DOI: 10.1111/acfi.13046

RESEARCH ARTICLE

ACCOUNTING & FINANCE afaanz WILEY

Impact of the interactive and diagnostic uses of performance measurement systems on procedural fairness perception, cooperation and performance in supply alliances

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Abstract

We examine the effects of interactive and diagnostic uses of performance measurement systems (PMSs) on two behavioural factors (procedural fairness perception and cooperation) in inter-firm alliances. We further investigate whether the two behavioural factors mediate the relationship between PMS uses and alliance performance. We find that both interactive and diagnostic uses of PMS are significantly related to procedural fairness perception but only the interactive use is significantly related to cooperation. The relationships between the two uses of PMS and alliance performance are serially mediated by procedural fairness perception and cooperation. These findings contribute to management accounting studies in inter-firm alliances.

KEYWORDS

cooperation, diagnostic uses, interactive uses, performance measurement systems, procedural fairness perception

JEL CLASSIFICATION

M41

1 | INTRODUCTION

Prior research suggests that inter-firm alliances face two salient problems: cooperation issues and fairness concerns (Caglio & Ditillo, 2008; Luo, 2002; Wang & Dyball, 2019). In this regard, transaction cost economics theory argues that firms' investments in alliances face the risk of being appropriated by others and such risk increases when there are more assets invested specifically into alliances, frequent exchanges between partner firms and uncertainties in alliance

transactions (Das & Teng, 1998; Dekker, 2004). Agency theory also assumes that partner firms are self-interested and may have moral hazard issues, owing to which they may not operate in the interests of the cooperative venture. Taken together, transaction cost economics theory and agency theory suggest that cooperation problems will be present in alliances since 'autonomous partners may have incentives to cheat and free-ride in order to attain their own specific goals at the expense of the objectives of collective undertaking, so that they need to introduce mechanism to align their objectives' in order to improve cooperation (Caglio & Ditillo, 2008, p. 890). Notably, cooperation problems increase alliance transaction costs, hinder coordination between partner firms on interdependent tasks and exacerbate inherent tensions among partner firms that make them compete for a larger portion of the benefits from alliances, leading to unsatisfactory alliance performance (Williamson, 1987, 1994; Zeng et al., 2021).

Conversely, resource-based theory highlights that inter-firm alliances are the result of pooling the unique resources of partner firms to achieve joint goals that would benefit all partners. Partner firms have to share their resources with each other because no partner has all the necessary resources to achieve their joint goals. It is essential to ensure the fair division of labour, alliance activities and procedures, as well as the fair distribution of joint output, for maintaining alliance partners' positive attitudes, such as cooperation, commitment, trust and reciprocity towards collective interests (Ariño & Ring, 2010; Caglio & Ditillo, 2020; Wang & Dyball, 2019). However, maintaining fairness may remain a challenge because of unrealistic goal expectations and goal disparities among partner firms, shifts in bargaining power (e.g., owing to changes in interdependencies) and changes in the operating environment (Das & Teng, 1998; Mahama & Chua, 2016). Partner firms may also face obstacles in generating fairness perceptions, including, but not limited to, the difficulty of measuring and evaluating fairness and the incompatibility between the objectives that each partner firm in the alliance desires to achieve (Husted & Folger, 2004; Ouchi, 1980). Injustice may result in impaired cooperation and conflict between partner firms (Klein et al., 2003), leading to unsatisfactory alliance performance.

Management accounting researchers have focused on the design of controls that can mitigate cooperation and fairness problems (Dekker, 2004; Wang & Dyball, 2019). For example, contracts and partner selection can be used to safeguard partner firms' specific investments in alliances that may be at risk of appropriation by opportunistic partner firms. In addition, social controls can be used to improve fairness (Wang & Dyball, 2019). These prior studies have contributed to knowledge about the controls, at least in theory, that can be used to mitigate alliance problems. However, most of these studies do not provide empirical evidence about the subsequent performance effects of these controls on alliances. Thus, whether these controls that are supposed to mitigate cooperation and fairness problems actually lead to improved alliance performance is unknown. Understanding the performance effects of these controls via cooperation and fairness is important because the ultimate goal of controls for dealing with alliance problems is to achieve alliance objectives and improve alliance performance. Further, prior studies have focused exclusively on the design or (extent of) use of controls, but to date, there is limited understanding on how to use the controls in a certain way to address alliance problems. Moreover, the same controls can be adopted and used differently to produce different outcomes (Carlsson-Wall et al., 2021; Dai et al., 2017; Tessier & Otley, 2012). Furthermore, it is not only the mere design and presence of controls but also how controls are practised and used in organisations that can create effects (Ahrens & Chapman, 2007). Thus, our study seeks to contribute to the existing accounting research by examining whether two types of use – diagnostic and interactive – of performance measurement systems (PMSs) can improve procedural fairness perception and cooperation and by investigating the extent to which both procedural fairness perception and cooperation mediate the relationship between the uses of PMSs and alliance performance.

We focus on the PMS because it is one of the most commonly used controls in inter-firm alliances (Anderson et al., 2015; Bedford et al., 2016; Coletti et al., 2005; Mahama, 2006). It is a formal control that comprises an interlinked set of metrics designed to measure multiple

dimensions of results and the actions that generate the results (Dekker, 2016; Hall, 2008; Neely et al., 1995). A PMS generates information that is intended to be used in reinforcing strategic objectives and in stimulating actions that consider the multiple aspects of strategy and operations that are crucial for successful outcomes (Hall, 2008; Neely et al., 1995). Drawing on the psychology literature, Hall (2008) argues that cognitive and motivational mechanisms may help explain the capacity of PMSs to influence performance. This argument suggests that psychological factors may serve as intermediate variables through which PMSs generate performance effects.

We examine the interactive and diagnostic uses of PMSs in inter-firm alliances because they are said to facilitate the implementation of strategy (Anderson et al., 2015; Simons, 1994). Given that alliances are strategic adaptation choices (Koza & Lewin, 1998), it is crucial to examine how these two types of PMS use facilitate alliance processes and performance. Generally, the levers of control framework proposed by Simons has been used to describe intra-organisational controls, even though some earlier research suggests the applicability of this framework in inter-firm alliance settings (Cannon & Homburg, 2001; Dekker, 2004; Dekker et al., 2013; Mouritsen & Thrane, 2006). Recently, however, Anderson et al. (2015) conducted field and survey research of three inter-firm alliances to examine whether this framework has descriptive validity for inter-firm management controls. Their findings provide evidence of the applicability of this framework in the inter-firm context. They conclude that this framework is sufficiently general to serve as an adequate basis for describing management controls used in inter-firm alliances. Anderson et al. (2015) call for further empirical research on the predictive validity of the use of this control framework in alliances.

To accomplish the aim of this study, we conducted a cross-industry online survey of supply alliance in the United States. We find that the diagnostic use of the PMS has a positive direct relationship with supply alliance performance; this relationship is also serially mediated by procedural fairness perception and cooperation. We also find that while the interactive use of the PMS has no significant direct relationship with alliance performance, its relationship with alliance performance is fully mediated by procedural fairness perception and cooperation.

Thus, this study contributes to the accounting literature that focuses on controls in inter-firm alliances. First, our study extends that of Anderson et al. (2015), who find that three control frameworks (including Simons' levers of control) developed to describe intra-organisational management controls have descriptive validity in the inter-firm context. They call for further research to establish the predictive validity of these frameworks and our study provides evidence of the path through which the interactive and diagnostic uses of a PMS affects alliance performance. Second, the study contributes to the accounting literature that examines the effects of controls on fairness perceptions in intra-organisational settings (Burney et al., 2009; Libby, 1999; Voußem et al., 2016; Wentzel, 2002) and in inter-firm relationship (Wang & Dyball, 2019). Contrary to Wang and Dyball (2019), we find that control uses (i.e., interactive and diagnostic uses of PMSs) have positive effects on procedural fairness perceptions in the inter-firm alliance context. Third, our study also contributes to the accounting literature that examines the link between controls and cooperation (Baiman & Rajan, 2002; Coletti et al., 2005; Mahama, 2006; Salvato et al., 2017). While these prior studies focus on the diagnostic use of controls on cooperation, we add to this literature by providing evidence of the effects of both the interactive and diagnostic uses of the PMS on cooperation in inter-firm settings. Last, we provide evidence of the intermediate mechanisms through which the two types of PMS use influence alliances' performance. Specifically, we provide empirical evidence of how procedural fairness perception and cooperation serially mediate the relationships between both types of PMS use and alliance performance.

The remainder of this paper is structured as follows. Section 2 focuses on the literature review and hypothesis development. Section 3 reports the research methods, followed by a section on results. Last, Section 5 discusses and concludes the study.

2 | LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 | Inter-firm alliances and their operation and management

Inter-firm alliances occur when 'separate legal entities, constituting themselves into buyers and suppliers, adopt a high level purposeful exchange to maintain inter-organisational relationships over an extended period, in which both parties may have the power to shape its nature and future direction' (Mahama, 2006, p. 317). Inter-firm alliances involve recurrent exchanges of resources, technology, expertise and experience among partners with the aim of achieving mutual benefits (Caglio & Ditillo, 2020; MacNeil, 1980). They are beyond traditional discrete exchanges in the market because this requires exchange partners to rely on one another and build a close cooperative relationship over a long period (Stuart, 1993). Nevertheless, partner firms have their own organisational culture, institutional environment and management style. These characteristics of partner firms would be brought into alliances as partner firms attempt to exert influence on the operation and management of alliances (Dekker, 2016; Zeng et al., 2021). Partner firms may implement their organisational culture and management style in alliances by shaping alliance routines that match with their own values, beliefs and behavioural patterns (Luvison & de Man, 2015; Scott, 2008). The culture orientation and management style of an alliance have significant implications on the alliance activities and the governance of these activities. For example, alliances with a collectivist culture orientation tend to rely less on a complex and rigid governance mechanism for managing the exchange relation than those with an individualistic culture orientation because a collectivist culture prioritises group goals over personal goals (Dekker, 2016; Wuyts & Geyskens, 2005). Further, in an alliance when accurate cost data input is constantly provided by partner firms, it facilitates information sharing and collaboration between these firms (Kajüter & Kulmala, 2005), while the lack of such a management practice may result in the termination of the alliance (Bruin, 2015). Some studies argue that compared with alliances in which partner firms have a similar culture and management style, alliances in which there is greater dissimilarity in the culture and management style of partner firms may experience challenges in communication, the misunderstanding of priorities and preferences, friction and conflict, making the operation and management of the alliance difficult and unstable (Brett & Okumura, 1998; Giannetti & Yafeh, 2012).

Zeng et al. (2021) examine a set of cross-board alliances and find that the institutional environment of partner firms also affects alliance operation and management. The institutional environment includes formal rules, such as the constitution, statutes, common laws, specific bylaws and political and economic rules of the country in which partner firms operate (North, 1990). These laws and rules regulate the rights and obligation of partner firms, affect the monitoring and enforcement of exchange agreements and provide incentives and sanctions for partner firms to conform to rules (Scott, 2008). Thus, partner firms need to adapt everyday alliance operation and management with these laws and rules; failure to do so would entail public scrutiny, financial costs and adverse legal consequences (Kostova & Roth, 2002; Scott, 2008). Zeng et al. (2021) further argue that the greater the institutional environment distance between partner firms, the less the likelihood of their developing shared organisational systems for governing alliance negotiations and managing conflict resolution (Wuyts et al., 2005), which would add structural and operational complexity to the alliance (Larsen et al., 2013).

Alliance operation and management can also be affected by the 'timing' of alliances. Ring and Van de Ven (1994) advocate that alliances can have three different life stages: formation, operation and outcome. Das and Teng (2002) further argue that alliance conditions (i.e., inter-dependencies, collective strength and conflicts between partner firms) may change at different alliance stages. Specifically, there tend to be high inter-dependencies, strong collective strengths and low conflicts between partner firms in the early formation stage of alliances, when alliance strategy is formulated and the alliance is established. As alliances develop to the operation stage,

partner firm diversity will increase and hidden agendas will arise, which increases the possibility of partner firm conflict affecting their cooperation. In addition, inter-dependencies between partner firms can quickly decrease during the alliance operation stage as a result of learning and gaining intended resources from the alliance (Inkpen & Beamish, 1997). Collective strengths may also take a downturn as the initial match between partner firms is no longer sustainable. Hence, the dynamics of alliance conditions at different stages of alliances have implications for alliance operation, management and performance (Dekker, 2016).

Overall, prior research suggests that the partner firm and alliance management style, culture and institutional environment and the 'timing' of alliances can significantly affect the operation and management of alliances. Considering these factors, a group of alliance researchers has devoted attention to examining the design and use of controls in the management of alliances.

2.2 | Controls in inter-firm alliances

It is widely recognised that the concept of controls in organisations has evolved over time since Hopwood initiated formal, quantitative and accounting-based views, to one that now embraces a more holistic perspective that includes both formal management control systems (MCSs) and informal controls (Abernethy & Chua, 1996; Ahrens & Chapman, 2004; Chenhall et al., 2010; Ferreira & Otley, 2009; Malmi & Brown, 2008). Informal controls are based on informal processes, a free flow of information throughout the organisation, and flexibility to 'encourage adaptive decision-making and to foster interactions within the organization' (Chenhall et al., 2010, p. 742) as well as to 'facilitate self-regulation by way of self-control' (Tucker, 2019, p. 220). By reviewing a few key studies on informal controls, Tucker (2019) summarises two distinctive features of informal controls. First, there is an absence of purposive, predetermined or deliberate design in informal controls. Rather, informal controls are embedded in and shape individuals' personal values, beliefs, attitudes and behaviours (Norris & O'Dwyer, 2004), which are often unplanned, emergent and spontaneous (Agyemang & Broadbent, 2015; Cardinal et al., 2004). Second, informal controls are espoused with ongoing social interactions/interdependence among individuals (Chenhall et al., 2011; Stouthuysen et al., 2017) to maintain social relations. Open communications and information sharing (Chenhall et al., 2011; Dekker, 2004), socialisation (Mahama, 2006) and behaving according to collective expectations (Kirsch et al., 2010) are commonly observed phenomena of informal controls.

Prior studies have also documented a set of different typologies of informal controls, such as self-controls, social controls and clan controls. Self-controls motivate individuals' actions of self-monitoring, rewarding and sanction to ensure that their actions are consistent with the prevailing group/organisational norms (Grabner & Speckbacher, 2016; Kirsch, 1997). Self-controls incorporate individuals' own views and personal values about how they would like to act as if one follows a gut feeling at a given time (Hopwood, 1974). Social controls emerge as a result of shared norms and mutual commitment of members within a group, which can influence individual actions (Hopwood, 1974). Social controls are typically important in socialisation and the consensus-making process (Dekker, 2004). Clan controls refer to the influence of organisational culture in directing organisation members to undertake accepted behaviours (Ouchi, 1980). These different informal controls are found to play important roles in the management of inter-firm alliances (Chenhall et al., 2011; Dekker, 2004; Stouthuysen et al., 2017; Wang & Dyball, 2019). For example, social controls are effective in increasing relationship commitment, reducing goal incongruence and establishing a compatible set of norms among alliance partner firms (Mahama, 2006; Wang & Dyball, 2019). Alliance activity participants' personal views and values of being flexible are essential for smooth functioning and coordination of alliance activities (Carlsson-Wall et al., 2011).

Our focus in this study is on the way inter-firm alliance partners use a formal MCS. Formal MCSs are deliberately designed by organisations and include 'formalized procedures and systems

that use information to maintain or alter patterns in organizational activity' (Simons, 1987, p. 358). This conceptualisation is well established in the literature and has been the basis for many studies that examine formal MCSs (Ahrens & Chapman, 2004; Kruis et al., 2016; Mahama, 2006; Stouthuysen et al., 2017; Tessier & Otley, 2012). Examples of such information-based routines and systems are the PMS, budgeting systems and incentive compensation systems.

Given that alliances are formed on the basis of the principles of voluntary cooperation and partners are bonded by long-term mutual benefits, some early alliance research argues that partners have the spontaneous motivation to align their interests and activities (Shapiro et al., 1992). Thus, the need to exert rigid controls, such as through a formal MCS, over alliances and partner firms, is reduced. This view is consistent with some intra-firm studies that argue that organisations can operate under the 'reactive use of controls' (Parker, 2001, 2002) or even in the 'absence of controls' (Semler, 1989, 1994; York & Maresco, 2005). According to Choudhury (1988), the absence of controls can be organisations' deliberate choice to achieve some beneficial outcomes. Choudhury (1988) further highlights three reasons that can explain the deliberate absence of controls: trust, constructive ambivalence and symbol. First, absence of controls can reflect a managerial attempt to foster commitment and trust in subordinates. Semler (1989, 1994) shares his own management experience as the president and chief executive officer of a Brazilian manufacturing firm about how trust between management and subordinates can be promoted when original organisational norms, manuals, rules, regulations and hierarchical organisation charts are reduced or eliminated within the organisation, significantly improving employee empowerment. This view is consistent with Dekker (2004), who finds that trust in partner firms' goodwill and capability can substitute the use of a formal MCS (i.e., outcome controls and behaviour controls) in inter-firm alliances. However, Dekker (2004) also acknowledges that trust will substitute outcome and behaviour controls only when a sufficient level of control is realised to safeguard fair alliance activities and transactions. In other words, the use of formal MCSs, which set basic expectations on alliance performance outcomes and duties of partner firms, to create a satisfactory level of fairness in alliance transactions is essential in creating the conditions in which trust between alliance partners can be fostered. Further, even when trust has been established between partner firms, regular performance (e.g., cost) monitoring on the reasonableness and fairness of partner firms' behaviours and activities is necessary and appropriate to justify ongoing trust and repair growing distrust under the dynamics of alliances (Mahama & Chua, 2016).

Second, the absence of controls can also be related to the constructive ambivalence in which management bodies attempt to generate flexibility, particularly when their organisation is facing a changing environment or pursuing an innovation strategy (Taipaleenmäki & Ikäheimo, 2013). Lacking formal strategic planning is a positive contingent strategy that allows a Uniting Church office to respond flexibly to multiple and changing strategic agendas imposed by a variety of different stakeholders in the organisation, as well as by the government (Parker, 2001). Christensen (2004) shows that the use of accounting words but not accounting numbers was a deliberate choice by university management to provide themselves scope for managerial discretion. Formal MCSs, such as post-completion auditing, accounting numbers, costing systems and cost-reduction mechanisms, are replaced by other forms of controls or activities such as capital investment controls, purposive ignorance and postpone accountability that can better help organisations achieve their (sometimes ambiguous) strategic imperatives when needed (Davila & Wouters, 2004; Huikku, 2007; Jørgensen & Messner, 2010). Studies in the 'beyond budget' literature also encourage moving beyond traditional budgets towards separating target setting at planning and resource allocation to enable the establishment of more strategic and ambitious targets. This can grant greater flexibility to different teams about how to achieve their targets, use dynamic resource allocation and shift from accounting and results controls towards management on employee selection, values and visions, which can enhance interactions between different personnel within the organisation and improve organisational outcomes (Becker, 2014;

Østergren & Stensaker, 2011). The above studies propose the consensus that coordination and interactions among relevant organisational members should be promoted, or at least not compromised, on the basis that control absence can enable information sharing and constructive challenges and debates on alternative options of (means to achieve) strategic imperatives or other sorts of flexibility in organisational everyday operations. Inter-firm alliances are voluntary cooperation between independent partner firms. Formal MCSs help routinise interactions (e.g., specify the frequency of meetings) between partner firms and the coordination of interdependent tasks (e.g., specify how partner firms adjust to each other in joint technology development), which provides fundamentals for establishing and maintaining cooperation between partner firms.

Third, absence of controls can also be a managerial attempt to send unequivocal signals regarding corporate priorities. Munro (1995) and Becker (2014) argue that the absence of centralised planning and fixed targets within the traditional budgeting process symbolise autonomy to organisation managers. However, Becker (2014) simultaneously argues that abandoning formal MCSs, including the centralised planning and fixed targets, may not be possible without delegating greater decision-making power (another type of formal MCS) to these managers and empowering them in the first place. This has implications for the necessity of the use of a formal MCS in inter-firm alliances.

Simons (1990) argues that almost all formal MCSs are used diagnostically. However, subject to the firm's strategy, top management may use any of the formal MCSs interactively (Chong & Mahama, 2014; Simons, 1990). According to Simons (1991), a control is regarded as being used interactively if 'a top manager reported that his personal, regular, and frequent use of a system was a top priority both for himself and for his subordinates, and that this system was used to set agendas for regular interlocking meetings with direct subordinates and others to review data and resulting action plans' (p. 52). Although Simons has provided conceptual definitions of interactive controls and highlighted the processes of control use that constitute the interactive use of controls, Bisbe et al. (2007) argue that the theoretical properties through which the construct is manifest are not explicitly stated. Some management control scholars have undertaken a systematic review of Simons' research and the related literature to delineate the theoretical properties of the construct and facilitate its operationalisation (Bisbe et al., 2007; Ferreira & Otley, 2009; Lindsay, 2018; Tessier & Otley, 2012). Bisbe et al. (2007), for instance, conceptualise interactive controls as a multidimensional construct that comprises five theoretical properties: (1) intensive use by top management; (2) intensive use by operating managers; (3) face-to-face challenges and debates; (4) a focus on strategic uncertainties; and (5) a non-invasive, facilitating and inspirational involvement. They argue further that 'as researchers reflect further on the meaning of ICS at the conceptual level, refinements on the proposed theoretical properties may be justified' (p. 798).

Ferreira and Otley (2009) propose a refinement of the theoretical properties articulated by Bisbe et al. (2007). They argue that, for conceptual clarity, interactive control systems should be split into two distinct sub-constructs: the interactive use of controls and strategic validity controls. The interactive use of controls, they argue, is concerned with the intensive use of any controls by managers (Ferreira & Otley, 2009; Tessier & Otley, 2012). Conversely, strategic validity control 'primarily serves the important role of identifying the failure of intended strategies and the risk of emergent strategies' (Ferreira & Otley, 2009, p. 275). They signal and facilitate the review of strategies through a dialogic process. Tessier and Otley (2012, p. 177) concur with Ferreira and Otley (2009) when they argue that 'the option of dividing the interactive concept into two distinct concepts seems more appropriate'. In furtherance of this, Tessier and Otley (2012) argue that the first three properties (highlighted above) of interactive control systems proposed by Bisbe et al. (2007) constitute conceptual properties of the interactive use of controls, while the fourth property constitutes strategic validity control. The fifth dimension, they suggest, defines the enabling role of control. Following the proposed refinement by Ferreira and Otley (2009)

and Tessier and Otley (2012), we conceptualise the interactive use of the PMS to encompass the intensive use of PMSs by alliance partners, involving face-to-face meetings that facilitate the continual challenge and debate of the underlying data, assumptions and action plans related to the supply alliance.

Prior research has provided evidence of how the interactive use of a PMS may operate in inter-firm alliances. Mouritsen et al. (2001) show that performance criteria encourage their case company and the company's suppliers to engage in systematic discussions about the possibility of incorporating new technology into their particular product-line and corporate identity program. Dekker (2004) finds performance measures are frequently used by firms to facilitate engagement, communication and interactions with their alliance partners in relation to innovation, cost reduction and product quality that affect alliance performance. Performance measures are themselves the object of communication and discussion that is mobilised by firms to actively engage their partners in periodic meetings (Anderson et al., 2015). Chua and Mahama (2007) highlights that performance measures related to time, cost and functionality are sources of continual debate and negotiations between buyer and supplier.

The diagnostic use of a PMS occurs when it is used primarily to focus managers' attention on critical performance variables through the monitoring and review of outcomes relative to predefined standards of performance (Anderson et al., 2015; Hofmann et al., 2012; Simons, 1994). Here, performance measures are used to specify and communicate targets to be pursued, provide direction for action and exact efficiency from organisational members (Bedford, 2015; Müller-Stewens et al., 2020). PMSs inhabit feedback mechanisms. Hence, when used diagnostically, they promote transparency, facilitate single-loop learning and provide the basis for corrective action (Anderson et al., 2015; Bedford, 2015; Henri, 2006; Mundy, 2010). The diagnostic use of a PMS is characterised by less intensive use of such controls by top management (Chong & Mahama, 2014; Widener, 2007). Unlike in interactive use, there is minimal and infrequent involvement of top management in the decision-making activities of operating managers when PMSs are used diagnostically. Thus, PMSs are used on an exception basis to align managers' actions and priorities with those of the organisation (Hofmann et al., 2012; Mundy, 2010; Widener, 2007). Translated to the inter-firm alliance context, the diagnostic use of a PMS can be characterised as the minimal and periodic use of performance measures by partner firms to monitor actual alliance performance against pre-specified performance targets and to take corrective actions. PMSs are viewed to be used diagnostically in all three case firms studied by Anderson et al. (2015). Other researchers, such as Mouritsen et al. (2001) and Dekker et al. (2013), have also published evidence of the diagnostic uses of PMSs in inter-firm alliance settings.

We expect the interactive and diagnostic uses of the PMS to be implicated in the procedural fairness perception and cooperative behaviour among alliance partners. We also expect that the relationships between these two types of PMS use (i.e., interactive and diagnostic) and supply alliance performance are mediated by procedural fairness perception and cooperation. Our expectations are represented by the theoretical model depicted in Figure 1.

2.3 | Interactive and diagnostic uses of PMSs and procedural fairness perception

Procedural fairness perception has been defined, in the alliance setting, as the extent to which the decision-making processes and alliance procedures that affect each party's gains and interests are impartial and fair as perceived by the parties or by the boundary spanners who represent each party (Luo, 2005; Prasad et al., 2011). Procedural fairness perception is an evaluative judgement about the extent to which the procedures applied in decision-making and execution are representative, free from bias, consistent across time and space and justifiable (Cugueró-Escofet & Rosanas, 2013; Goldman & Cropanzano, 2015; Langevin & Mendoza, 2013; Luo, 2007; Prasad et al., 2011). Prior studies have drawn on organisational justice theory to articulate conditions

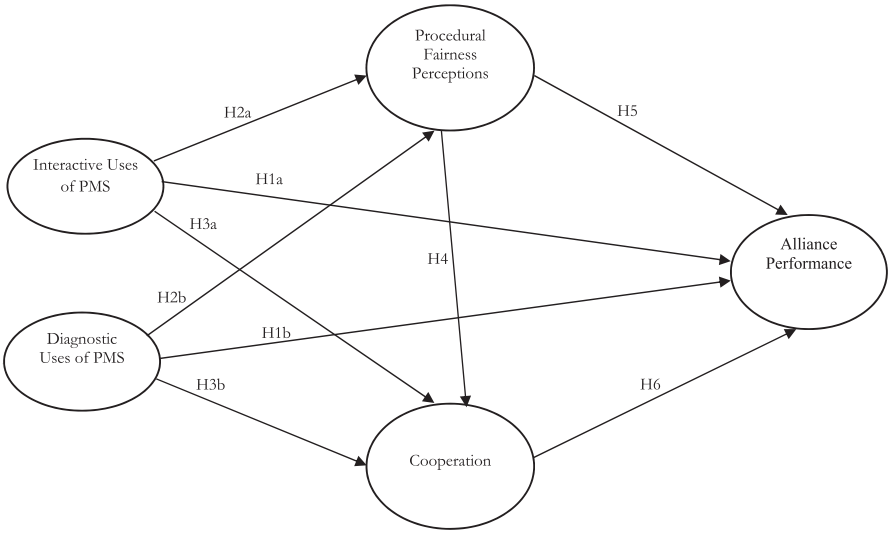

FIGURE 1 Theoretical model.

required for procedural fairness perception to include engagement/participation, explanation/justification, clarity of expectations, transparency and correctability of decisions and actions (Kim & Mauborgne, 1998; Prasad et al., 2011).

Prior intra-organisation studies have predominantly examined how managerial interventions, such as the design and use of controls, influence fairness judgements (Burney et al., 2009; Cohen et al., 2007; Lau & Moser, 2008; Libby, 1999, 2001; Van Veen-Dirks et al., 2021). In an experiment study, Libby (1999) examines the effects of a fair budgeting process on subordinate performance. Although not directly examining the causal relation between budget and fairness, the author assumes that budgets can be designed and used to generate fairness where fairness of the budgeting process is manipulated by allowing employees to communicate their preferred budget to their superior and giving a verbal explanation to subordinates for their lack of influence over the final budget set by the superior. The premise that controls can be designed and used to generate fairness perception of subordinates is also evident in Libby (2001), in which the author manipulates the fairness of the budget via assigning an individual target that is equivalent to the overall divisional target. The survey study of Burney et al. (2009) finds when measures for assessing employee performance are accurate, accessible, understandable, reliable, timely and can reflect the causal link of how their individual performance helps firm achieve its objectives, employees are more likely to generate fairness perceptions of organisational decision-making processes. In another survey study, Lau and Moser (2008) report that the use of nonfinancial measures is unconstrained by time considerations, which can measure employees' long-term performance more accurately, leading to enhanced procedural fairness perception. While the above studies seem to suggest the causal link to flow from controls to fairness, they do not intend to, and are unable to, demonstrate the existence of such causality. Van Veen-Dirks et al. (2021) directly examine the causal effect of controls on fairness. This study experimentally examines and finds a positive causal effect of enabling performance measurement system on procedural fairness. This is because a PMS with an enabling design can facilitate employees to provide suggestions for system improvement, modify the system to suit their own needs, understand the internal logic and working procedure of the system and comprehend the overall context within which employees are working. However, Van Veen-Dirks et al. (2021) and other studies on the control–fairness relationship in the intra-firm setting have not entirely ruled out the possibility of reverse causality (i.e., the casual link from procedural fairness to controls).

Wang and Dyball (2019), to our knowledge, is the only study that examines the relation between controls and procedural fairness beyond the intra-organisational context. Contrary to prior intra-organisational studies, the authors find a negative association between controls (measured as a mixture of contracts, planning and budgeting, formal authority relationship, standardised procedures and rules, supervision, performance evaluation, structural grouping and departmentalisation and management reports) and perceived fairness in key alliance processes. We extend these studies by examining two specific types of use of a particular control, the PMS, on partners' behaviour and alliance performance in inter-firm alliances.

We expect that the interactive use of the PMS will positively influence alliance partners' procedural fairness perceptions. PMSs are effective means for communicating desirable performance and creating standards for acceptable behaviour (Merchant, 1985). The interactive use of a PMS promotes and provokes such communications because alliance partners are encouraged to frequently and intensively participate in alliance meetings. Tuomela (2005) finds that the interactive use of the PMS facilitates debate and discussion of performance objectives and targets, critical success factors, assumed cause-and-effect relationship between different performance measures and between performance measures, operations and activities. Participating regularly in such discussion and debate goals can facilitate frequent information exchange between partner firms and thereby enhance transparency and understanding of each other's objectives, interests and preferences and how that affects the pursuit of collective performance goals (Dekker et al., 2018). In such participatory processes, partner firms have more opportunities to voice their opinions and challenge acts that deviate from the collective performance goals and with consequences for their payoff ratios of outcomes (De Cremer & Tyler, 2007; Libby, 1999; Tyler & Blader, 2013; Wentzel, 2002). The ability of alliance partners to voice their concerns and aspirations in the interactive use of a PMS affords them the opportunity to influence the setting of performance targets that reflect collective interests, the choice of desirable actions and the expected contributions of each partner firm, which gives them a feeling of control over alliance decisions, processes and outcomes (Rupp et al., 2017). This enhances partner firms' beliefs that their interests and preferences are represented in the alliances. This, in turn, increases partner firms' fairness perceptions about procedures involved in the alliance (Rupp et al., 2017; Schminke et al., 2000; Tyler & Blader, 2013). Consistent with Poppo and Zhou (2014), we expect that the greater the voice allowed to alliance partners through their participation in the interactive use of a PMS, the greater their procedural fairness perception.

While some scholars argue that the exercise of voice in a participatory process in and of itself improves procedural fairness perceptions, others argue that voice without influence may lower procedural fairness perceptions, especially when a party considers the decisions made and expected outcomes to be unfavourable (Langevin & Mendoza, 2013; Libby, 1999; Rupp et al., 2017). When parties express a voice that does not influence decisions and activities or when these decisions and activities result in unfavourable outcomes, they will seek explanation or justifications as an additional basis for evaluating procedural fairness (Libby, 1999; Rupp et al., 2017). One distinctive characteristic of the interactive use of a PMS is that it facilitates double-loop learning processes through which performance reports are debated, explanations are sought and feedback is provided on performance measures that deviate from expectations. This facilitates the rendering of causal accounts about the propriety of actions and decision processes (Bobocel & Gosse, 2015; Libby, 1999; Rupp et al., 2017). Such explanation enables partner firms to develop a more comprehensive understanding of the cognitive processes of decision-making, eliminates the attribution of bias and unfair motives to partners, and reduces partners' fear of cheating behaviour. Thus, the opportunity to seek and be provided with explanations relating to measured performance through the interactive use of a PMS is expected to enhance partner firms' perceptions of fairness in these alliance processes and activities. This expectation is supported by prior research evidence on the influence of explanation/justification

on procedural fairness perceptions in intra-firm settings (see, e.g., Bobocel & Zdaniuk, 2005; Libby, 1999; Shaw et al., 2003). Thus, we predict that:

Hypothesis 1a. *The extent of the interactive use of a PMS is positively associated with the level of procedural fairness perception of alliance partners.*

We also predict that the diagnostic use of a PMS will influence the procedural fairness perception of alliance partners. The extant literature indicates that judgement about the rules and processes of which allocation decisions are made is key to the formation of procedural fairness perception (Cropanzano & Ambrose, 2001; Voußem et al., 2016). We argue that the PMS inhabits the rules and processes of allocating outcomes and so its use in a diagnostic manner will influence procedural fairness perception. When PMSs are used diagnostically, they facilitate the communication of shared performance targets (Bedford, 2015; Müller-Stewens et al., 2020). These shared targets serve as salient reference criteria for the evaluation of the allocation process and form the basis for assessing partners' contributions to outcomes relative to their rewards and payoffs. In communicating shared performance targets, the diagnostic use of the PMS eliminates perceptions of bias and improves transparency in the processes used to evaluate and reward performance (Folger & Cropanzano, 1998; Langevin & Mendoza, 2013; Rupp et al., 2017; Voußem et al., 2016). This is expected to lead to greater procedural fairness perception among alliance partners.

In addition to the bias-suppression role of communicating targets, the diagnostic use of the PMS facilitates consistency in performance review and allocation processes. It establishes the measurement criteria and processes of evaluating actual performance against desired performance levels. This allows for consistency in the application of allocation rules and processes across people, situations and time. When all partners are subject to the same rules and procedures of measurement and evaluation across time and space, they will perceive the rules and procedures to be fair (Schminke et al., 2000). Existing research on fairness has found consistency in the application rules to be associated with greater perception of procedural fairness (Cropanzano & Ambrose, 2001; Folger & Cropanzano, 1998; Voußem et al., 2016). Thus, by providing the mechanism that facilitates consistency in the application of measurement and evaluation rules, the diagnostic use of the PMS is expected to improve procedural fairness perception.

Moreover, procedural fairness perception is believed to improve when there are mechanisms for correcting wrong decisions and actions (Langevin & Mendoza, 2013; Schminke et al., 2000). We argue that the diagnostic use of PMSs inhabits feedback mechanisms that provide opportunities for corrective actions and thereby influences procedural fairness perceptions among alliance partners. In providing feedback on variances, alliance partners are required to provide reasons and accept accountability for their decisions and outcomes. This process engenders single-loop learning that leads to corrective action (Anderson et al., 2015; Bedford, 2015; Hofmann et al., 2012). The accountability and corrective action that the diagnostic use of the PMS invoke are fundamental to procedural fairness perception (Folger & Cropanzano, 1998). Following the foregoing, we hypothesise:

Hypothesis 1b. *The extent of the diagnostic use of a PMS is positively associated with the level of procedural fairness perception of alliance partners.*

2.4 | Interactive and diagnostic uses of PMSs and cooperation

Cooperation is defined as the extra contribution of individual partners' effort, time and resources to interdependent tasks and actions that benefit the collective outcomes (Cremer et al., 2005; Gnyawali & Ryan Charleton, 2018). Cooperative behaviours occur when parties 'comply with,

help, and contribute energy to the group and its representatives' (De Cremer & Tyler, 2007, p. 639). Cooperation is a multidimensional construct that manifests in four domains of activity: information sharing, restraint from the use of power, joint problem-solving and willingness to adapt to changes (Heide & Miner, 1992; Mahama, 2006). *Information sharing* refers to the extent to which parties disclose critical and proprietary information that may be useful for the activities of others in the relationship (Heide & Miner, 1992). The predisposition to share information is said to be a crucial indication of cooperation. Also, power is believed to be always present in inter-firm alliances. It is 'the ability to impose one's will on others irrespective of or by manipulating their wish' (MacNeil, 1980, p. 32). *Restraint from the use of power* is to withhold from exploiting others even if the opportunity to do so exists (Heide & Miner, 1992; Mahama, 2006). Restraining from such exploitative behaviour is believed to be a manifestation of cooperation. *Joint problem-solving* can be described as 'treating problems as joint responsibilities and working collaboratively towards resolving those problems' (Mahama, 2006, p. 319). It is argued that joint problem-solving reflects partners' feeling of attachment and empathy towards each other (Janis, 1982). Such attachment and empathy may manifest in the partners working harmoniously in joint planning and action for the mutual fulfilment of their needs. *Willingness to adapt to changes* reflects flexibility and refers to the extent to which parties 'adjust their own behavior to accommodate needs of the other' (Heide & Miner, 1992, p. 275).

Prior research suggests that cooperation should not be assumed merely because two or more parties agree to be in a collective activity (Das & Teng, 1998; Mahama, 2006). Rather, cooperation is a behavioural outcome; a reciprocal action that needs to be fostered (De Cremer & Tyler, 2007; Gulati et al., 2012). In business relations, managerial intervention is considered a crucial part of generating and enhancing cooperation (Schalk & Curşeu, 2010). A stream of experimental studies has examined the direction of the relationship between controls and cooperation in intra-firm settings, demonstrating that causality flows from the former to the latter (Coletti et al., 2005; Garrett et al., 2019; Kelly & Tan, 2010; Rankin, 2004). The underling argument of these studies for the causal effect is that controls provide additional information and encourage actions that induce and increase trust and reciprocity between parties, leading to cooperation (Coletti et al., 2005; Das & Teng, 1998; Garrett et al., 2019; Mahama, 2006). For example, Coletti et al. (2005) argue that the use of controls such as sanctioning and monitoring systems can reduce opportunistic behaviours and thereby increase reciprocity and trust among collaborators, which has a positive effect on subsequent cooperation between these collaborators. This theoretical argument is supported by the results of an experiment. In the experiment, participants were instructed to assume the role of a research and development (R&D) manager at a large pharmaceutical company and to make a decision about whether to devote most of their division's limited resources to the division's individual projects or to a project involving cooperation with another R&D division. The authors also manipulated (presence of) control by informing participants about the possibility of periodic and unannounced audits of their investment decision by a consultant. Garrett et al. (2019) replicate the experiment of Coletti et al. (2005) and examine whether their findings still hold in an interactive or non-interactive setting. The interactive setting is 'where people work together and can benefit from each other's work', while a non-interactive setting is 'where people do not work together directly but where their behaviour can be observed' (p. 2494). Garrett et al. (2019) find that (presence of) controls in both settings increase future cooperative behaviour, but such effects are stronger in the interactive setting.

In the context of inter-firm alliances, survey evidence from Luo (2002), Mahama (2006) and Dekker et al. (2013) suggests that controls can influence cooperation among partner firms by providing visibility and trenchancy about partner firm behaviours and alliance results. Ding et al. (2013) provide a contrary argument that cooperation may affect controls. This is because prior cooperative experience can reveal information about partners' behaviour and skills, which can either reduce the need or facilitate the development of controls in alliances. However, their survey results do not provide empirical support for such effects. We extend these studies by

examining the effect of using PMSs interactively and diagnostically on cooperation in inter-firm settings.

We argue that the interactive use of the PMS will positively influence cooperation. Our expectation is grounded in the literature that suggests that frequent interactions among transacting parties increase cooperation among them (Heide & Miner, 1992; Poppo & Zhou, 2014; Salvato et al., 2017; Schalk & Curşeu, 2010; White, 2005). Heide and Miner (1992, p. 269), for instance, argue 'the frequency of interaction should have a positive effect on cooperation'. This is partly built on the understanding that interactions facilitate information sharing and bonding among parties. PMSs inhabit information about critical performance metrics, the assumed relationships among them, the expected performance targets (for both actions and results) and expected partners' contributions, on the one hand, and the actual performance outcomes and partners' contributions to these outcomes, on the other. Using the PMS interactively provides a dialogic mechanism that engenders regular and intensive interactions through which the information contained in PMS is shared and debated among alliance partners (Merchant, 1985; Tuomela, 2005). The use of PMS to interactively share critical performance information will reduce performance ambiguity and information asymmetry. This will enable parties to evaluate the actions of others and assess their respective payoffs, thereby facilitating cooperation.

Similarly, the interactions facilitate social bonds (attachment) and commitment to a shared future, as expressed in performance metrics and targets inhabited by the PMS, thereby motivating cooperation among partners (Korsgaard et al., 2003; Mahama, 2006; Poppo & Zhou, 2014). For Korsgaard et al. (2003), when parties feel attached, they identify with the collective goal of a relationship and are stimulated to cooperate in achieving those goals through reciprocal actions. This motivates partners to listen to one another's concerns about performance measurement targets and outcomes, the interpretations they provide for performance metrics, their reasoning for the choice of actions that are intended to achieve targets and their justifications for outcomes achieved (or not achieved). This enables partners to respond to these actions and concerns appropriately and in a timely manner (Heide & Miner, 1992; White, 2005). The response may include jointly identifying problems as reflected in performance measurement reports, developing shared meanings of these problems and their causal patterns, providing supporting information through the feedback mechanism in the PMS, adjusting their own behaviour to accommodate the needs of the other partners and/or making resources available for solving these problems (Heide & Miner, 1992; Mahama, 2006; Poppo & Zhou, 2014; White, 2005). Similarly, the interactive settings in which the PMS is discussed provide an ideal platform for parties to engage in renegotiations because they create awareness about their mutual expectations and the need for adaptations to accommodate the changing goals of the partners (Cannon & Perreault, 1999; Gulati et al., 2012).

On the basis of the above, we expect that the interactive use of the PMS will affect cooperation in supply alliances. More formally:

Hypothesis 2a. *The extent of the interactive use of a PMS is positively associated with the level of cooperation among alliance partners.*

Drawing on the existing literature, we predict that the diagnostic use of a PMS will enhance cooperation in supply alliances. As indicated previously, the diagnostic use of PMSs involves less interaction and focuses on the monitoring and review of alliance performance (Anderson et al., 2015; Müller-Stewens et al., 2020; Mundy, 2010). Prior intra-firm research suggests that the monitoring processes that characterise the diagnostic use of controls negatively affect cooperation (Enzle & Anderson, 1993; Ghoshal & Moran, 1996). Ghoshal and Moran (1996) associate monitoring in a hierarchical organisational setting with negative intentions and coercive behaviour. Monitoring is said to reflect distrust, leading to an adversarial rather than a cooperative relationship. However, research in inter-firm settings suggests that monitoring can

enhance cooperation (Birnberg, 1998; Poppo & Zhou, 2014; Wathne & Heide, 2000; Yilmaz & Kabadayi, 2006). Whereas in intra-firm settings, superiors monitor subordinates, monitoring in the inter-firm context is mutual, whereby partner firms monitor each other's behaviour and contribution to outcomes (Hagen & Choe, 1998; Wathne & Heide, 2000; Yilmaz & Kabadayi, 2006). Mutual monitoring eliminates perceptions of one party having negative intentions or seeking to coerce the other through the monitoring mechanisms because each party has an equal opportunity to monitor and intervene in the alliance processes. Having all partner firms monitor each other's productive activities in the alliance thereby become a mechanism to reduce information asymmetry and associated vulnerabilities, thereby facilitating cooperative behaviour (Wathne & Heide, 2000; Yilmaz & Kabadayi, 2006).

Yilmaz and Kabadayi (2006) note that when behavioural and outcome expectations are pre-specified, monitoring provides an effective mechanism for enhancing cooperation. We argue that PMSs provide effective criteria for mutual monitoring in inter-firm alliances. When used diagnostically, PMSs allow targets, priorities and measures to be collectively predetermined by partner firms, against which actual behaviour and outcomes are mutually monitored and evaluated by these partner firms; albeit infrequently (Yilmaz & Kabadayi, 2006). Such mutual monitoring and evaluation will draw partner firms' attention to problems and deviations from predetermined performance targets, encourage these firms to share information about key activities taken for achieving the shared performance targets, facilitate joint investigation of problems and deviations and secure corrective actions (Ferrin et al., 2007). In addition, it can facilitate the 'speed and reliability with which alliance partners learn about each other's actions, and ultimately are able to reciprocate each other's cooperative behaviour' (Parkhe, 1993, p. 801).

Hypothesis 2b. *The extent of the diagnostic use of a PMS is positively associated with the level of cooperation among alliance partners.*

2.5 | Procedural fairness perception and cooperation

Prior research suggests that procedural fairness perception has positive effects on cooperation in team situations (De Cremer & Tyler, 2007; Luo, 2005; Tyler & Blader, 2003). Theoretically, De Cremer and Tyler (2007) argue that individuals are willing to cooperate by investing resources, time and energy in the collective interest when fair procedures are perceived to exist. Following this theoretical argument, De Cremer and Tyler (2007) examine the causal direction of the procedural fairness perception and cooperation link through an experimental design study. In this experiment, procedural fairness perception, among other factors, was predicted to be an antecedent of cooperation; this prediction was supported by their findings. Consequently, they argue that procedural fairness perception is an antecedent to cooperation. Other experimental studies of the relationships have confirmed the flow of causality to be from procedural fairness perception to cooperation (see, e.g., Cremer et al., 2005; Tyler & Blader, 2000). While the link between procedural fairness perception and cooperation has been investigated in prior studies, we consider the examination of this link to be important in this current study because the link allows us to test a path model through which the interactive use of the PMS may indirectly affect alliance performance through these two variables. Following the above, we posit that in our research context, procedural fairness perceptions will positively influence cooperation.

First, the social psychology literature suggests that in social interactions, cooperation emerges when individuals feel affiliated with the group (or organisation) and that such feelings of affiliation merge the group into the individual's self-concept (Aksoy, 2019; De Cremer & Tyler, 2005). When individuals feel affiliated with a group, the individual is motivated to devote extra time, energy and resources in pursuit of the collective interest. Relying on the group engagement model, Cremer et al. (2005, p. 396) posit that 'procedural fairness is able to promote group members'

willingness to engage in cooperation, because being treated fairly and respectful motivates group members to consider the group (and its goals) as defining to self, consequently promoting behaviours enhancing joint benefits'. Nakos and Brouthers (2008) note that perceived fair procedures do not only make parties feel valued and respected, they also provide a supportive atmosphere in the alliance, reducing the motivation for self-seeking behaviour and encouraging greater cooperation and information sharing. For instance, the transparency associated with fair procedures, as outlined previously, encourages others to reciprocate by also being transparent. This is expected to lead to increased information sharing.

Second, prior research offers evidence that restraint from using power reflects partners' feelings of satisfaction and equity about each other (Ganesan, 1994; Maloni & Benton, 2000). We expect that when procedures are perceived to be fair, individuals will be satisfied that their self-interest is represented equitably in those procedures. As a result, they are expected to restrain from the use of power. This expectation is supported by Celly and Frazier (1996), who state that procedural fairness perception is effective in guarding against the use of power.

Third, by perceiving their interests to be represented in the collective interest, individuals are likely to develop a strong feeling of support for their group decision-making process and for the decisions resulting from that process (Kim & Mauborgne, 1998). This has a positive effect on joint problem-solving and increases partners' flexibility in adapting to changes. Adaptability to changes is further enhanced by the knowledge that fair procedures are adjustable and correctable (Luo, 2007; Prasad et al., 2011). Thus, when the need for changes arise, parties will be willing to change with the knowledge that the other party will reciprocate.

Following the above, we predict that alliance partners' procedural fairness perceptions are more likely to promote all the four dimensions of cooperation. Thus, we hypothesise:

Hypothesis 3. *The level of procedural fairness perception of alliance partners is positively associated with the level of cooperation among alliance partners.*

2.6 | Procedural fairness perception and alliance performance

Prior research suggests that procedural fairness perception can improve alliance performance. Partners who perceive decision-making processes to be fair have low resistance to the associated procedures and a high level of feeling involved (Renn, 1998). These feelings are more likely to focus partners' attention and effort on achieving goals (Earley & Shalley, 1991). Saxton (1997) finds that engaging in decision-making processes reduces information asymmetry among alliance partners and enhances commitment to alliance performance and involvement in alliance activities. The enhanced feeling of commitment and involvement motivates partners to act for mutual benefits. Luo (2005) also argues that procedural fairness perception is viewed as the best means for ensuring maximum personal efforts. Such effort leads to better alliance performance.

Perceived procedural fairness can increase partners' feelings of the equitability of alliance processes and can reduce their fears of others utilising these processes to engage in opportunistic behaviours. This in turn can increase partners' confidence in their investment, involvement and commitment to improve the quality of services/products provided by the alliance, leading to improved alliance performance. In addition, procedural fairness perception elicits a sense of group harmony, which encourages partners to prioritise collective interests over their own interests (Naumann & Bennett, 2002). Prior research also suggests that people who feel that they have been treated fairly by their group are motivated to strive for and achieve the best group outcomes (Pickett et al., 2004; Zadro et al., 2004), while politically charged alliance decisions may jeopardise the reconciling of individual partners' interests and alliance performance (Walter et al., 2012). This view is supported by Johnson et al. (2002), who finds that partners who perceive fairness in decision-making processes and procedures in their alliance are more likely to direct and expend extra efforts to achieve alliance goals.

In light of the above, it is expected that procedural fairness perceptions will enhance alliance performance. Thus:

Hypothesis 4. *The level of procedural fairness perception of alliance partners is positively associated with the level of alliance performance.*

2.7 | Cooperation and alliance performance

Prior research suggests that cooperation has a positive impact on alliance performance. First, information sharing among partners can save overall costs and enhance product/service quality, which may lead to better performance (Yang et al., 2016; Zhao et al., 2002). This is supported by Zhou and Benton (2007), who provide evidence to suggest that information sharing improves performance because partners are able to save the cost of collecting this information in the market and are likely to employ a less costly strategy. Second, through joint problem-solving, partners are able to complement one another by contributing their own expertise and experience (Yang et al., 2008). This improves efficiency, which may enhance performance. Cai et al. (2009) provide evidence of the positive relationship between joint problem-solving and alliance performance in a study of Chinese manufacturing firms involving buyer–supplier relationships. They find that joint problem-solving enables 'two parties [to] work together to troubleshoot problems and negotiate mutual adaptations for resolving the difficulty' (Cai et al., 2009, p. 662), which improves performance. Third, adaptation to changes may help alliances maintain competitive advantages by meeting customer needs (Huang & Gangopadhyay, 2004). Lee and Cavusgil (2006) find that flexibility in contracts enables alliance partners to overcome unexpected consequences arising from technological and market condition changes through renegotiating original clauses and procedures. This has a positive effect on alliance performance. In addition, Maloni and Benton (2000) argue that inter-firm power retains the potential to upset the mutuality of supply chain relationships and subsequently presents a barrier to the win-win integration process. Restraint from use of power reflects the reduction of the fear of exploitation behaviour, which promotes genuine commitment between partners (Brown et al., 1995). This prompts partners to exert extra effort, which has a positive effect on alliance performance (Ryciuk, 2020). In addition, Bucklin and Sengupta (1993) find that restraint from use of power creates balance and reduces vulnerability among alliance partners. They argue that enhanced balance among alliance partners will restrain partners from engaging in negative behaviour (e.g., subtle efforts to diminish the role of its partner with customers and failure to employ all of the resources required) and enlarge the reach of agreement, which leads to better alliance performance. Therefore, all four dimensions of cooperation are expected to have a positive effect on performance. More formally:

Hypothesis 5. *The level of cooperation among alliance partners is positively associated with the level of alliance performance.*

2.8 | Mediating effects of procedural fairness perception and cooperation

To comprehensively capture the role of PMSs in alliances, it is important to understand how procedural fairness perception and cooperation mediate the relationships between the two types of PMS use (interactive and diagnostic) on supply alliance performance. A mediation analysis will help explain the additional pathways and mechanisms through which these two types of PMS use influence supply alliance performance.

Prior research suggests that the interactive use of a PMS leads to greater performance in intra-firm settings (Bruining et al., 2004; Chong & Mahama, 2014; Osma et al., 2018;

Tuomela, 2005). Following these prior studies, we expect that the interactive use of the PMS will influence alliance performance. As indicated previously, supply alliances involve the division of labour among alliance partners (Gulati et al., 2012). This requires the coordination of individual and joint tasks of alliance partners. We argue that by engaging in regular dialogue, the interactive use of the PMS will facilitate coordination of the decisions and actions of the alliance partners and thereby enhance alliance performance. This argument is premised on the idea that through the two-way communication it inhabits, the interactive use of the PMS will facilitate the identification of the interdependences among the task to be performed by partners and enable the synchronisation and alignment of partners' actions (Anderson et al., 2015; Bedford, 2015; Dekker, 2004; Gulati et al., 2012). Through their field study, Anderson et al. (2015) provide empirical support for the coordinative role of the interactive use of a PMS and its implication for alliance performance.

In addition, the interface that characterises the interactive use of the PMS will enable alliance partners to jointly collaborate in setting the alliance agenda for outcomes and jointly discuss and devise ways to contribute to these outcomes in mutually beneficial ways (Bedford, 2015; Bisbe & Otley, 2004; Mundy, 2010). This will provide the alliance with priorities as well as directions and processes for achieving desired performance (Gulati et al., 2012). Further, we expect the regular and intense involvement of alliance partners in the interactive use of the PMS to signal vigilance and focus attention on alliance issues that are critical to performance (Lindsay, 2018).

Similarly, prior research suggests that the diagnostic use of controls provides the motivation and direction required to achieve predetermined goals (Bedford, 2015; Henri, 2006; Müller-Stewens et al., 2020; Mundy, 2010; Widener, 2007). Central to the motivational role of PMSs is the establishment of specific shared performance targets. Consistent with Müller-Stewens et al. (2020), we expect that the diagnostic use of a PMS in an alliance will facilitate the communication of shared performance targets and enable the establishment of the role expectations of each partner, thereby motivating goal-directed behaviour. We concur with Bedford (2015) that establishing and communicating targets in the diagnostic use of PMSs will enable the alliance to reduce uncertainty and focus partners' attention on predetermined performance standards. Also, shared performance targets are expected to promote goal congruence and foster the coordination of activities across organisational boundaries, leading to alliance performance improvements (Hofmann et al., 2012; James & Nakamura, 2015).

We juxtapose the above expectations about the effects of the two types of PMS use on alliance performance with the direct hypotheses above to argue for the mediating roles of procedural fairness perception and cooperation. In the direct effect hypothesis, we argue that the interactive and diagnostic uses of PMSs will positively influence procedural fairness perception and that procedural fairness perception will have direct effects on cooperation. Juxtaposing these direct hypotheses, we expect procedural fairness perception to transmit the effects of the interactive and diagnostic uses of PMSs to cooperation. Because procedural fairness perception is expected to directly influence cooperation and cooperation has also been hypothesised to have a direct influence on supply alliance performance, we argue that procedural fairness perception and cooperation will serially mediate the relationships between the interactive and diagnostic uses of the PMS and supply alliance performance. Specifically, we hypothesise:

Hypothesis 6a. *The relationship between the interactive use of the PMS and alliance performance is serially mediated by the level of procedural fairness perception of alliance partners and the level of cooperation among alliance partners.*

Hypothesis 6b. *The relationship between the diagnostic use of the PMS and alliance performance is serially mediated by the level of procedural fairness perception and the level of cooperation among alliance partners.*

3 | METHOD

3.1 | Sample selection and data collection

In selecting the sample for this study, we focused on targeting supply alliances with a longer-term orientation. Existing research in marketing suggests that a supply agreement with a longer-term orientation relies on interactive relational exchanges (Ganesan, 1994; Heide & John, 1990). Heide and John (1990) argue that the close and relational nature of supply/purchasing agreements with a longer-term orientation is primarily because of the bilateral expectation of continuity of the exchange. Ganesan (1994) notes that the expectation of continuity in supply agreements with a longer-term orientation engenders interaction that focuses on verifying and maximising payoffs over a series of transactional encounters. These marketing studies provided the basis for our selection of a sample comprising supply alliances with a longer-term orientation. We expect that such alliances will provide rich context for performance measures to be used.

Data were collected from a sample of firms involved in supply alliances across different industries in the US. A cross-industry sample was used to enhance the generalisability and external validity of the results. The choice of US supply alliances was made for two reasons. First, the large size of the US economy enhances the probability of obtaining a sufficient number of target sample firms. Second, a professional marketing research organisation (EmPanel Online) has a rich and well-established database from which we could generate a sample of US-based supply alliances that could be targeted for our survey. After generating the target sample from the database, we used the services of this organisation to program and host the survey online. The use of EmPanel Online to host the online survey is consistent with the method used in several other accounting studies.[1]

On the basis of the literature review, we developed an index of inter-firm alliances and used that as criteria for selecting potential participants from the EmPanel Online database. We selected alliances that identified as (a) long-term supply agreements/contracts; (b) outsourcing/contracting out, (c) long-term buyer–supplier contracting; (d) long-term service agreements; (e) buyer–supplier partnerships; (f) cooperative buyer–supplier relationships/contracts; (g) buyer–supplier collaborations; and (h) relational contracting. To be included in the target sample, the alliance needed to be involved in one of these relationships. We identified 2350 potential participants from different firms involved in various alliances that met these criteria. Although our unit of analysis is the supply alliance, we selected respondents (unit of observation) from one partner firm of an alliance owing to the challenges in identifying matching pairs of respondents for each alliance. Prior research on groups provides evidence that supports the use of individuals to respond to questions on groups' shared beliefs, expectations and attributes because those responses by an individual informant will be similar to the average of the sum of the group's response (Chong & Mahama, 2014; Lent et al., 2006; Lindsley et al., 1995). In the specific context of alliances, Geringer and Hebert (1991) and Dess and Robinson (1984) demonstrate that the responses from multiple respondents (each representing a partner in the same alliance) are all consistent, thereby making responses from an individual representative of the alliance. Our use of an individual informant is also consistent with prior control studies that have examined inter-firm alliance through surveys (Dekker & Van den Abbeele, 2010; Ding et al., 2013; Mahama, 2006; Wang & Dyball, 2019).

The target sample of respondents was supply/procurement/purchasing managers who were responsible for/involved in managing supply alliances. These managers were selected because this type of manager is responsible for managing supply alliance(s) within a firm and has access

[1]EmPanel Online has been used for data collection by numerous accounting studies, including those of Arnold et al. (2011, 2012), Chong and Mahama (2014), Christensen et al. (2020), Farkas and Murthy (2014), Johnson et al. (2020) and Prather-Kinsey et al. (2018). Brandon et al. (2014) provide an overview of the use of EmPanel Online by accounting researchers.

to more resources and information in relation to the supply relationship (Dekker et al., 2013). Potential respondents from the 2350 supply alliances were invited by email to participate in the survey. The email explained the background and aim of the research. Potential participants were assured of the confidentiality of their responses and that the study met the applicable ethics requirements. They were informed that only aggregate data would be used for further analysis. A link was provided so that those who were willing to participate in this study could access the survey. The online survey was presented in a similar format to that of paper-based self-administered questionnaires. Each screen contained only one separate section of the survey to ensure participants could read it easily and complete all questions before proceeding to next screen. A reminder message appeared to encourage participants to finish unanswered questions if they had not answered any question on a screen. The survey was created with the goal of keeping the completion time to less than 15 minutes. The aim of this approach was to boost the response rate and let respondents feel that their opinions were important, while not requiring them to spend too much time to complete the survey.

To ensure that the profile of the survey participants matched that of the target sample we sought, they had to answer the following four screening questions before they could proceed to the survey questions: (a) 'Is your firm based in the United States?'; (b) 'Does your firm have at least one supply alliance?'; (c) 'Are you involved in the management of one of the supply alliances?'; and (d) 'If you are involved in the management of more than one supply alliance, please nominate only one supply alliance and answer the survey based on that nominated supply alliance'. Participants who answered 'no' to any of these four questions were screened out and those who answered 'yes' to all four questions were allowed to proceed to the survey questions. Next, we provided a working definition of the supply alliances with a longer-term orientation and asked potential respondents to indicate by answering 'yes' if the alliance they nominated for the survey met the nature of supply alliances characterised by the definition.[2] Only those who answered 'yes' could proceed to the main survey; the remainder were screened out at this stage.

Of the 2350 potential participants who were invited to participate in the survey, 483 viewed the survey site and 353 managers actually began the survey, yielding a response rate of 15%. This response rate is consistent with the response rate reported in Widener's (2007) study of the levers of control framework. While we were unable to directly contact the target respondents to discover why they did not participate in the survey, the literature suggests that this could be owing to the target respondent changing organisations; companies' use of email filters; survey fatigue; companies' policies of 'no response to survey'; or companies disabling email links as a security measure (Muñoz-Leiva et al., 2010; Saleh & Bista, 2017). Among the 353 people who began the survey, 195 were screened out by the four screening questions. The design of the online survey was such that we could not determine how many people were screened out on the basis of each screening question. Of the remaining 158 managers who began the survey and were allowed to continue the survey after the four screening questions, two people did not complete the survey. This resulted in a final sample of 156 responses. A summary of the data collection process is outlined in Table 1 (Panel A). We assessed whether the sample size was adequate for a significance test to detect effects when they exist. We conducted this assessment using G*Power software. The results suggest that the minimum sample size required for moderate effect size with 95% statistical power at the 0.05 significance level is 74. We repeated the analysis by changing the significance level to 0.01. The results suggest that the required minimum sample size is 109. These results suggest that the useable sample of 156 is sufficient for detecting effects. In addition, we assessed the differences in means between early responses and late responses as a proxy for

[2]We provided the following working definition: 'Supply relationships/alliance occurs when separate legal entities (corporations), constituting themselves into buyers and suppliers, engage in cooperative (or collaborative) economic transaction (exchange) for their mutual benefit and over an extended period (and governed by a long-term contract), in which both parties may have the power to shape its nature and future direction. This includes long-term supply agreements/contracts and long-term outsourcing relationships'.

TABLE 1 Survey participants

Panel A: Summary of data collection processes		
Initial list of invited people		2350
No. of people who viewed the survey		483
No. of people who started the survey		353
No. of people who started the survey but were excluded by screening questions		195
No. of people who started the survey and were allowed to continue after screening questions		158
No. of people who continued the survey but did not complete the survey		2
No. of people who continued the survey and completed the survey		156
Industry	**Frequency**	**Percentage**
Panel B: Industry grouping of respondent firms		
Consumer discretionary	21	8.27
Consumer staples	24	9.45
Energy	14	5.51
Financial services	28	11.02
Health care	23	9.06
Industrials	40	15.75
Information technology	39	15.35
Materials	29	11.42
Metals and mining	11	4.33
Telecommunication services	10	3.94
Utilities	2	0.79
Other	13	5.12
Total	254[a]	100
Contract sum	**Frequency**	**Percentage**
Panel C: Size grouping of respondent firms		
Below $5 million	20	12.82
$5–$14.99 million	25	16.03
$15–$24.99 million	22	14.10
$25–$34.99 million	26	16.67
$35–$44.99 million	27	17.31
$45–$54.99 million	19	12.18
Above $55 million	17	10.90
Total	156	100

[a]Some respondent firms indicate that they involve multiple industries.

potential non-response bias. The results of the difference in means test across all variables in our model show that there is no statistical difference between early and late respondents, thereby suggesting that non-response bias is not a major threat.

3.2 | Measurement of constructs

None of the theoretical constructs of interest to this study can be observed or measured directly, which demonstrates the latent nature of these constructs. Therefore, these constructs were meas-

ured indirectly using observable multi-item scales. We developed reflective measures for all latent constructs, except for the interactive use of the PMS, in the theoretical model of this study (see Appendix 1 for the measures of each construct). To enhance the reliability and validity of data, we adapted the measures for all constructs from prior literature to suit the context of this study. Each measure is anchored on a 7-point Likert scale. The survey instrument was pilot tested on two accounting academics. They suggested further improvement in terms of the wording and clarity of questions. They also commented on the format and presentation of the scales. We implemented all these suggestions. The measures for each theoretical construct are discussed next.

Interactive use of PMS was measured as a formative unidimensional measurement model, in which the direction of causality is assumed to flow from its constitutive indicators to the construct (Bedford et al., 2016; Bedford & Speklé, 2018; Bisbe et al., 2007). Following Ferreira and Otley's (2009) refinement of Bisbe et al. (2007) and the conceptual argument of Tessier and Otley (2012), we measured the interactive use of the PMS with a focus on the constitutive indicators of the intensity of use of this control. The scale items for the construct were adapted from Henri (2006) and Widener (2007).[3]

Diagnostic use of PMS was measured as a reflective model. The four scale items measuring this were adapted from Henri (2006) and Widener (2007). The measures captured the focus on the key performance metrics, including their tracking, monitoring and review. Prior studies that have used the scale items have reported high reliability and validity for the measures (Bedford, 2015; Bedford et al., 2016; Chong & Mahama, 2014; Henri, 2006).

Procedural fairness perception was measured using a 7-item scale adapted from Luo (2008). Participants were asked to use a 7-item scale (with scores ranging from 1 = 'very unfair' to 7 = 'very fair') for indicating the level of their perception of the fairness of the procedures used in alliance decision-making and the execution of activities.

As indicated previously, existing literature suggests that *cooperation* is a multi-dimension construct that manifests in four domains: information sharing, restraint from use of power, joint problem-solving and willingness to adapt to changes. We used separate, 3-item scales to measure each of the four dimensions of cooperation. For each of the 3-item scales, two items were adapted from Mahama (2006) and one was developed from existing cooperation literature. These four dimensions are measured in a reflective mode. Since these four dimensions are manifestations of cooperation, we modelled cooperation as a reflective second-order construct of the four dimensions.

Alliance performance was measured on an 8-item scale developed by Mahama (2006). The scale measures participants' perceptions of service quality, product quality, cost, time and improved decision-making. Participants were asked to rate each performance criterion according to their expectation, with a score ranging from 1 (strongly disagree) to 7 (strongly agree). Cronbach's alpha for this measure is 0.911.

3.3 | Demographic information and control variables

In addition to collecting information on the primary theoretical constructs of interest to this study, we also collected information about the industry groupings of the respondent firms, the size of nominated supply alliances, the duration of the nominated supply alliances, the years of

[3]Three measurement items of interactive use of PMS (*Interact3*, *Interact4* and *Interact5*) may theoretically overlap with each other. Thus, they may not capture a distinct aspect of interactive use of PMS. We addressed this potential problem by following suggestions offered by Diamantopoulos and Siguaw (2006) and Bedford and Speklé (2018) to conduct a robustness test. Specifically, we retained one measurement item (e.g. *Interact3*) and dropped the other two measurement items (e.g. *Inteact4* and *Interact5*) and then re-ran the model. The results of our measurement and structural models remained unchanged. We repeated the same process and analysis by only keeping *Interact4* and *Interact5* respectively in our model. Our results continued to hold.

operation since the beginning of the alliance and the age of the respondent's organisation. We included these variables in the statistical model to partial out their effects.

The industry grouping of respondent firms is shown in Table 1 (Panel B). For the industry grouping factor, industrials (15.75%) and information technology (15.35%) had the highest representation among survey respondent firms. Telecommunications services (3.94%) and utilities (0.79%) were the least represented in the responses. We used the contract sum to proxy for the size of the nominated supply alliances. The size grouping of respondent firms is shown in Table 1 (Panel C). Contract sums in the range of US$35–44.99 million represented 17.31% of the contracts nominated for the study (highest representation in the sample), and contracts with the lowest representation (10.90%) in the responses had sums above $55 million. On average, the supply alliances nominated by respondents had a history of 15.6 years (SD = 9.6). Of the 156 respondent firms, 108 had past experience of cooperation with the partner firm(s) of the nominated supply alliances and 48 had no such experience. The 156 respondents had a mean of 8.3 years (SD = 4.6) of employment with the respondent firm. In addition, the respondents' mean length of managing the supply alliances was 6.6 years (SD = 4.6). Last, among all respondents, 50 (32.1%) were females and 106 (67.9%) were males.

4 | STATISTICAL ANALYSIS AND RESULTS

Following Hair et al. (2019), we assessed the skewness and kurtosis of the data collected and the results indicate that a significant number of the scale items have non-normal data. Therefore, we used the partial least squares (PLS) approach to structure equation modelling to analyse the data obtained from the survey. The advantages of using the PLS approach are that it makes no distributional assumptions about the data and is also suitable for studies that have small samples. According to Chin and Newsted (1999), the minimum sample size for PLS modelling should be 10 times the largest regression in the model. In this study, the construct with the largest regression is alliance performance, which has nine predictors leading to it. This suggests a minimum sample size of 90. Therefore, our sample size of 156 is adequate for PLS modelling. SmartPLS Release 3 (Ringle et al., 2015) was used to simultaneously estimate the measurement model and the structural model. We tested the significance of factor loading and path coefficients using bootstrapping resampling with 5000 subsamples (Hair et al., 2019).

4.1 | Results of PLS measurement model

We used the measurement model to evaluate the relationship between measures and constructs. We assessed the reflective measurement models' reliability (individual item and composite) and validity (convergent and discriminant) using classical test theory. Individual item reliability was examined using the factor loading of the items to their respective constructs. All measures that show loadings 0.7 or higher are said to be reliable, indicating that the variance of measures is more related to variance of construct than variance of errors (Hair et al., 2019). All measures for our first-order reflective constructs loaded higher than 0.7 at the 99% confidence level, except '*Adapt1*' and '*Fair4*'. '*Adapt1*' was retained in the model because it had a loading of 0.692 but '*Fair4*', with a loading <0.65, was excluded.[4] Cooperation was modelled as a second-order construct of its four first-order reflective constructs. Following the prior literature, we estimated the construct scores for cooperation using a Mode B repeated indicator approach (Becker et al., 2012; Henseler et al., 2009; Tenenhaus et al., 2005).[5] In this approach, the path coefficients of the first-order constructs of cooperation represent the factor loadings (Becker

[4]The results of the structural model remain relatively the same regardless of whether 'Fair4' is included or excluded.

[5]We re-ran the PLS model after estimating the construct scores of cooperation using Mode A repeated indicator approach and there were no significant differences in the results.

TABLE 2 Reflective measurement model – Descriptive statistics and factor-loadings

		Descriptive statistics				
Latent construct	**Scale items**	**Range**	**Mean**	**Std. dev.**	**Factor loading**	**Factor loading**
Diagnostic uses of PMS	*Diag1*	1–7	5.872	0.985	0.820	
	Diag2	3–7	5.917	0.954	0.829	
	Diag3	1–7	5.878	0.970	0.873	
	Diag4	1–7	5.936	0.991	0.845	
Procedural fairness perceptions	*Fair1*	3–7	5.737	0.941	0.761	
	Fair2	3–7	5.692	1.101	0.770	
	Fair3	3–7	5.801	0.996	0.714	
	Fair5	1–7	5.699	1.046	0.774	
	Fair6	3–7	5.853	0.979	0.776	
	Fair7	3–7	5.872	0.911	0.781	
Information sharing	*Inform1*	3–7	5.827	0.962	0.838	0.846
	Inform2	3–7	5.923	1.016	0.818	
	Inform3	2–7	5.744	1.143	0.730	
Restraint from use of power	*Rest1*	2–7	5.821	1.077	0.719	0.848
	Rest2	2–7	5.904	1.061	0.880	
	Rest3	3–7	5.891	1.010	0.839	
Joint problem solving	*Solve1*	3–7	5.763	1.063	0.761	0.831
	Solve2	3–7	5.744	1.073	0.845	
	Solve3	2–7	5.814	0.986	0.767	
Willingness to adapt to changes	*Adapt1*	1–7	5.641	1.103	0.692	0.843
	Adapt2	3–7	5.865	0.988	0.855	
	Adapt3	3–7	5.8462	1.020	0.848	
Alliance performance	*Perf1*	4–7	6.186	0.890	0.813	
	Perf2	3–7	6.179	0.930	0.819	
	Perf3	4–7	6.160	0.888	0.813	
	Perf4	4–7	6.173	0.878	0.810	
	Perf5	3–7	6.0.244	0.812	0.827	

Note: $n = 156$; All factor loadings are significant at the 99% confidence level.

et al., 2012). The factor loadings and descriptive statistics for the final measurement model are shown in Table 2. Acceptable construct reliability is demonstrated when the composite reliability coefficient, Cronbach's alpha and Dijkstra's rho_A coefficient exceed 0.7 (Hair et al., 2019). The composite reliability coefficient, Cronbach's alpha and Dijkstra's rho_A for all reflective constructs in our measurement model were above 0.7, which demonstrates adequate composite reliability (see Table 3, Panel A).

Convergent validity is the extent to which multiple measures of a construct are related with one another, where each measure represents a different aspect of the construct (Hair et al., 2019). In PLS, convergent validity is assessed via average variance extracted (AVE), which measures the average variance shared between a construct and its measures. An AVE of 0.5 or above indicates appropriate convergent validity (Hair et al., 2019). In this study, the AVEs for all reflective constructs were >0.5 (see Table 3, Panel A), providing evidence of adequate convergent validity.

We examined the discriminant validity of constructs by the cross-loadings of their intended measures and through the Fornell–Larcker criterion (Chin, 2010; Fornell & Larcker, 1981; Hair

TABLE 3 Construct reliability, AVEs and variance inflation factors (VIFs)

Reflective construct	Composite reliability	Cronbach's alpha	Dijkstra's rho_A	AVE
Panel A: Composite reliability, Cronbach's alpha AVEs and Dijkstra's rho_A				
Willingness to adapt to changes	0.843	0.720	0.743	0.643
Procedural fairness perception	0.893	0.856	0.857	0.582
Information sharing	0.839	0.710	0.711	0.635
Diagnostic uses of PMS	0.907	0.863	0.864	0.709
Alliance performance	0.909	0.875	0.875	0.666
Restraint from use of power	0.856	0.745	0.758	0.665
Joint problem solving	0.837	0.708	0.709	0.632
Formative construct	**Indicators**	**Factor weights**	***T*-stastistic**	**VIFs**
Panel B: Factor weights, *T*-statistics, and VIF for formative indicators				
Interactive uses of PMS	*Interact1*	0.293	4.012	1.876
	Interact2	0.228	2.694	1.652
	Interact3	0.287	3.582	1.490
	Interact4	0.168	1.706	1.742
	Interact5	0.085	1.047	1.948
	Interact6	0.174	1.658	1.932
	Interact7	0.242	2.000	2.070
	Cooperation	**Procedural fairness perception**	**Alliance performance**	
Panel C: Inner model VIFs				
Contract duration	1.223	1.216	1.237	
Contract size	1.245	1.227	1.248	
Diagnostic uses of PMS	2.393	2.281	2.403	
Procedural fairness perception	2.352		3.261	
Industry	1.116	1.116	1.139	
Interactive uses of PMS	3.253	2.420	3.555	
Operating years	2.253	2.248	2.329	
Organisation age	2.136	2.083	2.141	

Note: $n = 156$.

et al., 2019). In using cross-loadings, adequate discriminant validity is demonstrated if the measures for a construct load higher on the constructs they intend to measure than on other constructs. Chin (2010, pp. 671–673) further notes that to interpret cross-loadings, 'going down a particular construct column, you should expect to see item loadings to be higher than the cross loadings. Similarly, if you scan across a particular item row, you should expect to see that any item be more strongly related to its construct column than any other construct column. If this is found to be the case, the claim can be made for discriminant validity at the item level'. As shown in Appendix 2, all measures load higher on their intended constructs than the cross-loadings in the respective columns and rows, thereby providing some evidence of discriminant validity. A closer examination of the cross-loadings, however, shows that some cross-loadings were slightly more than 0.5. Chin (2010) argues that since the goal is to have a strong theoretical model in which constructs at the structural level are closely related, such high cross-loadings seem reasonable. He argues further that 'while a standardized loading 0.8 compared to a cross loading of 0.7 may raise concerns … providing squared results gives a more intuitive interpretation since it repre-

sents the percentage overlap between an item and any construct' (Chin, 2010, p. 674). For example, the item '*Inform1*' has a loading of 0.838 on the information sharing but cross-loads at 0.535 on the willingness to adapt to changes constructs. When these loadings are squared, '*Inform1*' has a shared variance of 70% with the information-sharing construct it intends to measure and only a 28.6% shared variance with the other construct (willingness to adapt to changes). This indicates that cross-loadings of about 0.5 may not pose serious threats to discriminant validity.

We also examined discriminant validity by comparing the square root of AVE with the correlations among the reflective constructs (Hair et al., 2019). In comparing the square root of AVE with correlations among constructs, discriminant validity is considered to be adequate if the square root of AVE is larger than the respective correlations between the constructs. The square root of AVE for each reflective construct is shown in Table 4 (Panel A) on the diagonal; the correlations between all constructs are shown in the off-diagonal. It can be concluded that discriminant validity for each construct is sufficient because the square roots of AVE for each reflective construct are larger than the respective correlation between the constructs. In addition, we assessed discriminant validity using the heterotrait–monotrait ratio (HTMT) of correlations for all reflective constructs. To demonstrate discriminant validity, HTMT values should be below 0.90 or more conservatively below 0.85 (Henseler et al., 2015). As shown in Table 4 (Panel B), the HTMT ratios for all constructs are lower than the 0.90 threshold, except for two pairs of first-order constructs of cooperation (restraint from use of power and willingness to adapt to changes; information sharing and joint problem-solving) that are marginally above 0.90. Classical test theory does not apply in the case of formative measurement models because these models do not assume correlations among the indicators (Chin, 2010; Hair et al., 2019). Instead, formative measurement models are assessed using the significance of factor weights and multicollinearity (Bedford, 2015; Chin, 2010; Hair et al., 2019). As reported in Table 3 (Panel B), the factor weights for all items measuring the interactive use of a PMS are all positive and significant at the 95% confidence level except for '*Interact5*', which is insignificant even though it has positive weight. Hair et al. (2019) recommends that in situations such as '*Interact5*', the item be retained if it loads significantly on the construct it is intended to measure. '*Interact5*' loads significantly (at the 99% confidence interval) on the interactive use of PMS construct and was thereby retained. In addition, we assessed each scale item of the interactive use of PMS construct for multicollinearity by examining their variance inflations factors (VIF). VIF values less than 5 indicate that multicollinearity is not a major concern (Hair et al., 2019). Table 3 (Panel B) shows that VIFs for all items measuring the interactive use of the PMS are in the range of 1.490–2.070, indicating that multicollinearity is not a threat. Overall, the PLS results provide confidence in the reliability and validity of the measurement model.

4.2 | Common method bias

Given that the data for this study were collected through a survey (and with perceptual measures), common method bias could have affected the results. To examine and address any possible concerns of common method bias, we implemented the single unmeasured method factor design in our PLS model (Liang et al., 2007; Mahama & Cheng, 2013; Podsakoff et al., 2003). We created a common method factor by using all scale items for the substantive (main) constructs in our model. This common method factor was then included in our PLS model to partial out any error variance in the measurement model (for details, see Liang et al., 2007 and Mahama & Cheng, 2013). In examining whether common method bias was a concern, we assessed (a) the statistical significance of factor loadings on both the method factor and substantive constructs, and (b) compared the percentage variance (measured as the squared values of the factor loadings) of each scale item explained by its substantive construct and by the common method factor. The results reported in Table 5 show insignificant loadings (except for one item) on the method factor.

TABLE 4 Discriminant validity

	Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Panel A: Fornell-Larcker criterion															
1	Willingness to adapt to changes	0.802													
2	Contract duration	0.111	1												
3	Contract size	0.165	0.254	1											
4	Cooperation	0.799	0.105	0.134											
5	Diagnostic uses of PMS	0.530	0.114	0.194	0.551	0.842									
6	Procedural fairness perception	0.683	0.102	0.109	0.771	0.640	0.763								
7	Industry	0.115	−0.099	−0.224	0.179	0.054	0.108	1							
8	Information sharing	0.630	0.085	0.147	0.846	0.415	0.611	0.188	0.797						
9	Interactive uses of PMS	0.601	0.101	0.246	0.702	0.743	0.725	0.146	0.630						
10	Operating years	−0.139	0.367	0.193	−0.092	0.036	−0.016	−0.016	−0.085	0.048	1				
11	Organisation age	−0.051	0.271	0.141	−0.051	0.082	−0.043	−0.025	−0.057	0.083	0.718	1			
12	Alliance performance	0.481	0.090	0.045	0.650	0.478	0.515	0.172	0.554	0.535	0.154	0.113	0.816		
13	Restraint from use of power	0.671	0.039	0.028	0.848	0.468	0.667	0.156	0.574	0.525	−0.052	−0.023	0.591	0.816	
14	Joint problem solving	0.560	0.125	0.125	0.830	0.456	0.621	0.121	0.645	0.603	−0.036	−0.047	0.541	0.607	0.795

	Construct	1	2	3	4	5	6	7	8	9	10	11	12
Panel B: Heterotrait-monotrait ratio (HTMT)													
1	Willingness to adapt to changes												
2	Contract duration	0.136											
3	Contract size	0.204	0.254										
4	Diagnostic uses of PMS	0.666	0.124	0.208									
5	Procedural fairness perception	0.874	0.109	0.117	0.742								
6	Industry	0.140	0.099	0.224	0.057	0.116							
7	Information sharing	0.864	0.100	0.173	0.529	0.781	0.222						

TABLE 4 (Continued)

	Construct	1	2	3	4	5	6	7	8	9	10	11	12
8	Operating years	0.172	0.367	0.193	0.043	0.079	0.016	0.098					
9	Organisation age	0.104	0.271	0.141	0.088	0.102	0.025	0.066	0.718				
10	Alliance performance	0.596	0.096	0.062	0.547	0.594	0.184	0.702	0.166	0.122			
11	Restraint from use of power	0.911	0.048	0.081	0.589	0.832	0.173	0.783	0.082	0.118	0.729		
12	Joint problem solving	0.773	0.148	0.155	0.581	0.796	0.144	0.912	0.118	0.149	0.687	0.829	

Note: $n = 156$; diagonal elements: square root of AVE; off-diagonal elements: correlations between constructs.

TABLE 5 Common method bias analysis with latent common method variance factor

	Scale items	Substantive factor loading (R1)	Variance explained by substantive factor ($R1^2$)	Method factor loading (R2)	Variance explained by method factor loading ($R2^2$)
Interactive uses of PMS	*Interact1*	0.699[a]	0.488	0.076	0.006
	Interact2	0.725[a]	0.526	0.011	0.000
	Interact3	0.568[a]	0.322	0.113	0.013
	Interact4	0.769[a]	0.591	−0.043	0.002
	Interact5	0.838[a]	0.703	−0.093	0.009
	Interact6	0.906[a]	0.821	−0.158	0.025
	Interact7	0.715[a]	0.512	0.094	0.009
Diagnostic uses of PMS	*Diag1*	0.838[a]	0.703	−0.020	0.000
	Diag2	0.823[a]	0.678	0.004	0.000
	Diag3	0.902[a]	0.813	−0.035	0.001
	Diag4	0.804[a]	0.646	0.051	0.003
Procedural fairness perception	*Fair1*	0.673[a]	0.452	0.097	0.009
	Fair2	0.730[a]	0.533	0.040	0.002
	Fair3	0.794[a]	0.631	0.085	0.007
	Fair5	0.735[a]	0.540	0.050	0.002
	Fair6	0.856[a]	0.732	−0.082	0.007
	Fair7	0.959[a]	0.920	−0.195	0.038
Information sharing	*Inform1*	0.887[a]	0.787	−0.054	0.003
	Inform2	0.970[a]	0.940	−0.175	0.031
	Inform3	0.502[a]	0.252	0.262	0.069
Restraint from use of power	*Rest1*	0.693[a]	0.480	0.039	0.001
	Rest2	0.930[a]	0.865	−0.060	0.004
	Rest3	0.810[a]	0.656	0.030	0.001
Joint problem solving	*Solve1*	0.794[a]	0.631	−0.040	0.002
	Solve2	0.894[a]	0.799	−0.052	0.003
	Solve3	0.692[a]	0.478	0.096	0.009
Willingness to adapt to changes	*Adapt1*	0.791[a]	0.626	−0.105	0.011
	Adapt2	0.866[a]	0.749	−0.013	0.000
	Adapt3	0.756[a]	0.571	0.100	0.010
Alliance performance	*Perf1*	0.767[a]	0.588	0.059	0.003
	Perf2	0.763[a]	0.582	0.068	0.005
	Perf3	0.836[a]	0.699	−0.026	0.001
	Perf4	0.894[a]	0.799	−0.106	0.011
	Perf5	0.823[a]	0.677	0.004	0.000
Average		0.794	0.641	0.001	0.009

Note: $n = 156$. According to Liang et al. (2007), the squared values of the method factor loadings are interpreted as the percent of indicator variance caused by common method factor, whereas the squared loadings of substantive constructs are interpreted as the percent of indicator variance caused by substantive constructs. They argue that 'if the method factor loadings are insignificant and the indicators' substantive variances are substantially greater than their method variances, we can conclude that common method bias is unlikely to be a serious concern' (p. 87). In Table 4, of our study, the method factor loadings are insignificant and the indicators' substantive variances are significantly greater than the variances of the method factor hence we consider common method bias not be a threat to our study.

[a]99% confidence level.

The percentage variances of the scale items explained by the substantive constructs (average variance = 0.641) are substantially greater than the percentage variances explained by the common method factor (average variance = 0.009). The ratio of substantive variance to common method variance is about 71:1. These results provide evidence that common method bias is unlikely to be a serious concern for this study (Liang et al., 2007).

In addition, the results of the PLS structural model (when the common method factor is included) are very similar to those of our substantive model, providing further evidence that our results are unlikely to be affected by common method bias. The results of the PLS structural model (when the common method factor is included) are reported in Appendix 3.

4.3 | Results of the structural model

The hypothesised relationships among constructs in the theoretical model were tested through the PLS structural model. In this model, we controlled for contextual factors, including contract duration, contract size, years contract has been operating, industry type and age of the respondent's organisation. Prior to reviewing the results, we assessed the regressions in the structural model for multicollinearity using the inner model VIFs. As shown in Table 3 (Panel C), all VIFs are below 5, demonstrating that multicollinearity is not a concern. We also assessed model predictiveness using R^2. The R^2 values for all the dependent variables in the structural model range from 0.506 to 0.660, indicating a good predictive model. Following this, we assessed the results for the hypotheses by examining the path coefficients and their statistical significance (using bootstrap confidence intervals). We first present the results for direct hypotheses and follow this with an examination of the results for the mediation hypotheses. Table 6 and Figure 2 summarise the results of the structural model. In Table 6, Panel A shows the results for direct relationships and Panel B shows the results for indirect relationships.

In Hypothesis 1a, we predicted a positive relationship between the interactive use of a PMS and procedural fairness perception, and this is supported by the results. As reported in Table 6 (Panel A), the path coefficient is positive ($\beta = 0.595$) for this relationship and significant at the 99% confidence level. Hypothesis 1b predicted a positive relationship between the diagnostic use of a PMS and procedural fairness perception. The path coefficient is positive ($\beta = 0.217$) for this relationship and significant at the 95% confidence level. Therefore, Hypotheses 1a and 1b are supported by the results.

Hypothesis 2a predicted a positive direct relationship between the interactive use of a PMS and cooperation. This hypothesis is supported with a positive path coefficient ($\beta = 0.320$) that is significant at the 99% confidence level. We also found an indirect relationship ($\beta = 0.333$; confidence interval = 99%) between the interactive use of a PMS and cooperation via procedural fairness perception (see Table 6, Panel B). In Hypothesis 2b, we predicted a positive direct relationship between the diagnostic use of a PMS and cooperation, but the results do not support a direct relationship. The path coefficient ($\beta = -0.060$) is not significant. Rather, the diagnostic use of the PMS is indirectly related ($\beta = 0.121$; confidence interval = 95%) to cooperation through procedural fairness perception (see Table 6, Panel B).

Hypothesis 3 predicted a positive relationship between procedural fairness perception and cooperation. As shown in Table 6 (Panel A), this hypothesis is supported with a positive path coefficient ($\beta = 0.555$) that is significant at the 99% confidence level. In Hypothesis 4, we predicted a positive relationship between procedural fairness perception and alliance performance. This hypothesised direct relationship is not supported. The path coefficient ($\beta = -0.133$) for this relationship is not significant (see Table 6, Panel A). We examined whether the relationship is indirect; the results confirmed a statistically significant specific indirect effect ($\beta = 0.348$; confidence interval = 99%) on alliance performance via cooperation. Hypothesis 5 predicted a positive relationship between cooperation and alliance performance. As reported

TABLE 6 PLS results

	Dependent variables		
	Procedural fairness perception	**Cooperation**	**Alliance performance**
Panel A: Direct effects Path coefficients, confidence interval (in parenthesis) and R^2			
Independent variables			
Interactive uses of PMS	0.595[a]	0.320[a]	0.112
	(0.400–0.828)	(0.017–0.678)	(−0.154 to 0.399)
Diagnostic uses of PMS	0.217[b]	−0.060	0.154[b]
	(0.022–0.385)	(−0.409 to 0.273)	(0.011–0.305)
Procedural fairness perception		0.555[a]	−0.133
		(0.329–0.729)	(−0.418 to 0.216)
Cooperation			0.627[a]
			(0.273–0.869)
Control variables			
Contract duration	0.056	0.068	−0.050
	(−0.043 to 0.137)	(−0.012 to 0.125)	(−0.152 to 0.044)
Contract size	−0.088	0.032	−0.111[b]
	(−0.193 to 0.015)	(−0.045 to 0.117)	(−0.201 to −0.012)
Industry	−0.005	0.089[b]	0.023
	(−0.106 to 0.079)	(0.016–0.164)	(−0.072 to 0.123)
Operating years	0.047	−0.160[a]	0.274[a]
	(−0.132 to 0.243)	(−0.328 to −0.0619)	(0.049–0.477)
Age of organisation	−0.150	0.042	−0.049
	(−0.342 to 0.011)	(−0.043 to 0.182)	(−0.173 to 0.115)
R^2	0.575	0.660	0.506

Path	**Path coefficient**	**Confidence interval**
Panel B: Indirect effects Path coefficients and bootstrap confidence intervals		
Interactive use of PMS → Procedural fairness → Cooperation	0.333[a]	0.227 to 0.454
Diagnostic use of PMS → Procedural fairness → Cooperation	0.121[b]	0.022 to 0.230
Procedural fairness → Cooperation → Alliance performance	0.348[a]	0.192 to 0.491
Interactive use of PMS → Procedural fairness → Cooperation → Alliance performance	0.207[a]	0.078 to 0.362
Diagnostic use of PMS → Procedural fairness → Cooperation → Alliance performance	0.076[b]	0.009 to 0.156
Interactive use of PMS → Procedural Fairness → Alliance performance	−0.079	−0.208 to 0.065
Diagnostic use of PMS → Procedural Fairness → Alliance performance	−0.029	−0.097 to 0.021
Interactive use of PMS → Cooperation → Alliance performance	0.201[b]	0.052 to 0.427
Diagnostic use of PMS → Cooperation → Alliance performance	−0.038	−0.216 to 0.109

Note: $n = 156$.

[a]99% confidence level.

[b]95% confidence level.

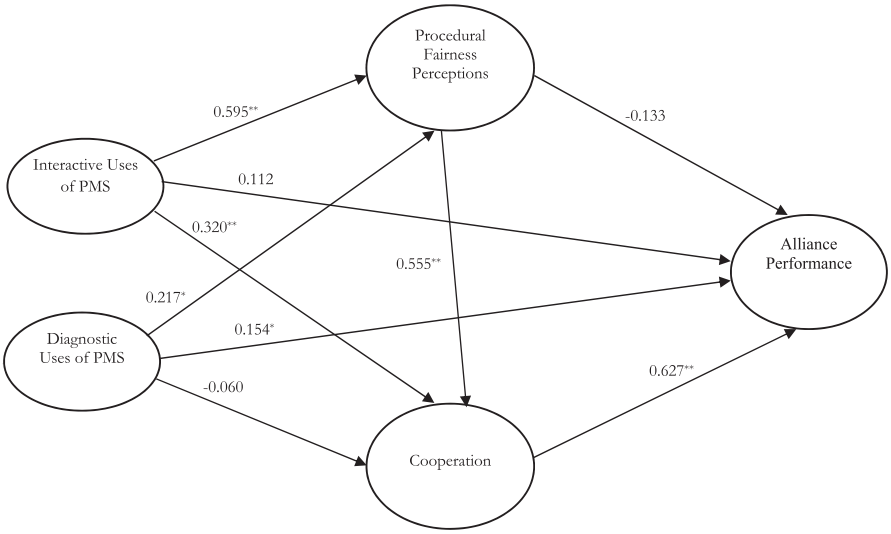

FIGURE 2 PLS structural model results. $n = 156$; **99% confidence level; *95% confidence level.

in Table 6 (Panel A), the path coefficient is positive ($\beta = 0.627$) and significant at the 99% confidence level.

We assessed the mediation hypotheses by following the procedure outlined in Nitzl et al. (2016). The mediation effect exists when the indirect effect is significant. If the indirect effect is significant but the direct effect is not, there is full mediation. However, if both the indirect and direct effects are significant, there is partial mediation. Hypothesis 6a predicted that procedural fairness perception and cooperation serially mediate the relationship between the interactive use of the PMS and alliance performance. This hypothesis is supported by the results. The indirect path coefficient is positive ($\beta = 0.207$) and significant at the 99% confidence level (see Table 6, Panel B). The direct effect ($\beta = 0.112$) as reported in Table 6 (Panel B) is insignificant, so the results suggest procedural fairness perception and cooperation have full serial mediation effect in the relationship between the interactive use of the PMS and alliance performance. In Hypothesis 6b, it was predicted that procedural fairness perception and cooperation serially mediate the relationship between the diagnostic use of the PMS and alliance performance. This hypothesis is supported. The indirect effect is positive ($\beta = 0.076$) and significant at the 95% confidence level (see Table 6, Panel B). The direct effect as shown in Table 6 (Panel A) is also significant ($\beta = 0.154$; confidence interval = 95%), which implies partial serial mediation.

In addition, we assessed the specific indirect effects of the two types of PMS use on alliance performance via each mediator separately. As reported in Table 6 (Panel B), there are no significant specific indirect effects of the two types of PMS use on performance through procedural fairness perception. However, the specific indirect effects of the interactive use of the PMS ($\beta = 0.054$) on alliance performance via cooperation is significant at the 95% level but the diagnostic use of the PMS has no significant specific indirect effect on alliance performance via cooperation (see Table 6, Panel B). In addition to the above results, these further analyses of the indirect effects suggest that cooperation is a significant conduit for the transmission of the effects of the two types of PMS use and procedural fairness perception to alliance performance. The analyses also add to the importance of the results for the serial mediation hypotheses (6a) and (6b), providing a process model of how the interactive and diagnostic uses of a PMS influence alliance performance.

5 | DISCUSSION AND CONCLUSION

This study investigated the relationships between two types of PMS use (interactive and diagnostic), procedural fairness perception and cooperation, and the associated effects on supply alliance performance. We developed a theoretical model to reflect our prediction of the relationships among these constructs and tested this model using the PLS approach to structural equation modelling. The results are important to the accounting and alliance literature because they highlight the significance of using a PMS interactively and diagnostically in order to encourage behaviours (e.g., procedural fairness perception and cooperation) that lead to better alliance performance. The study also contributes to the accounting literature that focuses on controls in inter-firm alliances.

First, our study provides strong empirical evidence on the behavioural and performance effects of interactive and diagnostic uses of controls (specifically, a PMS) in supply alliance settings. Our findings extend those of Anderson et al. (2015), who examine whether control frameworks developed to describe intra-organisational management controls are suitable for describing inter-firm management controls. While they find three control frameworks (including Simons' levers of control) to have descriptive validity in the inter-firm context, they suggest that a logical subsequent step should focus on establishing the predictive validity of these frameworks through the development and testing of hypotheses about their use. Our study contributes to that logical next step by providing evidence of the path through which the interactive and diagnostic uses of PMSs affects alliance performance. The support found for our hypothesised relationships also contributes to addressing Caglio and Ditillo's (2008) concern about using intra-organisational control frameworks in inter-firm alliances. Specifically, our findings underscore the importance of the interactive and diagnostic uses of a PMS in alliances.

Second, this study contributes to the accounting literature that examines the effects of controls on fairness perceptions. Some of these studies show that the diagnostic use of controls improves fairness perceptions in intra-organisational settings (Burney et al., 2009; Libby, 1999; Wentzel, 2002). In the inter-firm context, Wang and Dyball (2019) find support for the positive effects of social controls on fairness perceptions and how formal controls are negatively associated with fairness perception. Contrary to Wang and Dyball (2019), our study provides support for the positive effects of the interactive and diagnostic uses of a formal control (a PMS) on procedural fairness perception in alliances. The negative association in Wang and Dyball (2019) could be attributable to the nature of their formal control constructs. They theorise and measure the formal control to include broader categories of controls (such as contracts, planning and budgeting systems, standard operating procedures and supervision, among others); hence, the interaction among these controls could account for the negative association found. By explicitly examining the specific nature of types of use of controls (interactive and diagnostic) and by being specific about the particular type of formal control (i.e., the PMS), our study shows that formal controls significantly affect procedural fairness perception.

Third, our study contributes to the accounting literature that examines the link between controls and cooperation (Baiman & Rajan, 2002; Coletti et al., 2005; Dekker et al., 2013; Mahama, 2006; Salvato et al., 2017). In particular, the study extends that of Coletti et al. (2005), who examine, and find evidence of, the effects of using budget rewards on cooperation and the mediating role of cooperation in the relationship between the controls and trust in intra-organisational settings. Our findings of the positive direct impact of the interactive use of PMSs on cooperation supports those of Coletti et al. (2005). In addition, our findings show that procedural fairness perception is a conduit through which the interactive use of the PMS affects cooperation. Thus, our findings provide evidence of how the interactive use of PMSs directly and indirectly influences cooperation in inter-firm alliances. Further, this study contributes to the understanding of the path through which the diagnostic use of PMSs influences cooperation in inter-firm alliances. The diagnostic use of PMSs influences cooperation indirectly, rather than

directly, through procedural fairness perception. Overall, procedural fairness perception is an important mediator between the two types of PSM use and cooperation.

Fourth, we provide empirical evidence of the mediating roles of procedural fairness perception and cooperation in the relationship between the two types of PSM use (interactive and diagnostic) and alliance performance. While we do not find direct effects of the interactive use of the PMS on alliance performance, our results show that the effects of the interactive use are transmitted serially through procedural fairness perception and cooperation to alliance performance. In addition, we provide insights into how procedural fairness perception and cooperation serially mediate the effects of the diagnostic use of a PMS on alliance performance. The findings underscore the significance of cooperation as a precursor to alliance performance, given it was key in the transmission of the effects of the two types of PSM use and procedural fairness perception to alliance performance. In particular, the study provides a process model that explains the pathways through which the interactive and diagnostic uses of PMSs influence alliance performance.

In addition, this study's practical contribution is that it provides managers with knowledge about how a PMS is used in alliances. Given that the ultimate objectives of organisations engaged in supply alliances are to maintain a fair and stable cooperative environment and to maximise firm performance, the results of this study show that using a PMS interactively and diagnostically is important in realising these potential benefits. Thus, this study offers managers who are dealing with supply alliances a management control approach that can improve procedural fairness perception, cooperation and alliance.

Although these results provide useful information about the effects of the interactive and diagnostic uses of a PMS on partners' behaviours and how that translates into alliance performance, the results need to be interpreted with several limitations in mind. There is the inherent limitation of using a survey as the data collection method. Self-rated survey instruments are subject to common method bias. Although we conducted tests that suggest that common method bias is unlikely to be a serious threat in this study, we are unable to conclusively rule out its effects. In addition, although prior studies suggest that collecting alliance data from an individual informant may be valid (Dess & Robinson, 1984; Ding et al., 2013; Geringer & Hebert, 1991), the study would have benefited more from collecting data from both partners. Further, our model does not capture the cost of control uses. This could potentially affect the interpretation of the benefits of the types of PMS use. Last, this study investigated supply alliances across various industries with the aim of maximising the generalisability of the results. However, the internal validity of the results may be compromised.[6]

Accordingly, future research could extend the findings of this study in several ways. First, future studies can use more objective performance measures, such as revenues, gross profits and customer feedback, instead of perceived performance measures when studying control uses in inter-firm alliances. Second, this study tests the role of controls by focusing on a particular type: the PMS. There are other types of controls, including budgets, incentive systems/reward structures, strategic planning, group norms, behavioural and social controls (Collier, 2005; Dekker, 2004). Future research should explore the effects of these other controls in alliances. Third, prior studies suggest that alliance and partner firm culture, management style, institutional environment and 'timing' of the alliance may have significant implications for alliance operation, management and performance. To mitigate the effects of these factors on our results, we attempted to collect data from alliances that all originate from, and operate in, the same country (i.e., the US) because alliances and partner firms from the same country are similar in terms of these factors. In addition, we included control variables, such as industry, size and duration of alliances, and years of operation since the beginning of alliances, in our model. Despite these efforts, we cannot entirely rule out the effects of these factors on our findings.

[6]Ittner et al. (2003) argue that a single industry analysis has a higher (lower) internal validity (generalisability) compared with a multi-industry analysis.

It would be worthwhile for future research to include specific measures for these factors and examine how these factors may affect the findings of our study. Fourth, this study was built on a single-firm point of view in alliances. It would be very interesting if future research could draw upon all counterparties' (buyers and suppliers) perspectives and match their perceptions to examine the effects of shared perceptions in alliances.

ACKNOWLEDGEMENT

Open access publishing facilitated by Australian National University, as part of the Wiley - Australian National University agreement via the Council of Australian University Librarians.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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How to cite this article: Mahama, H. & Wang, Z. (2023) Impact of the interactive and diagnostic uses of performance measurement systems on procedural fairness perception, cooperation and performance in supply alliances. *Accounting & Finance*, 63, 3253–3296. Available from: https://doi.org/10.1111/acfi.13046

APPENDIX 1

SURVEY QUESTIONS AND THEIR DESCRIPTORS

Interactive uses of performance measurement system
The response scale for the following items ranged from 1 (not at all), to 7 (to a great extent).
To what extent do you and your alliance partner currently use performance measures to:
Interact1: Enable discussion in your supply alliance meetings.
Interact2: Enable continual challenge and debate underlying data, assumptions and action plans related to supply alliance.
Interact3: Provide a common view of the supply alliance.
Interact4: Tie the supply alliance partners together.
Interact5: Enable the supply alliance partners to focus on common issues.
Interact6: Enable the supply alliance partners to focus on critical success factors.
Interact7: Develop a common vocabulary in the supply alliance.

Diagnostic uses of performance measurement system
The response scale for the following items ranged from 1 (not at all), to 7 (to a great extent).
To what extent do you and your alliance partner currently use performance measures to:
Diag1: Track supply alliance progress towards supply alliance goals.
Diag2: Monitor alliance results.
Diag3: Compare supply alliance outcomes to supply alliance expectations.
Diag4: Review key measures used in supply alliance.

Procedural fairness perceptions
The response scale for the following items ranged from 1 (very unfair), to 7 (very fair).
How would you rate the fairness of the following procedures in the supply alliance:
Fairness1: The procedures used in supply alliance meetings and decision-making processes in these meetings.
Fairness2: The procedures the partners use in formulating and structuring the supply alliance.

Fairness3: The procedures used in planning, organising, and managing supply alliance activities.

Fairness4: The procedures used to govern knowledge or resource sharing between supply alliance partners.

Fairness5: The procedures for executing strategic decisions, including the clarity of their definition and consistency of their performance.

Fairness6: All partners' administration and monitoring of contract execution.

Fairness7: All partners' administration and monitoring of the implementation of strategic decisions.

Cooperation

The response scale for the following items ranged from 1 (strongly disagree), to 7 (strongly agree).

To what degree do you agree with the following statements about your alliance relationship?

Information sharing

Inform1: In this relationship, any information that might help other partner(s) will be provided to them.

Inform2: We keep each other informed about events or changes that may affect the other supply alliance partners.

Inform3: We share information about the supply alliance.

Joint problem solving

Solve1: In most aspects of this supply alliance we are jointly responsible for getting things done.

Solve2: We treat problems that arise in the course of this supply alliance as a joint rather than individual responsibility.

Solve3: We jointly solve problems when they arise in this supply alliance.

Willingness to adapt to changes

Adapt1: When some unexpected situation arises, we would rather work out a new deal than hold each other to the original terms of the contract.

Adapt2: It is expected that we will be open to modify our agreement if unexpected events occur.

Adapt3: We are willing to adapt to changes if unexpected events occur.

Restraint from use of power

Restraint1: We feel it is important not to use any proprietary information to other partner(s)' disadvantage.

Restraint2: We expect that neither party will make demand that might be damaging to the other.

Restraint3: We restrain from taking advantage of each other in this supply alliance.

Alliance performance

The response scale for the following items ranged from 1 (strongly disagree), to 7 (strongly agree).

Relative to your expectations, your relationship with the supplier has led to:

Perf1: Improved service quality.

Perf2: Improved product quality.

Perf3: Cost savings.

Perf4: On time delivery.

Perf5: High quality decision making.

APPENDIX 2

CROSS LOADINGS

Latent construct	Scale items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Diagnostic uses of PMS	Diag1	**0.820**	0.515	0.340	0.406	0.325	0.463	0.349
	Diag2	**0.829**	0.506	0.391	0.378	0.404	0.424	0.463
	Diag3	**0.873**	0.571	0.330	0.341	0.371	0.454	0.390
	Diag4	**0.845**	0.562	0.335	0.451	0.431	0.446	0.405
Procedural fairness perceptions	Fair1	0.466	**0.761**	0.554	0.544	0.435	0.604	0.388
	Fair2	0.512	**0.770**	0.431	0.496	0.447	0.514	0.450
	Fair3	0.377	**0.714**	0.531	0.487	0.513	0.482	0.398
	Fair5	0.595	**0.774**	0.414	0.508	0.485	0.501	0.375
	Fair6	0.540	**0.776**	0.415	0.471	0.539	0.493	0.393
	Fair7	0.432	**0.781**	0.450	0.548	0.423	0.529	0.349
Information sharing	Inform1	0.321	0.494	**0.838**	0.515	0.525	0.535	0.420
	Inform2	0.293	0.417	**0.818**	0.439	0.506	0.403	0.452
	Inform3	0.374	0.544	**0.730**	0.413	0.506	0.558	0.450
Restraint from use of power	Rest1	0.397	0.457	0.376	**0.719**	0.421	0.528	0.413
	Rest2	0.419	0.585	0.507	**0.880**	0.519	0.566	0.460
	Rest3	0.337	0.581	0.511	**0.839**	0.536	0.549	0.566
Joint problem solving	Solve1	0.320	0.419	0.566	0.384	**0.761**	0.432	0.424
	Solve2	0.423	0.565	0.485	0.499	**0.845**	0.438	0.385
	Solve3	0.343	0.493	0.491	0.558	**0.767**	0.466	0.479
Willingness to adapt to changes	Adapt1	0326	0.516	0.368	0.435	0.327	**0.692**	0.289
	Adapt2	0.478	0.597	0.534	0.545	0.474	**0.855**	0.365
	Adapt3	0.455	0.535	0.587	0.616	0.525	**0.848**	0.484
Alliance performance	Perf1	0.433	0.465	0.500	0.445	0.394	0.433	**0.813**
	Perf2	0.447	0.431	0.495	0.527	0.469	0.381	**0.819**
	Perf3	0.335	0.443	0.385	0.480	0.456	0.378	**0.813**
	Perf4	0.335	0.370	0.437	0.479	0.423	0.320	**0.810**
	Perf5	0.395	0.389	0.437	0.480	0.464	0.447	**0.827**

Note: The bold values represent the coorelation between a measurement item and a given (sub)construct it intends to measure. All factor loadings are significant at the 99% confidence level.

APPENDIX 3

PLS STRUCTURAL MODEL (WITH LATENT COMMON METHOD FACTOR INCLUDED) RESULTS

	Dependent variables		
Independent variables	**Procedural fairness perception**	**Cooperation**	**Alliance performance**
Interactive uses of PMS	0.557[a]	0.312[b]	0.039
	(0.350–0.851)	(0.059–0.554)	(−0.159 to 0.215)
Diagnostic uses of PMS	0.250[a]	−0.058	0.182[b]
	(0.061–0.414)	(−0.337 to 0.212)	(0.050–0.340)
Procedural fairness perception		0.562[a]	−0.113
		(0.338–0.762)	(−0.337 to 0.132)
Cooperation			0.645[a]
			(0.304–0.865)
R^2	0.563	0.658	0.501

Note: $n = 156$.

[a]99% Confidence interval.

[b]95% Confidence interval.