

ALLIANCE CAPABILITIES: REVIEW AND RESEARCH AGENDA

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Acknowledgements: We are very grateful to JOM Editor Sucheta Nadkarni and two anonymous JOM reviewers for their constructive comments and suggestions. We also acknowledge the useful feedback provided by Dovev Lavie and Jay Anand on an earlier version of this paper presented at the 2012 Academy of Management meetings. Finally, we are very thankful to Nan Jia, Kyle Mayer, and Libby Weber for helping us clarify and refine the directions for future research.

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ABSTRACT

A significant amount of empirical work has examined the role of alliances in enhancing firms' innovative output and economic performance. Most of this research directly relates organizational and environmental attributes to alliance-related outcomes. However, in recent years empirical research has begun to recognize the crucial role of alliance capabilities in explaining performance heterogeneities across alliances and across firms engaging in alliances. But, no systematic review of the growing body of empirical research on alliance capabilities has been undertaken to help us understand why and how capabilities matter. In our paper we first review prior empirical research on alliance capabilities, their antecedents and outcomes in terms of a framework that distinguishes between (a) three levels of analysis: an individual alliance versus a portfolio versus a dyad, and (b) two stages of the alliance: pre-formation versus post-formation. We then advance the literature through an integrative conceptual framework of alliance capabilities that distinguishes capabilities in terms of their effects on value creation and value capture. Finally, we synthesize the insights from our review and integrative framework to provide methodological suggestions and identify under-explored theoretical themes for future work.

Keywords: alliance capability; alliance management capability; alliance portfolio capability; relational capability; dynamic capability; alliance performance; value creation; value capture

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Alliance capabilities influence the ability of firms to create and capture value through alliances (Anand & Khanna, 2000), which refer to “any voluntarily initiated cooperative agreements between firms” (Gulati, 1995b: 620-621). Research on this topic not only provides a concrete way to conceptualize and understand organizational capabilities but also starts to untangle the learning processes that lead to capabilities (Kale & Singh, 2007). From a practical standpoint, this stream of research tries to explain why some firms are able to realize better performance than others from alliances (Ireland, Hitt & Vaidyanath, 2002).

Alliance capabilities explain performance heterogeneities across alliances and across firms with alliance activities because such capabilities affect the causal mechanisms (i.e., value creation and value capture) through which organizational, environmental, and dyad-specific attributes lead to superior or inferior performance. A simple example that distinguishes the value-creation from value-capture effects of alliance capabilities may help explain an important contradictory finding in prior literature: While Zollo, Reuer and Singh (2002) found a positive impact of partner-specific alliance experience on alliance performance, Hoang and Rothaermel (2005) found a general negative impact (first-order term non-significant; squared term negative) of partner-specific experience on joint project success. The value creation versus value capture aspects of alliance capabilities may explain these contradictory findings. If repeated interactions with the same partner lead to greater joint value-creation ability (due to increased ability to coordinate), the effect on alliance performance may be positive. But, if repeated experience with the same partner

enhances that partner's ability to capture private value (perhaps due to a deeper understanding of how to exploit the collaboration for private gains), then the alliance may suffer because one partner derives asymmetric benefits and siphons them away from the alliance (Kumar, 2010). Thus, scholars may be able to understand how a certain attribute such as partner-specific experience causally influences alliance performance by differentiating value-creation from value-capture aspects of alliance capabilities.

The crucial role of alliance capabilities was identified more than a decade ago by Ireland et al. (2002), who argued that alliance management is a source of competitive advantage and encompasses a variety of functions such as the ability to select the right partners, and the ability to build social capital and trust-based relationships. Interestingly, however, while the conceptual arguments in their paper are reflected in a significant body of empirical research on alliance capabilities, to the best of our knowledge there has been no subsequent attempt to organize or review that literature.¹ While Ireland et al. invoked the broad concept of alliance management (akin to our definition of alliance capability), their conceptual treatment did not recognize that capabilities could vary depending on the level of analysis (individual alliance versus portfolio versus dyad) and the stage (pre-formation versus post- formation) of an alliance. Hence, it is an opportune time to recognize these distinctions and develop a more holistic view of alliance capabilities.

We followed several steps to conduct our review. The scope of the review was constrained to empirical research published in top management journals². We conducted a keyword search³ to

identify relevant articles in the *ProQuest* database, spanning the period between January 1, 1990 and September 1, 2014. We chose the starting time for our review as January 1, 1990, because empirical alliance research applying the resource-based view (a dominant theoretical perspective in alliance research) took off during the 1990s (e.g., Eisenhardt & Schoonhoven, 1996). Alliance capability studies that were accepted for publication before September 1, 2014 were also included. We examined the titles and abstracts of over 1000 articles from the initial search and dropped papers that were clearly not pertinent to our topic. We retained empirical studies that met at least one of the following two conditions: (1) The study directly examined alliance capabilities, and/or their antecedents, and/or their outcomes; (2) The study examined alliance-specific, organizational, and environmental attributes and linked them directly to alliance-related outcomes (e.g., alliance formation or termination). The second set of articles did not explicitly measure alliance capabilities, but often invoked capability-related arguments. Including the second set of articles enabled us to place the capability studies within the broader alliance literature.⁴ We did not review articles that were purely conceptual although we drew upon these articles to inform our review and future research directions. This process resulted in a final set of 100 empirical articles included in our review. We then coded and categorized the articles as follows. We coded each empirical article's sample, data source, analytic methods, theoretical constructs, key findings, and underlying theoretical perspectives. We used this coding to develop an “antecedents—alliance capabilities—outcomes” review framework, further differentiating between three levels of analysis and two stages.

Our paper contributes to the strategic alliance capability literature in three ways. First, the review part of the paper is the first systematic attempt to organize the alliance capabilities literature in a manner that enables us to see what we know about such capabilities, their antecedents, and outcomes. We classify these capabilities in terms of level of analysis and alliance stages in a manner that helps us identify the most widely-studied capabilities (e.g., learning from prior alliance experience), capabilities/practices that have become standardized (e.g., alliance function), and under-studied capabilities (e.g., portfolio-specific, dyad-specific, and dynamic alliance capabilities). Second, we develop an integrative conceptual framework that distinguishes alliance capabilities in terms of their effects on value creation and value capture. The framework enables us to provide a holistic conceptual treatment of capabilities as well as identify the different causal mechanisms through which different capabilities influence outcomes. Finally, we provide a set of synthesizing methodological suggestions and theoretical themes for future research. In particular, we provide specific research questions centered on the trade-offs that firms face when it comes to choosing which capabilities to invest in and how to update and refine these capabilities over time and across alliance contexts.

REVIEW FRAMEWORK AND FINDINGS

Our review suggests that prior empirical work has distinguished between alliance capabilities at three different levels of analysis: (1) individual-alliance capabilities that focus on a firm's abilities to initiate, manage, and terminate individual alliances (Schreiner, Kale & Corsten, 2009), (2) alliance-portfolio capabilities that focus on a firm's abilities in developing and

coordinating an alliance portfolio (e.g., Sarkar, Aulakh & Madhok, 2009), and (3) dyad-specific alliance capabilities that reflect the relational capability of a dyad (e.g., Dyer & Singh, 1998; Wang & Zajac, 2007; Zollo et al., 2002). Further, the empirical research on alliance capabilities can be broadly divided into those that focus on the pre-formation stage (e.g., Gulati, 1999) and those that concentrate on the post-formation stage of alliances⁵ (e.g., Sarkar, Echambadi & Harrison, 2001). Pre-formation alliance capability research examines capabilities such as partner selection (Sarkar et al., 2001; Simonin, 1997), and outcomes such as alliance formation (Gulati, 1999). In contrast, post-formation research examines capabilities such as coordination (Schreiner et al., 2009; Simonin, 1997) and inter-organizational learning (Schilke & Goerzen, 2010), and outcomes such as alliance- and/or firm performance (Schilke & Goerzen, 2010; Schreiner et al., 2009).

Our review, accordingly, is organized in terms of these three levels of analysis and further distinguishes each of the two stages within each level. The resulting classification helps us distinguish between six categories of alliance capabilities as shown in Table 1. Next, we define the conceptual domain of each capability and then review the empirical evidence on the antecedents and outcomes of these capabilities along the framework presented in Figure 1.

Insert Table 1 and Figure 1 about here

INDIVIDUAL-ALLIANCE CAPABILITIES

Individual-alliance capability is mainly built upon the resource-based view, which posits that valuable, rare, and inimitable resources reside within an individual firm (Barney, 1991). It has been defined as a firm's ability to search, negotiate, manage, and terminate an individual alliance (Kale & Singh, 2009; Lavie, in press; Simonin, 1997)⁶. In terms of the stages in the lifecycle of an alliance, the components are as follows: *partner search*, *negotiation*, *coordination*, *communication*, *bonding*, *intra-firm learning*, and *exiting*.

Pre-formation individual-alliance capabilities. Before an alliance is functional, the focal firm needs to have the ability to successfully identify and capture partnering opportunities. *Partner search*, accordingly, reflects the firm's effort in "identifying and selecting potential collaborators", and it is followed by the firm's ability to *negotiate* "the terms and structures of the collaborative agreement" (Simonin, 1997: 1155). Other concepts such as alliance proactiveness (Sarkar et al., 2001) and alliance formation capability (Gulati, 1999; Leiblein & Miller, 2003) reflect the same idea of the firm's ability to choose the right partner(s).

Post-formation individual-alliance capabilities. Once an alliance is established, post-formation capabilities help firms create and capture value from the partnership. Schreiner et al. (2009) identified three post-formation abilities: coordination, communication, and bonding. *Coordination* captures the ability of the firm to efficiently manage the division of task responsibility, interdependence, and operational processes between alliance partners (Schilke, 2014a; Schreiner et al., 2009). *Communication* includes both formal and informal sharing of

valuable information with an ally (Schreiner et al., 2009). *Bonding* reflects the extent of affect and inter-personal liking between partnering firms (Schreiner et al., 2009).

Besides coordination, communication, and bonding with the alliance partner, *learning* is also an essential aspect of alliance capability. *Intra-firm learning* mainly refers to the processes of *articulating, codifying, sharing, and internalizing* knowledge regarding alliance management (Kale, 1999; Kale & Singh, 2007).

Exiting an alliance is the final stage of the lifecycle model of individual-alliance capability (Simonin, 1997). Deciding when and how to terminate an alliance relationship is critical. On the one hand, failing to terminate an alliance may push a firm into competency traps (Levinthal & March, 1993). On the other hand, terminating an alliance too early will prevent it from taking advantage of the knowledge gained in the alliance (Simonin, 1997).

This research stream on individual-alliance capabilities predominantly applies competence perspectives including organizational learning (e.g., Heimeriks & Duysters, 2007; Simonin, 1997), the knowledge-based view (Kale & Singh, 2007), dynamic capabilities (Schilke, 2014b) and the resource-based view (e.g., Gulati, 1999; Sarkar et al., 2001).

Antecedents and Individual-Alliance Capabilities (Link 1a-2a)

Scholars studying the links between antecedents and individual-alliance capabilities mainly apply the organizational learning perspective, which suggests that knowledge is derived from experience.

General alliance experience is reflected by a firm's cumulative number of alliances (Kale,

1999; Kale & Singh, 2007). Its positive impact on individual-alliance capabilities has been documented in several studies (Heimeriks & Duysters, 2007; Simonin, 1997). General alliance experience is found to increase a firm's likelihood of establishing an alliance function, which, in turn, contributes to greater alliance capabilities (Kale & Singh, 2007; Kale, 1999). Further, the relationship between general alliance experiences and alliance capabilities appears to vary across different types of alliances—for instance, firms learn more in R&D alliances than in production and marketing alliances (Anand & Khanna, 2000; Das, Sen & Sengupta, 1998).

Technology-specific experience, measured as the number of prior agreements with any partner on similar subjects (Reuer, Zollo & Singh, 2002), or the number of prior agreements with any partner in similar technological areas (Zollo et al., 2002), increases a firm's ability to manage alliances in similar technological domains because such experience improves the firm's absorptive capacity (Rothaermel & Alexandre, 2009). While Reuer et al. (2002) found that technological experience increases the firm's ability to manage subsequent alliances in similar technological domains and maintain stability in governance structure, Zollo et al. (2002) did not find evidence of a direct effect.

A dedicated *alliance function* is an organizational unit that accumulates alliance knowledge and coordinates alliance activities (Kale, 1999). Studies have found that the alliance function enhances alliance capability by synthesizing and sharing alliance knowledge, internally and externally, as well as through the monitoring and evaluating of alliance performance on an ongoing basis (Kale & Singh, 2007; Schilke & Goerzen, 2010).

Individual-Alliance Capabilities and Outcomes (Link 2a-3a)

We organize the review of empirical findings on how capabilities influence outcomes in terms of pre- and post-formation outcomes rather than based on capability constituents, because most prior studies do not distinguish between pre- and post-formation capabilities (e.g., Sarkar et al., 2001).

Alliance formation and *make or buy* decisions are pre-formation outcomes that have received scholarly attention. Gulati (1999) used alliance experience and alliance diversity as proxies of alliance formation capability and found that prior alliance experience increases a firm's likelihood of alliance formation. Leiblein and Miller (2003) found that a firm's partnering experience leads to more sourcing partnerships than in-house production, because such experience increases its abilities to select partners, negotiate contracts, manage cooperative relations, and adapt to changing technological and market conditions.

A general finding is that alliance capability increases the firm's post-formation financial performance not only at the time of announcing an alliance event (e.g., Swaminathan & Moorman, 2009) but also afterwards, such as *profitability*, *market share*, *return on investment*, and *sales growth* (e.g., Sarkar et al., 2001; Schreiner et al., 2009; Simonin, 1997). However, studies also suggest that the greater the other partner's alliance capability, the weaker is the contribution of the focal firm's alliance capability to positive market evaluation. That is, market evaluation is based on the relative strengths of the two partners' alliance capabilities (Kumar, 2010; Swaminathan & Moorman, 2009) as well as post-alliance competitive intensity (Oxley, Sampson & Silverman,

2009). Further, Das et al. (1998) found that the smaller partner in a technological alliance experiences the most positive gains from the stock market while the larger firm and non-technology alliances do not garner similar positive rewards. More recently, however, Katila, Rosenberger and Eisenhardt (2008) and Diestre and Rajagopalan (2012) have argued that smaller (entrepreneurial) firms are at greater risk of being exploited by their more powerful partners, suggesting that post-formation financial outcomes may indeed be asymmetric, depending on the relative value-appropriation abilities of the partners.

Several organizational and environmental characteristics, in particular *firm size* and *market dynamism*, moderate the effects of capabilities on financial outcomes. Sarkar et al. (2009) found that small firms benefit more from an alliance than their larger counterparts when they possess valuable technological assets. They also found that market dynamism increases the returns on alliance proactiveness. More recently, Schilke (2014a) found that alliance management capabilities are most beneficial when environmental dynamism is moderate, indicating that the benefits from such capabilities outweigh the costs when the environments are not changing too rapidly (Eisenhardt & Martin, 2000; Schilke, 2014b).

Prior studies have found that individual-alliance capabilities have positive impact on the focal firm's post-formation nonfinancial outcomes, including *interactional quality* with the partner (Johnson, Sohi & Grewal, 2004), *status in the partner's network* (Schreiner et al., 2009), and *learning* from the partner (Simonin, 1999). Such learning extends not only to information about business opportunities and potential customers (Schreiner et al., 2009) but also knowledge of how

to cooperate in inter-firm relations (Simonin, 1997). Intra-firm learning processes (i.e., articulation, codification, sharing, and internalization) also contribute to alliance success (Kale & Singh, 2007); however, Heimeriks, Bingham and Laamanen (2014) found that while codification is beneficial at the partner selection and alliance termination stages, it could be detrimental at the alliance management stage because it restricts flexibility and adaptability.

Antecedents and Outcomes (Link 1a-3a)

The pre-formation outcome, *attractiveness as a partner*, has been found to be positively influenced by a firm's alliance experiences along with strong managerial capabilities (Hitt, Ahlstrom, Dacin, Levitas & Svobodina, 2004; Hitt, Dacin, Levitas, Arregle & Borza, 2000), by favorable institutional contexts (Hitt et al., 2004), and by the extent of familiarity with the partner (Li, Eden, Hitt & Ireland, 2008). Firm-specific antecedents, such as *alliance experience* and *alliance function*, have been found to positively affect post-formation financial outcomes such as *abnormal stock market returns* (Kale, Dyer & Singh, 2002) and *valuations* (Anand & Khanna, 2000), *changes in market reaction* (Arikan & McGahan, 2010), and *post acquisition performance* (Zollo & Reuer, 2010). Regarding post-formation non-financial outcomes, prior studies have examined *alliance success*, which is influenced by alliance experience and alliance function, with the latter having a greater influence (Kale et al., 2002); *innovation performance*, which is affected by alliance experience though with different magnitudes of effects across alliance types (Sampson, 2005); the likelihood of *alliance termination*, which is reduced due to learning from negative termination experiences (Pangarkar, 2009); and, *dissolution of startups*, which is influenced by

negative termination experience (as when a partner withdraws from an alliance) (Singh & Mitchell, 1996).

ALLIANCE-PORTFOLIO CAPABILITIES

Alliance-portfolio capability has been defined as a firm's ability to initiate and manage a portfolio of alliances, including the ability to select partners based on portfolio fit, leveraging and sharing knowledge across alliances, and monitoring and coordinating the portfolio to minimize costs and maximize overall benefit to the organization (Heimeriks & Duysters, 2007; Wassmer, 2010). Managing a portfolio of alliances is different from managing an individual alliance (Sarkar et al., 2009), because partners in a firm's alliance portfolio are often interdependent (Vassolo, Anand & Folta, 2004).

Similar to individual-alliance capability, alliance-portfolio capability also consists of pre- and post-formation components. *Partnering proactiveness* is a pre-formation component that reflects a firm's engagement in actively searching for and forming partnerships ahead of competitors (Sarkar et al., 2009). *Governance capability* is both a pre- and a post-formation component of alliance-portfolio capabilities. It is "a firm's aggregate collection of knowledge, routines, and organizational structures associated with a particular collaborative mode" (Aggarwal & Hsu, 2009: 843). As a pre-formation component it suggests that firms tend to form alliances with a particular governance mode, and as a post-formation component it reflects how a firm manages a specific alliance mode more effectively (Aggarwal & Hsu, 2009).

Prior studies agree that *portfolio coordination*—the organizational processes that integrate

activities, strategies, and knowledge across alliances in the portfolio—is an important alliance capability at the post-formation stage (Rothaermel & Deeds, 2006; Sarkar et al., 2009; Schilke, 2014a, b; Schilke & Goerzen, 2010). An additional post-formation capability is *relational governance*, which consists of skills that are associated with developing relational mechanisms (mainly trust) with the firm’s partners in a portfolio (Sarkar et al., 2009).

In sum, empirical work on alliance-portfolio capabilities has traditionally relied on competence perspectives (e.g., Sarkar et al., 2009) and network theory (e.g., Ahuja, 2000). In recent years, a few portfolio capability studies have begun to invoke economic theories such as transaction cost (e.g., Aggarwal & Hsu, 2009) and real options theory (Vassolo et al., 2004).

Antecedents to Alliance-Portfolio Capabilities (Link 1c-2b)

Very few studies have examined the relationships between organizational antecedents and alliance-portfolio capabilities. Heimeriks and Duysters (2007) found that a firm’s general *alliance experience* was positively related to a broad set of capabilities that, in turn, had a positive effect on portfolio performance. Similarly, Rothaermel and Deeds (2006) conceptualized portfolio capability in terms of the optimal number of alliances pursued by the firm. However, it is not clear whether the number of alliances in a portfolio is always a valid proxy for underlying capabilities. Further, Gulati (1999) did not find support for the expectation that higher alliance diversity, reflective of a stronger alliance formation capability, would increase a firm’s likelihood of alliance formation. In general, the lack of research on antecedents of portfolio capability provides a fruitful avenue for future empirical research.

Alliance-Portfolio Capabilities and Outcomes (Link 2b-3b)

Ex ante, alliance-portfolio capabilities influence not only a firm's reliance on alliances but also the dominant governance mode (e.g., equity or licensing) used in the alliances. *Governance mode intensity* reflects the extent to which a particular governance mode dominates a firm's alliance portfolio (Aggarwal & Hsu, 2009), and it is the outcome of a firm's governance capabilities (i.e., a set of routines and structures that support a particular mode of governance). According to Aggarwal and Hsu (2009), a firm's governance capabilities will lead to the dominance of a particular governance mode in its alliance portfolio, and any deviation from this mode will be punished by the stock market.

Our review identified two post-formation portfolio outcomes: alliance portfolio capital and alliance portfolio performance. Sarkar et al (2009) conceptualized *alliance portfolio capital* as consisting of inter-organizational resources available to the firm when it has a portfolio of alliances and found that three constituents of alliance-portfolio capability—alliance proactiveness, relational governance, and portfolio coordination—increase alliance portfolio capital. Further, relational governance cultivates relational mechanisms (e.g., trust and commitment), which previous research suggests can lead to superior alliance performance (Lavie, Haunschild & Khanna, 2012). Studies have also shown that alliance-portfolio capabilities contribute to a firm's *alliance portfolio performance* (Heimeriks & Duysters, 2007; Schilke & Goerzen, 2010).

Other studies have linked portfolio capabilities not to portfolio-specific but to firm-level outcomes. For example, Rothaermel and Deeds (2006) argued that firms with stronger alliance

management capability can manage a greater number of alliances before returns from an additional partnership decreases. They found that portfolio diversity moderates the effect of capabilities on *new product developments* by increasing the optimal number of alliances in the portfolio. And, Sarkar et al., (2009) found that alliance portfolio capital improves a firm's market performance.

Antecedents and Portfolio Outcomes (Link 1c-3b)

Alliance experience improves portfolio performance (Heimeriks & Duysters, 2007). In addition, alliance experience in a certain governance mode (e.g., equity alliances) leads to a firm's dominant use of that mode in subsequent alliances (Aggarwal & Hsu, 2009).

From a measurement standpoint, the majority of prior studies do not distinguish between individual-alliance and alliance-portfolio capabilities (exceptions include Sarkar et al., 2009). Future research would do well to focus on the unique characteristics of alliance portfolios compared with an individual alliance: A portfolio could be *complementary*, (the total value generated by the portfolio is more than the sum of the individual alliances), or *substitutive* (the total value of a portfolio is less than the sum of the individual alliances) (Vassolo et al., 2004).

DYAD-SPECIFIC ALLIANCE CAPABILITIES

Dyad-specific alliance capability is mainly conceptualized from the relational view (Dyer & Singh, 1998), which complements the resource-based view by arguing that valuable resources also reside in the relationship between/among partnering firms.⁷ Hence, we follow the relational view (Dyer & Singh, 1998; Lavie, 2006) and define dyad-specific alliance capability as the capability that lies in a specific dyad and reflects the unique advantages that accrue to the two

parties in a dyadic relationship. Such a capability may not be transferable from the focal alliance to the firm's other partnerships.

Pre-formation dyad-specific capabilities. Wang and Zajac (2007) is the only study that has investigated how capabilities of two firms, which they described as *combined relational capabilities*, influence their likelihood of partnership or acquisition. The study assumed that two firms' relational capabilities are additive and therefore operationalized the dyad-level capability as the sum of firm-level capabilities.

Post-formation dyad-specific capabilities. Post-formation dyad-level capabilities have received more attention than pre-formation constituents, with some research focusing on general *inter-organizational capabilities* (Ethiraj et al., 2005; Sivadas & Dwyer, 2000; Zollo et al., 2002) and others investigating specific aspects such as *inter-firm learning* (Schilke & Goerzen, 2010; Simonin 1997), *integrative conflict management* (Kale, Singh & Perlmutter, 2000) and *knowledge stores* at the relationship level (Johnson et al., 2004). *Inter-firm learning* refers to "knowledge transfer across organizational boundaries" (Schilke & Goerzen, 2010: 1197). *Integrative conflict management* reflects the partners' ability to manage conflicts in a way that achieves 'win-win' outcomes (Kale et al., 2000). *Relational knowledge stores* consist of two partnering firms' unique knowledge about inter-firm interactions, about specific tasks such as the management of supply chains, and about the environment (Johnson et al., 2004).

Dyad-specific capabilities primarily build on the relational view (Dyer & Singh, 1998) but are also complemented by other theoretical perspectives including evolutionary economics (e.g.,

Zollo et al., 2002), the knowledge-based view, and organizational learning (e.g., Johnson et al., 2004; Kale et al., 2000). For the dyad-level of analysis, the logic of relational governance is particularly important (Zaheer & Venkatraman, 1995), because relational governance mechanisms, such as trust (Gulati, 1995a) and embeddedness in third-party ties (Bae & Gargiulo, 2004), can substitute for (Malhotra & Murnighan, 2002) or complement (Poppo & Zenger, 2002) formal contracts in mitigating exchange hazards.

Antecedents and Dyad-specific Alliance Capabilities (Link 1b-2c)

Prior research has examined the following antecedents of dyad-specific alliance capabilities: partner-specific experiences (Zollo et al., 2002), knowledge transfer (Dyer & Hatch, 2006), institutional support, administrative mechanisms of the alliance, and mutual dependence of partnering firms (Sivadas & Dwyer, 2000).

Partner-specific experiences reflect repeated interactions with the same alliance partner. Zollo et al. (2002) posit that two firms develop inter-organizational routines based on partner-specific experiences. But partner-specific experiences alone may not be sufficient to generate competitive advantages. Whether the focal firm is more effective at transferring its knowledge to the partner than its competitors also plays a crucial role (Dyer & Hatch, 2006). Dyer and Hatch (2006) found that a supplier realized higher quality and inventory performance in the partnership with Toyota than its other alliance relations, because Toyota provided more quality and productivity assistance to supplier partners. Sivadas and Dwyer (2000) found that various types of *organizational support* contribute to a greater dyad-level capability: clear agreements on resource

investments from each partner, lack of resistance from key players such as the top management, and certain organizational structures (e.g., formalization and management by shared values and norms) if the alliance is in the form of joint ventures.

Dyad-specific Alliance Capabilities and Outcomes (Link 2c-3c)

Wang and Zajac (2007) examined *alliance formation* and *acquisition* as pre-formation outcomes. They found that the combined relational capabilities of two firms in a dyad increased not only the likelihood of alliance formation but also the chance of one firm acquiring the other, but the effects of capabilities were weaker for acquisitions.

Ethiraj et al. (2005) found that software service firms' client-specific capability has a positive impact on project financial performance. Nonfinancial outcomes include the *overall assessment of an alliance's performance* (Zollo et al., 2002) as well as more specific outcomes such as *relational capital* (Kale et al., 2000), *relationship quality*, (Johnson et al., 2004), *learning*, *innovation* (Hoang & Rothaermel, 2005), and *protection of proprietary assets* (Kale et al., 2000). Kale et al. (2000: 218) argued that relational capital reflects the level of "mutual trust, respect, and friendship" of individuals due to close interaction between partnering firms and found that two partnering firms' ability to resolve conflict in a constructive way leads to more relational capital, a result consistent with the findings of Johnson et al. (2004). Improved relational capital enhances the protection of proprietary assets from misappropriation by the partner, facilitates dyad-level learning (Kale et al., 2000), and increases the buyer's willingness to pay in a supplier-buyer relationship (Elfenbein & Zenger, 2014). Since dyadic alliance capabilities help partnering firms

learn better from each other, R&D projects and new product developments become more successful (Hoang & Rothaermel, 2005; Sivadas & Dwyer, 2000).

Antecedents and Outcomes (Link 1b-3c)

The most widely studied dyad-level antecedent is *partner-specific experience* (or repeated direct ties). Regarding pre-formation outcomes, prior research suggests that the number of (direct or indirect) ties between two companies has an inverted-U impact on their further *alliance formation* (Chung, Singh & Lee, 2000; Gulati, 1995b), because repeated partnerships lead to diminishing marginal returns (Rothaermel, 2001), and firms want to balance the amount of embedded ties and weak ties (Capaldo, 2007; Chung et al., 2000). Repeated partnering experience also increases the likelihood of one firm *acquiring* the other (Vanhaverbeke, Duysters & Noorderhaven, 2002; Zaheer, Hernandez & Banerjee, 2010). With respect to post-formation outcomes, partner-specific experience affects both post-formation *governance design* (Dekker & Van den Abbeele, 2010) and *governance change* (Reuer et al., 2002). Finally, previous studies suggest mixed findings regarding its influence on *performance outcomes*. While Zollo et al. (2002) found that partner-specific experience improves *alliance performance*, Goerzen (2007) found it reduces *economic performance*, and Hoang and Rothaermel (2005) found a negative effect on joint *R&D project success*.

From a methodological standpoint, dyad-specific alliance capabilities have received less attention in empirical research than individual-alliance and portfolio capabilities mainly because of measurement challenges. Some studies have used partner-specific experience as a proxy for

dyadic capabilities (Ethiraj, Kale, Krishnan & Singh, 2005; Gulati, Lavie & Singh, 2009; Zollo et al., 2002). Other scholars have added two partnering firms' alliance capabilities, measured as historical number of alliances (Wang & Zajac, 2010) to generate dyad-level capabilities. Yet others have conceptualized and measured the construct through surveys at the relational level (Johnson et al., 2004; Kale et al., 2000; Sivadas & Dwyer, 2000). More importantly, prior research does not differentiate between pre- and post-formation capability constituents, nor does it recognize asymmetries in partners' value creation and value capture abilities.

Having reviewed the empirical evidence on each of the three alliance capabilities, we now attempt to integrate this research into the broader alliance literature by reviewing studies that directly tie antecedents to alliance outcomes. Since these antecedents have not yet been related to alliance capabilities, we refer to them as "alternative antecedents" and provide a summary of representative studies' major findings in an online appendix of this review article. For simplicity, we do not reiterate specific findings but focus on a few directions for future research.

First, more research is needed to understand how specific firm-level or environmental attributes impact the development of alliance capabilities. For instance, the technological resources of the firm may substitute for certain alliance capabilities in facilitating alliance formation but could also complement other capabilities in attracting partnering opportunities. And, environmental conditions that encourage more alliance activities may equip firms with greater alliance capabilities by enabling them to develop effective organizational routines and processes through trial and error learning. Second, the research on the relationships between

portfolio-specific alternative antecedents and outcomes has paid most attention to what configurations (e.g., size, diversity, and proportion) of the portfolio influence portfolio/firm performance. However, there is little research on what capabilities are required to initiate, manage, and update portfolio configurations. Finally, dyad-specific attributes influence value creation (through complementary resources) and value appropriation (through knowledge misappropriation), making inter-firm partnerships both cooperative and competitive in nature, a tension we explore in the next section.

RECONCEPTUALIZING ALLIANCE CAPABILITIES:

AN INTEGRATIVE FRAMEWORK AND AGENDA FOR FUTURE RESEARCH

In each of the preceding review sections, we provided several specific directions for future research. In this section we develop an integrative conceptual framework that helps us address two overarching limitations of prior alliance capability research. First, while there is a lot of empirical research on this topic, it tends to be rather fragmented. This conclusion is evident in the number of empirical relationships we discussed that had only one or two studies supporting them. Second, a large proportion of the empirical evidence tends to be correlational rather than causal and hence we often do not know *why* certain capabilities lead to certain outcomes. We attempt to address both limitations (fragmentation and causality inferences) by developing a framework of alliance capabilities that (a) provides an integrative conceptual treatment of capabilities and (b) focuses on the underlying causal mechanisms through which such capabilities help a firm create and capture value through alliances.

It is widely recognized that alliance capabilities are crucial because they enable firms to create and capture value through alliances (e.g., Anand & Khanna, 2000; Ireland et al., 2002). However, our literature review found that value creation is the dominant theme when it comes to the conceptualization of how alliance capabilities influence outcomes, perhaps because of the reliance on competence-based theories of the firm. In recent years, scholars have begun to recognize that the ability to capture value may be equally important in predicting alliance outcomes at the individual, portfolio and dyad levels (e.g., Lavie, 2007). When one partner has a greater ability to appropriate value from an alliance (Dussauge, Garrette & Mitchell, 2004), it could lead not only to sub-optimal outcomes for the alliance but could also lead to broader negative outcomes for the other partner (Diestre & Rajagopalan, 2012; Dyer, 1997). Hence, in order to fully understand the causal effects of alliance capabilities we need to examine both value creation and value capture. However, there has been no systematic attempt to isolate the distinct causal mechanisms through which capabilities help create versus capture value.

Table 2 provides an integrated view of the role of alliance capabilities in terms of a two-by-two matrix that distinguishes between value creation and value capture on one axis and pre- and post-formation stages on the other. For each quadrant in Table 2 we provide an illustrative list of key challenges/opportunities faced by the firm, research questions, capabilities, and theoretical perspectives. We first elaborate on each of these quadrants and then provide synthesizing methodological and theoretical challenges that cut across the four quadrants.

Insert Table 2 about here

Quadrant 1: Pre-formation Value Creation

Prior alliance capability studies suggest that proactive firms with partner-search capability generally experience positive outcomes (e.g., Sarkar et al., 2009). However, there are two key challenges that need to be addressed in order to select the partner who offers the best potential for value creation. The first is to identify whether a potential partner has valuable complementary resources (Baum, Cowan & Jonard, 2010). In assessing whether a potential partner has complementary resources, the presumption is that such resources cannot be purchased from the factor market and they should be valuable, rare, and inimitable resources (Barney, 1991). However, because resources/capabilities are causally ambiguous (Barney, 1991), the focal firm faces the following challenges: How can it determine whether a potential partner has complementary resources? And, how can it *ex ante* assess the post-formation value-creation potential of these resources? The second challenge is to deal with adverse selection when choosing among alternative partners. The focal firm typically faces asymmetric and imperfect information when it comes to assessing the quality of a potential partner's resources, leading to adverse selection problems (Chi, 1994). The adverse selection hazard is further amplified if we assume that alliance managers are boundedly rational and tend to pick from a limited pool of potential partners that they are already aware of (Gulati, 1995b).

To study these two challenges, scholars will benefit by integrating the competence perspectives (e.g., RBV and organizational learning) with organizational economics (e.g., transaction cost and agency theory). Competence-based theories are particularly useful when it comes to assessing which organizational structures, routines, and processes enhance firms' information gathering and processing abilities (Kale & Singh, 2009). For example, prior research has focused on the usefulness of the alliance function in terms of learning from existing alliance partners. However, at the partner selection stage an alliance function is also valuable in helping the firm assess the value creation potential of a wider range of potential alliance partners and the degree to which these partners help the firm exploit complementary capabilities. Thus, an alliance function may help firms deal with bounded rationality constraints and permit more comprehensive information processing.

Theories grounded in organizational economics, on the other hand, can be very valuable in understanding the sources of adverse selection and thus enable firms to understand the magnitude of the risk posed by different potential partners at the selection stage of the alliance. The key is to pick an alliance partner who is not only the most attractive from a complementarity perspective but also poses the least hazard from an adverse selection standpoint. It may, however, be costly to thoroughly assess both aspects across a number of potential partners. In addition, the focal firm cannot exhaust all possible partner choices, and it is very likely that the firm may fall into a cycle of constant search. Therefore, the firm needs to have the ability to balance search costs with expected payoffs.

Quadrant 2: Pre-formation Value Capture

At the pre-formation stage the focus is on choosing a partner and designing an alliance governance structure that enhances the ability of the focal firm to capture value from the alliance while also reducing the likelihood of *ex post* private value capture by the partner (Kumar, 2010). Accordingly, the two major challenges that need to be addressed here are (1) the allocation of value-capture rights between the partners and (2) the design of appropriate safeguards through contracts (Argyres & Mayer, 2007) to prevent *ex post* exchange hazards such as misappropriation, cheating, and holdup. Existing alliance capability research identifies some key capabilities that may be relevant in mitigating these challenges such as *negotiation capability* (Simonin, 1997) and *governance capability* (Aggarwal & Hsu, 2009). However, prior research did not clearly identify the causal role of these capabilities at the pre-formation stage and how they help mitigate the challenges relevant for value capture.

At the pre-formation stage, a major challenge that partnering firms face is to determine how value that will be created at the post-formation stage should be allocated. Property rights theory is particularly useful in addressing this question (Mahoney & Qian, 2013). The core principle is that ownership should be granted to the party that provides the resources based on which the value in question is created. Considerations here include whether the resources in question can be acquired in the factor market, and whether value is created through a combination of resources from partnering firms in which case the allocation of ownership rights should be based on relative contributions. Future research can examine how value-capture rights are

allocated, how these allocations are related to specific capabilities, and how the alliance outcomes vary across different contractual arrangements (Weber, Mayer & Macher, 2011).

The second challenge in Quadrant 2 is to put in place *ex ante* safeguards to deal with anticipated *ex post* exchange hazards. Hazards at the post-formation stage may include, but are not limited to, misappropriation, cheating, and holdup. Misappropriation may manifest in two forms: one is knowledge spillover as a form of externality (e.g., Diestre & Rajagopalan, 2012; Katila et al., 2008), and another is the extraction of resources by the partner (Kumar, 2010). Cheating “involves the breach of a precisely specified obligation that leaves little flexibility in the conduct of the contracting party”, and an example of cheating is a “licensee’s falsification of sales figure to reduce royalty” (Chi, 1994: 279). Finally, holdup results from partnering firms’ pooling of co-specialized resources and includes “any opportunistic behavior that may abate the efficiency of joint decision making” (Chi, 1994: 280). There is considerable scope for future research to examine the specific forms of safeguards firms apply to deal with these challenges and the capabilities that are most useful when it comes to the design of such safeguards. Partnering firms also learn from their prior experiences in using contracts to govern alliances, as they learn from their prior mistakes and therefore can add clauses in subsequent contracts to deal with these problems (Mayer & Argyres, 2004; Susarla, 2012). Thus, future research will benefit by integrating competence-based views (e.g., learning) with organizational economics (e.g., Transaction Cost Economics, property rights).

Quadrant 3: Post-formation Value Creation

At the post-formation stage, partnering firms have the opportunity to create value by leveraging complementary assets and learning from each other while dealing with the challenges posed by conflicts, unexpected contingencies, and moral hazards.

Extant alliance capability research helps us identify some capabilities that may facilitate value creation such as coordination (Schilke & Goerzen, 2010), communication (Schreiner et al., 2009), and inter-firm learning (Simonin, 1997). However, the literature has yet to examine how the effects of value-creation capabilities vary depending on relative resource dependencies between partnering firms. Conflicts that deter value creation may arise more often when power asymmetry is high, as in the case of a large pharmaceutical company's influence on a much smaller biotech partner's strategic choices (Diestre & Rajagopalan, 2012). To further examine these issues, researchers can find value in combining multiple theoretical perspectives, especially resource dependence theory, bargaining perspective, and conflict management.

Besides conflicts, another challenge for value creation in the post-formation stage is moral hazards, which "[involve] self-serving exercises of managerial discretion that one has promised to carry out in good faith and with diligence" (Chi, 1994: 277). An alliance (i.e., a hybrid form of organization) differs from an individual firm (i.e., hierarchy), where an authority (or fiat) exists (Williamson, 1991). In the absence of hierarchy, the ways to address the challenge of moral hazards include: (1) legal recourse to deal with explicit or implicit contract violations (Luo, 2006), (2) leveraging governance structures such as joint venture boards (Reuer, Klijn, van den Bosch &

Volberda, 2011), (3) associating a party's contribution with its outcome, or residual claimancy, and (4) assigning rights to control certain aspects of interdependent resources, or residual control (Chi, 1994). In sum, there is ample room for future research to examine the specific capabilities that enable firms to maximize their ability to create value after the alliance has been formed.

Quadrant 4: Post-formation Value Capture

At the pre-formation stage the firm is concerned with allocation of value-capture rights and setup of safeguards against *ex post* hazards. In the post-formation stage the key questions are: (1) how does a firm capture its fair share of value (e.g., through learning)? and, (2) how does a firm update and revise safeguard mechanisms (e.g., through contracts and governance) to address emerging contingencies and challenges? Prior research has identified several capabilities relevant for post-formation value capture, including intra-firm learning processes (Kale & Singh, 2007), inter-firm learning (Schilke & Goerzen, 2010), and governance capabilities (Aggarwal & Hsu, 2009). However, research is needed to address two literature gaps.

First, the opportunity at the post-formation stage to capture value through learning takes two forms: learning about alliance management through *intra*-firm learning processes, and learning from the partner through *inter*-firm learning mechanisms (Lane & Lubatkin, 1998). However, previous studies have not yet clearly distinguished between capabilities that build alliance management capabilities versus capacities that enable the firm to absorb new knowledge from its partners. In future research, scholars need to identify the distinct organizational routines and structures that contribute to each type of learning (e.g., Kale et al., 2002). There is

considerable scope to explore the micro-foundations of such capabilities in order to answer questions such as the following: How does knowledge get specialized, codified, circulated and protected? How do alliance managers and alliance functions work? What is the role of intra- and inter-firm managerial rotation and transfer in the knowledge assimilation and transfer process?

Second, prior work provides limited insights into the specific capabilities needed to monitor and update safeguard mechanisms as an alliance proceeds. The challenge at the post-formation stage centers on how to change governance structures and processes to deal with emerging contingencies and exchange hazards (Reuer & Ariño, 2002; Reuer et al., 2002). To examine such challenges, we recommend that scholars integrate competence-based and organizational economics perspectives. One approach may be to build on recent developments in the learning perspective differentiating productive learning from adverse learning (Obloj & Sengul, 2012). Productive learning focuses on how parties gradually learn to conduct tasks with greater efficiency when a new system, such as an alliance, is initiated. Adverse learning, on the other hand, occurs when the partners learn how to engage in private-benefit seeking behaviors through misappropriation, cheating, and holdup. Following that logic, we expect that productive learning would dominate in the initial stage of an alliance (or the beginning of a series of repeated ties), while adverse learning may become more salient at a later stage as the alliance progresses. Accordingly, we can expect that while coordinating capabilities may be crucial in the early stage of the alliance, ability to control and monitor partners' behaviors may be more crucial as the collaboration matures.

We conclude our paper with synthesizing methodological and theoretical themes that cut across the four quadrants and offer a broader agenda for future research.

DISCUSSION AND CONCLUSION

Methodological Suggestions for Future Research

We provide comments and suggestions on methods-related issues that integrate insights from the earlier review of empirical evidence as well as our framework (Table 2). First, among the three levels of analysis, the most widely studied is individual alliance capabilities. Specifically, prior studies have mainly focused on the ability to learn from prior alliance experience, and the positive effects of an alliance function are widely recognized. Portfolio- and dyad-specific alliance capabilities, however, are under-studied and represent promising future research areas, especially because dyad-specific capabilities are more salient in understanding asymmetries in value creation and value capture abilities (Table 2). Second, in the review section we categorized alliance capabilities in terms of levels of analysis and stages of alliance in order to highlight the issues emerging from misalignments in unit of analysis and endogeneity in research design. Our integrative framework (Table 2) clearly reveals that certain capabilities (e.g., governance capabilities) are relevant for both, pre- as well as post-formation stages. However, more work is needed to unpack the specific causal mechanisms that distinguish the effects of such capabilities in different stages of the alliance. Third, prior studies have not yet examined cross-level linkages across the three levels of alliance capabilities. We suggest that skills learned at one level could well be transferred to another and these multi-level linkages are shown in Figure 1 by the dotted lines

between firm-specific and dyad-specific alliance capabilities (Link 2a,b-2c) and between individual-alliance and alliance-portfolio capabilities (Link 2a-2b). Recent methodological advances in conducting multi-level analysis (Hitt, Beamish, Jackson & Mathieu, 2007) hold considerable promise for further investigation of how capabilities at different levels relate to each other and to alliance outcomes. Fourth, although we used a uni-directional causal framework in Figure 1 to review the empirical literature, it is important to acknowledge the existence of reciprocal, feedback loops. For instance, positive alliance outcomes may encourage a firm to learn more about alliance management and to invest more in the alliance function, thereby increasing its alliance capabilities.

Finally, we emphasize the value of separating the causal effects of capabilities that lead to value creation from those that lead to value capture. A challenge is that the same broadly defined capability (e.g., governance capability) may be relevant in multiple quadrants, but a more fine-grained operational measure of that capability may enable the researcher to tease out the distinct causal mechanisms through which that capability influences value creation or value capture. Alternative methodological approaches can help assess causality. The first is through appropriate experimental research designs that provide counterfactuals so that causal effects can be identified (e.g., Reuer, Tong, Tyler & Ariño, 2013). The second is through game-theory models (e.g., Chatain & Zemsky, 2011; Khanna, 1998). Value creation and capture can be designed as a two-stage game, and, through backward induction, scholars can model how expected payoffs at the second stage influence alliance partners' incentives to engage in value creation in the first stage.

The third approach is to identify alliance-specific conditions under which partnering firms have greater incentives to capture private value and carefully distinguish such conditions from those that are more likely to align partners' incentives to create value (e.g., Diestre & Rajagopalan, 2012; Lavie, 2007). Finally, scholars can optimize the orthogonality of value-creation versus value-capture capabilities when designing measures. For instance, patent portfolios can be used to measure a firm's ability to create value (e.g., Sampson, 2007), while historical patent lawsuits could proxy for the firm's incentive and ability to capture private value.

Next, we briefly elaborate on two theoretical themes that cut across the four quadrants in Table 2 and offer questions that we hope will push research in this area in more provocative and bolder directions. These themes also synthesize and extend the challenges identified in our earlier quadrant-specific discussions. The first theme is focused on trade-offs in capability investments and the second theme explores questions around dynamic alliance capabilities.

Theoretical Theme 1: Trade-offs in Capability Investments

Research Questions: *What, if any, are the trade-offs between the alliance capabilities that lead to value creation and those that enhance a firm's value capture ability? How do firms deal with these trade-offs in building alliance capabilities? What are the performance implications of these trade-offs and how do they vary across different alliance contexts?*

A major theoretical tension that cuts across the four quadrants in Table 2 stems from the fact that firms often have to choose which capabilities to invest in given their limited resources and managerial attention, and these choices reflect tough trade-offs. As noted by Winter (2003): 993,

choosing whether a specific capability is needed is “only a small part of the total problem of making profitable capability investments; the larger part is deciding *which* among the many promising but uncertain investments should be undertaken—recognizing there are likely to be trade-offs or other interactions among them” (italics in original).

To illustrate this tension, a firm can choose to develop stronger coordination and communication skills (Quadrant 3) that enhance its ability to create value in the alliance, because such capabilities enable it to better exploit complementary assets and allocate investments in a timely and optimal manner. Or, if the firm is facing resource constraints it may decide to invest more in building monitoring capabilities that enable it to prevent or catch partners’ opportunistic behaviors that lead to unfair or asymmetric value capture (Quadrant 4). Making significant investments in one type of value-creation capability may reduce the firm’s ability to deal with challenges relevant to value capture. For example, when a firm invests in value-creation capabilities, such as knowledge transfer and joint problem solving, it becomes particularly attractive to potential partners because of the enhanced ability of the alliance to create value. However, these capabilities also increase the transparency of the focal firm’s technologies and unique processes thus making it more susceptible to opportunistic value capture by the partner, especially under conditions of asymmetric power relations (Diestre & Rajagopalan, 2012).

A fruitful way to deepen our understanding of these tradeoffs is to examine the role of managerial perceptions and cognitions in shaping firms’ capability investment decisions. Interestingly, prior alliance research has not paid much attention to how prior experiences shape

managerial perceptions and how these perceptions in turn influence managers' future priorities and expectations. Depending on what the firm's managers perceive to be the greater opportunity or threat, the firm may choose to emphasize investments in one capability or another. For example, in recent literature on contracting, researchers find that firms concerned with preventing opportunistic behaviors tend to frame contractual clauses in a manner that punishes such behaviors while firms concerned more with promoting mutually beneficial relationships design contracts in a manner that rewards cooperative behaviors (Weber & Mayer, 2011; Weber, Mayer & Macher, 2011). Analogous reasoning can be invoked to study the antecedents and consequences of managerial perceptions in the broader context of alliance capability investments. Firms that perceive alliance relations as being filled with exchange hazards will tend to invest more in capabilities to prevent value capture by partners (Quadrants 2 and 4), while firms that have more positive expectations may invest disproportionately in capabilities to create value (Quadrants 1 and 3).

In essence, perceptions shape capability investment decisions, and in the process of making trade-offs a firm may become path dependent in reinforcing one set of alliance capabilities at the cost of another. However, because alliance contexts may change, alliance capabilities that are valuable in one setting may become less valuable in another. How firms can update their capabilities to remain adaptive is the next overarching theme suggested by our framework.

Theoretical Theme 2: Dynamic Alliance Capabilities

Research Questions: *How can firms develop and exploit dynamic alliance capabilities*

across the four quadrants in Table 2? Are certain capabilities more amenable to updating than others so that they remain valuable over time and across diverse alliance contexts?

Our integrative framework suggests that the value of alliance capabilities can vary across time as the alliance progresses from pre- to post-formation stages, as well as across alliance contexts (e.g., industry environments, partner attributes, functional type of alliance), because different contexts make different challenges or opportunities for value creation/capture more salient. This implies the need for firms to constantly update and refine existing capabilities or develop new ones that are more timely and context-appropriate. Drawing on the broader literature on dynamic capabilities (e.g., Helfat et al., 2007), we can conceptualize a dynamic alliance capability as one that purposefully extends and modifies existing alliance routines to adapt to the unique challenges posed by temporal and contextual variations.

Fortunately, alliance scholars interesting in studying how firms develop and exploit dynamic alliance capabilities can find useful conceptual and empirical guidance from scholars who have successfully unpacked contract design capabilities in the context of buyer-supplier relationships (e.g., Weber & Mayer, 2011; Weber et al., 2011), as well as from scholars who have been able to conceptualize and empirically isolate capabilities in adjusting alliance governance at the post-formation stage (e.g., Reuer et al., 2002).

Two other issues merit attention when scholars conceptualize dynamic alliance capabilities. The first is centered on the appropriate timing for the development of dynamic alliance capabilities based on the assumption that the value may be contingent on the stage of the alliance. For example,

Heimeriks et al. (2014) argue that while the selection and termination stages can be more structured, the alliance management stage needs more flexibility, suggesting that dynamic alliance capabilities may be more appropriate during the (middle) management stage of the alliance. A related second issue centers on capability hierarchy (Winter, 2003). If we conceptualize dynamic alliance capabilities as higher-order capabilities (e.g., Schilke, 2014b), then by definition, we need to clearly distinguish them from lower-order capabilities, conceptually as well as empirically. Research that further explores these distinctions can find useful guidance from the work of Kale and Singh (2007) who noted that:

...a firm's skills to manage different aspects of any alliance (Gulati, 1999) represent relevant *operational skills* necessary to manage alliances. But the alliance learning process seems like a *higher-order dynamic ability* that helps a firm learn, accumulate, and leverage alliance know-how so as to modify or improve its operational alliance management skills and achieve greater overall alliance success (p.995; italics are added).

To conclude, in this paper we first reviewed empirical evidence on alliance capabilities and then advanced the field by developing an integrative conceptual framework. This framework helped us address two issues with prior empirical research in this area: fragmentation and inferences on causality. Our framework recognizes that heterogeneity in alliance outcomes arises because different capabilities may be needed to address distinct value-creation and value-capture challenges and opportunities that firms face in the pre- and post-formation stages of alliances.

Finally, we integrated the insights from our literature review and conceptual framework to provide a focused set of methodological suggestions and theoretical themes for future work. We hope our paper will motivate research that is not only appealing to an academic audience but also provides practical insights for firms that consider alliances as useful strategies to build sustainable competitive advantage.

REFERENCES

- Aggarwal, V. A., & Hsu, D. H. 2009. Modes of cooperative R&D commercialization by start-ups. *Strategic Management Journal*, 30: 835-864.
- Ahuja, G. 2000. Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, 45: 425-455.
- Anand, B. N., & Khanna, T. 2000. Do firms learn to create value? The case of alliances. *Strategic Management Journal*, 21: 295-315.
- Argyres, N., & Mayer, K. J. 2007. Contract design as a firm capability: An integration of learning and transaction cost perspectives. *Academy of Management Review*, 32: 1060-1077.
- Arikan, A. M., & McGahan, A. M. 2010. The development of capabilities in new firms. *Strategic Management Journal*, 31: 1-18.
- Bae, J., & Gargiulo, M. 2004. Partner substitutability, alliance network structure, and firm profitability in the telecommunications industry. *Academy of Management Journal*, 47: 843-859.
- Barney, J. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17: 99-120.
- Baum, J. A. C., Cowan, R., & Jonard, N. 2010. Network-independent partner selection and the evolution of innovation networks. *Management Science*, 56: 2094-2110.
- Capaldo, A. 2007. Network structure and innovation: The leveraging of a dual network as a distinctive relational capability. *Strategic Management Journal*, 28: 585-608.

- Chatain, O., & Zemsky, P. 2011. Value creation and value capture with frictions. *Strategic Management Journal*, 32: 1206-1231.
- Chi, T. 1994. Trading in strategic resources: Necessary conditions, transaction cost problems, and choice of exchange structure. *Strategic Management Journal*, 15: 271-290.
- Chung, S., Singh, H., & Lee, K. 2000. Complementarity, status similarity and social capital as drivers of alliance formation. *Strategic Management Journal*, 21: 1-22.
- Das, S., Sen, P. K., & Sengupta, S. 1998. Impact of strategic alliances on firm valuation. *Academy of Management Journal*, 41: 27-41.
- Dekker, H. C., & Van den Abbeele, A. 2010. Organizational learning and interfirm control: The effects of partner search and prior exchange experiences. *Organization Science*, 21: 1233-1250.
- Diestre, L., & Rajagopalan, N. 2012. Are all 'sharks' dangerous? New biotechnology ventures and partner selection in R&D alliances. *Strategic Management Journal*, 33: 1115-1134.
- Dussauge, P., Garrette, B., & Mitchell, W. 2004. Asymmetric performance: The market share impact of scale and link alliances in the global auto industry. *Strategic Management Journal*, 25: 701-711.
- Dyer, J. H. 1997. Effective interfirm collaboration: How firms minimize transaction costs and maximize transaction value. *Strategic Management Journal*, 18: 535-556.
- Dyer, J. H., & Hatch, N. W. 2006. Relation-specific capabilities and barriers to knowledge transfers: Creating advantage through network relationships. *Strategic Management*

- Journal*, 27: 701-719.
- Dyer, J. H., & Singh, H. 1998. The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23: 660-679.
- Eisenhardt, K. M., & Martin, J. A. 2000. Dynamic capabilities: What are they? *Strategic Management Journal*, 21: 1105-1121.
- Eisenhardt, K. M., & Schoonhoven, C. B. 1996. Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Organization Science*, 7: 136-150.
- Elfenbein, D. W., & Zenger, T. R. 2014. What is a relationship worth? Repeated exchange and the development and deployment of relational capital. *Organization Science*, 25: 222-244.
- Ethiraj, S. K., Kale, P., Krishnan, M. S., & Singh, J. V. 2005. Where do capabilities come from and how do they matter? A study in the software services industry. *Strategic Management Journal*, 26: 25-45.
- Goerzen, A. 2007. Alliance networks and firm performance: The impact of repeated partnerships. *Strategic Management Journal*, 28: 487-509.
- Gulati, R. 1995a. Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of Management Journal*, 38: 85-112.
- Gulati, R. 1995b. Social structure and alliance formation patterns: A longitudinal analysis. *Administrative Science Quarterly*, 40: 619-652.
- Gulati, R. 1999. Network location and learning: The influence of network resources and firm

- capabilities on alliance formation. *Strategic Management Journal*, 20: 397-420.
- Gulati, R., Lavie, D., & Singh, H. 2009. The nature of partnering experience and the gains from alliances. *Strategic Management Journal*, 30: 1213-1233.
- Heimeriks, K. H., Bingham, C. B., & Laamanen, T. in press. Unveiling the temporally contingent role of codification in alliance success. *Strategic Management Journal*. doi: 10.1002/smj.2224.
- Heimeriks, K. H., & Duysters, G. 2007. Alliance capability as a mediator between experience and alliance performance: An empirical investigation into the alliance capability development process. *Journal of Management Studies*, 44: 25-49.
- Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D., & Winter, S. G. 2007. *Dynamic capabilities: Understanding dynamic change in organizations*. Malden, MA: Blackwell Publishing.
- Hitt, M. A., Ahlstrom, D., Dacin, M. T., Levitas, E., & Svobodina, L. 2004. The institutional effects on strategic alliance partner selection in transition economies: China vs. Russia. *Organization Science*, 15: 173-185.
- Hitt, M. A., Beamish, P. W., Jackson, S. E., & Mathieu, J. E. 2007. Building theoretical and empirical bridges across levels: Multilevel research in management. *Academy of Management Journal*, 50: 1385-1399.
- Hitt, M. A., Dacin, M. T., Levitas, E., Arregle, J.-L., & Borza, A. 2000. Partner selection in emerging and developed market contexts: Resource-based and organizational learning

- perspectives. *Academy of Management Journal*, 43: 449-467.
- Hoang, H., & Rothaermel, F. T. 2005. The effect of general and partner-specific alliance experience on joint R&D project performance. *Academy of Management Journal*, 48: 332-345.
- Ireland, R. D., Hitt, M. A., & Vaidyanath, D. 2002. Alliance management as a source of competitive advantage. *Journal of Management*, 28: 413-446.
- Johnson, J. L., Sohi, R. S., & Grewal, R. 2004. The role of relational knowledge stores in interfirm partnering. *Journal of Marketing*, 68: 21-36.
- Kale, P. 1999. *Alliance capability and success: A knowledge-based approach*. Unpublished doctoral dissertation, University of Pennsylvania.
- Kale, P., Dyer, J. H., & 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. 2007. Building firm capabilities through learning: The role of the alliance learning process in alliance capability and firm-level alliance success. *Strategic Management Journal*, 28: 981-1000.
- 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: 45-62.
- Kale, P., Singh, H., & Perlmutter, H. 2000. Learning and protection of proprietary assets in strategic alliances: Building relational capital. *Strategic Management Journal*, 21:

217-237.

Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. 2008. Swimming with sharks: Technology ventures, defense mechanisms and corporate relationships. *Administrative Science Quarterly*, 53: 295-332.

Khanna, T. 1998. The scope of alliances. *Organization Science*, 9: 340-355.

Kumar, M. V. S. 2010. Differential gains between partners in joint ventures: Role of resource appropriation and private benefits. *Organization Science*, 21: 232-248.

Lane, P. J., & Lubatkin, M. 1998. Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, 19: 461-477.

Lavie, D. 2006. The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of Management Review*, 31: 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.

Lavie, D. in press. Alliance capability. *The Palgrave Encyclopedia of Strategic Management*. Basingstoke: Palgrave Macmillan.

Lavie, D., Haunschild, P. R., & Khanna, P. 2012. Organizational differences, relational mechanisms, and alliance performance. *Strategic Management Journal*, 33: 1453-1479.

Leiblein, M. J., & Miller, D. J. 2003. An empirical examination of transaction- and firm-level influences on the vertical boundaries of the firm. *Strategic Management Journal*, 24:

839-859.

Levinthal, D. A., & March, J. G. 1993. The myopia of learning. *Strategic Management Journal*, 14:

95-112.

Li, D., Eden, L., Hitt, M. A., & Ireland, R. D. 2008. Friends, acquaintances, or strangers? Partner selection in R&D alliances. *Academy of Management Journal*, 51: 315-334.

Luo, Y. 2006. Opportunism in inter-firm exchanges in emerging markets. *Management and Organization Review*, 2: 121-147.

Mahoney, J. T., & Qian, L. 2013. Market frictions as building blocks of an organizational economics approach to strategic management. *Strategic Management Journal*, 34: 1019-1041.

Malhotra, D., & Murnighan, J. K. 2002. The effects of contracts on interpersonal trust. *Administrative Science Quarterly*, 47: 534-559.

Mayer, K. J., & Argyres, N. S. 2004. Learning to contract: Evidence from the personal computer industry. *Organization Science*, 15: 394-410.

Obloj, T., & Sengul, M. 2012. Incentive life-cycles: Learning and the division of value in firms. *Administrative Science Quarterly*, 57: 305-347.

Oxley, J. E., Sampson, R. C., & Silverman, B. S. 2009. Arms race or détente? How interfirm alliance announcements change the stock market valuation of rivals. *Management Science*, 55: 1321-1337.

Pangarkar, N. 2009. Do firms learn from alliance terminations? An empirical examination.

- Journal of Management Studies*, 46: 982-1004.
- Poppo, L., & Zenger, T. 2002. Do formal contracts and relational governance function as substitutes or complements? *Strategic Management Journal*, 23: 707-725.
- Reuer, J. J., & Ariño, A. 2002. Contractual renegotiations in strategic alliances. *Journal of Management*, 28: 47-68.
- Reuer, J. J., Klijn, E., van den Bosch, F. A. J., & Volberda, H. W. 2011. Bringing corporate governance to international joint ventures. *Global Strategy Journal*, 1: 54-66.
- Reuer, J. J., Tong, T. W., Tyler, B. B., & Ariño, A. 2013. Executive preferences for governance modes and exchange partners: An information economics perspective. *Strategic Management Journal*, 34: 1104-1122.
- Reuer, J. J., Zollo, M., & Singh, H. 2002. Post-formation dynamics in strategic alliances. *Strategic Management Journal*, 23: 135-151.
- Rothaermel, F. T. 2001. Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, 22: 687-699.
- Rothaermel, F. T., & Alexandre, M. T. 2009. Ambidexterity in technology sourcing: The moderating role of absorptive capacity. *Organization Science*, 20: 759-780.
- Rothaermel, F. T., & Deeds, D. L. 2006. Alliance type, alliance experience and alliance management capability in high-technology ventures. *Journal of Business Venturing*, 21: 429-460.
- Sampson, R. C. 2005. Experience effects and collaborative returns in R&D alliances. *Strategic*

- Management Journal*, 26: 1009-1031.
- 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: 364-386.
- Sarkar, M., Aulakh, P. S., & Madhok, A. 2009. Process capabilities and value generation in alliance portfolios. *Organization Science*, 20: 583-600.
- Sarkar, M., Echambadi, R. A. J., & Harrison, J. S. 2001. Alliance entrepreneurship and firm market performance. *Strategic Management Journal*, 22: 701-711.
- Schilke, O. 2014. On the contingent value of dynamic capabilities for competitive advantage: The nonlinear moderating effect of environmental dynamism. *Strategic Management Journal*, 35: 179-203.
- Schilke, O. in press. Second-order dynamic capabilities: How do they matter? *Academy of Management Perspectives*. doi: 10.5465/amp.2013.0093.
- Schilke, O., & Goerzen, A. 2010. Alliance management capability: An investigation of the construct and its measurement. *Journal of Management*, 36: 1192-1219.
- Schreiner, M., Kale, P., & Corsten, D. 2009. What really is alliance management capability and how does it impact alliance outcomes and success? *Strategic Management Journal*, 30: 1395-1419.
- Simonin, B. L. 1997. The importance of collaborative know-how: An empirical test of the learning organization. *Academy of Management Journal*, 40: 1150-1174.
- Simonin, B. L. 1999. Ambiguity and the process of knowledge transfer in strategic alliances.

- Strategic Management Journal*, 20: 595-623.
- Singh, K., & Mitchell, W. 1996. Precarious collaboration: Business survival after partners shut down or form new partnerships. *Strategic Management Journal*, 17: 99-115.
- Sivadas, E., & Dwyer, F. R. 2000. An examination of organizational factors influencing new product success in internal and alliance-based processes. *Journal of Marketing*, 64: 31-49.
- Susarla, A. 2012. Contractual flexibility, rent seeking, and renegotiation design: An empirical analysis of information technology outsourcing contracts. *Management Science*, 58: 1388-1407.
- Swaminathan, V., & Moorman, C. 2009. Marketing alliances, firm networks, and firm value creation. *Journal of Marketing*, 73: 52-69.
- Vanhaverbeke, W., Duysters, G., & Noorderhaven, N. 2002. External technology sourcing through alliances or acquisitions: An analysis of the application-specific integrated circuits industry. *Organization Science*, 13: 714-733.
- Vassolo, R. S., Anand, J., & Folta, T. B. 2004. Non-additivity in portfolios of exploration activities: A real options-based analysis of equity alliances in biotechnology. *Strategic Management Journal*, 25: 1045-1061.
- Wang, L., & Zajac, E. J. 2007. Alliance or acquisition? A dyadic perspective on interfirm resource combinations. *Strategic Management Journal*, 28: 1291-1317.
- Wassmer, U. 2010. Alliance portfolios: A review and research agenda. *Journal of Management*, 36: 141-171.

- Weber, L., & Mayer, K. J. 2011. Designing effective contracts: Exploring the influence of framing and expectations. *Academy of Management Review*, 36: 53-75.
- Weber, L., Mayer, K. J., & Macher, J. T. 2011. An analysis of extendibility and early termination provisions: The importance of framing duration safeguards. *Academy of Management Journal*, 54: 182-202.
- Williamson, O. E. 1991. Comparative Economic Organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, 36: 269-296.
- Winter, S. G. 2003. Understanding dynamic capabilities. *Strategic Management Journal*, 24: 991-995.
- Zaheer, A., Hernandez, E., & Banerjee, S. 2010. Prior alliances with targets and acquisition performance in knowledge-intensive industries. *Organization Science*, 21: 1072-1091.
- Zaheer, A., & Venkatraman, N. 1995. Relational governance as an interorganizational strategy: An empirical test of the role of trust in economic exchange. *Strategic Management Journal*, 16: 373-392.
- Zollo, M., & Reuer, J. J. 2010. Experience spillovers across corporate development activities. *Organization Science*, 21: 1195-1212.
- Zollo, M., Reuer, J. J., & Singh, H. 2002. Interorganizational routines and performance in strategic alliances. *Organization Science*, 13: 701-713.

FOOTNOTES

1. A focused review of the alliance portfolio literature is provided by Wassmer (2010). However, that paper deals with capabilities mainly in the context of alliance portfolios. In contrast, the focus of our review is on a comprehensive treatment of capabilities in relation to all three levels: individual alliance, dyad-level alliance, and alliance portfolios, distinguishing pre- versus post-formation stages as well. In discussing capabilities relevant at the portfolio level we draw upon Wassmer (2010) as appropriate.
2. The journals reviewed include: *Academy of Management Journal*, *Strategic Management Journal*, *Organization Science*, *Journal of Management*, *Administrative Science Quarterly*, *Management Science*, *Journal of Management Studies*, *Journal of Business Venturing*, *Research Policy*, and *Strategic Entrepreneurship Journal*.
3. The keywords used to search for articles were: *alliance**, *alliance capabilit**, *alliance management capabilit**, *relational capabilit**, *alliance portfolio capabilit**, *cooperative competenc**, *alliance competenc**. * denotes that any accompanied letters that formed the word were included in the search results.
4. The summary of this second set of papers is included in an online appendix of this review article.
5. Admittedly, many alliance scholars conceptualize alliances in terms of three distinct stages: formation, management, and termination (e.g., Heimeriks et al., 2014; Lavie, in press). More fine-grained stage differences may also include pre-formation contract design and negotiation

(Simonin, 1997), and post-formation coordination, and contract renewal (Mayer & Argyres, 2004). However, we choose the more parsimonious pre- and post-formation distinction, because these are two natural stages of an alliance. Theoretically, the two-stage framework enables us to identify implications for value creation versus value capture in a meaningful and parsimonious manner for future research. Methodologically, this distinction is relevant when it comes to dealing with endogeneity issues.

6. Individual-alliance capability has been variously defined as collaborative know-how (Simonin, 1997), alliance management capability (Schreiner et al., 2009), and project management capability (Ethiraj et al., 2005).
7. Several studies of alliance capabilities adopt the relational view. For instance, Zollo et al. (2002) suggest that partnering firms over time develop inter-organizational routines, which are defined as the “stable patterns of interaction among two firms developed and refined in the course of repeated collaborations” (Zollo et al., 2002: 701). Such routines are relation-specific rather than firm-specific. Sivadas and Dwyer (2000) conceptualize cooperative competency and point out that it “is *a property of the relationship* among the organizational entities participating in new product development” (Sivadas & Dwyer, 2000: 33-34; italics are added).

TABLE 1 ^a
Alliance Capabilities at Three Levels and Their Pre- and Post-formation Elements

	Pre formation	Post Formation
Individual Alliance Capabilities	<ul style="list-style-type: none"> • Partner Search Identify and select potential collaborators; 3-item Likert scale (Simonin 1997: 1163). • Negotiation Activities associated with negotiating terms and structures of an alliance agreement; 5-item Likert scale (Simonin 1997: 1163). 	<ul style="list-style-type: none"> • Coordination Routines that coordinate resources and activities with the partnering firm; 3-item Likert scale (Schilke and Goerzen, 2010: 1208). • Communication Formal as well as informal sharing of information; 5-item Likert scale (Schreiner et al. 2009: 1418). • Bonding Substantial and repeated interactions with interpersonal liking; 6-item Likert scale (Schreiner et al. 2009: 1418). • Intra-firm Learning Processes Routines associated with articulating, codifying, sharing, and internalizing alliance knowledge; Likert scales for the four learning processes (Kale and Singh, 2007: 999-1000). • Exiting Know when and how to exit an alliance relation; 2-item scale (Simonin 1997: 1163).
Alliance Portfolio Capabilities	<ul style="list-style-type: none"> • Partnering Proactiveness Actively search for and form alliance relations before competitors; 5-item Likert scale (Sarkar et al. 2009: 592). • Governance Capability A firm's knowledge, routines, and structures for a particular type of alliance; measured by the total number of relations and deviation in a year from the average activity of an alliance type (e.g., equity-based, license-only) (Aggarwal & Hsu, 2009: 848). 	<ul style="list-style-type: none"> • Governance Capability (Aggarwal & Hsu, 2009) • Portfolio Coordination Routines that integrate activities of all partnering firms in a portfolio; 4-item Likert scale (Schilke & Goerzen 2010: 1208). • Relational Governance Routines that are associated with the development of relational mechanisms (e.g., trust) with the firm's partners in a portfolio; 5-item Likert scale (Sarkar et al., 2009: 592).

(Table 1 continues)

	Pre Formation	Post Formation
Dyad-specific Alliance Capabilities	<ul style="list-style-type: none"> • Combined Relational Capability The aggregation of two partnering firms' abilities to interact with and manage interfirm relations; the total number of alliances formed by both firms with all other firms (including those outside the sample) in the previous 5 years (Wang & Zajac, 2010). 	<ul style="list-style-type: none"> • Inter-firm Learning Activities associated with transferring knowledge across organizational boundaries; 4-item Likert scale (Schilke & Goerzen, 2010: 1208). • Inter-organizational Capabilities Inter-organizational routines that help with interaction and cooperation across two partnering firms; proxied by partner-specific experience, which is measured as the number of prior agreements with the same partner (Zollo et al., 2002). • Integrative Conflict Management The ability to manage conflicts in a way to achieve 'win-win' situations; 6-item Likert scale (Kale et al., 2000: 237). • Relational Knowledge Stores Combined knowledge about interfirm interaction, about specific functions (e.g., management of supply chains), and about the environment; Likert scales for the three types of knowledge stores—interactional, functional, and environmental (Johnson et al., 2004: 33).

^a The definitions and operational descriptions provided in this table are illustrative rather than exhaustive. For detailed operational measures, please refer to specific pages in the studies identified for each capability.

TABLE 2 ^a

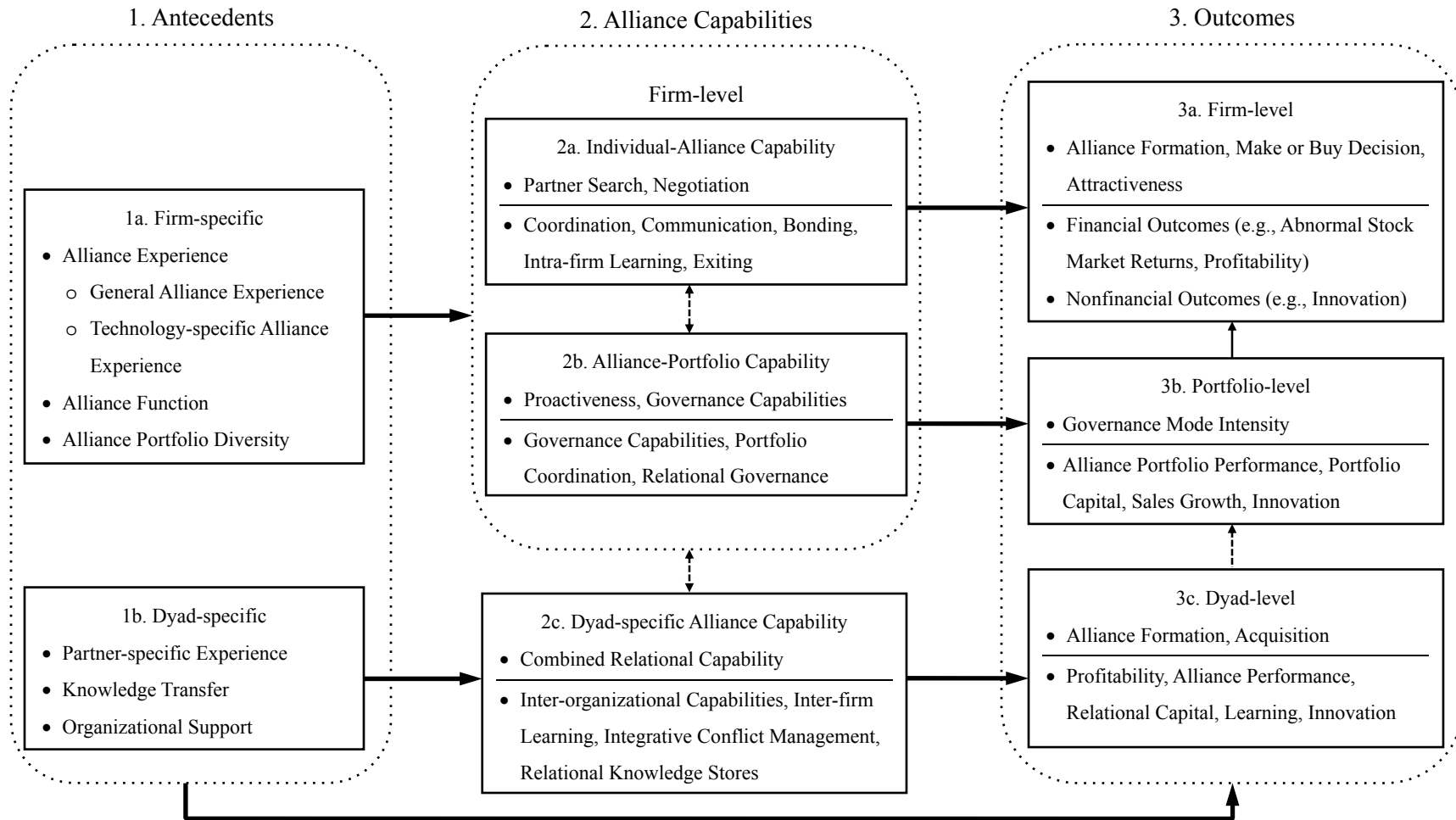
Alliance Capabilities: An Integrative Framework

	Value Creation	Value Capture
Pre Formation	<p>Challenges/Opportunities: identify complementary resources; mitigate adverse selection</p> <p>Questions: (1) Which capabilities enable firms to choose a partner that maximizes the value creation potential of the alliance? (2) How does each capability individually and collectively help address the information asymmetry and adverse selection challenges in the pre-formation stage?</p> <p>Capabilities: information search and processing; codified routines and processes including partner evaluation techniques</p> <p>Theories: competence-based theories, TCE, agency theory</p>	<p>Challenges/Opportunities: allocation of value-capture rights; <i>ex ante</i> safeguards against misappropriation, cheating, holdup</p> <p>Questions: (1) Which capabilities enable firms to design alliance agreements that <i>ex-ante</i> maximize their ability to capture fair value from the alliance? (2) Which capabilities enable firms to anticipate and guard against the <i>ex post</i> likelihood of opportunistic behaviors by the partner?</p> <p>Capabilities: contract design capability; governance capability; negotiation capability</p> <p>Theories: TCE, property rights, game theory, competence-based theories</p>
Post Formation	<p>Challenges/Opportunities: leveraging complementary assets; learning; resolving conflicts; dealing with moral hazards and unexpected contingencies</p> <p>Questions: Which capabilities enable the firm to (a) leverage complementary assets, (b) deal with conflicts and unexpected contingencies, and (c) mitigate moral hazards?</p> <p>Capabilities: coordination and communication, intra-firm routines for learning and knowledge transfer, problem solving and conflict resolution, updating/revision of contractual and governance mechanisms</p> <p>Theories: resource dependence, bargaining perspective, property rights, corporate governance, competence-based theories</p>	<p>Challenges/Opportunities: learning; governance changes dealing with exchange hazards (misappropriation, cheating, holdup)</p> <p>Questions: (1) Which capabilities enable the firm to (a) improve alliance management routines and processes, and (b) assimilate and utilize the partner's knowledge? (2) Which capabilities enable a firm to minimize the likelihood of partner behaviors that lead to asymmetric value capture?</p> <p>Capabilities: intra-firm routines for learning and knowledge transfer, relative absorptive capacity, monitoring capability, governance capability</p> <p>Theories: TCE, competence-based theories, game theory</p>

^a Competence-based theories include the resource-based view (RBV), organizational learning, knowledge-based view, and dynamic capabilities; Organizational economics includes Transaction Cost Economics (TCE), property rights, and agency theory.

FIGURE 1^a

Alliance Capabilities, Antecedents, and Outcomes: Review Framework



^a The dotted box circumscribing individual and portfolio alliance capabilities (2a and 2b) suggests that these two types of capabilities reside at the firm-level; the horizontal line within the capability boxes and outcomes boxes separates the pre- and post-formation stages of alliances; the dotted double arrows between individual and portfolio alliance capabilities (2a-2b), and firm-specific and dyad-specific capabilities (2a,b-2c) suggest that these links have not yet been examined empirically; the same for the dotted single arrow from dyad-level to portfolio-level outcomes (3c-3b); the solid single arrow from portfolio-level to firm-level outcomes (3b-3a) has been validated by prior empirical evidence.

ALLIANCE CAPABILITIES: REVIEW AND RESEARCH AGENDA (ONLINE APPENDIX)Alternative Antecedents of Alliance Outcomes ^a

Main Findings	Representative Studies
Firm Level	
<p>Alliance type. Benefits of alliances vary across different types of alliances. In general, horizontal (e.g., technological) alliances produce more innovative products than vertical ones; joint ventures, particularly R&D ones, are more conducive to knowledge transfer than contract-based alliances; exploratory alliances are beneficial for new product development while exploitative alliances lead to better product commercialization; new bio-pharmaceutical ventures' alliances with pharmaceutical companies have no significant effect on IPO valuation, but their IPO success is increased by ties with prominent VCs.</p>	<p>(Gulati & Higgins, 2003; Kotabe & Swan, 1995; Mowery, Oxley & Silverman, 1996; Rothaermel, 2001; Rothaermel & Deeds, 2004)</p>
<p>Organizational attributes. Organizational attributes influence a firm's alliance formation or attractiveness as a partner, and these include a firm's position in the technological space, whether it has knowledge in emerging technological fields, whether it possesses/lacks technological capabilities, whether it has just experienced an IPO, its technological knowledge breadth, and its firm-specific uncertainties.</p>	<p>(Anand, Oriani & Vassolo, 2010; Beckman, Haunschild & Phillips, 2004; Reuer & Tong, 2010; Sakakibara, 1997; Stuart, 1998; Zhang, Baden-Fuller & Mangematin, 2007)</p>
<p>Environmental attributes. Various environmental attributes influence alliance formation: market- and technological uncertainties encourage alliance activity; the early stage of industry evolution witnesses more alliance activities than the mature stage; a local environment with dense alliance activities encourages mimetic alliance formation but also increases alliance withdrawals due to availability of alternative partnering opportunities; institutional environments with norms of cooperation facilitate alliance formation as well knowledge acquisition; finally, significant environmental (legal) shifts alter alliance network composition.</p>	<p>(Beckman et al., 2004; Eisenhardt & Schoonhoven, 1996; Garcia-Pont & Nohria, 2002; Greve, Mitsuhashi & Baum, 2013; Madhavan, Koka & Prescott, 1998; Robertson & Gatignon, 1998; Vasudeva, Spencer & Teegen, 2013)</p>

Portfolio Level

Portfolio size. Some research has found that portfolio size has a direct positive association, while others have discovered an inverted-U relationship, with the firm's innovation performance. A firm's number of indirect ties weakens the benefits from the number of direct ties (i.e., portfolio size), mainly because of substitution of novel information provided by the two types of ties. Portfolio size alone may not lead to the most optimal innovative outcomes because partners' technological innovativeness also matters.

(Ahuja, 2000; Deeds & Hill, 1996; Shan, Gordon & Kogut, 1994; Stuart, 2000)

Portfolio diversity. Whether portfolio diversity increases, decrease, or has an inverted-U shaped impact on firm performance depends on how alliances are categorized: high organizational and functional diversities and low governance diversity contribute to better firm performance; industry diversity has a negative or U-shaped influence on firm performance; and nationality diversity tends to negatively influence the firm's economic performance.

(Goerzen & Beamish, 2005; Jiang, Tao & Santoro, 2010)

Portfolio configuration. Alliances can be categorized in the domains of structure (new or repeated), function (along the value chain), and attribute (similarity in organizational attributes with prior partners). The proportion of exploratory versus exploitative alliances from these domains affects outcomes: while balancing exploration and exploitation across domains increases, balancing within the same domain decreases, performance. Further, positive performance may result from either a balanced or a complementary effect between exploratory and exploitative alliances.

(Lavie, Kang & Rosenkopf, 2011; Lavie & Rosenkopf, 2006; Lavie, Stettner & Tushman, 2010; Rothaermel & Deeds, 2004; Stettner & Lavie, 2013; Wassmer, 2010)

Dyad Level

Complementary attributes. Complementary attributes between two potential partners are the most commonly studied dyad-specific antecedents. Technological overlap as a form of complementarity has an inverted-U impact on alliance formation, because moderate level of technological overlap not only avoids difficulties in communication but also ensures that novel information is transferred between partners. Technological overlap also facilitates partnership formation by reducing the negative influence of two firms' geographical distance. Knowledge overlap in such alliances, however, also increases the hazards of misappropriation, which is often dealt with by reducing alliance scope or adopting equity-based governance.

(Dussauge, Garrette & Mitchell, 2000; Fang, 2011; Khanna, Gulati & Nohria, 1998; Li, Eden, Hitt, Ireland & Garrett, 2012; Mitsuhashi & Greve, 2009; Mowery et al., 1996; Oxley & Sampson, 2004; Reuer & Lahiri, 2014)

Interfirm social relations. Interfirm social relations influence alliance formation as follows: joint participation in cooperative technical organizations usually leads to an alliance; alliances are usually formed between the focal firm and outside directors' home companies.

(Gulati & Westphal, 1999; Rosenkopf, Metiu & George, 2001)

Co-opetition. Scholars have begun to examine cooperation and competition outside as well as within alliance relations. For instance, dyad-specific assets and resource sharing between two partners prevents a rival from forming alliance with one party in the alliance. Interfirm rivalry, such as lawsuits, also happens within alliances: task complexity, absence of cooperative norms, and alliance duration are important predictors of intra-alliance rivalry.

(Gimeno, 2004; Gulati, 1995; Gulati & Westphal, 1999; Lumineau & Oxley, 2012)

^a. Wassmer (2010) provides a more detailed assessment of the antecedents to portfolio-level outcomes.

REFERENCES

- Ahuja, G. 2000. Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, 45: 425-455.
- Anand, J., Oriani, R., & Vassolo, R. S. 2010. Alliance activity as a dynamic capability in the face of a discontinuous technological change. *Organization Science*, 21: 1213-1232.
- Beckman, C. M., Haunschild, P. R., & Phillips, D. J. 2004. Friends or strangers? Firm-specific uncertainty, market uncertainty, and network partner selection. *Organization Science*, 15: 259-275.
- Deeds, D. L., & Hill, C. W. L. 1996. Strategic alliances and the rate of new product development: An empirical study of entrepreneurial biotechnology firms. *Journal of Business Venturing*, 11: 41-55.
- 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: 99-126.
- Eisenhardt, K. M., & Schoonhoven, C. B. 1996. Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Organization Science*, 7: 136-150.
- Fang, E. 2011. The effect of strategic alliance knowledge complementarity on new product innovativeness in China. *Organization Science*, 22: 158-172.
- Garcia-Pont, C., & Nohria, N. 2002. Local versus global mimetism: The dynamics of alliance

- formation in the automobile industry. *Strategic Management Journal*, 23: 307-321.
- Gimeno, J. 2004. Competition within and between networks: The contingent effect of competitive embeddedness on alliance formation. *Academy of Management Journal*, 47: 820-842.
- Goerzen, A., & Beamish, P. W. 2005. The effect of alliance network diversity on multinational enterprise performance. *Strategic Management Journal*, 26: 333-354.
- Greve, H. R., Mitsuhashi, H., & Baum, J. A. C. 2013. Greener pastures: Outside options and strategic alliance withdrawal. *Organization Science*, 24: 79-98.
- Gulati, R. 1995. Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of Management Journal*, 38: 85-112.
- Gulati, R., & Higgins, M. C. 2003. Which ties matter when? The contingent effects of interorganizational partnerships on IPO success. *Strategic Management Journal*, 24: 127-144.
- Gulati, R., & Westphal, J. D. 1999. Cooperative or controlling? The effects of CEO-board relations and the content of interlocks on the formation of joint ventures. *Administrative Science Quarterly*, 44: 473-506.
- Jiang, R. J., Tao, Q. T., & Santoro, M. D. 2010. Alliance portfolio diversity and firm performance. *Strategic Management Journal*, 31: 1136-1144.
- Khanna, T., Gulati, R., & Nohria, N. 1998. The dynamics of learning alliances: competition, cooperation, and relative scope. *Strategic Management Journal*, 19: 193-210.

- Kotabe, M., & Swan, S. K. 1995. The role of strategic alliances in high-technology new product development. *Strategic Management Journal*, 16: 621-636.
- Lavie, D., Kang, J., & Rosenkopf, L. 2011. Balance within and across domains: The performance implications of exploration and exploitation in alliances. *Organization Science*, 22: 1517-1538.
- Lavie, D., & Rosenkopf, L. 2006. Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, 49: 797-818.
- Lavie, D., Stettner, U., & Tushman, M. L. 2010. Exploration and Exploitation Within and Across Organizations. *Academy of Management Annals*, 4: 109-155.
- Li, D., Eden, L., Hitt, M. A., Ireland, R. D., & Garrett, R. P. 2012. Governance in multilateral R&D alliances. *Organization Science*, 23: 1191-1210.
- Lumineau, F., & Oxley, J. E. 2012. Let's work it out (or we'll see you in court): Litigation and private dispute resolution in vertical exchange relationships. *Organization Science*, 23: 820-834.
- Madhavan, R., Koka, B. R., & Prescott, J. E. 1998. Networks in transition: How industry events (re)shape interfirm relationships. *Strategic Management Journal*, 19: 439-459.
- Mitsuhashi, H., & Greve, H. R. 2009. A matching theory of alliance formation and organizational success: Complementarity and compatibility. *Academy of Management Journal*, 52: 975-995.
- Mowery, D. C., Oxley, J. E., & Silverman, B. S. 1996. Strategic alliances and interfirm

- knowledge transfer. *Strategic Management Journal*, 17: 77-91.
- Oxley, J. E., & Sampson, R. C. 2004. The scope and governance of international R&D alliances. *Strategic Management Journal*, 25: 723-749.
- Reuer, J. J., & Lahiri, N. 2014. Searching for alliance partners: Effects of geographic distance on the formation of R&D collaborations. *Organization Science*, 25: 283-298.
- Reuer, J. J., & Tong, T. W. 2010. Discovering valuable growth opportunities: An analysis of equity alliances with IPO firms. *Organization Science*, 21: 202-215.
- Robertson, T. S., & Gatignon, H. 1998. Technology development mode: A transaction cost conceptualization. *Strategic Management Journal*, 19: 515-531.
- Rosenkopf, L., Metiu, A., & George, V. P. 2001. From the bottom up? Technical committee activity and alliance formation. *Administrative Science Quarterly*, 46: 748-772.
- Rothaermel, F. T. 2001. Incumbent's advantage through exploiting complementary assets via interfirm cooperation. *Strategic Management Journal*, 22: 687-699.
- Rothaermel, F. T., & Deeds, D. L. 2004. Exploration and exploitation alliances in biotechnology: A system of new product development. *Strategic Management Journal*, 25: 201-221.
- Sakakibara, M. 1997. Heterogeneity of firm capabilities and cooperative research and development: An empirical examination of motives. *Strategic Management Journal*, 18: 143-164.
- Shan, W., Gordon, W., & Kogut, B. 1994. Interfirm cooperation and startup innovation in the biotechnology industry. *Strategic Management Journal*, 15: 387-394.

- Stettner, U., & Lavie, D. in press. Ambidexterity under scrutiny: Exploration and exploitation via internal organization, alliances, and acquisitions. *Strategic Management Journal*. doi: 10.1002/smj.2195.
- Stuart, T. E. 1998. Network positions and propensities to collaborate: An investigation of strategic alliance formation in a high-technology industry. *Administrative Science Quarterly*, 43: 668-698.
- 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*, 21: 791-811.
- Vasudeva, G., Spencer, J. W., & Teege, H. J. 2013. Bringing the institutional context back in: A cross-national comparison of alliance partner selection and knowledge acquisition. *Organization Science*, 24: 319-338.
- Wassmer, U. 2010. Alliance portfolios: A review and research agenda. *Journal of Management*, 36: 141-171.
- Zhang, J., Baden-Fuller, C., & Mangematin, V. 2007. Technological knowledge base, R&D organization structure and alliance formation: Evidence from the biopharmaceutical industry. *Research Policy*, 36: 515-528.