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# **Relational resources for innovation ambidexterity within coopetitive relationships: The contingent role of managerial ambidexterity**

## **Abstract**

**Purpose** – While the performance benefits of relational resources and managerial ambidexterity have been widely discussed in coopetition literature, there is only limited evidence that illustrates the underlying relationships between these relational resources and managerial ambidexterity. Against this background, this paper investigates how managerial ambidexterity moderates the innovation ambidexterity effects of relational resources (i.e., reciprocal investments and complementary resources).

**Design/Method/Approach** – We forward various hypotheses that are grounded within the theoretical tenets of the relational view and the dynamic capabilities perspective. To test the hypotheses, we use survey data provided by 313 firms that pursue horizontal coopetition relationships.

**Findings** – The research findings offer important insights in that while reciprocal investments lead to innovation ambidexterity, complementary resources do not result in such benefits. Additionally, managerial ambidexterity complements the relational resources to develop innovation ambidexterity if and only if both managerial exploration and exploitation are applied simultaneously.

**Originality** – As opposed to widely-held beliefs, we find that firms' use of complementary resources is not likely to lead to innovation ambidexterity even though such resources can help in developing strong relationships. In addition, although often overlooked, managerial ambidexterity plays a vital role in transforming relational resources into useful innovations for firms involved in coopetition relationships. It is crucial for firms that their managers balance their ambidextrous activities of exploration and exploitation so as to develop innovation ambidexterity.

**Key words** Reciprocal investments, complementary resources, managerial ambidexterity, manager's exploration, manager's exploitation, innovation ambidexterity

**Paper type** Research paper

# **Relational resources for innovation ambidexterity within coopetitive relationships: The contingent role of managerial ambidexterity**

## **1. Introduction**

Collaboration between competitors, termed coopetition, is becoming a popular form of relationship in recent years (Durach *et al.*, 2020; Gnyawali and Charleton, 2018; Sodhi and Tang, 2021). This popularity is attributed, in part, to its ability to allow coopetitors (i.e., firms pursuing coopetition) to balance challenging business environments on the one hand (Bouncken *et al.*, 2018; Sodhi and Tang, 2021), and to develop innovations and a competitive advantage on the other (Ritala and Hurmelinna-Laukkanen, 2013; Gnyawali and Charleton, 2018; Seepana *et al.*, 2020). Given the growing resource-specific challenges associated with supply chains induced by pandemics and socio-political instabilities (Sodhi and Tang, 2021), recent OM studies acknowledge an impending need to embrace coopetition to offset resource-specific challenges and to create win-win outcomes for supply chain partners (Wilhelm and Sydow, 2018; Durach *et al.*, 2020; Sodhi and Tang, 2021). The widely acknowledged view to adopt coopetition is attributed to its underlying ability to enable firms to share resources and investments to optimise their use for competitive advantage while mitigating the potential risks of resource failure (Gnyawali and Park, 2011; Gnyawali and Charleton, 2018; Durach *et al.*, 2020).

Although the role of knowledge sharing between coopetitors as a key source of innovation has received wider empirical attention (Ritala and Hurmelinna-Laukkanen, 2013; Bouncken *et al.*, 2018), the theoretical discourse on other important relational resources such as reciprocal investments and complementary resources has received rather insufficient empirical consideration within coopetition research (Sodhi and Tang, 2021). It is important to comprehend the implications of coopetitors' reciprocal investments and complementary

resources for innovation development since the tenets of the relational view allude that reciprocal investments and complementary resources possess similar potential for generating relational rents (Dyer and Singh, 1998; Dyer *et al.*, 2018). Assuming this inherent potential for relational rents, Dyer *et al.* (2018) acknowledges the need to specifically examine each of these resources to explicitly capture their effects in greater detail within strategic relationships such as coopetition. To this extent, following the theoretical debates of coopetition research (Luo, 2007; Gnyawali and Park, 2009; Hoffmann *et al.*, 2018; Durach *et al.*, 2020) as well as OM studies (e.g., Durach and Machuca, 2018; Srivastava *et al.*, 2017) on the significance of relational resources for strategic relationships, the first objective of this study is to specifically look at the effects of coepetitors' relational resources (i.e., complementary resources and reciprocal investments) on innovation ambidexterity.

Coopetition is often viewed as an ambidextrous form of relationship due to the simultaneity of cooperation and competition embedded within the relationship (Seepana *et al.*, 2020; Makhashen *et al.*, 2020). Scholars who focus on ambidextrous forms of relationships as well as innovations have been drawn to the notion of managerial ambidexterity (O'Reilly III and Tushman, 2011; Turner *et al.*, 2018; Seepana *et al.*, 2020). In particular, recent OM studies have advised on the need to develop managerial ambidexterity to respond to growing supply chain complexities (Turner *et al.*, 2018; Aslam *et al.*, 2018) in that managers could explore solutions and simultaneously exploit existing knowledge to benefit their firms, whereas the use of only either of these is less likely to address the challenges (Turner *et al.*, 2018). A growing body of coopetition research further suggests that managerial ambidexterity can be viewed as a capability which could allow managers to think and act ambidextrously to deal with supply chain resource challenges (Wilhelm and Sydow, 2018) as well as reconfigurations (Seepana *et al.*, 2020). However, as much as coopetition literature debates the significance of managerial ambidexterity, it lacks both clarity and evidence in explaining the extent to which ambidextrous

managers can transform firms' complementary resources and investments into innovations. Accordingly, the second objective is to investigate the moderating role of managerial ambidexterity on the relationship between relational resources and innovation ambidexterity.

In summary, the paper empirically addresses important associations between coopetitors' investments, complementarities, and managerial ambidexterity. The conceptual model along with the proposed hypotheses is depicted in Figure 1. The results of the study offer several important implications for both the OM and coopetition literature. *First*, our study suggests that coopetitors' reciprocal investments lead to the development of innovation ambidexterity whereas their complementary resources are less likely to be beneficial for innovations. This is an interesting finding given that both the OM (Sodhi and Tang, 2021; Seepana *et al.*, 2021) and coopetition (Gnyawali and Park, 2011; Hoffmann *et al.*, 2018) literature consider reciprocal investments and complementarities to be as beneficial for innovations as other relational resources such as knowledge sharing. Specifically, the counterintuitive finding regarding complementarities suggests that they do not benefit the development of innovation ambidexterity; this contrasts with existing beliefs within traditional interfirm relationships that suggest significant benefits instead (Durach and Machuca, 2018; Srivastava *et al.*, 2017). *Second*, there is little focus on quantitatively examining the ability of managerial ambidexterity (Raisch and Birkinshaw, 2008), particularly within ambidextrous relationships (Turner *et al.*, 2018; Blome *et al.*, 2013; Souza-Luz and Gavronski, 2020), in influencing the firm's resources for superior performance benefits. OM scholars, in particular, seek to understand the importance of managers in the development of ambidextrous forms of organisations including their supply chains to bring success to firms (Blome *et al.*, 2013; Turner *et al.*, 2018). Within the coopetition context, our study showcases the vital role played by managerial ambidexterity in facilitating innovation ambidexterity.

*Finally*, this paper holds particular importance given that it addresses OM calls on the need to perform cross-disciplinary research by combining different elements of strategy and operations (Anand and Gray, 2017; Hitt *et al.*, 2016). For instance, ‘operations strategy’ literature was essentially a result of integrating theories from strategy and operations management (Anand and Gray, 2017; Halldórsson *et al.*, 2015). Moreover, it is argued that cross-disciplinary research between OM and other disciplines would help in reimagining inter-organizational and network relationships differently so as to not only address the growing supply chain challenges but to also help develop innovative solutions (Touboulic *et al.*, 2020). By bridging the concepts of strategy (i.e., cooperation and managerial ambidexterity) and OM (interfirm relationships, and resources and investments) disciplines, the theorization as well as practical implications of our research help to validate the existing notions on how they both can complement each other to create new knowledge for the OM discipline.

-- Insert Figure 1 --

## **2. Theory and hypotheses development**

### **2.1 Relational resources, managerial ambidexterity, and innovation ambidexterity**

This study views complementary resources and reciprocal investments to be part of a higher order theoretical construct of relational resources. As for complementary resources, a firm’s complementary resources are primarily developed internally with an intent to create collaborative value as well as resource synergies by combining them with a relevant set of resources of a partner (Gnyawali and Park, 2009). Complementary resources are mainly generic in nature in that they tend to include skills such as management, design and co-development, as well as other firm-level strengths that possess a limited ability on their own but could develop a competitive advantage by combining with other resources of the partner firms (Dyer *et al.*, 2018; Lambe *et al.*, 2002). The utilization of complementary resources is

likely to be more effective in cooperative relationships due to similarities in competitors' industry and product-market backgrounds (Lane and Lubatkin, 1998; Ritala *et al.*, 2014) which could help transform complementarities into higher order benefits. Consistently, scholars argue that partners could foresee opportunities wherein the application of their distinct complementary resources, for instance, technical resources, becomes an essential tool to create resource synergies so as to exploit the opportunities (Emden *et al.*, 2006). As for reciprocal investments, it refers to competitors' investments in each other's relation-specific assets such as manufacturing plants, operating processes, technologies, and human resources so as to develop interdependencies, strengthen each other's capabilities, and to eventually create joint value (Bakshi and Kleindorfer, 2009; Gnyawali and Park, 2011). For instance, in the Sony-Samsung competition, Sony's complementary strengths of precision, technologies, and high quality standards helped to push Samsung's television display panel development ahead of other competitors. Similarly, both Sony and Samsung reciprocally invested over USD 6 billion in building display panel manufacturing plants, operating processes, and managerial teams to develop new innovative products at the same time (Gnyawali and Park, 2011). Thus, it is plausible to argue that complementary resources and reciprocal investment of competitors could likely play an important role in the development of ambidextrous innovations. However, extant competition literature provides little evidence on the extent of these effects.

This study considers innovation performance in an ambidextrous form – innovation ambidexterity, which refers to the development of a combination of incremental and radical innovations because of a firm's involvement in cooperation. This definition is adapted to the cooperation context from Lin *et al.* (2013). Our rationale for viewing innovation in an ambidextrous form rather than viewing them separately (i.e., incremental and radical) is inspired by extant literature that suggests that succeeding in the long term requires firms involved in ambidextrous relationships to undertake incremental and radical innovations

simultaneously (Lin et al., 2013; Strese et al., 2016). Innovation ambidexterity is also viewed as a combination of exploratory and exploitative innovations in extant research (Kortmann, 2015; Zhang et al., 2016). Irrespective of the divergent conceptualizations, the essence of the construct is to capture the simultaneous pursuit of developing both new products and processes (radical innovation) as well as improving existing products and processes (incremental innovation). Although the concept of innovation ambidexterity is still emerging (Zhang et al., 2016), the application of it is very much new to both the cooperation as well as OM literature. In this study, we focus on innovation ambidexterity at a firm-level that is resultant of a firm's involvement in a cooperative relationship. Pursuit of innovation ambidexterity is more relevant to our research setting in that partners simultaneously cooperate and compete for complementarities and investments and employ managerial ambidexterity to investigate the realization of ambidextrous innovations. This is consistent with claims that the prospect of innovation ambidexterity is particularly relevant in cooperation due to an amalgamation of partners' strategic resources and capabilities (Strese et al., 2016). For instance, cooperation between Samsung and Sony led to the development of innovative new generation TV display panels (Bouncken *et al.*, 2018; Gnyawali and Park, 2011). At the same time, it is reasonable to suggest that both firms could have attained incremental benefits to their products/markets in the same period rather than realising such benefits once the TV display panel technology inventions were attained. Despite theoretical discourse suggesting these potential links, little is known from both the OM and cooperation literature about both the extent as well as materialization of these effects.

This study views managerial ambidexterity as managers' skillset that allows the managers to simultaneously pursue activities of both exploration and exploitation (Hodgkinson *et al.*, 2017; O'Reilly III and Tushman, 2011; Mom *et al.*, 2007). Exploration activities are meant to broaden managers' existing knowledge; the nature of these activities focus on



discovering, learning, creating product or process renewals, and experimenting with new opportunities (Mom *et al.*, 2007; Seepana *et al.*, 2020). Managers' exploitation activities focus on refining their existing knowledge (Mom *et al.*, 2007; Mom *et al.*, 2009); these activities lead to improving current knowledge, implementing and expanding existing competencies, products or processes (March, 1991; Seepana *et al.*, 2020). Managerial ambidexterity is argued to be particularly relevant for coopetition (Seepana *et al.*, 2020) to transform resource and capability combinations (Blome *et al.*, 2013; Turner *et al.*, 2018; Souza-Luz and Gavronski, 2020) into potential performance benefits. Given the significance that extant coopetition and OM literature adds to the managerial ambidexterity in addressing performance related challenges (Seepana *et al.*, 2020; Turner *et al.*, 2018), the empirical investigation of its effects could help to not only validate the theoretical discourse but could offer clarity on the extent of its benefits.

## **2.2 Direct effects of relational resources**

The tenets of the relational view reveal that interfirm relationships represent a crucial form of relation-specific investments that can contribute to extensive resource and information flows between partners so as to improve their performance benefits (Dyer and Singh, 1998). These tenets also add that the overall quality of outcomes of a given interfirm relationship is dependent on the extent to which both the partners agree to invest in their relationship (Dyer *et al.*, 2018; Hofman *et al.*, 2017; Bouncken *et al.*, 2020). Additionally, the relational view also emphasizes that reciprocal investment is one of the essential factors that defines the success of a given relationship (Dyer and Singh, 1998; Dyer *et al.*, 2018) as it can support investments as well as the training needs of individuals/teams to pursue R&D activities for innovation development and to share underlying risks (Gnyawali and Charleton, 2018).

Consistent with the tenets of the relational view, coopetition literature views reciprocal investments to be a major determinant for firms involved in cooperative relationships (Gnyawali and Park, 2011; Bakshi and Kleindorfer, 2009; Durach *et al.*, 2020). The underlying

rationale is that such investments could lead to asset interconnectedness and mutual hostage on the one hand and relational rents such as innovations on the other (Gnyawali and Charleton, 2018). Given that innovations are characterized by high amounts of risk, partners' investments in each other's human, processes, and other physical assets could not only reduce the cost of potential product/market failure, but also enable them to strive towards an equilibrium of value creation (Bouncken *et al.*, 2020). Importantly, the leveraging abilities of coopetitors to maintain similar processes and target product markets could ensure the certainty of the development of various innovations (Gnyawali and Park, 2011; Bouncken *et al.*, 2020) that include both incremental and radical. Additionally, the investments in each other's facilities, training each other's teams, and reconfiguring their operating processes can improve the potential for realisation of innovations (Gnyawali and Park, 2011; Gnyawali and Charleton, 2018). For instance, coopetitors' pooling of investments could help reduce costs associated with acquiring various components and the overall cost of product development (Li and Zhao, 2021), thereby, enabling efficiencies in innovation development. However, the reduced cost in obtaining various components might allow partners to optimise and reconfigure/recombine their resource base to develop not only existing (i.e., incremental) but also new products/services (i.e., radical) at both the relational and the firm level at the same time (Li and Zhao, 2021). Accordingly, it is plausible to argue that coopetitors' reciprocal investments likely lead to both incremental and radical innovations concurrently. Therefore:

*H1a: Coopetitors' reciprocal investments are positively associated with the development of innovation ambidexterity.*

The proponents of the relational view suggest that the development of relational rents requires firms to use their competencies in combination with that of their partners (Dyer and Singh, 1998; Dyer *et al.*, 2018). Dyer and Singh (1998) further adds that partners' resources could provide a higher proportion of competitive advantage when used in combination, as improved

performance outcomes are generally a result of combinations of various complementarities. However, scholars also caution that all the complementary resources are not necessarily helpful in developing innovations and that this is contingent upon the type of complementary resource (Teece, 1986) such as either specialized technical or non-technical, and the type of activities for which the complementary resources are being exchanged (Luo, 2007; Hess and Rothaermel, 2011) such as either R&D activities or sales. Thus, extant literature indicates that the potential for generic and less specialized resources to lead to innovations is marginal.

OM literature consistently maintains that the sharing of complementary resources between partners could lead to resource synergies and likely result in various performance benefits (Vickery et al., 2010; Malhotra and Mackelprang, 2012; Srivastava et al., 2017). Similarly, extant coopetition research alludes that accessing partners' complementary resources can enable firms to develop in-learning, market knowledge, and trust (Luo, 2007; Kraus *et al.*, 2018). Consequently, complementarities are viewed as useful resources that can assist in the development of innovations within a coopetition setting (Gnyawali and Park, 2009; Kraus *et al.*, 2018). However, the views that the extant coopetition literature express on complementarities lack a critical perspective on the various aspects in which complementary resources could lead to innovation development. For instance, strategic alliance literature suggests that complementary resources are 'general purpose' resources that are difficult to be protected/patented and thus they do not necessarily lead to innovations (Hidding *et al.*, 2008). In particular, such complementary resources are said to be neither sufficiently specialised to help innovation development nor are the innovations in question dependent on such resources (Hess and Rothaermel, 2011; Teece, 1986). Additionally, in high-technology environments, focal firms that invite partners to form strategic relationships to share complementary resources risk losing advantage of their complementarities to partners that possess superior specialized resources (Hidding *et al.*, 2008) potentially due to competitors' higher relative absorptive

capabilities (Lane and Lubatkin, 1998; Ritala *et al.*, 2014). Thus, not only could the complementarities impact the focal firm's competitive advantage but also the sharing of complementarities could reduce the opportunities for developing significant innovations. This is particularly relevant to coopetitive relationships. For instance, Sony has established strategic relationships with competitor firms such as Samsung, Hitachi, Toshiba, and Panasonic since the year 2007. Sharing of various complementary resources such as technical skills that cannot be formally protected between these firms may have contributed to Sony not only registering a gradual decrease in their market share (Li and Qian, 2018) but also may have led to a reduction in their innovation development over the years compared to competitors such as Samsung. Therefore, we theorize that the increase in coopetitors' access to each other's complementary resources could rather lead to a decrease in their potential to generate innovations. Accordingly:

*H1b: Coopetitors' complementary resources are negatively associated with the development of innovation ambidexterity.*

### **2.3 Significance of managerial ambidexterity**

On one hand, OM literature outlines various firm level managerial skills and capabilities that supply chain managers tend to employ in practice. These include decision-making and leadership styles (Azadegan *et al.*, 2021), resource integration, reconfiguration, learning, and financial management capabilities (Essex *et al.*, 2016), human resource management skills, supply chain activity management skills (van Hoek *et al.*, 2002; Rahman and Qing, 2014; Ellinger and Ellinger, 2014), and IT skills (Jordan and Bak, 2016), among others. These various skills are argued to assist managers to develop necessary abilities to identify potential opportunities and address supply chain challenges innovatively (Ojha *et al.*, 2018). On the other hand, recent OM literature suggests that the managers involved in complex supply chains are deemed to pursue skills that allow them to engage in often opposite activities e.g., exploration

and exploitation (Turner *et al.*, 2018; Aslam *et al.*, 2018). The underlying argument is that growing supply chain complexities require managers to possess ambidexterity using which they are expected to execute two critical activities – for instance, exploration of opportunities on the one hand while simultaneously exploiting the resources to benefit their firms on the other (Aslam *et al.*, 2018; O'Reilly III and Tushman, 2011). Following the extant literature, we argue that it is necessary to study the application of such managerial ambidexterity due to (1) managerial ambidexterity being considered as a key antecedent to organizational ambidexterity (Raisch and Birkinshaw, 2008; Souza-Luz and Gavronski, 2020) and OM scholars specifically arguing for managerial ambidexterity to be suitable to manage complex supply chain challenges (Aslam *et al.*, 2018; Ojha *et al.*, 2018), (2) coopetition being an ambidextrous form of relationship is argued to benefit firms when managerial ambidexterity is employed (Lundgren-Henriksson and Kock, 2016; Seepana *et al.*, 2020), and (3) coopetition literature consistently draws parallels between exploration and exploitation aspects of ambidexterity and the cooperation and competition aspects of coopetition (Seepana *et al.*, 2020; Makhashen *et al.*, 2020) and suggests that managers' pursuit of simultaneous exploration and exploitation activities is likely to play a crucial role in resource configuration in order to manage the cooperative activities of their respective firms (Seepana *et al.*, 2020). Despite this growing theoretical support, the practice of how managerial ambidexterity could transform resources into competitive advantage within ambidextrous relationships is yet to be uncovered. Additionally, since the research on the implications of managerial ambidexterity on relational resources is scarce in both OM as well as coopetition research (Seepana *et al.*, 2020; Ojha *et al.*, 2018) uncovering the moderating effects of managerial ambidexterity on relational resources and innovation ambidexterity has the potential to add new knowledge to OM.

### **2.3.1 Moderating effects of managerial ambidexterity**

Managerial ambidexterity is viewed through the lens of dynamic capabilities perspective as its proponents imply that in order to attain ambidextrous outcomes, firms need managers who can accomplish ambidextrous activities (O'reilly and Tushman, 2008; Seepana *et al.*, 2020). Both the complementary resources and investment deployments within and across a relationship require managers to explore product-market opportunity fit to develop prospects for performance benefits and at the same time exploit existing resource and investment combinations to improve efficiencies so as to benefit their supply chains (Sirmon and Hitt, 2009; Rojo Gallego Burin *et al.*, 2020). These practices and activities, nonetheless, are unambiguously advocated in the dynamic capabilities perspective in that they suggest such activities to be a part of 'asset orchestration'. Asset orchestration expects managers to explore selected resource and investment combinations and deploy them for reconfiguration on one hand, and exploit internal as well as externally acquired resource competencies using various managerial practices on the other hand, in order to achieve performance benefits (Helfat *et al.*, 2007). Additionally, the paradigm of dynamic capabilities is argued to help explicate the strategic role played by managers in business transformations (Augier and Teece, 2009; Helfat and Martin, 2015). For instance, the proponents of the dynamic capabilities perspective comprehend the processes of opportunity sensing, seizing, and transformation as important aspects for strategic renewal (Teece *et al.*, 1997). By likening the sensing and seizing abilities of dynamic capabilities with the exploration and exploitation activities of managers, managerial ambidexterity is expected to play a significant role in sensing or exploring opportunities and seizing or exploiting such opportunities using necessary complementarities and other organisational assets to derive value for their firms (Augier and Teece, 2009; O'Reilly III and Tushman, 2011; Seepana *et al.*, 2020). For coopetitors, outside resources can come in the form of the partner's complementarities and investments to develop successful innovations

(Ritala and Hurmelinna-Laukkanen, 2013). Given the significant complexities involved in coopetition due to similarities in partners' product and market areas and the higher relative absorptive capacities that allow easier spillovers of resources between partners, there is a higher motivation for firms to deploy more of managerial ambidexterity to capture outside resources and investments and simultaneously transform them for both alliance as well as firm-level benefits (Seepana *et al.*, 2020). For instance, coopetitors tend to divide exploration activities (cooperation-specific) and exploitation activities (competition-specific) across their functions and tend to pursue them simultaneously (Makhashen *et al.*, 2020; Seepana *et al.*, 2020). These activities are inclined to be not only interdependent (Raisch and Birkinshaw, 2008; Makhashen *et al.*, 2020), but are expected to provide managers with a flexibility to improve their resource productivity and efficiencies on the one hand and facilitate experimentation on the other (Rosing *et al.*, 2010; Stettner and Lavie, 2014). The productivity, flexibility, and efficiency aspects, nonetheless, are mainly associated to the coopetitors' commitments towards sharing complementarities and exploring as well as exploiting their benefits for the development of innovations (Dyer *et al.*, 2018; Ritala and Hurmelinna-Laukkanen, 2009). Further emphasizing the importance of exploration and exploitation of complementary resources, literature alludes that firms are best positioned to realize innovation benefits through exploitation of existing complementarities on one hand (Rothaermel, 2001), while exploring complementary resource combinations with the partner on the other hand (Hoang and Rothaermel, 2010). Consequently, we argue that managerial ambidexterity is likely to be better suited for coopetitors to be able to simultaneously explore and exploit complementary resources to benefit their firms' efforts to develop innovation ambidexterity. Accordingly:

*H2a: Managerial ambidexterity will positively moderate the potential positive relationship between reciprocal investments and innovation ambidexterity.*

Alternatively, since managers in cooperative relationships work with cooperative and competitive aspects simultaneously, they maintain access to task-specific information (Bengtsson et al., 2018) about both the types of activities associated with the use of reciprocal investments. For instance, on the one hand, exploitation of investments in marketing, production and distribution could create potential for improvement of efficiencies for partners. On the other hand, exploration of activities for investments in important tasks such as research and development activities to create value will likely result in innovations (Sarkees et al., 2014). To this extent, managerial ambidexterity could make such task-specific investment channelling more beneficial for innovation development as it could help managers to channel their resources into relevant exploration and exploitation activities simultaneously (Seepana *et al.*, 2020). Moreover, the skill to manage contradictory priorities also enables managers to cyclically switch priorities in investment allocation for innovation development such that neither the exploration nor the exploitation could dominate the relationship at any given point of time (Maclean *et al.*, 2020). For example, Toyota's managers' ability to foster various improvements in their auto components through exploration and exploitation activities utilising their partners/suppliers' complementary resources and investments (Rosing *et al.*, 2010) is attributed to their managerial ambidexterity. Similarly, managers of both Sony and Samsung are argued to have pursued managerial ambidexterity to apply explorative and exploitative activities on each other's complementarities and reciprocal investments to develop various innovations (Gnyawali and Park, 2011; Seepana *et al.*, 2020). Therefore, it is plausible to posit that managerial ambidexterity likely helps to transform co-competitors' reciprocal investments into ambidextrous innovations within co-competition settings. Accordingly:

*H2b: Managerial ambidexterity will positively moderate the potential negative relationship between complementary resources and innovation ambidexterity.*



### **3. Methods**

#### **3.1 Research setting**

The objective of the study is to examine the relationship between relational resources and ambidextrous innovation, and the subsequent moderating effects of ambidextrous managers. The variables included in this study are a combination of firm-specific as well as relationship-specific aspects; these can be sufficiently addressed with the data collected from one side of each dyad. Similar data collection practice has been adopted in recent research (Faruquee *et al.*, 2021; Robson *et al.*, 2019). The unit of our analysis is the ‘coopetitive relationship’.

We collected data using a web-survey focused on the western European countries – UK, Ireland, Netherland, as well as North American countries – USA and Canada. We attribute the rationale for the selection of these geographies to the following principles: *One*, these countries are home to a high concentration of high-tech and knowledge-intensive companies and our study specifically focuses on this industry background; *Two*, the Eurostat’s (Eurostat, 2018) as well as the Organization for Economic Cooperation and Development’s (OECD, 2019) Territory Level 3 databases indicate that there is an increased collaboration amongst high-technology organizations in these geographies. Extant research alludes that coopetitive relationships are more common among firms that operate within knowledge-intensive and technology sectors (Bouncken *et al.*, 2018; Gnyawali and Charleton, 2018). Accordingly, this study includes automotive, pharma, consumer electronics, and information and communication technologies industries that are viewed as being technology and knowledge intensive by the Eurostat (Eurostat, 2018).

#### **Survey development and pilot test**

The survey instrument followed a phased development process. Initially, we conducted an extensive literature review to identify the measures for the constructs associated with our research inquiry through leading academic journals. Following this, we used the existing multi-

item scales to measure the constructs of interest in our survey questionnaire; sources of these scales are provided in section 3.3. Next, four leading academics from research-intensive universities were consulted for their expert views regarding the potential theoretical linkages between our variables of interest to ensure integral validity and consistency of process. We also sought observations for any further need to develop new measures; to that extent, after several deliberations, it was established that the existing measures sufficiently represent both the meaning of the constructs as well as the potential underlying relationships posited in this study (e.g., Kim *et al.*, 2012; Ritala and Hurmelinna-Laukkanen, 2013; Mom *et al.*, 2007; Lambe *et al.*, 2002). Nevertheless, following the deliberations and subsequent suggestions from the expert academics, we made minor changes to our survey. Lastly, we pilot tested the revised survey with 15 executives from high-technology companies that collaborate with firms of similar backgrounds. This test is performed to ensure whether the executives could interpret the survey questions in the intended fashion. Consequently, further refinements were made to our wordings (Hofman *et al.*, 2017). A final revised survey questionnaire was later transformed into the web-survey utilising the ‘Qualtrics’ online tool.

### **3.2 Data collection**

The ‘Qualtrics’ panel services were deployed to identify firms that match key criteria including the specific context of our study (i.e., collaboration between two horizontal competitors), industry background, respondents, as well as firms’ characteristics. There is an increased trend in the use of various panel services to collect data particularly within the OM discipline (Faruquee *et al.*, 2021; Vergheze *et al.*, 2019). We considered 1500 organisations pursuing horizontal cooperative relationships in our final sampling frame. We sought responses from managers who are highly knowledgeable about both their firm as well as their strategic relationships with competitors and who held a combination of strategic and operational positions. Additionally, we aimed to ensure that the web-survey be completed by only the key

respondents. Therefore, we categorically employed a screening question in the survey preamble – “*Does your firm cooperate and compete at the same time with a competitor firm or a firm that has similar product/service offering and similar target market*” – to make sure that it indicates a horizontal cooperative relationship. Furthermore, for the sake of clarity, we also provided a brief description about the ‘Samsung and Sony’ relationship as an example of a horizontal cooperative relationship at the start of the survey.

A criteria-based approach was rigorously observed during the data collection that included – centring only on the high-technology and knowledge-intensive firms, screening responses from horizontal cooperative firms, and developed western countries. This ensured that our sample frame is representative of the population. After several rounds of reminders, we received 355 responses from the 1500 online surveys, which translates into an initial response rate of 23.7%. Incomplete information such as half-completed/aborted surveys and missing information resulted in the removal of 42 responses from the original 355, resulting in an effective response rate of 20.9%. Table 2 presents an overview of sample characteristics.

-- Insert Table 2 --

### **3.3 Measures**

The survey instrument comprised of multi-item variables. All the items that characterize our variables of interest were measured on a 7-point Likert scale with endpoints “strongly disagree” to “strongly agree”, except for the innovation variable wherein the endpoints were “no such benefits” to “very high benefits”. Table 1 (Appendix) illustrates the various indicators used in this study.

#### **Dependent Variable**

*Ambidextrous innovations* is our dependent variable. Given that cooperation is an ambidextrous form of relationship, the expected performance benefits could also tend to be in an

ambidextrous form (Michelfelder and Kratzer, 2013; Makhashen *et al.*, 2020). Extant coopetition research that studied innovation performance effects has followed an approach that is similar to the one practiced in non-coopetitive studies – that is viewing incremental, radical, explorative, and exploitative as stand-alone performance constructs. However, this remains an overlooked aspect in empirical coopetition studies given that the approach of capturing innovation benefits can also be in an ambidextrous form (Lin *et al.*, 2013; Makhashen *et al.*, 2020). Accordingly, following the guidelines of Lin *et al.* (2013) and He and Wong (2004), we employed a product method to develop ‘ambidextrous innovation’ by multiplying ‘incremental innovation’ and ‘radical innovation’. We adapted measures for incremental and radical innovation from Kim *et al.* (2012), Chandy and Tellis (1998), and Ritala and Hurmelinna-Laukkanen (2013).

### **Independent Variables**

*Reciprocal investments* is operationalized utilising the scales for ‘Focal Firm Investments’ (FFI) and ‘Partner Firm Investments’ (PFI). Following extant literature (Artz, 1999; Joshi and Stump, 1999), ‘FFI’ reflects the extent to which the focal firm has invested in the partner’s resources, facilities or processes, and in training its people. Similarly, ‘PFI’ is defined as the extent to which the partner firm has invested in the focal firm’s resources, facilities or processes, and its people. Three-item scales were used to measure both the constructs. Additionally, these items were adapted from the buyer-supplier context to interfirm coopetition from Joshi and Stump (1999) and Artz (1999). We followed the widely employed multiplicative/product approach to infer simultaneity of both the partners’ investments in each other within a coopetitive relationship. The product method is interpreted to characterize the simultaneity of both constructs (Chandrasekaran *et al.*, 2012). A three-item scale from Lambe *et al.* (2002) is adapted to measure the construct of *Complementary resources*.

## **Moderating Variables**

*Manager exploration* is operationalised on a Four items scale. *Manager exploitation* is operationalised on a Five items scale. We have adapted measures for both these variables from Mom *et al.* (2007). To develop *manager's ambidexterity* construct, we followed the guidelines of the original source of Mom *et al.* (2007) wherein both the constructs are multiplied. Similar multiplicative method to operationalise manager's ambidexterity construct has been adopted by Mom *et al.* (2009) and Seepana *et al.* (2020). Following the recommendations of Gibson and Birkinshaw (2004), these studies contend that the multiplicative approach is best suited to develop manager's ambidexterity; as such this method is argued to explicitly take the ambidextrous behaviour of managers/individuals into account.

## **Control Variables**

We included several variables to control for potential confounding effects. *Firm size* and *partner firm size* are controlled for, as the scale of an organization's operations as well as the degree of access that the organization has towards resources is dependent on the organization's size; larger firms tend to have more resources to innovate (Li *et al.*, 2017). We utilised the number of employees as a measure of firm size. *Relationship length* is used as a control since organizations can utilise incentives gained from a relationship to influence the same relationship at a later stage (Verghese *et al.*, 2019). *Firm age* is also controlled for as older firms tend to have a stronger reputation in terms of providing them with a higher status in relationships to develop innovations (Li *et al.*, 2017). Additionally, we controlled for the intensity of collaboration between rivals for innovation across three alliance activities – *amount of (1) R&D collaboration, (2) new product development, and (3) technology development* (Ritala and Hurmelinna-Laukkanen, 2013).

### 3.4 Bias-specific countermeasures

To test for the non-response bias, the responses from the first month (early responses) and later months (late responses) were compared on specific demographic variables such as firm size, partner firm size, and firm age. Group comparison tests showed that there are no statistically significant (at 95 percent confidence level) differences, indicating that a non-response bias is not proven.

Given that single respondents from each sample firm answered questions related to independent, moderator, and dependent variables, we took a series of measures to avoid common method bias concerns. *First*, we ensured a specific structure when developing the survey in that the items measuring the dependent variables were positioned far away from the items measuring the independent variables. The data collection was part of a larger study which allowed us the flexibility to implement such a structure. Further, we utilised different scale anchors for dependent and independent variables as such a practice is argued to curtail covariation (Podsakoff *et al.*, 2003; Tortorella *et al.*, 2019). *Second*, we have clearly explained in the survey preamble that there are no correct or wrong answers and that respondents' responses will be treated as anonymous. Additionally, we ensured with the help of a screening question that the respondents had to be individuals from top management teams such as managing directors, alliance managers, and CEOs who are responsible for managing their collaboration with their competitor partners, and therefore the appropriate respondents (Tortorella *et al.*, 2019). The data indicates that the respondents were sufficiently knowledgeable about the questions asked in the survey; this helped to not only increase our confidence in the data quality, but also minimise common method bias (Boyer and Verma, 2000, Li *et al.*, 2017). *Third*, we performed a single factor confirmatory factor analysis (CFA) (Sea-Jin *et al.*, 2010): The single factor model fit indices – CFI = 0.825, TLI = 0.840, IFI = 0.841, RMSEA = 0.097, normed  $\chi^2$  [NC] = 4.610 were significantly worse in comparison to

our measurement model – IFI = 0.965, CFI = 0.954, TLI = 0.965, RMSEA = 0.055, normed  $\chi^2$  [NC] = 1.943. *Fourth*, we ensured that questions related to the relationship-specific measures of reciprocal investments and complementary resources can be effectively answered by a single firm in each dyad. The step-by-step procedures and the CFA test results could conclude that common method variance is likely to not be a concern in our dataset (Podsakoff *et al.*, 2003; Sea-Jin *et al.*, 2010; Li *et al.*, 2017; Tortorella *et al.*, 2019).

### **3.5 Assessing instrument development**

To ensure content validity of the measurement items, we grounded the survey instrument in extant literature in that all the constructs adapted for this study were based upon previously validated measures. In addition, our pilot test involving both industry practitioners and academics and the resulting minor adaptations to improve the completeness and overall structure of the instrument (Dillman, 2007), as explained in the survey development section, further safeguarded the content validity of the survey instrument.

We adopted CFA analysis to verify construct validity and unidimensionality. The results of the analysis suggest that our variables are distinctive as the model fits our data well [IFI = 0.965, CFI = 0.954, TLI = 0.965, RMSEA = 0.055, normed  $\chi^2$  [NC] = 1.943], and all the factor loadings were found to be statistically significant ( $p < 0.001$ ). Overall, these results suggest that the proposed measurement items are both reliable and valid. In addition, we conducted the Fornell and Larcker test (Fornell and Larcker, 1981) to establish discriminant validity. As per the test, the squared correlation values between any pair of constructs of our model is less than the value of the AVE estimates of the respective constructs except for the outcome variable which has a marginally higher value than the respective AVE value. The correlation and AVE values are presented in Table 3 and Table 1 respectively.

-- Insert Table 3 --

Reliability of our constructs was first examined using Coefficient alpha (Nunnally, 1978). Additionally, given that scholars argue that there may be inconsistencies with the estimation of construct reliability when using coefficient alpha (Deng and Chan, 2017), we also evaluated coefficient omega (McDonald, 1999). The coefficient alpha and coefficient omega values were higher than 0.70. Moreover, the composite reliability (CR) for all constructs also surpassed 0.70 (Hair *et al.*, 2012). Additionally, the AVE values exceeded the benchmark value of 0.50. These results are provided in Table 1. To this end, our results show that the indicators are reliable, valid, as well as unidimensional. A couple of indicators were excluded during the instrument development process as they did not meet the psychometric standards. Please refer to Table 1 for the excluded indicators.

#### **4. Analysis and Results**

We carried out a series of ordinary least square (OLS) regression analyses to test the underlying relationships between our variables of interest. Prior to performing the OLS analysis, we tested the data for multicollinearity (Kennedy, 2003; Wiengarten *et al.*, 2011). Given that our independent variables are relatively highly correlated, the chance of multicollinearity is high (Aiken, 1991), although the discriminant validity tests do not infer dangers. Therefore, to further pre-analyse the data, we computed variance inflation factor (VIF) values to detect potential multi-collinearity specific threats both for the independent variables and the interaction variables. The computed VIF values are found to be less than the commonly used threshold of 5 with 2.565 being the highest (Hair *et al.*, 2012); thus, multi-collinearity might not be a concern in our model. Furthermore, in order to provide additional certainty that multicollinearity was not a concern in our analysis, our regression analyses that include the interactions terms were estimated in separate models, which is a commonly advocated practice (Ray *et al.*, 2005; Wiengarten *et al.*, 2011).



Table 4 shows the results associated to the hypotheses H1a through H2b. Hypotheses H1a and H1b proposed that while reciprocal investments will have a positive effect, complementary resources will have a negative effect on ambidextrous innovation. The results indicate that reciprocal investments are positively associated to ambidextrous innovation (Model 2) [ $\beta = 0.533$ ,  $p < 0.0001$ ]; complementary resources are negatively associated to ambidextrous innovation (Model 2) [ $\beta = -0.115$ ,  $p < 0.05$ ]. Thus, H1a and H1b were supported.

Hypotheses H2a and H2b were focused on the positive moderating effects of managerial ambidexterity. The three-way interaction terms shown in model 5 suggest that managerial ambidexterity positively moderates both the relationships between reciprocal investments and innovation ambidexterity [ $\beta = 0.707$ ,  $p < 0.0001$  (Model 5)] as well as complementary resources and innovation ambidexterity [ $\beta = 0.584$ ,  $p < 0.01$  (Model 5)]. Therefore, our results find support for these hypotheses.

We also calculated the effect sizes using the partial eta-squared ( $\eta^2$ ) values to determine whether the statistical significance of our results is practically meaningful (Kiss et al., 2020; Cohen, 1988). Cohen (1988) recommends that  $\eta^2$  values typically range between 0.01 (small effect size) and 0.09 (large effect size) in social sciences research. The  $\eta^2$  values of the relationships between reciprocal investments and innovation ambidexterity, and complementary resources and innovation ambidexterity were 0.039 and 0.021, respectively. These results imply that both the direct relationships have small to medium effect sizes. As for the moderation models, effect size of the managerial ambidexterity on the principal relationships between reciprocal investments and innovation ambidexterity, and complementary resources and innovation ambidexterity were found to be 0.082 and 0.063, respectively. These statistical findings affirm that the effect sizes are larger for moderating effects of managerial ambidexterity. This result is also consistent with not only the strengths

of Beta coefficient and R squared values of the respective relationships, but also with larger effect sizes reported in extant research related to ambidexterity (Drach-Zahavy and Freund, 2007; Kiss et al., 2020).

-- Insert Table 4 --

## **5. Discussion**

The importance of managerial ambidexterity for strategic supply chain relationships, such as cooperation, to manage various challenges and to pursue performance benefits has been debated in extant research (Turner *et al.*, 2018; Aslam *et al.*, 2018; Souza-Luz and Gavronski, 2020). This study adds to the existing knowledge on the specific role that managerial ambidexterity could play in transforming the competitors' relational resources into innovation ambidexterity. The study further shows a thorough examination of the role of competitors' relational resources and managerial ambidexterity in the development of innovation ambidexterity.

### **Theoretical implications**

We posited that relational resources, i.e., complementary resources and reciprocal investments, could affect innovation ambidexterity differently in that reciprocal investments lead to innovation ambidexterity (H1a) whereas complementary resources lead to a reduction in innovation ambidexterity (H1b). As for the findings associated to H1a, the results are consistent with notions from both OM and cooperation literature which suggest that reciprocal investments consisting of partners' investments in each other's facilities and processes, and training each other's teams/individuals can increase relationship development and commitment, and the eventual realisation of various performance benefits (Gnyawali and Park, 2011; Hoffmann *et al.*, 2018; Wilhelm and Sydow, 2018). When it comes to competitors' complementary resources leading to a reduction in innovation ambidexterity (H1b), although this finding is inconsistent with studies that propound sharing complementary resources as being beneficial for competitors

(Bouncken *et al.*, 2018; Gnyawali and Park, 2011; Gnyawali and Park, 2009), the result elicits support from the proponents of the revisited relational view (Dyer *et al.*, 2018). Dyer *et al.* (2018) suggests that complementary resources are likely to be beneficial for the formation of a relationship, though they may not necessarily result in innovation in certain dynamic contexts despite the partners' complementarities being different from each other. Given that coopetition is often viewed as a dynamic phenomenon (Luo, 2007; Seepana *et al.*, 2020) partly due to its simultaneous cooperation and competition, it is plausible for it to be likened to the tenets of the relational view. Consequently, it is reasonable to argue that the generic nature of complementary resources, despite being different between coopetitors, lacks the specialization needed to generate innovations in a high-tech setting (Hidding *et al.*, 2008). This scenario is relatable to various real-world examples – Microsoft has not managed to build market leadership in search engines or maps, despite the several complementary resources such as skills and product development capabilities that it possess in common with its strategic alliance partners (Hidding *et al.*, 2008). However, the complementarities of both Sony and Samsung arguably helped in the development of various innovations (Gnyawali and Park, 2011; Rai *et al.*, 2022). The underlying reason for Sony and Samsung's success could be attributed to the specialized complementarities (e.g., specific technologies used within R&D that were protected/patented) exchanged between them which does not seem to be the case for Microsoft. Our results also reflect this line of thought. Thus, our finding is consistent with notions that suggest that firms cannot count on generic and pre-existing complementary resources to gain market leadership and innovation (Hidding *et al.*, 2008). Moreover, coopetitors' higher relative absorptive capacity (Ritala *et al.*, 2014) could make the exchange of generic complementarities not only easily accessible but also less prominent wherein resource prominence is a necessary precondition to develop innovations in coopetition (Rai *et al.*, 2022; Seepana *et al.*, 2021; Kalaitzi *et al.*, 2019). Thus, our study concludes that the higher the exchange of such

complementary resources between coopetitors, the lower the opportunities to transform complementary resources into innovation ambidexterity.

As for managerial ambidexterity, results indicate that it will assist in transforming not only the reciprocal investments but also complementary resources into successful innovations. Consequently, managerial ambidexterity is important for firms that pursue cooperative/ambidextrous forms of supply chain relationships. Theoretically, the notion of a balanced approach of managerial ambidexterity aligns with the proponents of dynamic managerial capabilities. This suggests that the creation of innovations are partly the result of managers' ability to sense and seize resource opportunities (Helfat and Martin, 2015) which can be compared to simultaneous exploring and exploiting opportunities (Mom *et al.*, 2009; O'Reilly III and Tushman, 2011; Blome *et al.*, 2013). In other words, the sense and seize abilities reflect that by utilising their individual-level capabilities, managers will be able to explore and exploit opportunities by combining and transforming firms' relational resources into potential innovations while reducing complexities associated to their resources and supply chains (Aslam *et al.*, 2018; Turner *et al.*, 2018). Furthermore, managers' involvement in ambidextrous supply chain relationships means that they are not faced with either exploration or exploitation situations but instead are expected to have the necessary means to simultaneously explore and exploit resource opportunities to benefit their firm as well as their strategic relationship (Rojo *et al.*, 2016; Aslam *et al.*, 2018). Our results associated with hypotheses H2a and H2b reflect these views. Accordingly, we put forth that managerial ambidexterity acts as distinct capability and offer the managers an ability to transform not only their generic complementary resources but also their reciprocal investment combinations into significant innovations. Figure 2 presents the interaction plots for the moderating effects of managerial ambidexterity between (a) reciprocal investment and innovation ambidexterity and (b) complementary resources and innovation ambidexterity. Both the plots indicate that the

relationships between reciprocal investments and innovation ambidexterity, and complementary resources and innovation ambidexterity become significantly stronger in the presence of higher levels of managerial ambidexterity. Specifically, these results imply that managers' application of stronger levels of managerial ambidexterity is more advantageous for coopetitors to transform their relational resources into innovation ambidexterity.

-- Insert Figure 2 --

We found that coopetitors complementary resources are negatively associated to ambidextrous innovations (H1b) and we attributed this finding to the generic and non-specialized nature of complementary resources. However, following the findings of H2b, it is plausible to argue that the managerial ambidexterity, albeit at moderate and higher levels, will offer a vital capability to transform less specialized resources into innovation ambidexterity. This finding can be linked to the views that the existence of complementary resources is a necessary but insufficient condition to achieve resource synergy (Harrison *et al.*, 2001), whereas managerial ambidexterity could channel the complementarities into relevant resource gaps to create the synergy needed to generate maximum benefits. This is also consistent with the notion that managers tend to benefit from their communications with their partners which in turn helps to develop synergies between their complementarities and thus helps to improve existing competencies (Floyd and Lane, 2000) as well as the development of innovations (Mom *et al.*, 2009). In other words, this result implies that no matter whether coopetitors possess less specialized and more generic complementary resources, the managerial ambidexterity can benefit the coopetitors by improving resource utilisation through resource recombinations and refinements. Thus, this result clarifies the role and benefits of complementary resources for coopetitors in the presence of managerial ambidexterity as a contingent to develop innovation ambidexterity. Additionally, this result also adds to the knowledge of both the OM and coopetition disciplines (e.g., María Dolores *et al.*, 2008; Lee *et al.*, 2014; Ritala, 2012; Rai *et*

*al.*, 2022). In essence, our study suggests that it is not always necessary for coopetitors to possess specialized complementarities to generate innovation ambidexterity as the more common and generic complementarities can also result in such innovations in the presence of coopetitors' managerial ambidexterity.

Although not hypothesised, it can be noticed from our findings in model 4 of the Table 4 that the results of the moderating effects of managers' exploration and exploitation activities offer interesting results. These results effectively suggest that the manager's use of either exploration or exploitation activities alone will be less effective for coopetitors to transform relational resources into innovation ambidexterity. Moreover, this result is inconsistent with the previous notions from OM studies that suggest managerial exploration and exploitation activities could individually benefit the organization (Ojha *et al.*, 2018; Mathias, 2014; Aslam *et al.*, 2018). This mismatch could be attributed to the belief that coopetition's simultaneous cooperation and competition require managers to pursue both exploration and exploitation activities at the same time rather than at different time intervals to attain benefits (Makhashen *et al.*, 2020; Seepana *et al.*, 2020). This is unlikely to be the case for firms involved in non-coopetitive supply chain relationships that do not experience simultaneous cooperation and competition; consequently, there is a less requirement to pursue simultaneous exploration and exploitation activities. Nevertheless, these results are also consistent with existing assumptions that coopetitors' failure to pursue both the types of activities at the same time could lead to an imbalance in resource exploration on one hand and resource integration on the other hand (Seepana *et al.*, 2020) which could subsequently affect the strength of innovation ambidexterity. Accordingly, as our results reflect, these results add to the knowledge in that they suggest managers' pursuance of either exploration or exploitation activities at any given point of time will not benefit strategic supply chain or coopetition relationships.

Our finding can also be linked to the principles of the so called ‘innovator dilemma’ (Christensen and Raynor, 2003) which acknowledges that the challenges being faced by the firms require new ways of dealing, and ambidexterity could be one solution in such situations (O’reilly and Tushman, 2008). Accordingly, in the context of cooperative relationships, we argue that it is logical to explain our results through the innovator dilemma’s solution lens to suggest that managers’ ambidexterity is likely to be a key solution for firms involved in ambidextrous or even strategic relationships to transform relational resources into innovation ambidexterity. Recognising this importance, OM scholars rightly observe that introducing ambidexterity as a strategic behaviour should be a key objective for managers (Tamayo-Torres *et al.*, 2017; Souza-Luz and Gavronski, 2020); our findings offer support to this observation within the cooperation context.

**Managerial implications:** Cooperation is critical for firms to develop innovations. As much as the reciprocal investments and complementary resources are important relational resources to develop innovations, cooperation also necessitates managers to possess the important skillset of managerial ambidexterity in order to be able to transform their relational resources into innovations. Subsequently, our study offers several insights to managers of cooperative firms and firms involved in strategic supply chain relationships. *First*, our results suggest enhancing reciprocal investments in resources such as training teams/people, operating processes, and other relational assets as these can assist in improving partners’ commitment as well as in the development of strategic supply chain relationships. Interestingly, the opinions that we have received during our pilot study from several practitioners align with this in that they emphasized reciprocal investments to lead to a shared vision and reinforcement of trust which then results in the optimization of investments and the subsequent development of products/processes. Since our results validate the opinions expressed by managers in our pilot study, we advise managers of cooperative relationships who aim to develop innovations to pay

special attention to enhance the use of reciprocal investments. However, at the same time, our study cautions managers to restrain from excessively relying on generic complementary resources as such complementarities may not benefit the development of innovations within strategic relationships such as coopetition. The generic complementary resources could help the managers to enter and develop coopetitive relationships with potential partners initially, however, the dangers of coopetition being highly competitive could make the generic resources less sufficient in the managers' effort to develop innovation ambidexterity. Therefore, it is advisable for managers to focus on more specialized complementary resources to generate innovation ambidexterity within coopetition settings. *Second*, it is crucial for managers to recognise the importance of possessing managerial ambidexterity that allows them to simultaneously pursue exploration and exploitation activities. The simultaneous pursuit of exploration and exploitation activities helps to improve the managers' ability to better integrate (using exploration activities of learning and renewing new products etc.) and allocate (using exploitation activities of accumulating experiences and application of skills etc.) their firms' tangible and intangible relational resources and associated routines for innovation development. Besides, such ambidexterity could also help managers to be able to balance potential conflicts between coopetitors due to the simultaneous exploration and exploitation activities. Furthermore, our study also offers a more general suggestion to the managers in that it showcases the importance of focusing beyond the conventional knowledge sharing routines for innovation development in coopetition and emphasises also on managerial ambidexterity and other mechanisms to transform their relational resources into significant innovations.

## **6. Conclusion, limitation, and future research direction**

Our study addresses an important question that oversees the potential innovation performance benefits that relational resources could bring to coopetitors; it also studies the moderating role of ambidextrous managers on this relationship. The importance of investigating these



relationships could be attributed to not only the lack of evidence to comprehend the theoretical discourse on these variables of interest, but also to the call for research to understand the role of these resources and capability combinations for innovations within ambidextrous relationships (Sodhi and Tang, 2021; Turner *et al.*, 2018; Gnyawali and Charleton, 2018). Accordingly, this study offers nuanced insights into the performance impacts of relational resources and firm-specific managerial capabilities.

Like many empirical research studies, the present study comes with a set of limitations. Our data sources are from multiple countries which can help improve the generalisability of the results. However, the results may not establish a complete relevance in all countries' context. For example, the application of managers' ambidexterity may vary based on manager backgrounds and cultures, and that not all managers may possess a particular set of capabilities (Eisenhardt and Martin, 2000) to make them ambidextrous. The data is collected from one side of each dyadic cooperative relationship; therefore, the results could affect our interpretations in part. However, collecting data from one side of each dyad is a conventional conundrum in empirical research, and the use of such an approach to investigate a phenomena in strategic relationships is a frequent occurrence (Robson *et al.*, 2019). The cross-sectional survey design adopted in the study may not help in testing causality. Even though it would become expensive as well as expansive, performing longitudinal studies and collecting data from both sides of the dyadic cooperative relationship could be beneficial for future research. Our study has investigated only the managerial ambidexterity and not the other skills and capabilities such as transformation, transactional, IT capabilities, and different leadership styles, among others. Consequently, discovering the effects of such capabilities and ambidextrous functional teams/groups in transforming organizational resources and investments into performance benefits will be an interesting future research area. Complementary resources are traditionally considered generic but it is also viewed as specialised in specific contexts such as studying

firms' technological resources. As much as our method of operationalisation of complementary resources is widely acceptable, development of an alternative operationalisation for cooperator's specialised complementary resources could be explored by future research.

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# Appendix

Figure 1: Conceptual model

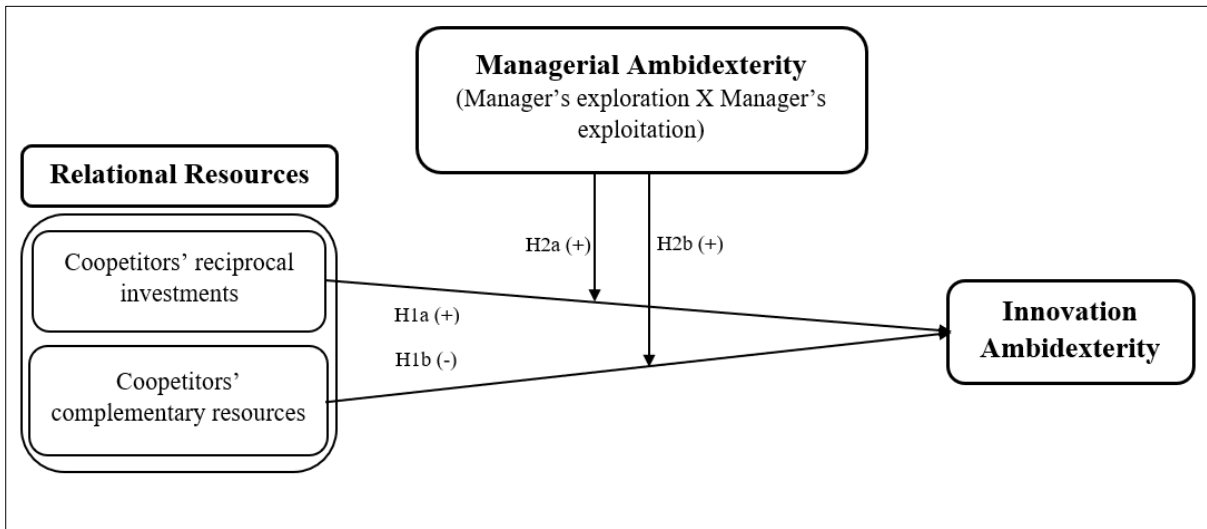
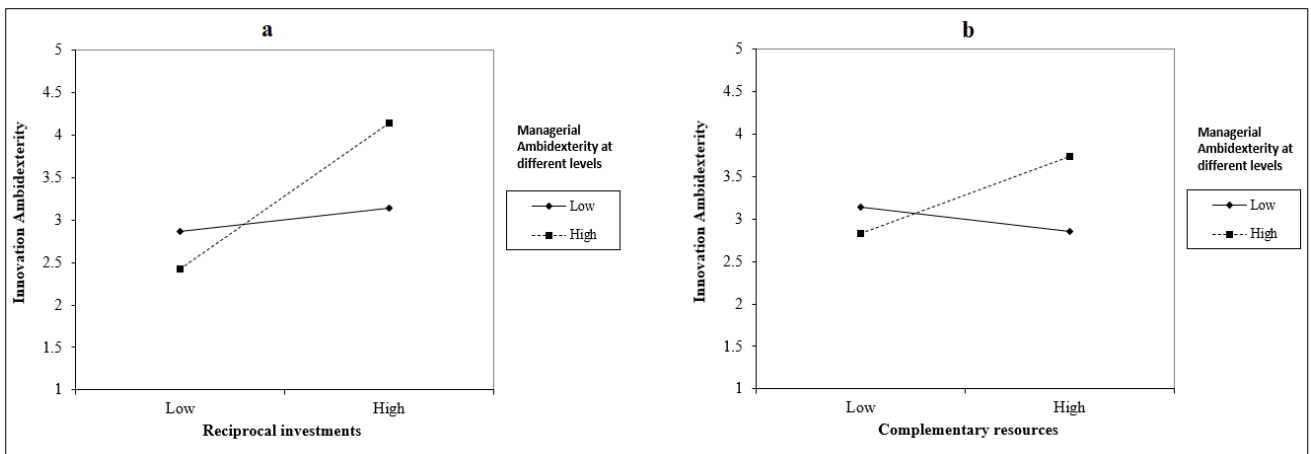


Figure 2: Moderating effects of managerial ambidexterity at different levels between (a) reciprocal investments and innovation ambidexterity and (b) complementary resources and innovation ambidexterity





**Table 1: Factor analysis**

	Loadings
To what extent do you agree with the following in your current relationship with your competitor partner...	
<b>Reciprocal Investments</b>	
<b>Investments in partner firm</b> ( $\alpha = 0.770$ ; $\Omega = 0.771$ ; AVE = 0.54; CR = 0.78)	
We have made significant investments in resources dedicated to our relationship with this partner firm.	0.739
Our operating process has been tailored to meet the requirements of dealing with this partner firm.	0.781
Training this partner has involved substantial commitments of time and money.	0.671
<b>Partner's investment in our firm</b> ( $\alpha = 0.759$ ; $\Omega = 0.759$ ; AVE = 0.51; CR = 0.76)	
Our partner firm has made significant investments in resources dedicated to their relationship with us.	0.759
Our partner's operating process has been tailored to meet the requirements of our firm.	0.713
Training our people has involved substantial commitments of time and money for our partner firm.	0.673
<b>Complementary resources</b> ( $\alpha = 0.782$ ; $\Omega = 0.782$ ; AVE = 0.54; CR = 0.78)	
We each have separate abilities that, when combined together, enable us to achieve goals beyond our individual reach.	0.707
We both have complementary strengths that are useful to our relationship.	0.762
We both contribute different resources to this relationship that help us achieve mutual goals.	0.742
While in relationship with your competitor partner, to what extent did you (as the manager) engage in work related activities that are characterised as follows...	
<b>Ambidextrous managers</b>	
<b>Manager's exploration</b> ( $\alpha = 0.768$ ; $\Omega = 0.769$ ; AVE = 0.52; CR = 0.77)	
Searching for new possibilities with respect to products/services, processes or markets*.	
Focusing on strong renewal of products/services or processes.	0.748
Activities requiring quite some adaptability of you.	0.731
Activities requiring you to learn new skills or knowledge.	0.693
<b>Manager's exploitation</b> ( $\alpha = 0.836$ ; $\Omega = 0.838$ ; AVE = 0.57; CR = 0.84)	
Activities of which a lot of experience has been accumulated by yourself*.	
Activities which serve existing (internal) customers with existing services/products.	0.689
Activities of which it is clear to you how to conduct them.	0.807
Activities which you can properly conduct by using your present knowledge.	0.750
Activities which clearly fit into existing company policy.	0.763
Estimate the extent of the following benefits this relationship has brought to 'your company' in the past 3-5 years ...	
<b>Ambidextrous innovations</b>	
<b>Incremental innovation</b> ( $\alpha = 0.848$ ; $\Omega = 0.849$ ; AVE = 0.65; CR = 0.85)	
Improving current products/services/processes.	0.828
Percentage of total sales from improved current products/services is up substantially.	0.797
Percentage of improved current products/services in the product range is significantly higher compared to the competitors.	0.793
<b>Radical innovation</b> ( $\alpha = 0.795$ ; $\Omega = 0.796$ ; AVE = 0.57; CR = 0.80)	
Creating completely new products/services/processes.	0.731
Percentage of total sales from completely new products/services is up substantially.	0.780
Percentage of completely new products/services in the product range is significantly higher compared to the competitors	0.744

\* Items deleted due to not meeting psychometric requirements

**Table 2: Sample characteristics**

<i>Characteristics</i>	<i>Share (%)</i>
Number of employees	
51-250	33.9
251-1000	41.9
1001 and above	24.3
Company age since founded (in years)	
1-5	0.6
6-10	17.9
11-20	34.8
21 and above	46.6
Industry	
Automotive	11.5
Engineering	28.4
Information and communication technology (ICT)	29.7
Consumer electronics	6.4
Pharmaceuticals	6.4
Machinery	12.5
Research and Development (R&D)	5.1
Title	
CEO/COO/CFO/CTO	20.1
Product manager	28.4
Managing director	16.0
General manager	15.7
R&D manager	9.9
Vice president	6.7
Alliance manager	3.2
Number of years in current role	
2-5	31.6
6-10	39.3
11-20	21.1
>21	8.0

**Table 3: Correlations**

Factors	Mean	S.D	FI	PI	CR	MEX	MEXP	II	RI
FI	5.421	1.054	1						
PI	5.408	1.030	0.725	1					
CR	5.702	0.924	0.721	0.679	1				
MEX	5.511	1.034	0.622	0.607	0.598	1			
MEXP	5.641	0.951	0.644	0.590	0.661	0.716	1		
II	5.605	1.039	0.593	0.645	0.612	0.694	0.707	1	
RI	5.469	1.054	0.575	0.631	0.547	0.666	0.569	0.767	1

FI-Focal firm's Investments; PI-Partner firm's Investments; CR-Complementary Resources; MEX-Manager's Exploration; MEXP-Manager's Exploitation; II-Incremental Innovations ; RI-Radical Innovations.  
N=313; All correlations are significant at  $p < 0.01$

**Table 4: OLS regression results**

	Innovation Ambidexterity				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Beta	Beta	Beta	Beta	Beta
<u>Control variables</u>					
Employee size	0.116	0.087	0.066	0.065	0.057
Partner employee size	0.041	-0.002	0.002	0.009	0.003
Relationship length	-0.015	-0.022	-0.020	-0.031	-0.027
Company age	0.021	0.036	0.044	0.020	0.014
Amount of R&D collaboration	-0.142	-0.061	0.061	0.008	-0.013
Amount of new product development	0.043	0.080	0.108	0.043	0.038
Amount of technology development	-0.160	-0.037	-0.033	-0.066	-0.065
<u>Predictor</u>					
RI		0.533***	0.544***	0.135*	0.112*
CR		-0.115*	-0.072	-0.062	-0.144**
MEX			-0.233**	-0.119	-0.197*
MXX			0.109*	0.214**	0.163*
<i>Two-way Interaction Terms</i>					
RI * MEX				-0.210	0.036
CR * MEX				0.146	0.119
RI * MEXP				-0.034	0.042
CR * MEXP				0.257*	0.201
<i>Three-way Interaction Terms</i>					
RI * MA (MEX * MXX)					0.707***
CR * MA (MEX * MXX)					0.584**
<u>Model summary</u>					
R <sup>2</sup>	0.068	0.359	0.382	0.514	0.534
Adjusted R <sup>2</sup>	0.046	0.339	0.358	0.489	0.506
Model F-value	3.076**	18.341***	16.440***	20.400***	19.323***

RI-Reciprocal Investments; CR-Complementary Resources; MEX-Manager Exploration; MEXP-Manager Exploitation; MA-Manager's ambidexterity. N=313. \* p<0.05; \*\* p<0.01; \*\*\* p<0.001