 2) using external knowledge across a larger alliance portfolio calls firms to invest more resources to adjust internal routines to manifold partners (Lahiri & Narayanan, 2013); and 3) firms engaging in an increasing number of alliances have to deal with more

bureaucracy and transaction costs related to the need of coordinating multiple partners (Rothaermel, 2001).

2.2. Alliance portfolio diversity

Alliance portfolio size is not the exclusive main feature that characterizes alliance portfolio phenomenon (Wassmer, 2010). Accordingly, alliance portfolio scholars have pointed to the importance of a second main characteristic that might incarnate alliance portfolio phenomenon. Specifically, these scholars refer to the multidimensional concept of alliance portfolio diversity (Jiang et al., 2010; Lee, Kirkpatrick-Husk, & Madhavan, 2014). Thus, alliance portfolio diversity is the second main feature that characterizes alliance portfolio phenomenon. Alliance portfolio diversity refers to the degree of variance in partners, alliances, and resources that the focal firm has access to via its multiple alliances links (Jiang et al., 2010). Variance in partners has been studied in terms of partners attributes (Oerlemans, Knoben & Pretorius, 2013). Indeed, alliance portfolio scholars have explained alliance portfolio partner diversity by including in their empirical studies specific variables that are referred to specific partner attributes such as its size (Baum, Calabrese, & Silverman, 2000), its business activities (Dussauge, Garrette, & Mitchell, 2000), and also its country of origin (Lavie & Miller, 2008).

Drawing on the proliferation of studies on alliance portfolio partner diversity, some alliance scholars have enlarged the contours of alliance portfolio diversity by investigating also the diversity in terms of alliances and resources (Cui & O' Connor, 2012). These authors specifically credit attention to alliance portfolio resource diversity, i.e., the degree to which the resources of different partners in an alliance portfolio are different. Alliance portfolio literature suggests that managing a more diverse alliance portfolio implies that the focal firm has to evaluate a series of benefits vs drawbacks associated with the different degree of variety of partners, alliances and resources that the focal firm has access to.

On the one side, a more variance in partners, alliances and resources portrays an ample array of *benefits* associated with such heterogeneity. Allying with diverse partners brings more opportunities to: (1) access new resources (Beckman & Haunschild, 2002; Swaminathan & Moorman, 2009); (2) develop new ideas, technologies, and products (Wuyts, Dutta & Stremersch, 2004) as the focal firm is not locked into prior knowledge (Cohen & Levinthal, 1990); (3) reduce coordination, monitoring, and communication costs (Oerlemans *et al.*, 2013); and (4) provide strategic flexibility to manage high technological uncertainty (Hoffmann, 2007).

On the other side, some scholars have pointed to the potential *drawbacks* connected to high levels of alliance portfolio diversity. Allying with different partners may: (1) raise managerial challenges (Duysters & Lokshin, 2011), thereby inhibiting the exchange and integration of resources and information across alliance portfolio partners; (2) increase the costs associated with knowledge utilization (Vasudeva & Anand, 2011); and (3) nurture information overflow problem (Koput, 1997).

2.3. Alliance portfolio internationalization

Alliance portfolio size and alliance portfolio diversity are two main characteristics that inform alliance portfolio phenomenon. However, extant alliance portfolio literature states that another feature of alliance portfolio is relevant for alliance portfolio management: i.e., alliance portfolio internationalization. Alliance portfolio internationalization refers to the degree of foreign partners in a firm's collection of immediate alliance relationships (Lavie & Miller, 2008). The degree of foreignness is represented by cross-national cultural, geographical, institutional and economic development divergences between the focal firm's home country and its partners (Ghemawat, 2001). Alliance portfolio research submits that managing an alliance portfolio with high levels of foreign partners is challenging because of the simultaneous presence of both advantages and disadvantages connected to different degrees

of foreignness between the focal firm and its alliance portfolio partners. Some authors argue that an alliance portfolio with high diversity of international partners provides several benefits to the focal firm. First, it gives the focal firm the possibility to obtain resources that are accessible by means of local partners, thus ameliorating the firm's competitiveness (García-Canal et al., 2002). Second, a more foreign alliance portfolio can robust a focal firm's flexibility and its capacity to be responsive to turbulent and dynamic environmental changes (Eisenhardt & Schoonhoven, 1996; Powell, Koput & Smith-Doerr, 1996). Finally, it allows the focal firm to allocate its activities over the globe in a way to ameliorate its performance in technology-driven industries (Zaheer, 2000).

Notwithstanding that, other authors show that an alliance portfolio with high diversity of international partners might entail also some challenges. First, managerial complexity that emerge from acculturation issues between the focal firms and its foreign partners. Second, learning becomes more difficult in the presence of international partners because the focal firm is required to invest larger amounts of resources in tools of communication and transportation to support interaction (Parkhe, 1991; Steensma & Lyles, 2000). Last but not least, misappropriation of value in foreign partners' home countries might occur as foreign partners possess more knowledge about shareholders in their countries of origin (Hamel, 1991; Lavie, 2006; Yan & Gray, 1994).

Summing up, extant alliance portfolio literature suggests that three main characteristics are relevant for alliance portfolio management phenomenon; i.e., alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization. It also shows that these three alliance portfolio characteristics are critical for alliance portfolio management as these three features of alliance portfolio present both benefits and challenges to the focal firm. In the following section, I explore the importance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization and investigate how

these three alliance portfolio characteristics are managed by conducting a representative alliance portfolio case study of the telecom industry; Ericsson's alliance portfolio.

3. RESEARCH METHOD: IN-DEPTH CASE STUDY

As previously mentioned, the purpose of this chapter is to detect how firms handle their alliance portfolios. In this perspective, I have identified from the alliance portfolio literature three main features that characterize an alliance portfolio: (a) alliance portfolio size - the number of partners or alliances to which a firm is connected at a given point in time (Wassmer, 2010); (b) alliance portfolio diversity – the degree of variance in partners, alliances, and resources the focal firm has access to via its multiple alliances links (Jiang et al., 2010); and (c) alliance portfolio internationalization – the degree of foreign partners in a firm's collection of immediate alliance relationships (Lavie & Miller, 2008). In order to investigate the relevance of the three main alliance portfolio features that I have extracted from alliance portfolio literature, the present paper conducts an in-depth qualitative study that explores alliance portfolio characteristics within its real-life context (Eisenhardt, 1989; Yin, 2003). In this vein, I have performed an in-depth analysis of a single case (Eisenhardt & Graebner, 2007; Siggelkow, 2007).

Two reasons have driven me to conduct a single case study. First, the exploration of a single case study epitomizes a distinctive and critical case in challenging a well-formulated theory (Yin, 2009). Second, since only limited theoretical understanding subsists about how firms handle their alliance portfolios, the benefits of extracting many details in a particular case (Eisenhardt & Graebner, 2007) allowing theory to emerge from the data can be a valuable starting point (Siggelkow, 2007). Therefore, it seems that a single case study may be appreciated as a revelatory case in detecting how firms handle their alliance portfolios.

3.1. Theoretical sampling: Ericsson

To conduct this study I have selected the case by following the principles of theoretical sampling (Glaser & Strauss, 1967; Mason, 1996; Pettigrew, 1990). Three key motives have driven me to inspect the Ericsson's alliance portfolio. First, Ericsson represents a case that is prototypical and paradigmatic of a successful key player in the European and global telecom industry (Di Minin & Bianchi, 2011). Founded in 1876, and with its headquarters in Stockholm, Sweden, Ericsson is the leading provider of communications technology and services in the world. Accordingly, it is considered to be among the three largest telecom firms in selling products and services to its customers, hiring employees, and involving a considerable number of shareholders in its businesses (see Table 1). Ericsson mostly provides services, software, and infrastructure in ICT for telecommunications operators. It also supplies traditional telecommunications and IP networking equipment, mobile and fixed broadband, operations and business support services, cable television, and video systems. These business activities involve more than 110,000 employees and lead Ericsson to play a key role in the telecom industry achieving 228 SEK billion in net sales 16,8 SEK billion of operating income, 7,4 SEK billion of operating margin, and 18,7 SEK billion of cash flow activities.

Second, I have reason to believe that Ericsson is a representative alliance portfolio case study because of its importance along the dimensions of interest (Gerring, 2007). From this perspective, the methodological value of the Ericsson case stems from its relevance along the dimensions under scrutiny in this study: (a) alliance portfolio size; (b) alliance portfolio diversity; and (c) alliance portfolio internationalization. Accordingly, prior studies show that over the last two decades Ericsson has announced 86 alliances, involving 134 different partners from 180 different countries (Ferrigno, 2016).

Finally, I have decided to explore the Ericsson's alliance portfolio because of data access. The possibility to leverage on a notable amount of data and information regarding the bundle of alliances in which Ericsson is involved offers a noteworthy opportunity to dig

deeper in the understanding of the three main features of alliance portfolio. This, in turn, will help me to comprehend how successful firms are able to handle the array of alliances in which they are involved.

Table 1. A snapshot of Ericsson

Business	Provider of communication technology and services
Firm foundation	1876
Headquarter	Stockholm, Sweden
Industry	Telecom industry
Net sales	228,0 (SEK billion)
Operating income	16,8 (SEK billion)
Operating margin	7,4 (SEK billion)
Cash flow from operating activities	18,7 (SEK billion)
Employees	114.340
Sales	35.320.543.689
Market capitalization	39.768.539.081

* : The data are referred to year 2014 and are available at Factiva database website (www.global.factiva.com)

3.2. Data source

As discussed earlier, the exploratory nature of this analysis implies the need to inspect the variety and richness of data that help to understand how firms manage their alliance portfolios. In order to increase the evidence for the case study context and thus ameliorate the trustworthiness of the data (Lincoln & Denzin, 1994), as well as the comprehension of the researcher sampling choice (Cook, Campbell, & Day, 1979), the analysis of the Ericsson's alliance portfolio case is grounded on a system of multiple data sources that combines a variety of information sources and allows the triangulation of data types (Jick, 1979). First, I have collected data from primary sources such as financial reports (annual reports, 10-Q reports and 10-K reports from 1994 to 2014), and new releases available at Ericsson website. Second,

I have included in the data collection various secondary sources such as 92 alliance announcements press releases from two representative and complementary alliance databases (SDC Platinum and Factiva database), and an ample set of social networks (including Facebook, Linkedin, Twitter, and Google plus) in which Ericsson has posted information about the relationships with its alliance partners. In addition, I have gathered data from 100 videos, posted on Ericsson youtube channel (section – networks), along with it has been possible to extract information about the complementarities between Ericsson and its alliance portfolio partners. Third, I have integrated the previous sources by using 24 transcripts of interviews of Ericsson and its partners' executives who, according to Ericsson website and press releases, were considered highly knowledgeable informants because they were positioned at various significant managerial levels or were involved in any of the alliances formed by the focal firm from 1994 to 2014. A report of the main data sources used to analyze Ericsson's alliance portfolio is summarized in Table 2.

Table 2. Data sources

Data source	**Details**
Ericsson website, and other online sources (e.g., SEC Edgar, Internet Archive)	SEC filings (Annual reports, 10-Q reports and 10-K reports from 1994 to 2014). Ericsson news releases from founding to 2014.
Alliance announcements	92 Press releases from SDC and Factiva database from 1994 to 2014.
Social networks	Ericsson posts on Facebook, Linkedin, Twitter, Google plus about its relationships with alliance partners.
Videos	100 videos of Ericsson about its networks of partners on Ericsson youtube channel (section networks) ranging from 1 to 6 minutes.
Interviews	24 transcripts of interviews from Ericsson and alliance partners executives published in Factiva database.

3.3. Temporal bracketing

The focal period under inquiry ranges from 1994 to 2014. In order to scrutinize how Ericsson has managed its alliance portfolio characteristics across these two decades, I have analyzed the data through temporal bracketing. By understanding the temporal progressions of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization, the case study led me to observe some interesting aspects of the relevance of these three alliance portfolio characteristics over time. To exemplify how Ericsson has managed its alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization over time I have divided the 21 years period under scrutiny into three temporal phases (i.e. phase I, 1994-2000; phase II, 2001-2007; and phase III, 2008-2014). The methodological choice to partition Ericsson's alliance portfolio characteristics in the three phases is justified by three key reasons. First, making comparisons of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization across the three temporal phases is a particularly attractive approach for conducting a detailed appreciation of the relevance of these three alliance portfolio characteristics over time as each phase in which I observe alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization comprises 7 years of observations. Thus, an appreciation of the relevance of these three alliance portfolio characteristics is not affected by differences in terms of years of observations among the three phases.

Second, temporal decomposition enriches the external validity of this study (Eisenhardt, 1989) because I consider as cut-off two external events that burst with marked economic implications for Ericsson: a) Dot-com bubble in 2001; b) economic recession in 2007.

Finally, using temporal bracketing, I investigate how "actions of one period lead to changes in the context that will affect action in subsequent periods" (Langley, 1999: 703). In this sense, the research strategy to single out the time scale into successive periods is

effectively suitable as it consents me to comprehend how Ericsson was able to shape its alliance portfolio over time by leveraging on its alliance portfolio characteristics.

4. DATA ANALYSIS OF THE ERICSSON CASE

The notable amount of data I have collected about Ericsson's alliance portfolio case study provides the basis to use an inductive case based approach that consents to offer a detailed analysis of the alliance portfolio management phenomenon in a real context. In this vein, in Table 3 I report the alliances, the partners, and the purpose of each alliance formed by Ericsson from 1994 to 2014. However, the aim of this chapter is not to detect the reasons that have driven Ericsson to expand its alliance portfolio over time, neither to detect the motives that have lead Ericsson to include or exclude certain partners from its alliance portfolio over time. Instead, by drawing on Ericsson's alliance portfolio case study this chapter seeks to offer a crystallized understanding of the relevance of the main features that, according to extant alliance portfolio literature, characterize alliance portfolio over time. Accordingly, in the subsections that follow, I shall show an empirical evidence of alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization in Ericsson's alliance portfolio. Then, I proceed by making comparison of these three alliance portfolios characteristics across three different phases three temporal phases (i.e. phase I, 1994-2000; phase II, 2001-2007; and phase III, 2008-2014).

Table 3. A snapshot of Ericsson's alliance portfolio

Year	Partner	Purpose of the alliance
1995	Collaborative Information Technology Research Institute (CITRI) of the Royal Melbourne Institute of Technology and the University of Melbourne	Develop advanced telecommunications networking technology for global markets in Melbourne.
1999	Microsoft	Create a new generation of Web-connected mobile phones for business.
2000	Charles Schwab & Co	Design and launch targeted Internet applications using mobile phones to extend the functionality of the wireless investing services that Schwab is providing to its international community of customers.
	D2	Ericsson supports the construction of D2's UMTS network by delivering, installing and servicing leading-edge network infrastructure equipment for 500 million euros.
	Heilongjiang Mobile Communications	GSM expansion contract in China valued at $90 million.
	InterWorld Corp	Develop wireless e-commerce platforms.
	Investor AB, Industrivarden and Merrill Lynch	Investor AB, Industrivarden and Merrill Lynch agree to form Ericsson Venture Partners, a $300 million venture capital fund, targeting mobile Internet development. Ericsson Venture Partners invest primarily in mobile Internet ventures and technologies, focusing on Europe and North America.
	Juniper Networks	Deliver data-ready mobile solutions to facilitate the growth of wireless Internet traffic.
	Korea IMT-2000 Consortium	Jointly establish and manage system networks for commercialized IMT-2000 services with both Ericsson Korea and Ericsson Wireless by the year 2002.
	Magneti Marelli	Supply communication solutions and mobile Internet applications to be integrated into Magneti Marelli's telematic systems.
	Sybase and Swedbank	Supply the market's first always available platform for mobile e-commerce, m-commerce, applicable to Ericsson's smartphones and communicators based on the EPOC operating system.
	Telefonica Moviles	Develop services for the Internet and mobile telephony and create and market GSM, GPRS and UMTS mobile telephony products.
	Tivoli Systems	Jointly develop a comprehensive set of mobile device management solutions (Ericsson incorporates Tivoli device management technologies into Ericsson's next generation of mobile communication devices) and propose a set of international standards for managing the next generation of mobile devices.
	Agilent Technologies, Alcatel Optronics, Agere Systems , ExceLight Communications, JDS Uniphase, Mitsubishi Electric, NEC and OpNext	Form a common transponder design platform to address the needs of very short reach, short reach, intermediate reach and long reach networks.

Table 3. Continued

Year	Partner	Purpose of the alliance
2001	Chongqing Mobile	Focus on the production of microwave transmission equipment, system installation, training and consulting in China.
	Flextronics	Leading to a rapid improvement of economies of scale, a much smaller capital exposure and reduced risk.Flextronics will take over all related Ericsson facilities in Brazil, Malaysia, Sweden (Linkoping and Pilangen). UK (Carlton and Scunthorpe) and parts of the US plant in Lynchburg/Virginia.
	Skandia Insurance	Offer electronic devices for health and security, such as remote-controlled locking devices and doors, fire and burglar alarms and home-care support for the elderly.
	Tecnosistemi	Establish two operating companies: one in Italy and the other in Brazil under the name Technosson SA.
	Telefonica Moviles Espana, Generalitat of Catalonia and Hewlett-Packard Company	Focus on developing mobile phone-related products and mobile e-services and boost the market for applications on mobile networks (including GSM, GPRS and UMTS) - fostering business opportunities for companies and innovative services for customer.
2002	BPL Telecom	Address the enterprise solutions market. BPL Telecom markets and distributes the enterprise products of Ericsson through BPL Telecom network of 17 sales offices, 41 service centres and 160 value added resellers. Ericsson plans to launch new generation PBX solutions for the Indian market, positioned at stand-alone call centres and web-based call centres.
	Dalian Daxian	Localize Ericsson's bluetooth technology in China.
	Langchao	Develop and promote wireless telecommunication technologies and products in Jinan and support the development of mobile internet business which basing on bluetooth, GPRS module and CDMA module.
	PartnerTech	Generate products for fiber recoating, a step in the manufacture of fiber-optic components. PartnerTech supplies the recoater, the machine that coats the fiber with acrylate once splicing has been completed.
	Texas Instruments	Extend an agreement for GPRS and 3G reference design platforms based on TI's advanced silicon technology.
	Wind	Conduct joint research and development of mobile telephone services, fixed-mobile Internet solutions and UMTS applications in Italy.
	Motorola, Microsoft, IBM, Intel, Lucent Technologies, Oracle, Samsung Electronics, Vodafone and Sun Microsystems	Develop services that are compatible across the networks of different operators and different mobile telephone models.
	Sony	Become the world's leading manufacturer of mobile phones within 5 years.S ony Ericsson will produce cell phones with more applications, such as color screens, Internet browsing and a digital camera that can send photos to other mobile phones or email boxes.
2003	ADM Group	ADM Group accesses to Ericsson's sales channels, knowhow, advance product information and solutions testing centers.
	Rococo Software	Bring Bluetooth applications to market more quickly. Ericsson Technology Licensing will adapt Rococo Software's market-leading standard Java technology to work with the Ericsson Core Bluetooth Stack and will sell Bluetooth software with the Rococo Java API.

Table 3. Continued

Year	Partner	Purpose of the alliance
2004	Cisco	Jointly sell and integrate key products to help telecommunications carriers migrate their older networks to new ones based on IP.
	Cisco Systems and ParaRede	Provide broadband Internet access featuring voice, data and multimedia transmission via local fixed-line phone operators. Ericsson and Cisco Systems will provide the access technology and ParaRede will manage the implementation of the new technology in Portuguese fixed-line phone operators.
	France Telecom	Jointly develop IP Multimedia Services for the consumer market.
	Napster	Offer the first complete, fully integrated digital music service available for mobile operators.
	SAGEM	Ericsson Mobile Platforms supply SAGEM with its U100 platform for 3G/WCDMA devices.
	Telstra	Put content from Telstra's directories business Sensis, pay-TV joint venture Foxtel and internet service provider BigPond on a new Telstra Service Delivery Platform.
	UMTS-Nät AB	Deliver the first and one of the absolute largest shared 3G network in the global telecommunications industry to TeliaSonera and Tele2.
	ZTE	Bring TD-SCDMA (Time Division-Synchronous Code Division Multiple Access) solutions to the Chinese market.
	Bridge Mobile, Motorola and ZTE	Ericsson, Motorola Inc. and ZTE Corp join the Bridge Mobile Alliance to promote knowledge exchange and collaboration between mobile operators and technology solutions providers.
	Alcatel, Motorola, NEC, Nokia and Siemens	Enable and promote the availability of open carrier platforms based on Commercial Off The Shelf (COTS) hardware and software and free open source software building blocks.
2006	Arima	Arima Communications selects and uses U310 and U360 mobile platforms of Ericsson and rolls out attractive mobile phones in the market on the strength of the solutions.
	Digitel	Digitel has selected Ericsson to launch its ringback tone music service Music Ton in its nationwide GSM network in Venezuela.
	Sun and Nokia	Developing an architecture that will offer a wide range of applications and be easily adaptable.
	TietoEnator	Create a full end-to-end provider of automatic meter reading and management solutions by combining TietoEnator's expertise in the energy sector, system integration and business process management with Ericsson's mobility and enterprise communication experience.
2007	Compal Communications	Ericsson licenses the U310 mobile platform to Compal Communications to consent Compal Communications to offer attractive products incorporating the latest technology for mass-market deployment, with short time to market.
	Endemol	Develop interactive TV and user-generated content via Ericsson's 'Me-On-TV' solution.
	Partner Communications	Replace a third party 3G equipment existing in Partner's network and expand thereof, and for the support and maintenance of the Ericsson elements in Partner's network.
	Sun	Develop an open source Java technology-based multimedia application server as well as a supporting program for the developer community and offer third party developers access to converged services delivery platforms through their respective developer programs, such as the Sun Developer Network (SDN), Sun Partner Advantage Program and Ericsson Mobility World Developer Program.
	Vidiator	Offer Vidiator’s award-winning Xenon products for Ericsson’s Mobile TV sol.

Table 3. Continued

Year	Partner	Purpose of the alliance
2008	Alcatel-Lucent, Samsung Electronics Co., KT Corp, SK Telecom Co, and Dongwon Systems Corp.	Develop next-generation network technologies, set technology standards and sell network equipment.
	AT&T and Lenovo	Enabling business PC users to access broadband-speed Internet via their ThinkPad notebook PCs. Ericsson's integrated mobile broadband modules for high-speed packet access (HSPA) will enable access to these speeds in the new notebooks.
	Digicel Group	Supply the nationwide deployment of a GSM/EDGE network in Panama.
	GTL	Offer managed network infrastructure services to network operators and service providers in the UK.
	Intel	Extend Ericsson 3G mobile broadband technology for notebooks and pocket devices.
	T-Mobile Netherlands	Cementing Ericsson's position in the Dutch market. Ericsson continues to manage end-to-end network operations for the former Orange network and takes on responsibility for streamlining T-Mobile Netherlands' overall network infrastructure by dismantling the former Orange mobile networks.
	Toshiba	Ericsson provides mobile broadband modules for Toshiba's business laptops.
	Econet Wireless Global	Expand Econet's network in Zimbabwe.
2009	Kaixin001	Bring new applications that will allow users to manage their virtual space, interact with friends and stay updated on their online communities, all via their mobile devices - anytime, anywhere. Future services could include real-time uploading of photos and videos from mobile phones, SMS alerts on a favorite celebrity's activities, and location-based services, such as checking if friends are nearby.
	NEC, NeuStar, Orange, Symlabs and TeliaSonera	Develop best practices for managing identity-information and identity-enabled transactions and services in the global telecom sector.
	STMicroelectronics	Focus on product research, design and the development and creation of mobile platforms and wireless semiconductors. In the joint venture, STMicroelectronics would contribute its multimedia and connectivity solutions as well as 2G/EDGE platform and 3G offering. Ericsson would contribute its 3G and LTE platform technology.
	TeliaSonera	Introducing a new mobile advertising solution in Sweden to offer ads tailored to fit consumers' personal needs and interests.
	Zain	Ericsson manages most of the network and field operations for Zains wireless networks and operational support systems, serving almost 4,000 sites across Nigeria.
2010	LG	Ericsson becomes the largest shareholder by acquiring 51% share in LG-Ericsson.
	LG-Nortel	Ericsson acquires Nortel's majority shareholding (50%+1 share) in LG-Nortel, the joint venture of LG Electronics and Nortel Networks. The purchase price is approximately USD 242 million in order to expand Ericsson's footprint in the Korean market, to provide Ericsson with a well-established sales channel and strong R&D capability in the country and to provide Ericsson with an industrial base and the ability to build new customer relationships.
	Motorola	Provide an industry leading LTE-based solution for public safety mobile broadband that will interoperate with mission critical voice and data to unify the delivery of high-performing voice and broadband multimedia applications. Combined with Motorola's public safety optimized LTE core and interoperability platform, Ericsson provides its industry leading LTE access equipment as well as parts of its packet core and related services to deliver broadband multimedia services to public safety. Motorola's advanced devices, video security and command and control solutions leverages these platforms to offer public safety unprecedented situational collaboration and situational awareness.
	Nortel	Ericsson acquires Guangdong Nortel Telecommunication Equipment (GDNT), a Chinese joint venture established in 1995 between Nortel and local Chinese corporations and telecom operators,for approximately $50 million in cash.
	Telefonica S.A. and Indra	Transfer of Telefonica's complete pre-paid billing assets, related operations support systems together with about 500 employees that develop, operate and maintain the solution that serves about 100 million subscribers in the Telefonica Group.

Table 3. Continued

Year	Partner	Purpose of the alliance
2011	Akamai	Jointly develop a technology to bring to market mobile cloud acceleration solutions aimed at improving end-user Internet experiences such as mobile ecommerce, enterprise applications and internet content.
	Clearwire Corporation	Transfer the day-to-day management of Clearwire's 4G network to Ericsson and allow Clearwire to realize operational efficiencies and reduce operating costs.
	Singapore Telecommunications	Provide emergency communications services to support disaster relief efforts in South and Southeast Asia through Ericsson Response.
2012	Calix	Calix resells Ericsson's fiber access assets (EDA 1500 GPON Assets).
	Western Union	Enable cellphone network operators to bring cellphone financial services to unbanked people around the world.
2013	China Mobile	Ericsson deploys LTE TDD (TD-LTE) in 15 provinces in mainland China.
	Gemalto NV	Provide an integrated solution comprising the Ericsson Device Connection and Gemalto Subscription Management Platforms in order to reduce complexity of M2M deployments for mobile network operators and offer investment scalability.
	SAP AG	Jointly market and sell cloud-based, machine-to-machine (M2M) solutions and services to enterprises via operators around the globe.
	STMicroelectronics	Ericsson takes on the design, development and sales of the LTE multimode thin modem solutions, including 2G, 3G and 4G interoperability. STM takes on the existing ST-Ericsson products, other than LTE multimode thin modems, and the GNSS (Global Navigation Satellite System) connectivity solution sold to a third party, and related business as well as certain assembly and test facilities.
	Telstra	Bring the next generation of mobile broadband to Australia.
2014	Cienia	Develop joint transport solutions for IP-optical convergence and service provider software-defined networking (SDN). As part of this agreement, Ericsson offers Ciena's Converged Packet Optical portfolio, including the 6500 Packet-Optical Platform and 5400 family.
	Samsung	License agreement that covers patents relating to GSM, UMTS, and LTE standards for both networks and handsets.
	Telefonica	Launch of a joint R&D program to understand, in-depth, the challenges and opportunities in network transformation during the coming decade, specifically in the areas of Network Functions Virtualization (NFV) and service provider Software Defined Networking (SDN) in order to build more flexible and cost-efficient solutions, as well as to enable networks as true platforms for innovation.

4.1. Ericsson's alliance portfolio size

As previously argued, alliance portfolio research pinpoints the importance of alliance portfolio size as one of the main features that characterize alliance portfolio management phenomenon. Alliance portfolio size has been traditionally operationalized in two ways: a) the number of alliances in which a focal firm is involved (Wassmer, 2010); or (b) the number of partners to which the focal firm is related to (Hoffman, 2007). Accordingly, in this study I have calculated alliance portfolio size by considering both the number of alliances and the number of partners of Ericsson's alliance portfolio. As regards the number of alliances, Table 4 shows that Ericsson has formed an increasing number of alliances over time. In particular, in the years 2000, 2004 and 2008 Ericsson has consistently enlarged the size of its alliance portfolio by forming respectively 12, 10 and 8 alliances. I found similar findings by considering the number of partners involved in Ericsson's alliance portfolio. Indeed, as table 4 shows, in the years 2000, 2004 and 2008 Ericsson has enlarged the size of its alliance portfolio by involving respectively 22, 17 and 13 partners.

Hence, independently from the dimensions or the variable chosen to compute alliance portfolio size - i.e., (a) the number of alliances in which a focal firm is involved (Wassmer, 2010); or (b) the number of partners to which the focal firm is related to (Hoffman, 2007) - what this analysis seems to show as unquestionable is that Ericsson has invested a lot of resources and efforts to enlarge its alliance portfolio over time. Accordingly, Ericsson's alliance portfolio case study seems to show that Ericsson presents a large alliance portfolio. Thus, this finding seems to support the stream of alliance portfolio literature (Deeds, et al., 2000; Lahiri & Narayanan, 2013; Sampson, 2007) that argue that a large alliance portfolio might be beneficial for the focal firm performance.

Table 4. Ericsson's alliance portfolio size (1994-2014)

Year	Number of alliances	Number of partners	Number of alliances*	Number of partners*
1994	0	0	0	0
1995	1	2	1	2
1996	1	2	1	2
1997	1	2	1	2
1998	1	2	1	2
1999	2	3	2	3
2000	14	25	13	23
2001	19	32	18	30
2002	27	48	26	46
2003	29	50	28	48
2004	39	67	37	64
2005	39	67	25	42
2006	43	72	24	40
2007	48	77	21	29
2008	56	90	27	40
2009	61	99	22	32
2010	66	105	27	38
2011	64	108	26	36
2012	66	110	23	33
2013	71	115	20	25
2014	74	118	18	19

Note: * indicates that I consider alive each alliance for 5 years (Stuart, 2000).

4.2. Ericsson's alliance portfolio diversity

Alliance portfolio research suggests that alliance portfolio diversity is another feature that epitomizes alliance portfolio management phenomenon. Alliance portfolio diversity relates to the degree of variance in partners, alliances, and resources that the focal firm has access to via its multiple alliances links (Jiang et al., 2010). Following previous literature, I have calculated alliance portfolio diversity by considering the degree of variance among alliance portfolio partners.

In Ericsson's alliance portfolio case study I note that Ericsson's alliance portfolio is characterized by the presence of a wide array of diverse partners. Indeed, as Table 5 shows, the number of different partners that are involved in Ericsson's alliance portfolio does not appear to diverge significantly from the number of total partners to which Ericsson is engaged with. Actually, Ericsson has devoted attention to maintain a certain level of partners' heterogeneity in its alliance portfolio over time, thereby gaining benefits that stem from such heterogeneity (Beckman & Haunschild, 2002; Hoffmann, 2007; Swaminathan & Moorman, 2009; Wuyts et al., 2004). Notwithstanding that, the relevance of a high degree of variance among Ericsson's alliance portfolio partners does not indicate that Ericsson is not prone to repeat or renew its alliances with the same partners. For instance, Ericsson has formed five strategic collaborations with Telefonica (in the years 2000, 2001, 2005, 2010, and 2014), four strategic agreements with Microsoft (in the years 1999, 2000, 2003, and 2005), Motorola (in the years 2002, 2005, 2006, and 2010), and Samsung (in years 2002, 2005, 2008, and 2014). A part from these collaborations, Ericsson's alliance portfolio case study seems to show that this focal firm has managed its alliance portfolio by relying on diverse partners over time, thereby supporting the stream of alliance portfolio literature that emphasize the benefits that are associated with high degrees of alliance portfolio diversity among alliance portfolio partners.

Table 5. Ericsson's alliance portfolio diversity (1994-2014)

Year	Number of partners	Number of different partners	Number of partners*	Number of different partners*
1994	0	0	0	0
1995	2	2	2	2
1996	2	2	2	2
1997	2	2	2	2
1998	2	2	2	2
1999	3	3	3	3
2000	25	25	23	23
2001	32	32	30	30
2002	48	47	46	45
2003	50	49	48	47
2004	67	63	64	60
2005	67	63	42	38
2006	72	66	40	34
2007	77	70	29	23
2008	90	81	40	32
2009	99	88	32	25
2010	105	92	38	29
2011	108	95	36	29
2012	110	97	33	28
2013	115	100	25	22
2014	118	101	19	16

Note: * indicates that I consider alive each alliance for 5 years (Stuart, 2000).

4.3. Ericsson's alliance portfolio internationalization

Alliance portfolio internationalization is the last feature that, according to extant alliance portfolio research, characterizes the alliance portfolio management phenomenon. Alliance portfolio internationalization relates to the degree of foreign partners in a firm's collection of immediate alliance relationships (Lavie & Miller, 2008). Accordingly, I have calculated alliance portfolio internationalization by considering the country of origin of alliance portfolio's partners.

In Ericsson's alliance portfolio case study I observe that Ericsson's alliance portfolio is characterized by the presence of an extensive array of foreign partners. Indeed, as Table 6 shows, regardless of the year I take into consideration, the number of foreign partners that are involved in Ericsson's alliance portfolio seems to converge significantly to the number of total partners to which Ericsson is connected to. Actually, in the years 1995, 1996, 1997, 1998, and 1999 the number of foreign partners in Ericsson's alliance portfolio seems to correspond to the number of total partners that are present in Ericsson's alliance portfolio. Thus, Ericsson's alliance portfolio case study seems to show that allying with foreign partners plays a central role in Ericsson's alliance portfolio management. In fact, as Table 6 shows, Ericsson has managed its alliance portfolio by involving a consistent number of partners from various countries over the globe. Moreover, in Ericsson's alliance portfolio case study I note that Ericsson has formed a few number of alliances with national partners. Indeed, Ericsson has created one strategic partnership with Investor AB, Industrivarden, and Swedbank (in 2000), one collaborative agreement with Skandia Insurance (in 2001) and lastly, two strategic alliances with Teliasonera (in 2009).

Hence, drawing on these results, this analysis seems to show that cross-national differences are considered to be relevant for the management of Ericsson's alliance portfolio. Thus, this insight seems to support the stream of alliance portfolio research that pinpoints the importance of the benefits associated with the presence of high degrees of international

partners in alliance portfolio (Eisenhardt & Schoonhoven, 1996; García-Canal et al., 2002; Powell et al., 1996; Zaheer, 2000).

Summing up, the analysis of Ericsson's alliance portfolio case study sheds lights on the relevance of the three main features that, according to extant alliance portfolio research, epitomize alliance portfolio management phenomenon; i.e., alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization. Additionally, this analysis shows how Ericsson, a successful firm that operates in the telecom industry, manages its alliance portfolio by leveraging on the formation of several alliances with a plenty number of diverse and foreign partners over time.

Table 6. Ericsson's alliance portfolio internationalization (1994-2014)

Year	Number of partners	Number of foreign partners	Number of partners*	Number of foreign partners*
1994	0	0	0	0
1995	2	2	2	2
1996	2	2	2	2
1997	2	2	2	2
1998	2	2	2	2
1999	3	3	3	3
2000	25	22	23	20
2001	32	28	30	26
2002	48	44	46	42
2003	50	46	48	44
2004	67	63	64	60
2005	67	63	42	41
2006	72	68	40	40
2007	77	73	29	29
2008	90	86	40	40
2009	99	93	32	30
2010	105	99	38	36
2011	108	102	36	34
2012	110	104	33	31
2013	115	109	25	23
2014	118	112	19	19

Note: * indicates that I consider alive each alliance for 5 years (Stuart, 2000).

5. DISCUSSION AND CONCLUSION

In the previous section, I have observed that alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization are three key features that have epitomized Ericsson's alliance portfolio from 1994 to 2014. However, one of the main objectives of this study is to explore how Ericsson has managed these three alliance portfolio characteristics over time. In order to achieve this objective, by decomposing the period of observation into three temporal phases: phase I (from 1994 to 2000); phase II (from 2001 to 2007); and, phase III (from 2008 to 2014), I have juxtaposed the relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization. The results of the analysis leads to highlight two important aspects. First, alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization present different levels of relevance across the three temporal phases. In particular, I observe that phase I is characterized by the prominence of alliance portfolio diversity, while phase II is epitomized by the prominence of alliance portfolio size, and phase III is characterized by high levels of relevance of alliance portfolio internationalization. The findings of the temporal decomposition of Ericsson's alliance portfolio characteristics across the three phases are reported in Table 7. Second, I note that the different levels of relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization across the three temporal phases are the result of Ericsson's alliance portfolio strategy performed in "trial and error" fashion way. Actually, Ericsson has changed its alliance portfolio strategy over time by accruing the benefits and learning from the challenges that stem from high levels of alliance portfolio diversity (phase I) as well as high levels of alliance portfolio size (phase II). In doing so, Ericsson has progressively changed its alliance portfolio strategy by shifting from an alliance portfolio diversity strategy (phase I) to an alliance portfolio size strategy (phase II), to alliance portfolio

internationalization strategy (phase III).[11] In the sections that follow, I discuss how Ericsson has successfully changed its strategy in managing these three alliance portfolio characteristics over time.

[11] The results of this analysis remain equal if I consider alive each alliance for 5 years (see appendix).

Table 7. A comparison among Ericsson's APS, APD and API over time

Phase I (from 1994 to 2000)

Year	Alliance Portfolio Size	Alliance Portfolio Diversity		Alliance Portfolio Internationalization	
	Number of partners	Number of different partners	Number of partners/Number of different partners	Number of foreign partners	Number of partners/Number of foreign partners
1994	0	0	0	0	0
1995	2	2	1	2	1
1996	2	2	1	2	1
1997	2	2	1	2	1
1998	2	2	1	2	1
1999	3	3	1	3	1
2000	25	23	1,09	22	1,14

Phase II (from 2000 to 2007)

Year	Alliance Portfolio Size	Alliance Portfolio Diversity		Alliance Portfolio Internationalization	
	Number of partners	Number of different partners	Number of partners /Number of different partners	Number of foreign partners	Number of partners/ Number of foreign partners
2001	32	32	1,00	28	1,14
2002	48	47	1,02	44	1,09
2003	50	49	1,02	46	1,09
2004	67	63	1,06	63	1,06
2005	67	63	1,06	63	1,06
2006	72	66	1,09	68	1,06
2007	**77**	70	1,10	73	1,05

Phase III (from 2007 to 2014)

Year	Alliance Portfolio Size	Alliance Portfolio Diversity		Alliance Portfolio Internationalization	
	Number of partners	Number of different partners	Number of partners /Number of different partners	Number of foreign partners	Number of partners/ Number of foreign partners
2008	90	81	1,11	86	1,05
2009	99	88	1,13	93	1,06
2010	105	92	1,14	99	1,06
2011	108	95	1,14	102	1,06
2012	110	97	1,13	104	1,06
2013	115	100	1,15	109	1,06
2014	118	101	1,17	112	1,05

Appendix

Phase I (from 1994 to 2000)

Year	Alliance Portfolio Size	Alliance Portfolio Diversity		Alliance Portfolio Internationalization	
	Number of partners	Number of different partners	Number of partners/Number of different partners	Number of foreign partners	Number of partners/Number of foreign partners
1994	0	0	0	0	0
1995	2	2	1	2	1
1996	2	2	1	2	1
1997	2	2	1	2	1
1998	2	2	1	2	1
1999	3	3	1	3	1
2000	23	23	1	20	1,15

Phase II (from 2000 to 2007)

Year	Alliance Portfolio Size	Alliance Portfolio Diversity		Alliance Portfolio Internationalization	
	Number of partners	Number of different partners	Number of partners/Number of different partners	Number of foreign partners	Number of partners/Number of foreign partners
2001	30	30	1,00	26	1,15
2002	46	45	1,02	42	1,10
2003	48	47	1,02	44	1,09
2004	64	60	1,07	60	1,07
2005	42	38	1,11	41	1,02
2006	40	34	1,18	40	1,00
2007	29	23	1,26	29	1,00

Phase III (from 2007 to 2014)

Year	Alliance Portfolio Size	Alliance Portfolio Diversity		Alliance Portfolio Internationalization	
	Number of partners	Number of different partners	Number of partners/Number of different partners	Number of foreign partners	Number of partners/Number of foreign partners
2008	40	32	1,25	40,00	1,00
2009	32	25	1,28	30,00	1,07
2010	38	29	1,31	36,00	1,06
2011	36	29	1,24	34,00	1,06
2012	33	28	1,18	31,00	1,06
2013	25	22	1,14	23,00	1,09
2014	19	16	1,19	19,00	1,00

5.1. Phase I (from 1994 to 2000)

By comparing the relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization in Phase I, I observe that Ericsson's alliance portfolio case study is characterized by the prominence of alliance portfolio diversity. Table 7 shows that in Phase I Ericsson presents higher levels of alliance portfolio diversity than those of alliance portfolio size and alliance portfolio internationalization. Actually, this Table also shows that Ericsson has formed all alliances with diverse partners. The 25 partners involved in its portfolio differ per knowledge and information they bring to Ericsson's portfolio. This result suggests that in the phase I Ericsson has devoted its attention to involve different partners with different knowledge and information in its alliance portfolio. By involving different partners in its alliance portfolio, Ericsson has leveraged on the benefits that stem from the heterogeneity of resources of its partners. Indeed, a more variety in partners allowed Ericsson to access new resources (Beckman & Haunschild, 2002; Swaminathan & Moorman, 2009). For instance, this insight is apparent from the alliance that Ericsson has formed in 2000 with Telefonica Moviles.

"This joint venture will focus on the development of services and the creation and marketing of GSM, GPRS and UMTS mobile telephony products. Ericsson and Telefonica Moviles plan to bring in a third partner specializing in information technology and an institutional investor, according to the statement, which provides no further details. Telefonica Moviles, Telefonica's mobile telephony subsidiary, will shortly float a part of its capital on the stock exchange". (Ericsson's Chief Operative Officer, Ericsson Internal Press release, 2000)

Moreover, Ericsson's alliance portfolio inquiry suggests also that a more variety in partners has allowed Ericsson to build new technologies, and mobile products (Wuyts, Dutta & Stremersch, 2004). In fact, in 2000 Ericsson has formed a multipartner alliance with Investor AB, Industrivarden and Merrill Lynch to create new mobile products based on Internet technologies.

"We expect more mobile Internet users than fixed Internet users already by 2003, and this means an incredible demand for building out networks and creating new services. By joining

the knowledge of these four venture partners this initiative will provide a very strong drive for the creation of the mobile Internet". (Ericsson's Chief Executive Officer, Ericsson Internal Press release, 2000)

5.2. Phase II (from 2001 to 2007)

In the phase I of Ericsson's alliance portfolio case study it is apparent that Ericsson has devoted its efforts to forming its alliances with different partners so as to access new resources and create new technologies and products. Thus, Ericsson has benefited from the heterogeneity of resources, knowledge, and information that is associated with high levels of alliance portfolio diversity. However, moving to the phase II of Ericsson's alliance portfolio study I observe that Ericsson has changed its alliance portfolio strategy. In particular, I note that in Phase II, which ranges from 2001 to 2007, Ericsson has started to pay attention to the size of its alliance portfolio. More precisely, in Phase II Ericsson has enlarged its alliance portfolio size by forming a considerable amount of alliances, thereby increasing the number of partners involved in its alliance portfolio. Indeed, as Table 7 shows, the phase II of Ericsson's alliance portfolio case study is characterized by high levels of alliance portfolio size. Accordingly, by comparing the number of partners involved at the end of Phase I (25 partners) with the number of partners of Ericson's alliance portfolio at the end of Phase II (77 partners), I note that Ericsson has expanded its alliance portfolio by forming alliances with additional 52 partners. The strategic decision to focus on alliance portfolio size, rather than on alliance portfolio diversity and alliance portfolio internationalization is due to two main reasons. First, Ericsson has involved several partners in its alliance portfolio to leverage external knowledge and to achieve economies of scale and volume flexibility from more than one alliance (Di Minin, Frattini, & Piccaluga, 2010; Lahiri & Narayanan, 2013). Accordingly, this insight is evident in the strategic alliance formed with Flextronics in 2001:

"In light of a significant change in the world market for mobile phones we have decided to fundamentally change the setup of our business ... The alliance with Flextronics will enable us to achieve economies of scale and volume flexibility... We are committed to remain a top player in mobile phones... With this new set-up, we respond to a much tougher business environment, and we create a sound basis for long-term profitability." (Ericsson's Vice President, Ee Times Press release, 2001)

Second, Ericsson's alliance portfolio case study shows that in phase II Ericsson has enlarged its alliance portfolio to develop a more comprehensive understanding of the diverse knowledge bases of its partners over time (Deeds, Decarolis, & Coombs, 2000). Indeed, in the end of 2004 Ericsson has formed an alliance with Pararede and Cisco Systems to cross leverage knowledge from a previous alliance with Cisco System.

"The companies plan to provide broadband Internet access featuring voice, data and multimedia transmission via local fixed-line phone operators. Ericsson and Cisco Systems will provide the access technology and ParaRede will manage the implementation of the new technology in Portuguese fixed-line phone operators. ParaRede's partnership with Ericsson and Cisco Systems is a consequence of a strategic partnership established between Ericsson and Cisco in the end of April 2004". (Ericsson's Chief Executive Officer, Ericsson's Internal Press release, 2004)

5.3. Phase III (from 2008 to 2014)

In the phase III in which I compare the relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization I note that it is alliance portfolio internationalization that assumes paramount importance *vis-a-vis* alliance portfolio size and alliance portfolio diversity. Hence, Ericsson's alliance portfolio inquiry suggests that, from 2008 to 2014, Ericsson has devoted its attention to include in its alliance portfolio several foreign partners. Indeed, as Table 7 shows, in 2014 Ericsson's alliance portfolio involves 112 foreign partners. This result shows that, in the phase III, Ericsson has managed its alliance portfolio by leveraging on the cross-national cultural, geographical, institutional and economic development divergences of its alliance portfolio partners (Ghemawat, 2001). Two reasons have lead Ericsson to focus on alliance portfolio internationalization. First, an enhanced foreign

alliance portfolio has contributed to improve Ericsson's flexibility and its capacity to be responsive to turbulent and dynamic environmental changes (Eisenhardt & Schoonhoven, 1996; Powell, Koput & Smith-Doerr, 1996). This insight is evident in the alliance formed with LG-Electronics in 2010:

"Korea is one of the largest telecom markets with advanced end-user demand of new services. A strengthening of our position through the collaboration with our new partner LG Electronics will enhance our position for future technology shifts such as LTE "(Ericsson's President, Ericsson's Internal Press release, 2010).

Second, an improved foreign alliance portfolio allows Ericsson to allocate its activities over the world in a way to ameliorate its market position in technology-driven industries (Zaheer, 2000). This insight is clearly evident in the alliance formed with T-Mobile in 2008:

"This strategic partnership is an important milestone in Ericsson's relationship with T-Mobile. It underlines our strong market position and means Ericsson is now a supplier to all Dutch operators." (President of Ericsson Netherlands, Ericsson's Internal Press release, 2008).

Summing up, the comparison of the relevance among alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization across the three phases of Ericsson's alliance portfolio study sheds additional lights on how Ericsson has managed the three alliance portfolio characteristics over time. In the phase I (from 1994 to 2000), Ericsson has managed its portfolio by forming alliances with different partners, thereby benefiting from the heterogeneity of resources that stems from high levels of alliance portfolio diversity. In the phase II (from 2001 to 2007), Ericsson has changed its alliance portfolio strategy by giving more importance to the size of its portfolio. Accordingly, it has enlarged its alliance portfolio size by forming a considerable amount of alliances with several partners. In the phase III (from 2008 to 2014) Ericsson has pointed the attention on its alliance portfolio internationalization, thereby leveraging the cultural, geographical, institutional and economic development differences of its alliance portfolio partners. Drawing on these findings, in the following section

I conclude the chapter by discussing the theoretical and managerial implications and advancing a few research questions that might stimulate additional research on alliance portfolio.

5.4. Theoretical contributions

This chapter advances three theoretical contributions to strategic alliance research. First, it provides a more comprehensive understanding of alliance portfolio characteristics by unveiling the three main features (alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization) that, according to extant alliance portfolio literature, epitomize alliance portfolio management phenomenon. Accordingly, the chapter shows that the management of an alliance portfolio is characterized by: (a) the number of partners or alliances a focal firm is connected to (i.e. alliance portfolio size); (b) the degree of variety in partners, alliances, and resources that the focal firm has access to via its multiple alliances links (i.e. alliance portfolio diversity); and (c) the degree of foreign partners in a firm's collection of immediate alliance relationships (i.e. alliance portfolio internationalization).

Second, this chapter discusses empirical evidence of these three alliance portfolio characteristics in a business context. By conducting an in-depth longitudinal case study of the portfolio of alliances that Ericsson has managed from 1994 to 2014, the study shows that alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization are relevant for the management of Ericsson's alliance portfolio. Drawing on the analysis of Ericsson's alliance portfolio over time, this chapter shows how this successful firm of the telecom industry has consistently devoted its resources and efforts in developing an alliance portfolio that is characterized by the presence of several alliances with an increasing amount of diverse and foreign partners over time. In doing so, the chapter enriches the array of qualitative studies on the evolution of alliance portfolios (Lavie & Singh, 2011).

Finally, the chapter contributes to the stream of alliance portfolio literature that argues that three main characteristics are critical to alliance portfolio management phenomenon as they present both benefits and challenges for the management of alliance portfolio. Indeed, by tapping into Ericsson's alliance portfolio, the chapter shows how Ericsson has managed its alliance portfolio by leveraging on the benefits that are associated with alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization.

5.5. Managerial implications

As concerns the practical implication of the study, the chapter advances a couple of relevant managerial implications. First, alliance managers should pay attention to managing the alliances they form from a portfolio perspective. By analyzing the bundle of alliances that Ericsson has formed in the last two decades, the chapter shows how a successful firm in the telecom industry is called to face the challenge of managing multiple alliance per time. Hence, how a focal firm's alliance portfolio can be managed successfully is a significant question whose importance cannot be ignored by alliance managers.

Second, alliance managers are called to develop a more comprehensive understanding of the main features that characterize the alliance portfolios they manage. Alliance portfolio size, alliance portfolio diversity, and alliance portfolio internationalization are three key characteristics that pose both benefits and challenges to the management of alliance portfolios.

This chapter shows that alliance managers should invest their efforts in paying considerable attention to the three key characteristics that epitomize their alliance portfolios: 1) the amount of alliances they intend to form, (as well as the partners they are willing to ally with); 2) the variety of partners, resources and alliances that might be present in their alliance

portfolios; and 3) the differences that might exist between their company and its foreign partners' countries of origin.

5.6. Limitations and future research

This chapter has three limitations that may be fertile ground for nurturing future research on alliance portfolio literature. First, since this study is based on a single case; i.e., Ericsson's alliance portfolio, the extensibility of the results I claim in this chapter is bounded to the multiple possible interpretations of the evidence that might occur in a single case study (Eisenhardt & Graebner, 2007). In this vein, future studies may confirm, enlarge, or restrict the validity of the results of this study by conducting a multiple comparative case studies research.

Second, I have focused my analysis on the three main features (i.e., alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization) that, according to extant alliance portfolio literature, epitomize alliance portfolio management. In order to explore additional important features of alliance portfolio management phenomenon, future studies may investigate whether alliance portfolio structural characteristics such as alliance portfolio density, alliance portfolio cohesion, and alliance portfolio centrality might be also relevant or not for the management of alliance portfolio.

Finally, this study has not empirically analyzed how the three alliance portfolio characteristics affect the focal firm performance. Quantitative studies that examine the relationships between the three alliance portfolio characteristics and the focal firm's performance may address this intriguing research question.

6. REFERENCES

Ahuja, G. (1996). *Collaboration and innovation: A longitudinal study of inter-firm linkages and firm patenting in the global advanced materials industry*. Unpublished PhD dissertation, University of Michigan, Ann Arbor, MI.

Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: a longitudinal study. *Administrative Science Quarterly*, 45(3), 425-455.

Anderson, E. (1990). Two firms, one frontier: On assessing joint venture performance. *Sloan Management Review, 31*, 19–30.

Bakker, R. M., & Knoben, J. (2014). Built to last or meant to end: intertemporal choice in strategic alliance portfolios. *Organization Science*, *26*(1), 256-276.

Bamford, J. D., Gomes-Casseres, B., & Robinson, M. S. (2003). Mastering alliance strategy. San Francisco: Jossey-Bass.

Baum, J. A. C., Calabrese, T., & Silverman, B. S. (2000). Don't go it alone: alliance network composition and start-ups' performance in Canadian biotechnology. *Strategic Management Journal*, *21*, 267-294.

Beckman, C. M., & Haunschild, P. R. (2002). Network learning: the effects of partners' heterogeneity of experience on corporate acquisitions. *Administrative Science Quarterly*, *47* (1), 92-124.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 128-152.

Cook, T. D., Campbell, D. T., & Day, A. (1979). *Quasi-experimentation: design & analysis issues for field settings* (Vol. 351). Boston: Houghton Mifflin.

Cui, A. S., & O'Connor, G. (2012). Alliance portfolio resource diversity and firm innovation. *Journal of Marketing*, *76* (4), 24-43.

Dagnino, G.B., & Ferrigno, G. (2015).The strategic management of multipartner alliances: uncovering the triadic alliance problem. In Das T.K (Ed.), *Managing Multipartner Strategic Alliances*. Information Age Publishing: 135-169.

Deeds, D. L., DeCarolis, D., & Coombs, J. (2000). Dynamic capabilities and new product development in high technology ventures: an empirical analysis of new biotechnology firms. *Journal of Business Venturing*, *15* (3), 211-229.

Di Minin, A., & Bianchi, M. (2011). Safe nests in global nets: Internationalization and appropriability of R&D in wireless telecom. *Journal of International Business Studies*, 42(7), 910-934.

Di Minin, A., Frattini, F., & Piccaluga, A. (2010). Fiat: open innovation in a downturn (1993–2003). *California Management Review*, 52(3), 132-159.

Dussauge, P., Garrette, B., & Mitchell, W. (2000). Learning from competing partners: outcomes and durations of scale and link alliances in Europe, North America and Asia. *Strategic Management Journal*, *21* (2), 99-126.

Duysters, G., & Lokshin, B. (2011). Determinants of alliance portfolio complexity and its effect on innovative performance of companies*. *Journal of Product Innovation Management*, *28* (4), 570-585.

Duysters, G., Kok, G., & Vaandrager, M. (1999). Crafting successful strategic technology partnerships. *R&D Management*, *29*(4), 343-351.

Dyer, J., Kale, P., & Singh, H. (2001). How to make strategic alliances work. *Sloan Management Review, 42*(4), 37–43.

Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4) 532-550.
Eisenhardt, K., & Graebner, M. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal*, 50(1), 25–32.

Eisenhardt, K. M., & Schoonhoven, C. B. (1996). Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Organization Science*, *7*(2), 136-150.

Ernst, D. (2004). Envisioning collaboration. In J. Bamford, B. Gomes-Casseres, & M. Robinson (Eds.), *Mastering alliance strategies.* San Francisco, CA: Jossey-Bass.

Feder, B. J. Retrenchment, not retreat. New York Times, 24 January 2001.

Ferrigno, G. (in press). Looking for alliance portfolio characteristics: the case of telecom industry. In Das T.K (Ed.), *Managing alliance portfolios and networks*. Charlotte, NC: Information Age Publishing.

García-Canal, E., Duarte, C. L., Criado, J. R., & Llaneza, A. V. (2002). Accelerating international expansion through global alliances: a typology of cooperative strategies. *Journal of World Business*, *37* (2), 91-107.

Gerring, J. (2007) Case Study Research, Cambridge, MA: Cambridge University Press.

Ghemawat, P. (2001). Distance still matters. *Harvard Business Review*, *79*(8), 137-147.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: strategies for qualitative research*. Chicago, IL: Aldine.

Gomes-Casseres B. (2015). *Remix strategy. The three laws of Business Combinations*. Boston, MA: Harvard Business Review Press.

Hamel, G. (1991). Competition for competence and interpartner learning within international strategic alliances. *Strategic Management Journal*, *12*(S1), 83-103.

Morris, D., & Hergert, M. (1987). Trends in international collaborative agreements. *Columbia Journal of World Business*, *22*(2), 15-21.

Hoffmann, W. H. (2007). Strategies for managing a portfolio of alliances. *Strategic Management Journal*, *28* (8), 827-856.

Jiang, R. J., Tao, Q. T., & Santoro, M. D. (2010). Alliance portfolio diversity and firm performance. *Strategic Management Journal*, *31* (10), 1136-1144.

Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, *24*, 602-611.

Kale, P., Dyer, J., & Singh, H. (2002). Alliance capability, stock market response and long-term alliance success: the role of the alliance function. *Strategic Management Journal, 23*, 747–767.

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

Kale, P., Singh, H., & Bell, J. (2009). Relating well: building capabilities for sustaining alliance networks. In P. Kleindorfer & Y. Wind (Eds.), *The network challenge: Strategies for managing the new interlinked enterprise*. London, UK: Pearson Press.

Kogut, B. (1991). Joint ventures and the option to expand and acquire. *Management Science, 37*, 19–34.

Koput, K. W. (1997). A chaotic model of innovative search: some answers, many questions. *Organization Science*, *8* (5), 528-542.

Lahiri, N., & Narayanan, S. (2013). Vertical integration, innovation, and alliance portfolio size: implications for firm performance. *Strategic Management Journal*, *34* (9), 1042-1064.

Langley, A. and Truax, J. (1994) „A process study of new technology adoption in smaller manufacturing firms", *Journal of Management Studies*, 31(5): 619-652.

Lavie, D. (2006). The competitive advantage of interconnected firms: an extension of the resource-based view. *Academy of Management Review*, *31*(3), 638-658.

Lavie, D., & Miller, S. R. (2008). Alliance portfolio internationalization and firm performance. *Organization Science*, *19* (4), 623-646.

Lee, D. D., Kirkpatrick-Husk, K., & Madhavan, R. (2014). Diversity in alliance portfolios and performance outcomes: a meta-analysis. *Journal of Management*, 0149206314556316.

Lincoln, Y. S., & Denzin, N. K. (1994). The fifth moment. *Handbook of qualitative research*, *1*, 575-586.

Mason, J. (1996). Qualitative researching. Newbury Park, CA: Sage.

Oerlemans, L. A., Knoben, J., & Pretorius, M. W. (2013). Alliance portfolio diversity, radical and incremental innovation: the moderating role of technology management. *Technovation*, *33* (6), 234-246.

Parise, S., & Casher, A. (2003). Alliance portfolios: designing and managing your network of business-partner relationships. *The Academy of Management Executive*, *17*(4), 25-39.

Parkhe, A. (1991). Interfirm diversity, organizational learning, and longevity in global strategic alliances. *Journal of International Business Studies*, *22*(4), 579-601.

Pettigrew, A. M. (1990). Longitudinal field research on change: theory and practice. *Organization Science*, 1(3), 267–292.

Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology. *Administrative Science Quarterly*, 116-145.

Reuer, J. J., & Ariño, A. (2003). Strategic alliances as contractual forms. In *Academy of Management Proceedings* (Vol. 2003, No. 1, pp. R1-R6). Academy of Management.

Rothaermel, F. T. (2001). Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, *22*(6-7), 687-699.

Rothaermel, F. T., & Boeker, W. (2008). Old technology meets new technology: Complementarities, similarities and alliance formation. *Strategic Management Journal, 29*, 47–77.

Sampson, R. C. (2007). R&D alliances and firm performance: the impact of technological diversity and alliance organization on innovation. *Academy of Management Journal*, *50* (2), 364-386.

Sarkar, M. B., Aulakh, P. S., & Madhok, A. (2009). Process capabilities and value generation in alliance portfolios. *Organization Science*, *20* (3), 583-600.

Siggelkow, N. (2007). Persuasion with case studies. *Academy of Management Journal*, 50(1): 50-24.

Steensma, H. K., & Lyles, M. A. (2000). Explaining IJV survival in a transitional economy through social exchange and knowledge-based perspectives. *Strategic Management Journal*, 831-851.

Stuart, T. E. (2000). Interorganizational alliances and the performance of firms: A study of growth and innovation rates in a high-technology industry. *Strategic Management Journal*, 791-811.

Swaminathan, V., & Moorman, C. (2009). Marketing alliances, firm networks, and firm value creation. *Journal of Marketing*, *73* (5), 52-69.

Vasudeva, G., & Anand, J. (2011). Unpacking absorptive capacity: A study of knowledge utilization from alliance portfolios. *Academy of Management Journal*, *54* (3), 611-623.

Wassmer, U. (2010). Alliance portfolios: A review and research agenda. *Journal of Management*, *36* (1), 141-171.

Wassmer, U., & Dussauge, P. (2012). Network resource stocks and flows: how do alliance portfolios affect the value of new alliance formations?. *Strategic Management Journal*, 33(7), 871-883.

Wuyts, S., Dutta, S., & Stremersch, S. (2004). Portfolios of interfirm agreements in technology-intensive markets: consequences for innovation and profitability. *Journal of Marketing*, *68* (2), 88-100.

Yan, A., & Gray, B. (1994). Bargaining power, management control, and performance in United States–China joint ventures: a comparative case study. *Academy of Management Journal*, 37(6), 1478-1517.

Yin, R. K. (2003). *Case study research: design and methods*.Thousand Oaks, CA: Sage publication.

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Newbury Park, CA: Sage.

Zaheer, S. (2000). Time zone economics and managerial work in a global world. In P. C. Earley, & H. Singh (eds). *Innovations in International and Cross-cultural Management*. Thousand Oaks, CA: Sage Publications.

CONCLUSIONS

Subsequent to their first appearance in the literature in the late 1980s (Ghemawat, Porter, & Rowlinson, 1986; Porter & Fuller, 1986), strategic alliances have progressively shaped the evolution of strategic management field and then gained a relevant position within it. Over the last decade, a proliferation of studies on strategic alliances have epitomized the strategic management field (Contractor & Lorange, 2002; Gulati, 1998; Wassmer, 2010).

The present dissertation aims to be helpful in unpacking three key aspects of strategic alliances; i.e., value creation and value appropriation mechanisms, alliance configuration, and the evolution of alliance portfolios. The structure of this dissertation reflects the three key investigation chapters it contains and is organized as follows:

- Chapter I: "Value Creation and Value Appropriation in Strategic Alliances: Identifying and Resolving the Tensions";
- Chapter II: "Understanding R&D Alliance Configuration Using Fuzzy Set Analysis";
- Chapter III: "Exploring Alliance Portfolio Characteristics: Evidence from Ericsson Case Study".

In the subsections that follow, we discuss the main findings of each chapter of the dissertation. Drawing on this fertile ground, we then discuss how each chapter contributes to management theories that populate strategic management field and offers a menu of good practices for managers that have to handle strategic alliances.

****

Chapter one has conducted a systematic review of two distinct, and interrelated processes underlying alliance partners' performance: value creation and value appropriation. In doing so,

the research has aimed to identify the rationale under which specific value creation mechanisms and specific value appropriation mechanisms are (more or less) effective.

The investigation included a detailed analysis of 50 articles published in leading management journals between May 1988 and July 2017. Following a similar approach to James, Leiblein & Lu (2013) the research has submitted a comprehensive summary of the articles examined, their theoretical underpinnings and inherent key assumptions, and their key contributions to the understanding of value creation and value appropriation mechanisms. Drawing on a such in-depth analysis, the research has provided a conceptual map that portrays the interdependence between four key value creation mechanisms (i.e., resource combinations, asset specificity, commitment, and trust), and four value appropriation mechanisms (i.e., bargaining power, isolating mechanisms, competition, and absorptive capacity).

The discussion of these mechanisms as well as the interdependences that occur among them is challenged by focusing on the theories. In particular, the research has provided a robust theoretical discussion of what these mechanisms and their interdependences are. Accordingly, we discussed the theoretical underpinnings explaining the rationales of these constructs, their limitations and why they are not sufficient to clarify the value tensions in alliances.

The analysis of the extant literature on value creation and value appropriation in alliances also revealed some areas of inquiry where additional investigation is needed. Consequently, the research has developed a research agenda that is likely to enrich our understanding of the interdependence between value creation and value appropriation mechanisms in alliance literature, as well as to stimulate the advancement of the debate on value creation and value appropriation in strategic alliances. In particular, the chapter has identified three areas of future research opportunities on the issue: (1) the antecedents of value creation and value appropriation mechanisms; (2) the interdependence between and within value creation

mechanisms and value appropriation mechanisms; and (3) the measures of value creation and value appropriation mechanisms.

Drawing on these findings, chapter one has aimed to offer three theoretical contributions. First, while some scholars have advocated the need to treat value creation and value appropriation in a joint fashion (e.g., Lepak et al., 2007), progress in that direction has been pretty slow. By reviewing and elaborating on the literature on dimensions and antecedents of value creation and value appropriation, the chapter has addressed the interdependence between the two value-related processes underlying alliance outcomes. Second, by comparing the key mechanisms of value creation and value appropriation, chapter one has identified and reduced issues of theorizing and interpretation that might occur when research is focused exclusively on either issue (whether value creation or value appropriation). Finally, by identifying a structured and comprehensive set of research opportunities for future studies, the chapter aimed to stimulate the advancement of research on value creation and value appropriation processes, thereby providing researchers with a reasoned array of promising research directions.

****

Chapter two has explored the relationship between R&D alliances and alliance partners' innovation performance. Differently from previous studies on R&D alliances, this chapter has used the theoretical lens of the knowledge-based view of the alliances (Grant & Baden-Fuller, 2004; Vasudeva & Anand, 2011) to disentangle the major drivers that lead alliance partners to achieve high innovation performance by means of R&D alliances. In particular, we singled out two main groups of drivers: (a) partners' attributes (size, age, and experience) and (b) alliance characteristics (strategic orientation and structure). The identification of these factors prepared the fertile ground for studying R&D alliances configurations, whose importance has been considered relevant for firm innovation performance (Faems et al., 2005; George et al., 2001).

The chapter also enriches the debate on R&D alliances by challenging the study of R&D alliance configuration through the adoption of a novel and promising methodological approach: fuzzy set Qualitative Comparative Analysis (fsQCA). Indeed, despite this method has gained acknowledgement from different disciplines across various topics (Misangyi et al., 2017), this chapter has the merit to use this method for the first time in the context of R&D alliances.

The implementation of fsQCA in 33 R&D alliances, formed by 75 telecom firms worldwide in the year 2010, provided valuable insights for alliance literature. In more detail, the findings of the fuzzy set analysis suggests that three alternative R&D alliance configurations offer sufficient conditions to achieve high innovation performance: 1) an alliance configuration with high partner age; 2) an alliance configuration with extensive partner experience and no strategic orientation; and 3) an alliance configuration with extensive partner experience and a horizontal structure.

Drawing on these findings, the chapter offers three contributions that support the advancement of knowledge-based research on R&D alliances and one managerial implication. First, we supply a classificatory contribution. By drawing on the knowledge-based view of the alliances, we acquired a better awareness of the individual factors underlying the innovation performance of firms involved in R&D alliances. Specifically, we identified two groups of drivers: (a) partner attributes (size, age, and experience) and (b) alliance characteristics (strategic orientation, and structure).

Second, we contribute by prioritizing the (combinatory) effects of factors. By examining the presence of combinatory effects among these individual factors and their impact on firm innovation performance, we have enriched our understanding of the influence that these factors have on the high innovation performance of firms involved in an alliance. Specifically, by conducting a fuzzy set analysis, we have learned that some factors are more important than

others. We have found that three alternative combinations of factors (i.e., partner age and partner experience combined with the absence of a strategic orientation for the alliance or with the presence of a horizontal structure of the alliance) have a major impact on the high innovation performance of the firms involved in an alliance. Correspondingly, partner size and the presence of a strategic orientation for the alliance have a minor impact on the high innovation performance of the firms involved in an alliance. This result suggests in turn that firms involved in R&D alliances can take three specific approaches to achieve high innovation performance.

Third, we offer a methodological contribution. We used fuzzy set analysis to examine the relationship between the factors required to configure R&D alliances and the combined effects that lead to high innovation performance. By looking at the findings reported above, we can argue that this method is helpful for detecting the combinatory effects of the key configuration factors in the R&D alliances context.

Last, but not least, this understanding also conveys an important implication for alliance managers and entrepreneurs. In fact, if alliance leaders want to realize high innovation performance, they should bear in mind that some factors, such as partner age and partner experience (especially when they are combined with the absence of a strategic orientation or the horizontal structure of the R&D alliance) are more important than other factors, such as partner size or the presence of a strategic orientation.

****

Chapter three has detected how firms can manage their alliance portfolios over time. The investigation of this research question is considered important as previous studies indicate that the dynamics underlying alliance portfolio management do differ from those regarding the management of dyadic alliances (Sarkar et al., 2009). Additionally, previous research has

pinpointed that synergies and dual cause-and-effect relationships, that might be originated from the presence of multiple alliances, may critically challenge the management of alliance portfolio (Hoffman, 2007; Wassmer & Dussauge, 2012).

The chapter aimed to join this debate by claiming the argument that also the characteristics of the portfolio are relevant for management of alliance portfolio. To tackle this research question, the chapter has conducted the research in two stages. In the first stage, I have reviewed the existing body of research on alliance portfolio and identified the three main alliance portfolio characteristics that, according to alliance literature, are considered relevant for the management of alliance portfolio: a) alliance portfolio size; b) alliance portfolio diversity; and c) alliance portfolio internationalization. Then, I have explored the importance of these three alliance portfolio characteristics by conducting an in-depth longitudinal case study of Ericsson's alliance portfolio over a two-decade period of observation (1994-2014). By decomposing Ericsson's alliance portfolio into three temporal phases: phase I (from 1994 to 2000); phase II (from 2001 to 2007); and, phase III (from 2008 to 2014), this chapter juxtaposes the relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization over time.

The results of the analysis lead to highlight two important aspects. First, alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization present different levels of relevance across the three temporal phases. Second, the different levels of relevance of alliance portfolio size, alliance portfolio diversity and alliance portfolio internationalization across the three temporal phases are the result of Ericsson's alliance portfolio strategy performed in "trial and error" fashion way.

Drawing on these findings, the chapter aimed to offer three theoretical contributions. First, by unveiling the three specific features of the alliance portfolio (i.e., alliance portfolio size,

alliance portfolio diversity, and alliance portfolio internationalization), it provides a more comprehensive understanding of alliance portfolio characteristics. As a result, the findings of the chapter aimed to address the need for summarizing prior art of literature on alliance portfolio characteristics (George et al., 2001).

Second, by tapping into Ericsson's alliance portfolio, the chapter explored the importance of these three alliance portfolio management main characteristics in a representative firm's alliance portfolio over a two-decade period of observation (1994-2014). In doing so, the chapter aimed to enrich the array of qualitative studies on the evolution of alliance portfolios (Lavie & Singh, 2011).

Finally, drawing on Ericsson's alliance portfolio case study, this chapter showed how a firm has managed its alliance portfolio by leveraging on the benefits and challenges that are associated with alliance portfolio size, alliance diversity and alliance portfolio internationalization. In doing so, this study aimed to expand the stream of research that investigates the management of alliance portfolios (Hoffman, 2005, 2007).

****

Taken together, the three chapters of the dissertation advanced alliance research by providing a number of findings, intuitions, and contributions that we hope might be considered interesting for both academics and practitioners.

Although we claimed that the vigor of these insights makes each chapter a complete and exhaustive essay and can be read separately from the others, we also argue that the joint consideration of the three chapters might convey valuable conceptual insights regarding the outcomes of strategic alliances.

First, by investigating the interdependence between value creation and value appropriation processes, we show that the outcomes of strategic alliances depend not only on value creation,

or on value appropriation, but they also depend on the mechanisms underlying the two outcome processes.

Second, by exploring the alliance configurations in R&D alliances, we illustrate that high innovation performance of alliance partners can be sufficiently achieved only when this outcome derives from the combination of specific R&D alliance drivers.

Finally, by identifying the alliance portfolio main features that characterize its management, we suggest that the outcomes of alliance portfolio might arise from the implementation of "trial and error" alliance strategies that benefit from the equilibrium among alliance portfolio characteristics.

REFERENCES

Contractor, F. J., & Lorange, P. (2002). The growth of alliances in the knowledge-based economy. *International Business Review*, 11(4), 485-502.

Faems, D., Van Looy, B., & Debackere, K. (2005). Interorganizational collaboration and innovation: Toward a portfolio approach. *Journal of Product Innovation Management*, 22(3), 238-250.

George, G., Zahra, S. A., Wheatley, K. K., & Khan, R. (2001). The effects of alliance portfolio characteristics and absorptive capacity on performance: A study of biotechnology firms. *The Journal of High Technology Management Research*, 12(2), 205-226.

Ghemawat, P., Porter, M. E., & Rawlinson, R. A. (1986). Patterns of international coalition activity. *Competition in global industries*, 345-366.

Grant, R. M., & Baden-Fuller, C. (2004). A knowledge accessing theory of strategic alliances. *Journal of Management Studies*, 41(1), 61-84.

Gulati, R. (1998). Alliances and networks. *Strategic Management Journal*, 19: 293-318.

Hoffmann, W. H. (2005). How to manage a portfolio of alliances. *Long Range Planning*, 38(2), 121-143.

Hoffmann, W. H. (2007). Strategies for managing a portfolio of alliances. *Strategic Management Journal*, 28(8), 827-856.

James, S. D., Leiblein, M. J., & Lu, S. (2013). How firms capture value from their innovations. *Journal of Management*, 39(5), 1123-1155.

Lavie, D., & Singh, H. (2011). The evolution of alliance portfolios: the case of Unisys. *Industrial and Corporate Change*, 21(3), 763-809.

Lepak, D. P., Smith, K. G., & Taylor, M. S. (2007). Value creation and value capture: a multilevel perspective. *Academy of Management Review*, 32(1), 180-194.

Misangyi, V. F., Greckhamer, T., Furnari, S., Fiss, P. C., Crilly, D., & Aguilera, R. (2017). Embracing causal complexity: The emergence of a neo-configurational perspective. *Journal of Management*, 43(1), 255-282.

Porter, M. E., & Fuller, M. B. (1986). Coalitions and Global Strategy. In M. E., Porter (Ed.) *Competition in global industries*. Cambridge, MA: Harvard University Press.

Sarkar, M. B., Aulakh, P. S., & Madhok, A. (2009). Process capabilities and value generation in alliance portfolios. *Organization Science*, 20(3), 583-600.

Vasudeva, G., & Anand, J. (2011). Unpacking absorptive capacity: A study of knowledge utilization from alliance portfolios. *Academy of Management Journal*, 54(3), 611-623.

Wassmer, U. (2010). Alliance portfolios: A review and research agenda. *Journal of Management*, 36(1), 141-171.

Wassmer, U., & Dussauge, P. (2012). Network resource stocks and flows: how do alliance portfolios affect the value of new alliance formations?. *Strategic Management Journal*, 33(7), 871-883.

ACKNOLEDGEMENTS

The present dissertation aims to thank those who taught, supported and tolerated me during my doctoral studies. It is my intention to express particular gratitude to my academic teachers, colleagues and friends who have inspired and advised me in writing this thesis.

Let me confess my immense respect and esteem to Professor Giovanni Battista Dagnino, who is my "academic father", mentor, and supervisor at the University of Catania. His devotion to research and his belief in the academic community have progressively harbored my great ambition to become a scholar. Every single achievement, success, or publication will always be the result of your challenging and persevering support during my PhD program.

I also express my gratitude to Professor Isidoro Mazza, PhD coordinator of the doctoral programme, as well as to other members of the doctoral committee in Economics and Management for supporting me through the fruitful ideas, comments and suggestions that accompanied me during the doctoral programme.

I gratefully acknowledge Professor Xavier Martin, who was my supervisor at Tilburg University from January to July 2015. His valuable advices and challenging feedbacks, as co-author of chapter one, have significantly contributed to augment the vigor of this dissertation.

I also thank my french co-author, Louis Mulotte, for its prompt help and constant support in managing my Dissertation challenges. I also extend my sincere gratitude to Professors Koen Heimericks and Niels Noorderhaven for their help in arranging my visiting at this very active department. Here I also thank my « dutch academic family » (De Leeuw Tim, Geert Dujsters, Astrid Kramer, Jeroen Kulman, Zilin Hi, Zhengou Li, Miranda Stienstra, and Ruud Sneep, and

all PhD students) for our intense research discussions during coffe-breaks, brown bag seminars, and research days.

I am also thankful to Professor Maria Bengtsson for supervising my short but intense forthnight visiting at Umea University in October 2015. Her help and support for facilitating the collection of data, used in chapter two and three of this dissertation, are warmly appreciated.

I owe a debt of gratitude to Professors Alberto Di Minin and Andrea Piccaluga for providing me the opportunity to complete my PhD studies and to collaborate with Scuola Superiore Sant'Anna (Pisa) in the last year of my PhD Program. During this research fellowship I met fantastic people with a such spirit of group, such as Elena Casprini, Valentina Cucino, Chiara De Marco, Cristina Marullo, Irene Martelli, and all Phd Students from a such terrific academic environment.

I would like to thank also several scholars who supported me in drafting earlier proposals of my dissertation through insightful one-to-one sessions organized at University of Catania (Tina Ambos, Jay Anand, Paolo Aversa, Paolo Boccardelli, Francesca Cabiddu, Carmelo Cennamo, Fabrizio Cesaroni, Claudio Giachetti, Luigi Marengo and Margarethe Wiersema) as well as those arranged at Tilburg University (Oliver Chatain, Jean-Louis Hennart, and Joe LaBianca). In particular, I gratefully acknowledge Professors Dovev Lavie and Jeff Reuer who served as informal advisers of previous proposals of my thesis and expressed generous feedbacks that inspired me in the elaboration of advanced proposals of my dissertation. I also owe a debt of gratitude to Professors Marjorie Lyles, Santi Furnari and Andrea Piccaluga for spending their time to read some of my studies and offering precious informal and constructive reviews respectively for chapter one, chapter two, and chapter three of my thesis.

I am also thankful to anonymous reviewers who provided significant inputs that helped me to amelierote the quality and vigor of my working papers. In particular, I thank those who

provided their reviews for the following prestigeous management conferences: the R&D Management Conference 2015, Pisa, June 23-26, 2015; the 35th Strategic Management Society (SMS) Annual Conference, Denver, October 3-6, 2015; the SMS Special Conference, Rome, June 5-7, 2016; the 76th Academy of Management (AOM) Annual Meeting, Anaheim, August 5-9, 2016; the 36th SMS Annual Conference, Berlin, September 17-20, 2016; the 77th AOM Annual Meeting, Atlanta, August 4-8, 2017; and the 37th SMS Annual Conference, Houston, October, 2017.

This dissertation has also benefited from rich and prolific round tables discussions with senior and junior scholars at the following doctoral workshops: the 6th European Institute for Advanced Studies in Management (EIASM) Workshop on Coopetition Strategy and Practice, Umea University, May 22-23, 2014; the 74th AOM Annual Meeting Business Policy and Strategy (BPS) Doctoral Consortium, Philadelphia, August 1-5, 2014; the 75th AOM Annual Meeting International Management (IM) Doctoral Consortium, Vancouver, August 7-11, 2015; the 35th SMS Annual Conference Doctoral Workshop, Denver, October 3-6, 2015; the Journal of Management Studies (JMS) Conference Doctoral workshop, University of Warwick, March 21-23, 2016; the 5th Knowledge Technology and Organization (KTO) SKEMA Business School Paper Development Workshop, Sophia Antipolis, June 15-18, 2016; the 76th AOM Annual Meeting BPS Dissertation Consortium, Anaheim, August 5-9, 2016; and the Groningen Collaboration for Innovation (GCIC) Conference Doctoral Workshop, Groningen, September 21-22, 2016.

I also thank Professor Arabella Mocciaro Li Destri, my supervisor for MSc thesis, for believing in my intellectual research skills and constantly supporting me in the elaboration of my PhD project. You opened up a new world, I will always be on debt with you. I take this occasion to thank Professors Anna Minà and Massimo Pasquale Picone, who I consider my informal

supervisors at University of Catania, because of their constant tips in managing my daily PhD challenges. Your help and support mean a lot for me.

Moreover, I wish to thank all people who have supported my frustration and devotion to my doctoral studies. It is a pleasure to thank Angelo Solarino, who I met as academic colleague and then became friend through our "AOM or SMS sessions time" spent together at various international conferences. I also thank Roberto Hernandez, a friend I met by chance at Essex Summer School in July 2014. We learned from each other about how to manage our PhD life. Thanks also to my colleagues at University of Catania (Livio Ferrante) and University of Messina (Adriana Tempo, Rosaria Ferlito, Claudia Frisenna, and Nicoletta Marzullo), who helped and assisted me in managing my frustration during my doctoral studies.

Last but not least, I would like to thank the most important people of my life: my family, my best mates and my girlfriend, Chiara. Without your help, encouragement, and tolerance this dissertation would never have seen the light.