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## Formal controls and alliance performance: The effects of alliance motivation and informal controls

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### ABSTRACT

In this research, we study the use of formal control types (outcome, behavior) across different alliance motivations (exploitation, exploration, ambidextrous) and the effects on alliance performance. This study further examines whether this relationship is moderated by the use of informal controls. Survey data from 236 organizations pursuing strategic alliances indicate that when firms opt for one primary strategic alliance motivation, firms' emphasis on either outcome controls (in exploitation alliances) or behavior controls (in exploration alliances) increases alliance performance. Results also support a complementary relationship between outcome and behavior controls in explaining alliance performance in ambidextrous alliances. Furthermore, our findings reveal that while informal controls enhance the effectiveness of behavior controls in exploration alliances, the benefits of informal controls disappear in the context of outcome controls and exploitation alliances. In ambidextrous alliances, firms need to carefully proportion the informal control level because beyond a moderate level, informal controls seem to negatively affect a control configuration using outcome and behavior controls. Our analysis provides a more nuanced view on how organizations may successfully control alliances with different motivations.

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### 1. Introduction

As technology advances and competition intensifies, firms form alliances to share and exchange resources. Such alliances permit firms to *exploit* their existing knowledge and/or *explore* new opportunities (e.g., Koza and Lewin, 1998; Kristal et al., 2010; Levinthal and March, 1993; March, 1991). While recent research has examined whether firms are better off pursuing a single strategy (exploitation or exploration) or simultaneously pursuing two strategies (exploitation and exploration), commonly known as *ambidextrous alliances* (Lavie et al., 2011), much more remains to be understood about how firms effectively control alliances with different motivations. This study examines the use of controls across different alliance motivations and the effects on alliance performance.

In particular, little consensus exists on the effectiveness of *formal controls* to shape alliances. For example, innovation literature

features a predominantly pessimistic attitude toward formal controls. Extensive research emphasizes the adverse effects of formal controls on creativity in exploration alliances and highlights the importance of intrinsic motivation and freedom (e.g., Amabile, 1998; Carson, 2007; Lee and Cavusgil, 2006). A parallel literature in management has simultaneously argued that formal controls have a role in new technology alliances, for example, by preventing potential opportunism, facilitating joint problem solving, and implementing radical innovative (i.e., exploration) ideas (e.g., Argyres et al., 2007; Mayer and Argyres, 2004). A third stream of literature finds that formal controls may be useful to develop both exploration and exploitation objectives (e.g., Jansen et al., 2006). Thus, although formal controls are ubiquitous in alliances, research on their actual effects has shown an inconsistent pattern.

We aim to address this gap in two ways. First, we deviate from previous studies and differentiate types of formal controls. That is, while alliance research has typically approached formal controls in terms of the *degree* to which firms rely on hierarchical elements (e.g., detailed contracts, the use of equity as a "hostage", and joint venture structures), we focus on the concrete formal mechanisms a firm can use to control its partner. We also describe in more detail *how* the required behavior will become motivated. Therefore, following organizational control theory (e.g.,

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Cardinal et al., 2004; Das and Teng, 1998; Eisenhardt, 1985; Kirsch, 1996; Kirsch, 2004; Ouchi, 1979) and previous empirical accounting research (e.g., Dekker, 2004; Dekker and Van den Abbeele, 2010; Emsley and Kidon, 2007; Langfield-Smith, 2008; Mahama, 2006), we distinguish between outcome and behavior controls. Historically, organizational control research has generally advocated one or the other type of formal control (e.g., Eisenhardt, 1985; Govindarajan and Fisher, 1990; Ouchi, 1979), but more recent work has suggested the complementary use of the different types (e.g., Cardinal et al., 2004; Choudhury and Sabherwal, 2003; Dekker and Van den Abbeele, 2010; Langfield-Smith, 2008). We investigate both the individual and interactive effects of outcome and behavior controls on alliance performance across different alliance motivations. Our rationale is that (mis)alignment between the alliance motivation and the mechanisms of formal control is associated with subsequent increased (decreased) alliance performance. We adopt a multifaceted approach to alliance performance (i.e., financial, operational, satisfaction) that describes a global perception of it based on one firm's experiences (i.e., the firm exercising control) (see, also, Krishnan et al., 2006).

Second, we note the potentially critical relationship between formal and informal controls. Some studies suggest that informal controls may help shape formal control performance effects (e.g., Cardinal, 2001; Dekker and Van den Abbeele, 2010; Fryxell et al., 2002; Gulati and Nickerson, 2008; Heide et al., 2007; Poppo and Zenger, 2002). Informal controls are based on *social or people* strategies (Das and Teng, 2001; Eisenhardt, 1985). Unlike formal control situations, explicit incentives are not needed to align partners' goals. Firms become more committed to the alliance through socialization and consensus-making. Informal controls may positively moderate the relationship between formal controls and alliance outcomes because they may buffer the adaptive limits of formal controls. One such limit is that formal controls may have a restricted capacity to control alliance partner activities because foreseeing all possible contingencies is difficult (Poppo and Zenger, 2002). Another potential limit is that formal controls may offend a partner's sense of autonomy (Christ et al., 2008; Deci and Ryan, 1987; Heide et al., 2007; Stouthuysen et al., 2012). However, informal controls also carry potential costs and disadvantages, and complementary effects of formal and informal controls cannot be assumed (e.g., Das and Teng, 1998; Hoetker and Mellewigt, 2009). So far, little empirical evidence indicates exactly how informal controls moderate the effectiveness of formal controls matched with different alliance motivations.

Our findings from moderated hierarchical regression analyses on survey data from 236 organizations pursuing strategic alliances show that when the alliance specializes in either exploitation or exploration, firms' use of outcome controls (in exploitation alliances) or behavior controls (in exploration alliances) increases alliance performance. However, in ambidextrous alliances, outcome and behavior controls are shown to have complementary effects on performance. Further, our results reveal nuances in the effectiveness of informal controls dependent on the alliance motivation and the formal controls with which they are paired. In particular, while informal controls increase the effectiveness of behavior controls in exploration alliances, the benefits of informal controls disappear when alliances are characterized by outcome controls and exploitation. In ambidextrous alliances, our findings suggest that firms should carefully consider the level of informal controls to get the intended effect on alliance performance when a firm already relies on outcome and behavior controls.

Overall, our findings elucidate how organizations may successfully pursue alliances through the effective use of controls. Following Anderson and Dekker (2014) and Vélez et al. (2008), we argue that a more nuanced approach encompassing the different types of formal control and alliance motivations may provide a

more complete assessment of the effectiveness of formal controls and their interrelationship with informal controls.

## 2. Literature review and hypotheses

### 2.1. Strategic alliance motivations

March (1991) distinguishes between exploration and exploitation as motives for organizational adaptation. Exploitation refers to the intensification of existing capabilities and improvements in efficiencies. Exploration refers to experimenting with or establishing new assets and capabilities.

Building on March (1991), Koza and Lewin (1998) advance a coevolution theory that highlights two basic motivations for entering strategic alliances and explains three types of alliances. The first type links firms with strong exploitation motivations, but little to no exploration intent. The overriding objective of an exploitation alliance is to secure new incremental revenues by combining specific assets unique to each partner (Koza and Lewin, 2000). Value is added, for example, by leveraging economies of scale or technology access to cut costs and deliver enhanced, well-managed service levels (Lavie and Rosenkopf, 2006).

In the second alliance type, firms share strong exploration motivations, with limited or no exploitation intent. Firms typically engage in exploration alliances to offer new designs, create new markets, and develop new distribution channels (Kristal et al., 2010). Lavie and Rosenkopf (2006) suggest that exploration alliances enhance an organization's adaptation to environmental changes by allowing it to attain knowledge outside its domain. In exploration alliances, partnering firms share risks and gains as they collaborate on transforming key business processes into competitive tools (Youngdahl et al., 2008).

The third alliance type, ambidextrous alliances, links firms with strategic motivations that include strong exploration and exploitation intents. The firms seek to simultaneously capture value from leveraging existing capabilities, assets, and so forth and create new value through joint learning activities (e.g., see Lavie et al., 2011; Yang et al., 2014). We ultimately regard exploration and exploitation as two distinct dimensions of alliance motivation, rather than two ends of a unidimensional scale.<sup>1</sup>

### 2.2. Formal controls and alliance performance

We rely on organizational control research and empirical accounting research to differentiate two types of formal control—outcome and behavior controls (e.g., Cardinal, 2001; Cardinal et al., 2004; Choudhury and Sabherwal, 2003; Das and Teng, 2001; Dekker, 2004; Dekker and Van den Abbeele, 2010; Eisenhardt, 1985; Emsley and Kidon, 2007; Kirsch et al., 2002; Langfield-Smith, 2008; Mahama, 2006; Ouchi, 1979). These controls are often equated with the conceptions of market and hierarchy types of formal governance (e.g., Dekker, 2004; Ouchi, 1979). A firm that relies on outcome controls defines outcomes to be realized but then allows alliance partners to decide how to achieve them, such that its "Performance evaluation then focuses upon the

<sup>1</sup> In unidimensional models, alliance motivation has been conceptualized as a continuum bounded by the diametric poles of exploitation and exploration. In contrast, the bidimensional view posits that there is potential value in viewing exploitation and exploration as separate but related constructs in which the lack of exploitation does not necessarily signify exploration. Bidimensional models of alliance motivation are founded on exploration and exploitation motivations containing fundamentally different logics that require very different strategies and structures (Tushman and O'Reilly, 1996) as well as research on conditions of ambidexterity (e.g., He and Wong, 2004; Jansen et al., 2006; Kristal et al., 2010; Park et al., 2002; Rothaermel, 2001; Rothaermel and Deeds, 2004).

extent to which targets were met and not on the processes used to achieve the targets" (Kirsch et al., 2002, p. 486). Outcome controls feature mechanisms to specify outcome targets (e.g., sales volume, functional specifications, products delivery times, cost-reduction targets), as well as tools to monitor a partner's performance in relation to the specified output targets (e.g., product testing by the controlling firm) and reward goal attainment (Dekker, 2004; Choudhury and Sabherwal, 2003). In contrast, a firms that uses behavior controls seeks to influence the actual production process and means to achieve the relationships goals. That is to say, with behavior controls, or control over activities that transform inputs into outputs, firms explicitly evaluate or modify the processes, procedures, and methodologies to follow and monitor their partner's compliance (Cardinal et al., 2004; Dekker, 2004; Merchant and Van der Stede, 2007). In the context of strategic alliances, such controls may be enacted through not only (ex-ante) reviews where the controlling firm can (dis)approve or co-modify the procedures and methodologies a partner suggests to follow (Merchant and Van der Stede, 2007), but also monitoring of a partner's behavior (e.g., through direct observation, regular process reports, quality control, lawsuit provisions) and provision of feedback on the activities that were expected to produce the focal outcomes (Cardinal et al., 2004; Dekker, 2004).

While both types of controls include mechanisms for motivating partners toward attaining alliance objectives, they operate differentially. Given these differences in modus operandi, organizational control research has generally advocated one or the other type of formal control (e.g., Eisenhardt, 1985; Govindarajan and Fisher, 1990; Ouchi, 1979). Contrary to classic control theory, however, a few studies have found that firms often use behavior and outcome controls in combination to control their alliances (e.g., Cardinal et al., 2004; Choudhury and Sabherwal, 2003; Dekker and Van den Abbeele, 2010; Langfield-Smith, 2008). There is little research, however, on how exactly formal control types interact in explaining alliance performance. The current study describes the specific alliance motivations influencing a firm's use of controls and how different choices affect alliance performance. The benefits of individual or complementary use of formal controls will thus depend on the alliance motivation. As such, we argue that firms' use of formal control types is contingent on the alliance motivation, thereby enhancing (reducing) alliance performance in case of (mis)alignment.

### 2.3. Formal controls for exploitation alliances

In exploitation alliances, firms' use of outcome controls benefits alliance performance for several reasons. First, exploitation alliances compared to exploration alliances feature less outcome uncertainty because they refine and extend existing competencies, technologies, and paradigms, with returns that "are positive, proximate, and predictable" (March, 1991, p. 85). Consequently, exploitation alliances may encourage the use of outcome controls since desired outcomes can be clearly articulated and accurately measured (Langfield-Smith, 2008). Moreover, uncertainty declines when the outcomes are distinct, which helps partners focus on goals and ultimately enhances the alliance performance (Joshi, 2009).

In contrast, firms' reliance on behavior controls may be less effective than firms' reliance on outcome controls because controlling firms must thoroughly understand the actions–ends relationships of the monitored processes (Ouchi, 1979; Widener, 2007), which may entail substantial costs (Eisenhardt, 1985). Outcome controls in exploitation alliances are then a more efficient form of control because they do not require such an understanding, which spares time and other resources (Govindarajan and Fisher, 1990).

Furthermore, because exploitation alliances allow the development of clear and quantifiable outcome targets, focusing on outcome controls not only provides legitimacy for the control mechanism, but also permits the partner latitude with respect to their behavior (Heide et al., 2007). That is, while outcome controls incentivize and hold the alliance partner accountable for their performance, the partner can choose their own methods. In contrast, behavior controls are a more direct form of control because they provide both direction and guidance to the partner throughout the entire process (Kreutzer et al., 2014). A need for direction and guidance arises when, in the pursuit of value creation, firms engage in exploration alliances involving interdependent tasks and mutual adaptation (Dekker, 2004; Koza and Lewin, 1998). Behavior controls in exploitation alliances are then less efficient than outcome controls, as they are costly and produce no value for lack of a need for coordination and adaptation in exploitation alliances and, hence, cannot contribute to performance. In line with these arguments, we propose

**H1.** In exploitation alliances, firms' reliance on outcome controls will contribute more positively to alliance performance than firms' reliance on behavior controls.

### 2.4. Formal controls for exploration alliances

Because exploration alliances are motivated by learning unknown technologies or attaining new geographic markets or product domains, outcome controls may be less viable than behavior controls. The strategic ambiguity that characterizes exploration alliances hinders setting reliable and valid outcome targets, and alliance members who perceive a lack of control over their situations may feel confused and experience a negative work attitude (Joshi, 2009). In addition, the market-based nature of outcome controls and the resulting lack of clear direction and feedback for improvement (Kreutzer et al., 2014) may cause alliance partners to become overly focused on activities with immediate payoffs to the detriment of long-term objectives (Anderson and Oliver, 1987).

Given that the outcome targets of exploration alliances are generally ambiguous, monitoring progress and performance outcomes is complicated (Koza and Lewin, 2000). Compared with outcome controls, behavior controls may provide a more flexible means of assessment because they focus on an alliance partner's actions rather than performance outcomes (Kirsch, 1996). Moreover, because exploration alliances generally mandate ongoing involvement by both partners (Rothaermel and Deeds, 2004) and coordination across organizational boundaries, behavior controls may be useful because they can foster dialog and enable timely, corrective interventions into monitored processes (Dekker, 2004). Hereby behavior controls not only refer to the process by which firms can articulate or modify the procedures and methodologies their alliance partner needs to follow, but also the evaluation of the partner's actual behavior (Kirsch, 1996). The latter requires various information-gathering mechanisms, such as direct observation (e.g., visiting vendor premises) or weekly progress reports, that strengthen coordination. In so doing, these *interactive* processes enable alliance partners to signal organizational priorities and even generate new exploration strategies (Ahrens and Chapman, 2004; Bisbe and Otley, 2004; Simons, 1995). Not surprisingly then, given their "hands-off" (i.e., market-based) approach, we expect firms' reliance on outcome controls to be less effective compared to behavior controls in an exploration alliance context. This argument aligns with the idea that hierarchical types of control, such as behavior controls, are more effective for managing information-processing requirements than market-based type of controls (Galbraith, 1977; Thompson, 1967). Narayanan et al. (2011), for example, provide empirical evidence that in

interfirm relationships, when task complexity (leading to task uncertainty) is high, emphasizing coordination between a firm and its partner (form of external process integration) positively affects performance. Consequently, in an exploration alliance, in which tasks are more complex and production processes more interdependent, behavior controls allow firms to better coordinate tasks and actions across organizational boundaries. In contrast, outcome controls focus more on actual consequences, thereby leaving an alliance partner to choose in isolation how to reach the objectives, potentially leading to confusion and demotivation.

Lastly, [Noordhoff et al. \(2011\)](#) note that exploration alliances, more than exploitation alliances, involve the exchange of complex, sensitive, tacit knowledge, which increases the risk of opportunistic behavior. In this context, a firm that suspects an alliance partner of internalizing its information and perhaps using it opportunistically may withhold sensitive information, provoking the other partner to do the same. To address this risk, behavior controls, such as explicit information exchange and usage clauses, may regulate the alliance partners' conduct more effectively than outcome controls ([Argyres and Mayer, 2007](#); [Das and Teng, 2001](#)). Accordingly, we predict

**H2.** In exploration alliances, firms' reliance on behavior controls will contribute more positively to alliance performance than firms' reliance on outcome controls.

## 2.5. Formal controls for ambidextrous alliances

Recent accounting research on managing strategic contradictions posits that firms will be more successful when opposing tensions are approached from a both/and rather than from an either/or perspective (e.g., [Bedford, 2015](#); [Henri, 2006](#); [Mundy, 2010](#); [Widener, 2007](#)). Thus, in our context, managing and controlling alliances with competing motivations of exploitation and exploration requires a combination of controls for steering a partner's actions congruent with the alliance's goals while also giving the partner sufficient autonomy to make decisions. We argue that the simultaneous use of behavior and outcome controls may generate a dynamic tension that encourages alliance partners to concurrently address demands for both exploration objectives and predictable exploitation objectives. In particular, while the combined use of outcome and behavior controls helps to create this necessary tension, a preference for one formal control type over the other may disrupt this capability and ultimately hinder the performance of ambidextrous alliances. For example, sole reliance on outcome controls can result in inadequate coordination, an overfocus on short-term targets, and weak protection of sensitive knowledge-sharing, while a lack of outcome controls may result in poor focus and reduce alliance partners' initiative-related efforts. Meanwhile, sole reliance on behavior controls can be destabilizing by generating continual dialog and change, preventing activities from being completed. It can also be demotivating ([Heide et al., 2007](#)). Failure to stress behavior controls next to outcome controls, however, can conceal the need for change because a constructive dialog that challenges existing assumptions is lacking ([Kreutzer et al., 2014](#)). It can also result in a lack of contractual definition of legitimate behavior for achieving outcome targets in a novel context ([Das and Teng, 2001](#)).

Altogether, these arguments suggest that a firm's simultaneous use of outcome and behavior controls in an ambidextrous alliance will benefit alliance performance more than a firm's use of individual formal control types.

**H3.** In ambidextrous alliances, firms' simultaneous reliance on outcome controls and behavior controls will contribute more posi-

tively to alliance performance than firms' individual use of outcome controls or behavior controls.

## 2.6. The moderating impact of informal controls on the effectiveness of formal controls

We argue that the match between alliance motivations and appropriate formal controls may affect performance. Interestingly, however, previous research suggests that *informal controls* may also influence formal control performance effects (e.g., [Cardinal, 2001](#); [Dekker and Van den Abbeele, 2010](#); [Fryxell et al., 2002](#); [Gulati and Nickerson, 2008](#); [Heide et al., 2007](#); [Popo and Zenger, 2002](#)). As in earlier studies, informal controls are generally understood to include people- or social-based mechanisms that enhance open communication and the sharing of information, trust, dependence, and cooperation ([Das and Teng, 2001](#); [Eisenhardt, 1985](#)). Through a socialization and consensus-making process, partners become more committed to the alliance, and shared views serve to strongly influence the behavior of the partners ([Lee and Cavusgil, 2006](#)). In some cases, such shared understanding is the end result of a comprehensive partner selection process ([Dekker and Van den Abbeele, 2010](#)). In other cases, it requires ongoing socialization ([Kirsch, 1996](#)), including regular meetings ([Choudhury and Sabherwal, 2003](#); [Fryxell et al., 2002](#)), workshops, and interfirm visits ([Cousins et al., 2006](#)).

It's clear from our informal control conceptualization that informal controls can also be *formally* organized as opposed to being ad hoc ([Hoetker and Mellewigt, 2009](#)). In that way, the same control mechanism can support more than one control mode. For example, conference calls at specified intervals may allow the controlling firm to assess tasks that the alliance partner has been performing (behavior control), but shared values and beliefs may also result over time from the interpersonal interaction that takes place in these conference calls (informal control) ([Kirsch, 1997](#)). We differentiate informal controls from formal controls, though, based on two, critical interrelated distinctions. First, the operation of formal controls is largely independent of specific people involved, while informal controls, by contrast, are tightly bound to the specific individuals and their relationships (cf. 'people' or 'relational control') ([Eisenhardt, 1985](#); [Hoetker and Mellewigt, 2009](#)). Second, formal controls can specify outcomes, for example, 'set a target date of 2020 for lifting products to 500,000', or involve specific actions, for example, 'checklists remind system developers of the actions they need to take.' On the other hand, the outcome of an informal control mechanism relies on the interaction of individuals from the alliance partners involved and, thus, cannot be pre-specified ([Das and Teng, 1998](#)). Similarly, the specific behavior of individuals as they interact cannot be stipulated in advance. For example, a firm cannot specify in advance what will occur during a face-to-face meeting of managers of both alliance partners ([Hoetker and Mellewigt, 2009](#)).

Despite the importance of formal controls for the control of alliances, prior studies which examined the effects of informal controls on formal controls frequently pointed to the inherent limitations of formal controls and generation of *residual* negative performance effects (e.g., [Anderson et al., 2017](#); [Carey et al., 2011](#); [Fryxell et al., 2002](#); [Liu et al., 2009](#); [Popo and Zenger, 2002](#)). Complementary use of informal controls may reduce these effects, thereby further strengthening alliance performance. [Popo and Zenger \(2002\)](#), for example, argue that because formal controls are inevitably incomplete, informal controls may promote confidence among alliance partners that unexpected contingencies can be resolved without opportunistic advantage being taken. [Fryxell et al. \(2002\)](#) suggest that informal controls may also foster trust between alliance

partners, which can support the development of more effective formal control (Vosselman and van der Meer-Kooistra, 2009).<sup>2</sup>

Some studies have taken a more nuanced view on the interrelationship between informal and formal controls. Heide et al. (2007) and Stouthuysen et al. (2012), for example, find that the supplementary effect of informal controls on formal controls is more positive with behavior controls than outcome controls. Other studies have suggested that informal controls may be counterproductive because of high costs and oversocialization (e.g., Bijlsma-Frankema and Costa, 2005; Das and Teng, 1998; Krishnan et al., 2006; McEvily et al., 2003; Hoetker and Mellewigt, 2009). Das and Teng (1998), for example, argue that informal controls consume time and resources because they depend on repeated interactions between managers of the different alliance members. Furthermore, with high levels of informal control and consequently substantial trust, alliance partners are more likely to accept information from the other partner at face value (Krishnan et al., 2006). Informal controls may even increase the danger of opportunism (Bijlsma-Frankema and Costa, 2005). Uzzi (1997) noted that close social ties in economic exchanges may restrict partners from new information and opportunities and consequently reduce alliance performance. Moreover, because informal controls may "take on some aspects of internal supply that diminish incentives, such as second chances being given more frequently, an expectation of due process before termination, and greater willingness to negotiate unexpected cost increases" (Hoetker and Mellewigt, 2009, p. 1029), they may even offset the effectiveness of formal controls (McEvily et al., 2003; Hoetker and Mellewigt, 2009).

We suggest that the positive and negative effects of informal controls on formal control effectiveness could be better understood by (1) distinguishing between the motivation of the alliance, (2) distinguishing between the types of formal control, and (3) evaluating these relationships in the context of alliance performance.

### 2.6.1. The effect of informal controls on outcome controls in exploitation alliances

Hypothesis 1 anticipates that in exploitation alliances, firms' reliance on outcome controls will increase alliance performance more positively than firms' reliance on behavior controls. We expect, however, that informal controls will weaken this performance effect of outcome controls in exploitation alliances for several reasons.

First, recall from the logic behind Hypothesis 1 that the effectiveness of outcome controls depends on reliable and valid outcome measures. Because exploitation alliances involve less outcome uncertainty, firms may clearly specify and monitor outcome targets, and the risk of misevaluating partner performance is low. Outcome controls will then motivate alliance partners by signaling that improved performance garners increased payments and preferred status for future business (Joshi, 2009). Informal controls may then be less necessary because the level of commitment and engagement is already high, and the relative costs of infor-

mal controls may outweigh their relative benefits. Second, when outcomes are measurable, firms rely on outcome controls regardless of their knowledge of the alliance process activities (e.g., Kirsch, 1996; Ouchi, 1979). Ongoing behavioral surveillance is not required, which makes outcome controls a very efficient type of control (Anderson and Oliver, 1987; Kreutzer et al., 2014). Informal controls may harm outcome controls' effectiveness because the additional time and resources are unnecessary costs. Third, Hoetker and Mellewigt (2009) and Malhotra and Lumineau (2011) suggest that less uncertain alliance environments, such as with exploitation alliances, may facilitate the negotiation of mutually acceptable controls such as performance measures. Such measures should limit partner disputes and promote a willingness to resolve any disputes that do emerge. Not surprisingly then, investing in additional informal controls is less worthwhile.

Overall, we expect that informal controls in exploitation alliances may weaken the positive effect of outcome controls on alliance performance. A stronger prediction would be that informal controls change the direction of the overall positive performance effect of outcome controls in exploitation alliances. However, we do not believe theory supports such a strong prediction.

**H4.** Informal controls negatively moderate the relationship between outcome controls and alliance performance in exploitation alliances.

### 2.6.2. The effect of informal controls on behavior controls in exploration alliances

The main premise of Hypothesis 2 is that firms' greater reliance on behavior controls in exploration alliances more positively affects alliance performance compared with their reliance on outcome controls. We expect that informal controls further strengthen this positive performance effect.

First, the effectiveness of behavior controls varies directly with a firm's understanding of the alliance processes and member activities (Kirsch, 1996; Kirsch et al., 2002). Complementing behavior controls with informal controls may then improve firms' understanding by establishing a climate that encourages trust and information sharing. Second, the dynamic nature of exploration alliances greatly complicates the design and monitoring of progress and, hence, increases the contracting and monitoring costs related to an exclusive reliance on behavior controls (Cardinal et al., 2004). Informal controls may mitigate these costs by allowing the alliance partners to assume that agreements will hold and contingencies will be addressed in good faith (Poppo and Zenger, 2002). Moreover, when unanticipated changes do occur, formal renegotiation will not be necessary, increasing the strategic flexibility of the relationship (Hoetker and Mellewigt, 2009). Third, in the event of an alliance-ending dispute, the literature on incomplete contracting emphasizes that alliance activities, even if *observable* through behavior controls, may not be *verifiable* in a court of law (Lumineau and Oxley, 2012). The focus on advancing (intangible) learning and developing new advanced knowledge in exploration alliances, in particular, will hinder any external arbitrator (e.g., courts) from ascertaining whether each partner is performing as agreed (Hoetker and Mellewigt, 2009). Moreover, high reliance on behavior controls in such a context may even escalate the alliance dispute and its cost. Because behavior controls typically contain explicit provisions, e.g., the specification of partners' roles, or the allocation of asset decision rights, or the definition of sanctions that can be imposed on the offending party, they may create incentives for each side to defend its own behavior and question the other's actions (Lumineau and Malhotra, 2011). This, again, highlights the need for complementing behavior controls with high levels of informal control because the latter may "reduce information asymmetries between the parties, decrease uncertainty over

<sup>2</sup> Our conceptualization of informal controls does not equal trust. In particular, firms can decide to implement informal controls by promulgating common values, beliefs, and philosophy. The outcome of this socialization process may then lead to increased levels of trust (e.g., Dekker, 2004). Dekker (2004), for example, elaborates how trust and informal controls are interconnected, yet distinct: "Although relational trust is an emergent characteristic and cannot simply be implemented, over time it can be built. Mechanisms to build trust are deliberate risk taking and increasing interaction, for instance by joint goal setting, problem solving, decision making and partner development activities" (Dekker, 2004: 33). In summary, we study the moderating impact of informal controls, which are people- or social-based mechanisms managers can deploy, as opposed to trust, which is a set of beliefs that cannot be deployed by managers.

litigation outcomes, and facilitate negotiation and private dispute resolution" (Lumineau and Oxley, 2012, p. 824).

Lastly, because behavior controls dictate how to perform or coordinate activities, they could stifle creativity and innovation (Anderson and Oliver, 1987; Carson, 2007). Moreover, because scrutiny is inherent in behavior controls, trust is often also compromised. In an experimental analysis of managing strategic alliances, Christ et al. (2008), for example, found behavior controls compromised both trust in the organization and cooperation by the alliance partner. Informal controls may then improve the overall effectiveness of behavior controls in exploration alliances because partners may perceive the behavior controls as being more fair and reasonable (Heide et al., 2007). Informal controls may be implemented by promulgating common values, beliefs, and philosophy. This socialization process may in turn enhance trust (Das and Teng, 1998; Fryxell et al., 2002), which may reduce the residual negative reaction (i.e., psychological cost) of alliance partners feeling restricted by the controlling firm's use of behavior controls. In summary, the costs of informal controls may be merited in governing exploration alliances because they empower behavior controls. Accordingly,

**H5.** Informal controls positively moderate the relationship between behavior controls and alliance performance in exploration alliances.

#### 2.6.3. The effect of informal controls on formal controls in ambidextrous alliances

Hypothesis 3 reflects that a control configuration characterized by outcome and behavior controls encourages alliance partners to expand exploration search while recognizing the risks to avoid in order to prevent disruption to exploitation routines, leading to increased alliance performance in ambidextrous alliances. We expect that a firm's complementary reliance on informal controls may increase the effectiveness of a formal control configuration by creating opportunities for further socialization and increasing trust and thus the chances to combine existing knowledge (underlying exploitation) and develop new knowledge (underlying exploration). As argued earlier, informal controls may also assist in establishing legitimacy for relying on formal controls, especially behavior controls, and enable flexibility in the case of unexpected contingencies.

However, a firm's supplementary reliance on informal controls may limit access to divergent perspectives and alternative methods, consequently reducing the effectiveness of a control configuration characterized by the use of outcome and behavior controls in ambidextrous alliances. In particular, because high levels of informal control may diffuse strong norms and establish shared behavioral expectations, they reduce deviant behavior, limit search scope, and increase selective perception of alternatives (Krishnan et al., 2006; Uzzi, 1997). Complementary reliance on informal controls will therefore eventually constrain the tension provoked by a firm's simultaneous use of outcome and behavior controls to continually assess when to breach existing boundaries to adapt to (exploitation) or take advantage of shifting environmental conditions (exploration).

We make no hypothesis about whether informal controls positively or negatively impact firms' increased reliance on both outcome and behavior controls in explaining alliance performance in ambidextrous alliances; however, we model the relations among the various control types to permit either relation. We propose a model (Fig. 1) that relates specific alliance motivations with appropriate formal controls, leading to increased alliance performance. Our model further investigates the moderating relationship arising from the use of informal and formal controls matched with an alliance's motivation.

### 3. Method

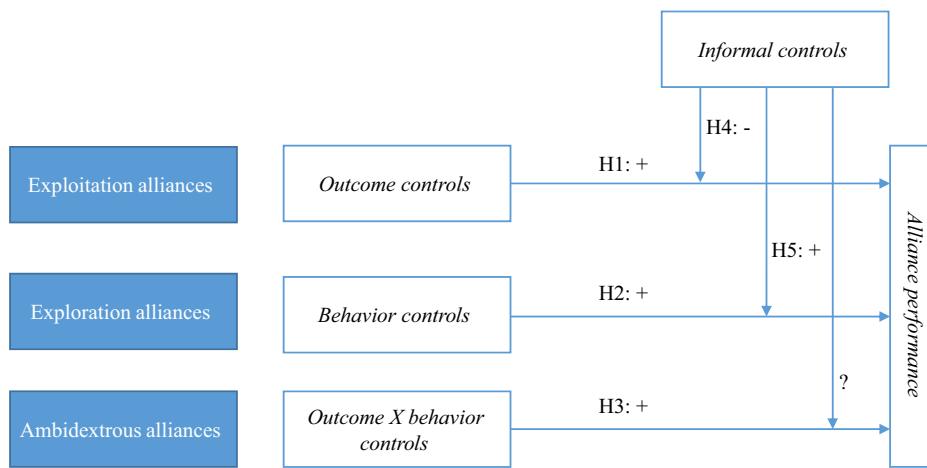
#### 3.1. Sample and data collection

To test our hypotheses, we used a survey and collected data on controls, alliance motivation, and alliance performance. The alumni database of a large, western European business school provided the primary data. The database contains information on the study programs of the alumni and their current job positions. We first selected executives in functions such as vice-presidents of alliances, vice-president of strategy, alliance directors or, in absence of these functions, managers in charge of alliance management or external relations managers (Heimeriks et al., 2015). In total, we identified 946 executives who deemed to be appropriate for this study. We used a three-part survey to offset potential problems associated with single-respondent bias and common-method bias. According to Doty and Glick (1998) and following Jansen et al. (2006) and Levin and Cross (2004) temporal separation of the measurement of independent and dependent variables reduces common method bias.

The first part of the survey assessed alliance motivation (exploitation, exploration) and was sent to 946 alliance managers and vice-presidents responsible for managing and overseeing firms' alliances. We allowed respondents to identify their most important alliance (Kale et al., 2002; Hoetker and Mellewigt, 2009) and asked them to describe the underlying motivation. Following Hoetker and Mellewigt (2009, p. 1032), we defined an alliance as "a voluntary arrangement between firms in order to gain a competitive advantage, involving exchanging, sharing, or co-development of products, technologies or services." Mergers and acquisitions were excluded. In total, 372 alliance responsibles returned their questionnaire (39.3 percent response rate).

Within two weeks after completing the first part, these 372 alliance responsibles received the second part of the survey. To ensure that respondents answered questions with respect to the same alliance, we reiterated the name of the alliance partner and the task description. We assessed the alliance's reliance on outcome controls, behavior controls, and informal controls. We received 339 questionnaires (35.8 percent response rate).

Finally, two to three weeks after receipt of the second survey, a third survey was mailed to the same 339 alliance responsibles to assess their main alliance's performance and their general appraisal of the survey. To maximize response rates, we followed Yu and Cooper (1983) and combined a mail survey with a telephone option (chosen by seven respondents). We received 267 surveys, representing a 28.2 percent final response rate, which was comparable to recent surveys with top executives on alliances (Dekker et al., 2013; Heimeriks et al., 2015; Kale et al., 2002). After deleting 31 cases mainly because of missing values, we had a usable sample of 236 matched questionnaires. We took precautionary measures to minimize common methods bias, although recent research shows that such bias is less of a concern for studies (like ours) with interaction effects (Siemsen et al., 2010). In addition, Schaller et al. (2014) provide strong confirmatory evidence that the effects of common methods variance do not alter the substantive inferences of study results. We also performed a Harman's (1967) single factor test. In this test, common method variance exists in the data if an unrotated exploratory factor analysis on all the measurement items used in the model shows that one factor accounts for the majority of the variance. Our factor analysis (principal components analysis) revealed six factor with eigenvalues greater than one. The first factor of the unrotated solution only accounted for 28 percent of the variance. Also a confirmatory factor analysis model in which each item was constrained to load only on a single factor yielded poor model



**Fig. 1.** Conceptual model of the relation between alliance motivations, formal controls, the moderating impact of informal controls, and alliance performance.

fit ( $\chi^2/df > 10$ , NNFI = .55, CFI = .59, RMSEA = .25).<sup>3</sup> These results suggest that common method bias did not seriously affect our results.

Of the respondents, 63 percent were active in information and communication technology (ICT) and service sectors. Of the reported alliances, 71 percent were with a specialist service provider, including ICT services (22%), transport and storage (19%), facility services (e.g., catering, cleaning; 18%), business development (7%); financial administration (4%); R&D research (4%); corporate bank services (4%); and legal services (3%). This divergence toward alliances with a service partner accords with recent alliance work (e.g., Lavie et al., 2011) and can be explained by modern technological innovations, trends in globalization, and competitive advances (Tiwana and Keil, 2007). Alliances lasted 4.47 years on average. Finally, our sample includes 35 percent equity alliances (e.g., joint ventures) and 65 percent nonequity alliances (e.g., licensing agreements, buyer-supplier relationships).

We tested for nonresponse bias by comparing respondents with nonrespondents from the final sample in terms of gender, organizational function, and firm size and found no significant differences. We also compared our final sample of alliance responsibles ( $n = 236$ ) with the initial sampling frame ( $n = 946$ ) with respect to firm size. We found no significant differences. Finally, we compared our final sample (participation in all three surveys) with the alliance responsibles that participated only in the first or second wave of data collection to our focal variables. For each wave, we also compared early with late responders. These  $t$ -tests were not significant at a 95% confidence level.

### 3.2. Constructs and measurement

We prepared the questionnaire using well-established scales. In a pilot test, a random selection of 11 managers with various tenures at different firms, not included in the main sample, reviewed the survey for content, clarity, and validity. We modified some scale items based on their feedback. The full version of the scales appears in Appendix A; all scales used seven-point Likert-type items with

anchors at 1 ("strongly disagree") and 7 ("strongly agree"), unless stated otherwise. For all scales, we calculated individual scores as the mean scores for the combined scale items.

#### 3.2.1. Dependent variable

**Alliance performance.** Consistent with Krishnan et al. (2006), we asked alliance responsibles to indicate the extent to which they agreed that several goals and objectives were achieved over the past year. The scale ( $\alpha = .96$ ) contained five items on a seven-point Likert-type scale (1 = very unsuccessful; 7 = very successful) and covered multiple facets of alliance performance, namely, overall satisfaction (two items), operational performance (two items), and financial performance (one item).

#### 3.2.2. Independent and moderating variables

**Alliance motivations.** Following He and Wong (2004), Kristal et al. (2010), and Rothaermel and Deeds (2004), we regard exploration and exploitation as two distinct dimensions of alliance motivation. Exploitation was measured with a four-item scale ( $\alpha = .89$ ) adapted from He and Wong (2004), Kristal et al. (2010) and Jansen et al. (2006). These items measured the extent to which alliances build on existing knowledge and meet the needs of existing customers. The four-item measure for exploration motivation ( $\alpha = .82$ ) captured the extent to which alliances depart from existing knowledge and pursue innovations for emerging customers or markets.

**Formal controls.** The scales to measure outcome and behavior controls came from Dekker (2004), Cardinal (2001), Cardinal et al. (2004), and Kirsch et al. (2002). Specifically, the three-item scale for assessing the outcome control construct ( $\alpha = .84$ ) reflected the extent to which the firm specified alliance outcomes and monitored their achievement. The behavior control scale ( $\alpha = .89$ ) also consisted of three items but referred to the extent to which the firm evaluated and modified alliance procedures and development methodologies and monitored partner's compliance with this pre-specified behavior.

For the *informal controls* construct, we used a five-item scale ( $\alpha = .93$ ) based on previous literature (Cousins et al., 2006; Dekker and Van den Abbeele, 2010; Fryxell et al., 2002; Kirsch et al., 2002). The informal control scale assessed the degree to which firms used different socialization mechanisms (e.g., interactive goal setting, regularly organized meetings, joint workshops) to promote shared beliefs, norms, and values among alliance partners or to maximize common goals and values from the start through careful partner selection and socialization.

We tested the measurement model independently of and prior to our assessment of the structural relations (i.e., our hypothe-

<sup>3</sup> The normed  $\chi^2$  ( $\chi^2/df$ ) is an absolute fit index (i.e., no upper boundary). Compared to the  $\chi^2$ , this index is less sensitive to sample size. Normed  $\chi^2$  values less than 2 indicate acceptable model fit. The NNFI (non-normed fit index) is an incremental fit index and compares the fit of the null model with the fit of the estimated model. NNFI values greater than 0.90 indicate well-fitting models. The RMSEA (root-mean-square error of approximation) is an index of model parsimoniousness. RMSEA values smaller than .08 are indicative of a good model fit. See Hair et al. (2006) for a detailed discussion of fit statistics.

ses) (Hancock and Mueller, 2001). To verify the goodness of fit of the measurement model, we subjected all items of the dependent, independent, and moderating constructs to confirmatory factor analyses (CFA). An analysis in which each item was constrained to load only on the factor for which it was the proposed indicator yielded a satisfactory model fit ( $\chi^2/df = 2.41$ , NNFI = .94, CFI = .95, RMSEA = .078), and item loadings were as proposed and significant ( $p < .05$ ). To further assess discriminant validity, we calculated the average variance extracted (AVE) of each construct and compared these values with the shared variance with any other constructs. The AVE values exceeded the recommended .5 threshold and were always greater than the highest variance that each construct shared with any other construct (Fornell and Larcker, 1981), which indicated discriminant validity between the constructs. In summary, all fit indices and validity tests indicate that our measurement model was reliable and valid.

### 3.2.3. Control variables

Because of the significant variance in the samples, the first two variables we controlled for were the respondent firm's and respondent partner's industries, with dummy variables distinguishing industries in the service (1) and nonservice (0) sectors. We also measured firm size as the logarithm of the number of employees. We distinguish equity from non-equity alliances. Thus, equity assumes a value of one for alliances with an equity component (e.g., joint ventures) and zero for purely contractual alliances (Reuer and Ariño, 2002). We also considered the degree of asset specificity on a seven-point Likert scale (ranging from "negligible" to "substantial") that measured (1) "If we decided to stop this alliance, the expenses the company would have in transferring its business to another alliance partner provide would be..." and (2) "If this alliance were to dissolve, our non-recoverable investments in equipment, people, etc. would be..." (Dekker et al., 2013; Hoetker and Mellewigt, 2009). Alliance duration reflected the number of years the respondent firm had been using the alliance partner's services. We provide the descriptive information (scale means and standard deviations) and a correlation matrix of the focal and control variables in Table 1.

## 4. Analysis methods

Before we examined the relation between alliance motivations, formal controls, the moderating impact of informal controls, and alliance performance, we used a two-stage cluster analysis to create subgroups in our sample (Ketchen and Shook, 1996). In the first stage, the individual scores on the exploitation and exploration constructs were subjected to a hierarchical cluster analysis using Ward's method (Hair et al., 2006). The agglomeration coefficients indicated appropriate solutions of two, three, or four clusters. A quick review of the cluster centroids led to a 4-cluster solution, which clearly distinguishes between exploration alliances, exploitation alliances, ambidextrous alliances, and alliances without clear focus. In the second stage, we entered the cluster centroids of the 4-cluster as initial cluster centers of a K-Means cluster analysis. The K-Means cluster algorithm represents a fine-tuning of the hierarchical cluster analysis (Hair et al., 2006).

As presented in Table 2, Panel A, cluster 1 joins alliances with strong exploration motivations ( $n = 75$ ), while cluster 2 represents alliances with strong exploitation motivations ( $n = 56$ ). Alliances in cluster 4 emphasized both exploration and exploitation motivations and thus are ambidextrous alliances ( $n = 56$ ). Finally, cluster 3 represents alliances that are not motivated by either exploration or exploitation ( $n = 49$ ). Because our hypotheses only involve alliances with strong motivations, cluster 3 was not considered further (Bedford, 2015).

**Table 2** Panel B reports the mean scores of each cluster's reliance on formal and informal controls. Regarding the use of formal controls, results show that exploration alliances primarily make use of behavior controls, exploitation alliances of outcome controls, and ambidextrous alliances of both outcome and behavior controls. Although not hypothesized, these findings align with Koza and Lewin's (1998, 2000) theoretical propositions that the greater the exploitation (respectively, explorative) intent of the alliance, the greater the reliance on outcome (respectively, behavior) controls. Even though we did not hypothesize a relation between alliance motivations and reliance on informal controls, Table 2 Panel B shows that each cluster relies relatively highly on informal controls. In particular, ambidextrous and, to a lesser extent, exploration alliances place great emphasis on informal controls.

Because our hypotheses do not require testing simultaneous relationships, moderated hierarchical regression analysis is the best technique for testing our hypotheses (Antonakis et al., 2010). Independent variables were mean centered to facilitate the interpretability of our results (Hayes et al., 2012).<sup>4</sup> In Table 3 we report the parameter estimates, *t*-values, and levels of significance of our models, along with the R-square and adjusted R-square values for the dependent variable, alliance performance. We ran separate models for each cluster. For exploration (cluster 1) and exploitation (cluster 2) alliances, we first entered the control variables and the main effects of outcome, behavior, and informal controls (Model 1). We then entered the interactions between outcome and informal controls, behavior and informal controls, and behavior and outcome controls (Model 2). Adding the interaction between behavior and outcome controls was not strictly necessary to test our hypotheses, but we included this term to make the results comparable with those of the ambidextrous alliances. We used a slightly different approach to test the hypotheses concerning the ambidextrous alliances (cluster 4). That is, similar to exploitation and exploration alliances, we first entered the control variables and the main effects of outcome, behavior, and informal controls (Model 1). To test the effect of firms' reliance on both outcome and behavior controls (Hypothesis 3), we entered the interaction between outcome and behavior controls (Model 2) and included the remaining two- and three-way interactions (Model 3). To determine the merits of adding the interaction terms to the models, we calculated the change in R-square and assessed its significance using an *F*-test. We calculated variance inflation factors (VIFs) to assess the impact of multicollinearity on parameter estimates. The maximum VIF for models without interaction terms was 1.95 and for models including interaction terms, the maximum VIF was 5.09. Yet, because all high VIFs were caused by the inclusion of interaction terms and *p*-values for product terms are not affected by multicollinearity, we concluded that multicollinearity is not a problem (Hayes et al., 2012; Shieh, 2011).

## 5. Results

### 5.1. The influence of formal controls on alliance performance

**Table 3** reports the estimates of the effects of formal controls on alliance performance. Examining the effects for exploitation alliances in Table 3, Panel A, we observe that outcome controls have a positive and highly significant effect on alliance performance ( $b = .60$ ,  $p < .001$ ), whereas behavior controls have a negative

<sup>4</sup> It has often been argued that mean centering reduces multicollinearity. However, mean centering in regression models does not reduce multicollinearity and the problems multicollinearity produces (for a comprehensive discussion of this issue, see Hayes et al., 2012).

**Table 1**

Pearson correlations and descriptive statistics of focal study variables.

Construct	1	2	3	4	5	6	7	8	9	10	11	12
1 Alliance performance	(.96)											
2 Exploitation	0.14 **	(.89)										
3 Exploration	0.24 ***	-0.28 ***	(.82)									
4 Outcome controls (OC)	0.09	0.17 ***	-0.10	(.84)								
5 Behavior controls (BC)	0.08	-0.09	0.37 ***	0.36 ***	(.89)							
6 Informal controls (IC)	0.49 ***	0.10	0.35 ***	-0.18	0.15 **	(.93)						
7 OC × IC	0.36 ***	0.25 ***	0.12 *	0.75 ***	0.42 ***	0.49 ***						
8 BC × IC	0.41 ***	0.02	0.47 ***	0.18 ***	0.80 ***	0.70 ***	0.62 ***					
9 OC × BC	0.04	0.09	0.14 **	0.84 ***	0.77 ***	-0.01	0.73 ***	0.54 ***				
10 Firm size	0.13 *	0.20 ***	0.06	-0.08	0.03	0.16 **	0.05	0.12 *	-0.03			
11 Asset specificity	0.13 **	0.02	0.17 ***	-0.07	0.12 *	0.27 ***	0.11 *	0.24 ***	0.05	0.10		
12 Alliance duration	0.14 **	-0.10	0.29 ***	-0.01	0.29 ***	0.24 ***	0.13 **	0.34 ***	0.15 **	0.10	0.20 ***	
Mean	4.82	4.27	4.08	4.3	4.8	4.64	20.3	23.2	21.4	4.47	4.9	4.42
SD	1.41	1.21	1.27	1.51	1.41	1.05	8.32	9.49	10.4	3.6	1.29	1.55

Note. n = 236. Numbers in parentheses on the diagonal are Cronbach's alphas of the composite scales.

\* p &lt; .10.

\*\* p &lt; .05.

\*\*\* p &lt; .01.

**Table 2**

Pairwise comparison of cluster means for alliance motivations and control types.

	Cluster 1: Exploration (n = 75)	Cluster 2: Exploitation (n = 56)	Cluster 3: Moderate (n = 49)	Cluster 4: Ambidexterity (n = 56)	Mean differences
Panel a: Alliance motivation					
Exploitation	5.17 (0.45)	2.63 (0.69)	3.3 (1.00)	4.75 (0.72)	C1 > C4 > C3 > C2
Exploration	3.06 (0.55)	5.25 (0.47)	3.71 (0.92)	5.38 (0.63)	C2 = C4 > C3 > C1
Panel b: Control type					
Outcome	3.72 (1.57)	4.38 (1.90)	4.63 (1.19)	4.69 (0.92)	C3, C4 > C1
Behavior	5.26 (1.30)	4.02 (1.46)	4.52 (1.44)	5.22 (1.04)	C1, C4 > C2, C3 (*)
Informal	4.85 (1.20)	4.35 (1.08)	4.64 (1.08)	5.25 (0.78)	C4 > C2, C3

a: Standard deviations reported in parentheses.

b: Tukey post hoc tests for cluster mean differences reported at p &lt; 0.05. Pairs denoted by an asterisk (\*) used Tamhane's T2 because equality of variances was not assumed.

and highly significant effect ( $b = -.56$ ,  $p < .001$ ). These results thus provide support for H1.

A different pattern emerges for exploration alliances. The results of Model 1 in Table 3, Panel B indicate that behavior controls have positive and highly significant effects on alliance performance ( $b = .34$ ,  $p < .001$ ). The negative but insignificant coefficient of outcome controls ( $b = -.12$ ,  $p > .05$ ) indicates that they do not affect the performance of exploration alliances. Thus, in contrast to exploitation alliances, exploration alliances seem to benefit from increased reliance on behavior controls. The results support H2.

Table 3 Panel C, Models 1 and 2 report the estimates of the performance effects of formal controls in ambidextrous alliances. Notably, the insignificant coefficients for both outcome controls ( $b = .14$ ,  $p > .05$ ) and behavior controls ( $b = -.07$ ,  $p > .05$ ) indicate that neither type of control directly affects alliance performance. Interestingly and in line with our hypothesis, the significant and positive coefficient of the interaction term between behavior and outcome controls is positive and significant ( $b = .22$ ,  $p < .05$ ). To interpret this interaction, we plotted the results in Fig. 2 and tested the simple slopes of outcome controls for high and low levels of behavior controls (one standard deviation below and above the mean). The simple slope for outcome controls with high reliance on behavior controls is positive and marginally significant ( $t = 1.67$ ,  $p = .10$ ), while the simple slope for low reliance on behavior controls does not differ significantly from zero ( $t = -.44$ ,  $p > .05$ ). We also performed Johnson-Neyman regions of significance analyses (Spiller et al., 2013) to investigate the level of behavior control at which the effect of outcome controls becomes significant. Results indicate

that outcome controls have a (marginally) significant and positive effect on alliance performance for behavior control levels of 6.27 and above. For lower behavior control levels, the joint effects of outcome and behavior controls are nonsignificant. These results suggest that a high reliance on both outcome and behavior controls is necessary to positively affect performance of ambidextrous alliances. Other configurations of outcome and behavior controls seem to yield suboptimal alliance performance for firms pursuing ambidextrous alliances. Thus, these findings lend support to H3.

### 5.2. The moderating impact of informal controls on the effectiveness of formal controls

To investigate how informal controls may shape the alliance performance effects of formal controls across different alliance motivations, we included the interactions between formal and informal controls in our models. Although we did not hypothesize any direct effect of informal controls, the results in Table 3 report positive and (marginally) significant main effects of informal controls on alliance performance for each motivation.

Table 3 Panel A, Model 2 reports the interactions between outcome and informal controls for exploitation alliances. These results reveal a negative and significant interaction term between outcome controls and informal controls ( $b = -.04$ ,  $p < .05$ ). Fig. 3 and simple slope analyses revealed that for exploitation alliances, the relation between outcome controls and alliance performance is stronger for firms with low reliance on informal controls than for firms with high reliance on informal controls (low reliance on

**Table 3**

Parameter estimates of formal and informal controls on alliance performance (OLS).

	Panel A: Exploitation alliances				Panel B: Exploration alliances			
	Model 1		Model 2		Model 1		Model 2	
	B	p	B	p	B	p	B	p
<b>Control variables</b>								
Firm industry	0.31		0.27	0.40	0.16	0.62	** 0.01	0.59 ** 0.02
Partner industry	0.19		0.51	0.28	0.32	1.16	*** 0.00	1.17 *** 0.00
Firm size	-0.06		0.19	-0.08	0.10	0.10	** 0.03	0.11 ** 0.02
Equity vs. non-equity	0.15	*	0.07	0.13	0.11	-0.09	0.33	-0.13 0.15
Asset specificity	0.08		0.32	0.08	0.35	-0.25	** 0.01	-0.27 *** 0.01
Alliance duration	-0.03		0.69	-0.10	0.23	0.18	** 0.03	0.18 ** 0.03
<b>Control types</b>								
Outcome	0.60	*** 0.00	0.49	*** 0.00	-0.12		0.12	-0.21 ** 0.02
Behavior	-0.56	*** 0.00	-0.47	*** 0.00	0.34		*** 0.00	0.41 *** 0.00
Informal	0.21	*	0.06	0.23	*	0.05	1.06	*** 0.00 0.78 *** 0.00
<b>Interactions</b>								
Outcome × informal			-0.04	**	0.04			0.10 0.16
Behavior × informal			0.15		0.20			0.27 * 0.08
Output × behavior			-0.16		0.46			0.11 0.24
<b>Model fit</b>								
R <sup>2</sup>	0.26		0.37		0.34			0.43
Adj. R <sup>2</sup>	0.23		0.33		0.31			0.40
Change R <sup>2</sup>			0.11					0.10
<b>Panel C: Ambidextrous alliances</b>								
	Model 1		Model 2		Model 3			
	B	p	B	p	B	p	B	p
<b>Control variables</b>								
Firm industry	0.38		0.28	0.38	0.26		0.15	0.67
Partner industry	-0.26		0.28	-0.32	0.18		-0.28	0.23
Firm size	-0.01		0.65	-0.02	0.45		-0.03	0.26
Equity vs. non-equity	-0.08		0.25	-0.07	0.29		-0.10	0.14
Asset specificity	0.02		0.79	-0.03	0.77		-0.03	0.78
Alliance duration	0.01		0.94	0.05	0.57		0.07	0.38
<b>Control types</b>								
Outcome	0.14		0.50	0.14	0.49		0.22	0.28
Behavior	-0.07		0.70	0.06	0.75		0.07	0.71
Informal	0.42	**	0.02	0.45	**	0.01	0.68	*** 0.00
<b>Interaction formal control types</b>								
Outcome × behavior				0.22	**	0.04	0.18	0.19
<b>Interactions informal controls</b>								
Outcome × informal							0.27	0.28
Behavior × informal							-0.38	0.22
Outcome × behavior × informal							-0.24	0.08
<b>Model fit</b>								
R <sup>2</sup>	0.27		0.34				0.41	
Adj. R <sup>2</sup>	0.13		0.20				0.23	
Change R <sup>2</sup>			0.07				0.07	

Notes:

\* p &lt; .10.

\*\* p &lt; .05.

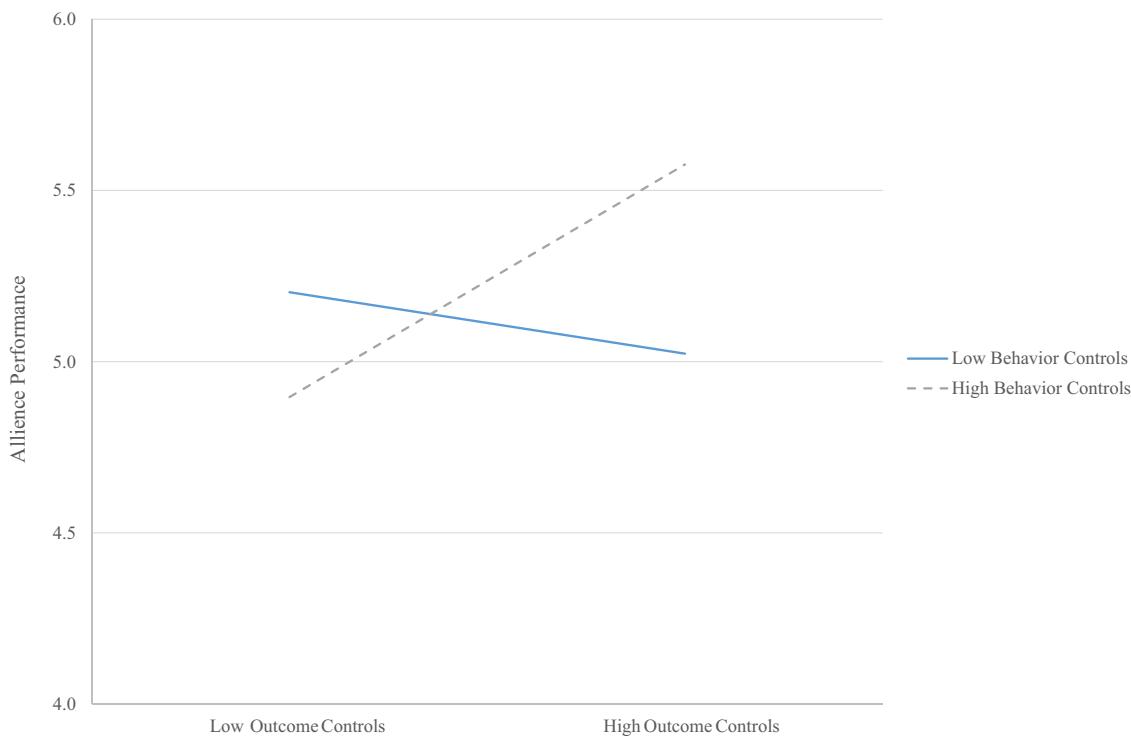
\*\*\* p &lt; .01.

informal controls:  $b_{outcomecontrols}$ :  $b = .66$ ,  $p < .001$ ; high reliance on informal controls:  $b_{outcomecontrols}$ :  $b = .35$ ,  $p < .05$ ). Interestingly, in the absence of outcome controls, alliance performance seems to benefit from high reliance on informal controls. Yet, the beneficial effect of informal controls seems to diminish when reliance on outcome controls increases. Thus, these results suggest that informal controls and outcome controls act as substitutes (high reliance on either outcome controls or informal controls) in explaining alliance performance in exploitation alliances. These results support H4.

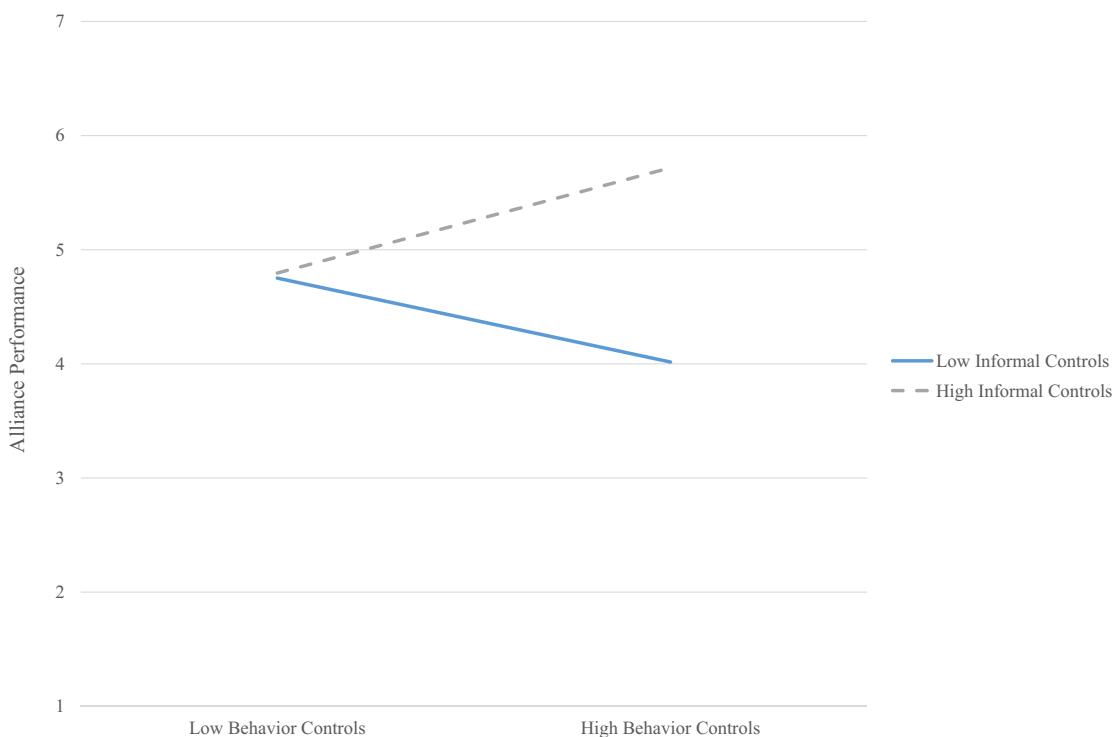
Table 3 Panel B, Model 2 shows that for exploration alliances, the interaction term between behavior and informal controls is positive and marginally significant ( $b = .27$ ,  $p < .10$ ). Fig. 4 depicts this interaction effect. A simple slope analysis further reveals that behavior controls have only a positive and significant impact on alliance performance when firms rely highly on informal controls in exploration alliances ( $b = .36$ ;  $p = .04$ ). Fig. 4 also shows that reliance on behavior controls does not affect alliance performance in the

absence of informal controls ( $b = -.28$ ;  $p = .40$ ). These findings provide support for H5 and suggest a complementary relationship between behavior and informal controls in exploration alliances.

We finally investigated the impact of informal controls on the simultaneous reliance on outcome and behavior controls for ambidextrous alliances. Table 3, Panel C, Model 3 shows a negative and marginally significant three-way interaction between outcome, behavior, and informal controls ( $b = -.24$ ,  $p > .05$ ). To interpret this result, we first estimated the interaction effects of outcome and behavior controls at high and low levels of informal controls. At low levels of informal controls, the interaction is positive and marginally significant ( $b_{lowinformalcontrols} = .37$ ,  $p = .06$ ; see Fig. 5), but at high levels, the interaction is insignificant ( $b_{lowinformalcontrols} = -.007$ ,  $p = .96$ ). A Johnson-Neyman analysis further indicates that informal controls may not exceed the value of 4.9 to keep the beneficial impact of the behavior and outcome controls interaction. High reliance on informal controls seems to suppress



**Fig. 2.** Plot of interaction effect of outcome  $\times$  behavior controls for ambidextrous alliances.



**Fig. 3.** Plot of interaction effect of behavior  $\times$  informal controls for exploration alliances.

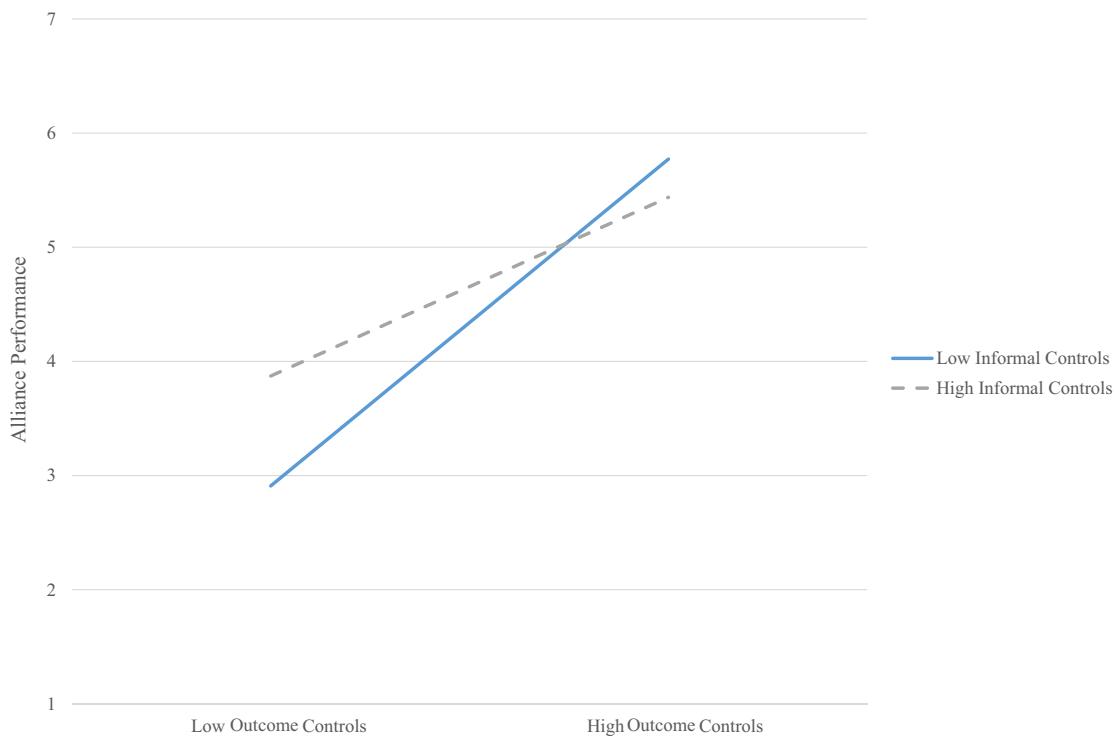
the positive interaction between outcome and behavior controls in explaining ambidextrous alliance performance.

## 6. Conclusion

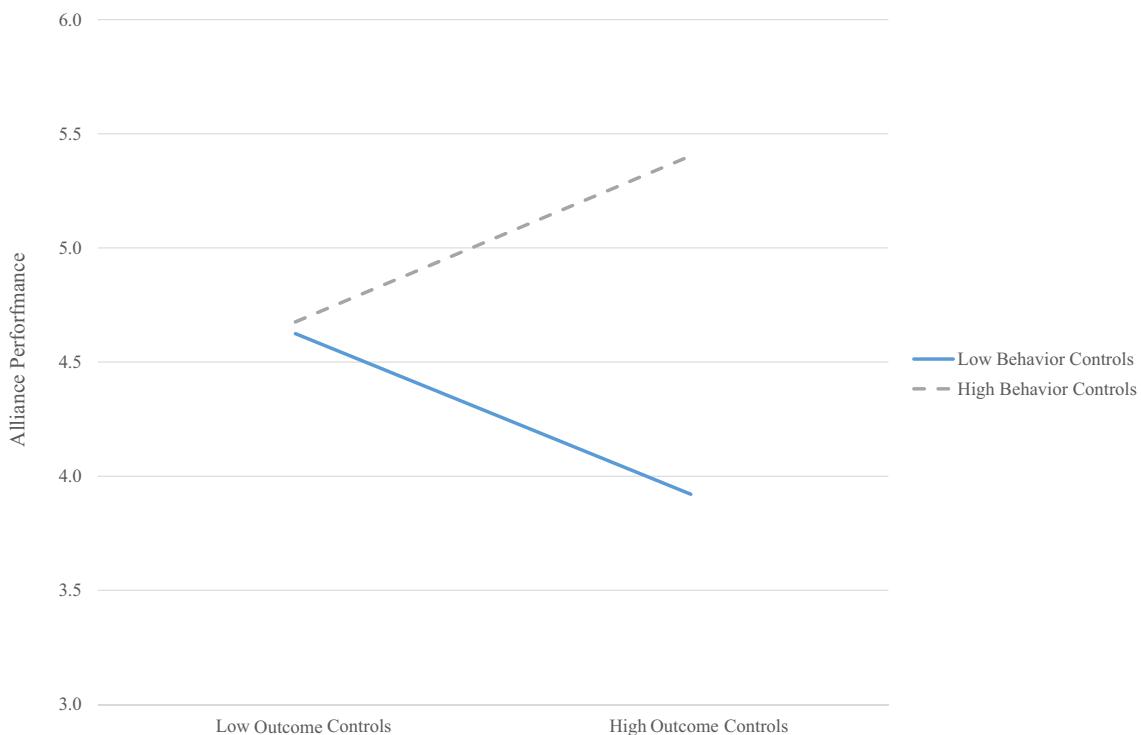
Our study provides empirical evidence that formal controls' effectiveness depends on the particular type of formal control (outcome, behavior) and the alliance motivation (exploitation,

exploration, ambidextrous). This study also extends the research on the interrelationships that exist among various controls by investigating the effectiveness of formal control types individually, in combination, and paired with informal controls.

Our study confirms previous conceptual assertions that (mis)alignment between the different alliance motivations and the use of formal controls is associated with subsequent increased (decreased) alliance performance. Specifically, the results show



**Fig. 4.** Plot of interaction effect of outcome × informal controls for exploitation alliances.



**Fig. 5.** Plot of the interaction effect of outcome × behavior controls for low levels of informal control and ambidextrous alliances.

that when firms opt for one primary strategic alliance intent, their emphasis on either outcome controls (in exploitation alliances) or behavior controls (in exploration alliances) increases alliance performance. Results also support the expected complementary relationship of outcome and behavior controls in explaining alliance performance in ambidextrous alliances, arguably because the advantages of each formal control type can mitigate the disadvantages of the other. Strikingly, neither of the two types of formal

control types alone significantly affects alliance performance in ambidextrous alliances. This result is consistent with previous research that suggests that competing organizational goals necessitate a control configuration that generates dynamic tensions (e.g., between radical innovation and predictable goal achievement) to effectively balance contradictory strategic agendas (Bedford, 2015; Mundy, 2010; Simons, 1995).

This study also examined whether the use of informal controls further moderates the performance of alliances with a motivation that matches with the formal controls used. Similar to previous reports of a complementary relationship between formal and informal controls (e.g., [Cardinal, 2001](#); [Dekker and Van den Abbeele, 2010](#); [Fryxell et al., 2002](#); [Gulati and Nickerson, 2008](#); [Heide et al., 2007](#); [Popo and Zenger, 2002](#)), we find that informal controls positively moderate the effectiveness of behavior controls in exploration alliances. This finding suggests that although behavior controls are already effective in the management of exploration alliances, they may leave the alliance partner with *residual* negative performance effects (see e.g., [Heide et al., 2007](#)). Informal controls provide a buffer against such effects.

The benefits of such a complementary approach, however, disappear when firms use outcome controls in exploitation alliances. When the strategic intent behind entering an alliance involves exploitation, our study indicates that firms attain optimal alliance performance by the use of outcome controls *solely*; in the presence of outcome controls, informal controls are unnecessarily burdensome.

Finally, the study indicates that a firm's supplementary reliance on informal controls negatively influences alliance performance in ambidextrous alliances when firms already rely on outcome and behavior controls. However, weak evidence indicates that low to moderate levels of informal control may have a positive influence. We believe that by *proportioning* the level of informal controls, firms can push their control configuration featuring outcome *and* behavior controls toward further realization of exploitation *and* exploration objectives in ambidextrous alliances. Our evidence is weak, however, so further investigation is needed to explain why and how informal and formal controls interrelate in governing ambidextrous alliances.

Overall, our findings extend prior understanding on how the use of formal controls associated with enhanced alliance performance varies by alliance motivation. Furthermore, our findings are consistent with reports that informal and formal controls partially complement each other ([Anderson and Dekker, 2014](#); [Vélez et al., 2008](#)). More specifically, informal controls do not simply increase the effectiveness of formal controls; their effect is contingent on the alliance motivation and the formal control configuration.

Our study has several limitations. First, a firm that simultaneously balances exploration and exploitation within an alliance may misapply controls suitable for one activity when performing the other, thus encountering negative performance effects. To effectively manage the competing tensions of exploitation and exploration, firms not only need to simultaneously and intensively use both outcome and behavior controls, but also apply them appropriately. Outcome controls mainly operate to improve the effective conduct of exploitation activities, while behavior controls encourage exploration activities. However, the available data did not allow us to study the effects of a (mis)match between control type and the characteristics of a specific activity within an ambidextrous alliance. Future research could examine how the alignment between specific activities within an ambidextrous alliance relate to the types of controls used. Second, as with any cross-sectional study, ours is limited by the inability to rule out concerns about endogeneity. We also cannot rule out different learning processes and timing patterns (see [Lumineau et al., 2011](#)) that may drive control dynamics. Third, we surveyed only one informant per company and asked questions about only the controls and alliance motivation behind the most important contract. Although this approach is common in alliance research (e.g., [Anderson and Dekker, 2005](#); [Heimeriks et al., 2015](#); [Kale et al., 2002](#)), surveying multiple informants per company or integrating the partner perspective might yield better data. Fourth, we did not measure whether the alliance was ongoing, which could signal greater success. Fifth, because

respondents evaluated alliance performance and assessed the controls they exerted simultaneously, we cannot rule out the effects of human bias on single-source data. That said, the temporal separation of the independent and dependent measures provides valuable methodological contributions, and our statistical analysis supported the validity of our results. Sixth, the operationalization of informal controls does not encompass trust. Future research could analyze how formal and informal controls and trust attributes are related to more specifically elucidate the governance of various alliance types and their performance outcomes. Finally, we ignored the costs of customizing firm's reliance on controls; this customization is a key element of interfirrm governance and needs to be disentangled from the other control costs.

Our study not only examines how organizations rely on various formal control types, individually and in combination, when controlling exploitation, exploration, or ambidextrous alliances, but also evaluates their respective performance effects in the context of informal controls. As such, our findings provide empirical evidence on effectively controlling alliances and yield unique and actionable theoretical and managerial insights.

## **Appendix A. Measurement scales and scale items**

### *A.1 Alliance performance*

Please assess the alliance performance over the past year on each of the following criteria:

Overall performance of the alliance

Meeting quality objectives

Alliance's overall success with regard to the attainment of goals

Meeting technical and/or efficiency objectives

Meeting financial objectives.

### *A.2 Outcome controls*

Our company monitors the achievement of specific performance goals set for the alliance partner.

Our company links alliance partner rewards to its goal achievement.

Our company establishes specific and clear alliance partner outcome performance objectives.

### *A.3 Behavior controls*

Our company (co-)modifies product/service development procedures if necessary.

Our company evaluates the methodology and processes the alliance partner uses to accomplish a certain task.

Our company provides formal feedback and information to the alliance partner about the results of its activities and behavior with a view to fostering appropriate changes.

### *A.4 Exploitation alliance*

Please evaluate the degree to which the following statements accurately describe your company's strategic intent to engage in current alliance partnership:

Introduction of improved, but existing products and services for our local markets

Improvement provision's efficiency of products and services

Increase economies of scales in existing markets

Implement regularly small adaptations to existing technologies, products and services.

### A.5 Exploration alliance

Please evaluate the degree to which the following statements accurately describe your company's strategic intent to engage in current alliance partnership:

- Introduction of a new generation of technologies, products and services
- Utilization of new opportunities in new markets
- Commercialization of technologies, products or services that are completely new to our company
- Experimentation with new products and services in local markets.

### A.6 Informal controls

Perceptions of common culture and values determine the selection of alliance partner and are assessed in advance.

Our company places a significant weight on joint meetings and alliance partner's active participation to understand the relationship's goals, values, and norms.

When new opportunities and challenges arise, our company will involve alliance partner in order to set out new and shared objectives.

Exchange of information in this alliance takes place frequently and happens face-to-face.

Our company organizes workshops and trainings in order to stimulate shared understandings and common goals between alliance members.

Note: all scales used seven-point Likert-type items. Alliance performance used "1=very unsuccessful" and "7=very successful" as anchors. All other scales used "1=strongly disagree" and "7=strongly agree" as anchors.

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