Corporate Management Review
Vol. 41 No. 1, 2021
pp. 49-81

Effects of network capital and resources on SMEs competitiveness: A moderated mediation approach
網絡資本與資源對中小企業競爭力之影響效果：以調節式中介為研究取向

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Abstract: This research extends previous related literature by combining network structure, organizational reciprocity, and organizational agility to explore whether and how network resources improve small- and medium-size enterprise (SME) performance. Data collected from Taiwanese SMEs indicate that a high-quality network structure enhances firm performance. In addition, as a mediating mechanism, organizational agility combines external resources with internal capabilities to enhance the effects of network structure on said performance. Most notably, the findings present that organizational reciprocity strengthens these direct and mediation effects such that firms with high organizational reciprocity outperform those with low organizational reciprocity.

Keywords: Network structure, organizational reciprocity, organizational agility, competitive advantages, small- and medium-size enterprise (SME).

摘要：本研究結合網絡結構、組織互惠性和組織敏捷性等面向來探討網絡資源是否有助於改善中小企業之經營績效以及瞭解上述機制如何運行。透過台

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DOI: 10.3966/102873102021064101002

灣中小企業的實證資料研究指出，高品質的網絡結構地位有助於提升企業之經營績效。此外，企業可以運用組織敏捷性作為結合外部資源與組織內部能力的中介機制，並藉以強化網絡結構對企業績效之效果。更者，策略夥伴間的組織互惠性會進一步強化網絡結構對企業績效之直接與中介效果，使得組織互惠較高的企業之績效表現優於組織互惠較低的企業。

關鍵詞：網絡結構、組織互惠性、組織敏捷性、競爭優勢、中小企業

1. Introduction

Uncertainty or sudden challenges are common in the business environment of all firms. Bennett and Lemoine (2014) pointed out that this environment is volatile, uncertain, complex, and ambiguous. To address rapid changes in the market, demand, technology, and policies, firms must quickly detect and respond to variations in the external environment so as to maintain or enhance their competitiveness. Small- and medium-size enterprises (SMEs) are especially vulnerable to additional variability and new challenges in their specific industry. With operations running at a smaller scale, weak economic fundamentals, and limited resources (Liou, 2018), SMEs have limited risk-prevention ability when confronting uncertainty. In such an unstable environment, the literature has covered various approaches they can take to adapt to uncertainty, respond to sudden challenges, reverse unfortunate situations, and sustain competitive advantages (Bennett and Lemoine, 2014; Liu and Yang, 2020).

As is recognized in the resource-based view (RBV), valuable, rare, inimitable, and non-substitutable (VRIN) resources create competitive advantages, but SMEs frequently lack such assets. Accordingly, Lavie (2006) extended RBV to firm interconnections and asserted that firms can overcome internal resource limitations and reach a resource-dominant position by networking with external partners. The resources obtained in this manner help compensate for resource deficiency, enforce current resources, equip firms with innovation capabilities, and benefit operations and management (Chin *et al*., 2018; Jiang *et al*., 2018; Sheehan and Foss, 2007).

Firms in a strategic network likewise are able to obtain social capital from their network relationships (Portes, 1998; Singh *et al*., 2011). Thus, strategic networks and the resources within them can become critical sources of SMEs' competitive advantage. Furthermore, resources from external network ties enable firms to respond to unexpected changes and mitigate the impact of any uncertainty (Miles and Snow, 1992). According to Liu and Yang (2020), a firm's network structure and its embedded resources have positive effects on organizational agility and performance. The literature has confirmed that firms with a high degree of agility are able to efficiently and effectively reconfigure internal and external resources in order to rapidly detect unexpected changes. By exploiting network resources, SMEs strengthen their sensing abilities and respond to market dynamicity. Thus, within a strong network structure, SMEs are able to leverage network resources and accumulate network social capital, thus cultivating superior agility and therefore superior advantages (Jiang *et al*., 2018; Liu and Yang, 2020).

Although network structure relates to firm performance (Das and Teng, 1998; Stam and Elfring, 2008; Yang and Liu, 2012; Yao *et al*., 2020), engaging in strategic networks has its advantages and disadvantages. Firms sometimes struggle with partner free-riding, devote more time to developing relationships with network members, consume resources to verify information, and even miss valuable opportunities, because partners do not contribute in a timely manner. Changes in the structural status of an individual network member may also cause uncertainty and opportunistic behavior in a cooperative relationship. Weber and Mayer (2014) believed that uncertainty in a partnership relationship originates from asymmetry in company size, which leads to changes in the cognitive framework of strategic partner cooperation. Williamson (1985) argued that relationship uncertainty itself eventually induces opportunistic behavior among partners. Sparrowe *et al*. (2001) proposed that network relationship hindrance negatively relates to group performance. Likewise, network centrality and tie intensity do not guarantee benefits (Wincent *et al*., 2010), because central network positions incur potential costs (Coleman, 1990; Cook and Emerson,

1978; Gulati and Sytch, 2007), and building and maintaining intense ties can be costly (Wincent *et al*., 2010).

These negative effects may weaken the advantages of network structure and social capital. Therefore, investigations into how network structure correlates to firm performance have yielded mixed results. Contingent factors such as the relationship between partners might explain the inconsistencies reported regarding the effects of network structure (Maurer and Ebers, 2006). Hoppner and Griffith (2011) and Blonska *et al*. (2013) argued that network benefits originate from the accumulation of fair memberships or cooperative exchange relationships. Blonska *et al*. (2013) concluded that organizational reciprocity, a cornerstone of cooperative exchange relationships, contributes to the formation of relational capital. Wincent *et al*.(2010) indicated that the reciprocity mechanism reduces opportunism and free-riding behaviors and sustains interaction among network members. Although the value of social capital may be conditional on the level of reciprocity in a relationship, scant research has investigated this problem. To fill this gap, the current study explores how reciprocal efforts within an SME network can strengthen the effect of social capital embedded in a strategic network to improve organizational capabilities and firm performance.

The present study examines the contingent effects of organizational reciprocity and develops a moderated mediation model to investigate the joint effects of organizational agility as a mediator and organizational reciprocity as a conditional variable in firm performance. We take data collected from 230 Taiwanese SMEs to empirically test the research hypotheses, offering the following results. First, network structure positively significantly relates to firm performance. Second, organizational agility positively significantly mediates the relationship between network structure and firm performance. Third, organizational reciprocity positively moderates the direct and indirect effects of network structure on firm performance when it is strong rather than when it is weak.

2. Literature review and hypotheses development

2.1 Network structure and firm performance

Network structure is an indicator of an entity's access to network resources (Yang and Liu, 2012). Through their connections to strategic networks, firms establish cooperative relationships to obtain resources, knowledge, support, information, and opportunities, which can either compensate for a lack of current possessions or upgrade existing ones. Social capital is subsequently generated, and network benefits are derived (Coleman, 1988; Putnam *et al*., 1994).

Network structures are measured on the basis of their tie intensity, degree of centrality, and betweenness centrality (Wincent *et al*., 2010). Tie intensity refers to the interaction frequency of the focal firm with network members. The more frequently the focal firm communicates with other network actors, the closer it becomes to other firms in that network, thus creating easier access to the resources and information circulating among member firms (Eder and Enke, 1991). In addition, through regular contact with network members, the firm can obtain time credit, which ensures the timely distribution of resources and information. Network members are also able to formulate business proposals with one another and obtain new capabilities (Gulati, 1999), adopt different operational processes, and acquire know-how concerning market conditions from each other. They can observe the credibility of other members, seize opportunities as soon as they arise, establish relations with potential customers, and buffer environmental turbulence and threats (Heimeriks and Duysters, 2007; Sammarra and Biggiero, 2008).

Degree of centrality denotes the number of network partners (Freeman, 1978). In a strategic network, the links connecting network members represent pipelines that facilitate smooth participation in joint activities and allow for resource integration with comprehensive effects (Van Wijk *et al*., 2008). Having numerous connections in a strategic network increases the possibility of the focal firm reaching key members, broadens resource variety, and raises the diversity of embedded information (Ahuja, 2000; Gulati, 1999; Yang and Liu, 2012).

Through a multilink mechanism, firms ensure the completeness of external information and resources, thus reducing search costs, preventing the opportunism of allies, and enhancing trust and reciprocity between partners (Coleman, 1990; Lin *et al.*, 2001). Therefore, as information efficiency and resource acquisition improve, social capital is gained and firm performance is enhanced.

Betweenness centrality refers to the focal firm being in a position such that it links two disconnected members together. The focal firm then plays a role in filling a structural hole, thereby bridging flows of information (Burt, 1992). Wincent *et al*. (2010) posited that firms with high levels of betweenness centrality act as information and resource regulators and controllers to connect many members that are not directly related. Through this bridging position, firms are more likely to receive support and access to new information and resources (Baum *et al*., 2012; Zaheer and Bell, 2005). In addition, the intermediary position allows focal firms to link together originally independent resources and information, thereby stimulating product exploration, technological advances, innovation, market expansion, and the capture of entrepreneur interest (Yang and Liu, 2012). Consequently, a high level of betweenness centrality enriches the connotations of resources, extends the potential applications of new information, expands the scope of social capital, leads to superior performance, and sustains competitive advantages (Burt, 1992; 2001; McEvily and Zaheer, 1999).

To sum up, the strategic network is a platform for exchanging information and sharing resources among network actors. A good network structure smooths platform operation, integrates internal and external resources, enriches information, ensures that opportunities can be seized in a timely manner, expedites strategic action, and extends the usefulness of data. Such a network structure also reduces the cost of obtaining resources and strengthens the predictability of business environment dynamics. Accordingly, focal firms can cultivate social capital (Burt, 2000), enhance innovation (Capaldo, 2007; Schilling and Phelps, 2007), transfer knowledge (Reagans and McEvily, 2003), and access information (Alatas *et al*., 2016), which in turn heighten firm

performance (Liu and Yang, 2020; Wincent *et al*., 2010).

2.2 Network structure, organizational agility, and firm performance

Organizational agility is the capability of a firm to sense unpredictable instability and react efficiently to such instability. An agile firm knows how to approach unforeseen challenges, to react in a timely manner through efficient and effective realignment and the reconfiguration of resources, messages, functions, business processes, and strategies (Braunscheidel and Suresh, 2009; Grnasekaran, 1999; Liu and Yang, 2020; Shang *et al*., 2019; Swafford *et al*., 2006), and to take advantage of these challenges as an opportunity to obtain profit (Sharifi and Zhang, 1999). Therefore, in the current rapidly changing business environment, organizational agility is an essential competitive advantage (Almahamid *et al*., 2010; Barreto, 2010; Liu and Yang, 2020).

Organizational agility consists of two complementary facets: sensing ability, or the ability to remain alert to changes and identify opportunities in the business environment (Evans and Salaiz, 2019; Overby *et al*., 2006; Pavlou and El Sawy, 2011); and response ability, or the ability to reconfigure and integrate resources, technologies, knowledge, procedures, and information when faced with changes in demand and the business environment (Dove, 2002; Overby *et al*., 2006; Roberts and Grover, 2012). However, Premaratne (2001) argued that the resources possessed by firms are usually insufficient for them to sense and react (Overby *et al*., 2006). Supplementing its resources with those obtained from a good network structure allows a firm to overcome deficiencies and meet the requirements of its operation strategies when facing uncertainty. Gulati *et al*. (2011) asserted that strategic networks provide firms with externally relevant resources and opportunities. Wincent *et al*. (2010) proposed that firms can overcome organizational limitations through links to strategic networks that allow access to external cumulative resources, knowledge, information, and the recognition of allies. A strategic network also helps firms to accumulate valuable knowledge and resources and provides opportunities to adopt innovative strategies and activities (Liu and Yang, 2020), which firms require to be agile.

The timely acquisition of diverse and vital resources, knowledge, support, technology, and capabilities from a good network structure enables firms to quickly identify threats and market opportunities. Consequently, firms can discern the patterns of changing trends, confirm the optimal business direction, refine their resources and information, and adjust their mode of operation so as to meet consumer demand, increase consumer satisfaction, and consolidate loyalty (Braunscheidel and Suresh, 2009; Swafford *et al*., 2008). A superior network structure improves the focal firm's perception, responsiveness, speed, flexibility, and accuracy at an economical cost and therefore benefits its performance (Liu *et al*., 2013; Liu and Yang, 2020).

2.3 Network structure and organizational reciprocity

A strategic network provides a platform for members that have common goals and interests to cooperate with each other in all areas. However, risks do remain; for example, network members usually have their own objectives, which naturally result in a conflict between collective interests and the self-interest of individual members (Wincent *et al*., 2010). In addition, firms may suffer from unfair treatment by partners under asymmetric power relations, encounter free-riding partners that only want to share resources but are hesitant to make a commitment, consume too much of their own management resources in maintaining a network structure, and lose benefits and investment opportunities as a result of the inability of partners to provide resources on time (Kim *et al*., 2006; Wincent *et al*., 2010). Hence, the quality of the network structure matters. Specifically, transactions within a strategic network should be accomplished through reciprocal and long-term cooperation among its members (Powell *et al*., 1996).

Parties to a reciprocal relationship usually engage in trading activities with limited self-interest; that is, firms are willing to sacrifice some of their own interests to respond to the fair and friendly behavior of the other party (Jolls, 1998). Likewise, as Bruni *et al*. (2008) asserted, firms may abandon self-interest and instead pursue long-term and mutually favorable activities if the expected

results can be obtained from the interaction among partners. A cooperative relationship promotes the reciprocity of network participants. The reciprocity mechanism in a network ensures that the contribution of any one party is fairly rewarded, which in turn reduces opportunism and free-riding and sustains interaction among network members (Wincent *et al*., 2010).

Firms in a strategic network are concerned with how their partners treat them. If the other party is fair and generous, then they are willing to reciprocate this treatment and reward the other party. Therefore, reciprocal relationships that emphasize peer-to-peer exchange between partners and assume that participants will seek the common maximum benefit are at the heart of ongoing interactions among partners (Blount, 1995; Charness, 2004; Coleman, 1990; Fehr and Gächter, 2000). Hence, reciprocity rather than traditional self-interest provides a more favorable behavioral model and is expected to influence the behavior of alliances in trading activities (Larson, 1992). Reciprocity is also the main determinant when selecting partners for a strategic alliance (Chung *et al*., 2000) and increases the probability of one firm to work with others or to form alliances (Li and Rowley, 2002).

2.4 Conditional effects of organizational reciprocity

Reciprocity stems from long-term relationships or exchanges among firms in which the firms are willing to share resources to achieve common interests and goals (Cropanzano and Mitchell, 2005). Reciprocal behavior therefore explains the difference in the performances of firms within a network (Bosse *et al*., 2009). Firms with higher reciprocity obtain more feedback from their partners and exhibit better performance. Furthermore, maintaining highly intensive and extensive exchanges with reciprocal partners ensures the quality of functioning within the strategic network, wherein focal firms obtain valuable knowledge and resources and establish strategic organizational targets. The reciprocity of partners also allows firms positioned in a structural hole to play a key role in controlling resources, opportunities, and cooperative business activities, thereby gaining entrepreneurial benefits (Yang and Liu, 2012).

With reciprocity among network members, there exist no asymmetric power, free-riding behaviors, uneven commitment or contribution, incompatibility among partners, lack or withholding of partner feedback, or abuse of power (Kim *et al*., 2006; Wincent *et al*., 2010). Therefore, establishing and reinforcing reciprocity guarantee that focal firms have immediate access to key information and resources and also allow them to acquire knowledge regarding operational processes and technologies and sharing capabilities. In addition, reciprocity optimizes network relationships, strengthens trust in alliances, and establishes the reliability of transactions between partners. Firms utilize network structures to obtain effective resources and information and then combine resources with their development strategies at lower transaction costs and market risk, thereby improving their agility and increasing their performance gains (Chai *et al*., 2011; Das and Teng, 2002). Accordingly, we set up the following hypothesis.

H1: Organizational reciprocity moderates the relationship between network structure and firm performance such that the path between network structure and performance is stronger when organizational reciprocity is high rather than low.

Liu and Yang (2020) observed that network structure influences an organization's internal capabilities and thus significantly impacts firm performance. The establishment of a good network structure helps firms obtain external information and resources, which in turn helps them improve their perception of and response to market changes and to shape their unique competitive advantages. However, Wincent *et al*. (2010) combined two sources of social capital existing in strategic networks, network structure and organizational reciprocity, as the means and measure for firms to obtain network resources, but ignored their any possible interaction effect. In contrast to the structural social capital formed by the network structure, organizational reciprocity is a key factor in the formation of relational capital and is also a key antecedent that impacts corporate competitive strategies (Ireland *et al*., 2002; Tsaur and Wang, 2011). Therefore, organizational reciprocity is a cooperation strategy that a firm can employ when interacting with its partners (Pesämaa *et al*., 2013).

According to Chandler (1962), organizations follow up with a strategy that in fact determines said organizations. The influence of network structure on organizational capabilities and performance may increase as the degree of organizational reciprocity changes. More specifically, Chung *et al*. (2000) remarked that when firms choose partners to join their strategic alliances, the reciprocity of the potential partner is the main consideration. Li and Rowley (2002) argued that a firm's reciprocal behavior increases the possibility of cooperation with other enterprises or alliances. Chai *et al*. (2011) observed that the reciprocity of organizations establishes trust and reliable transaction relationships among partners. Therefore, the reciprocal relationship between organizations emphasizes their reciprocal exchange behavior, which is at the core of the continuous interaction of the partners. Maintaining a favorable and mutually beneficial relationship with partners helps firms establish more partnerships, interact more frequently with partners, and play a bridging role in a strategic network.

Compared with a low level of organizational reciprocity, a high level of organizational reciprocity facilitates the acquisition of diverse, reliable, non-repetitive, and relatively important information and resources. Moreover, firms can use the information and resources obtained to improve their perception and responsiveness, thereby improving their performance (Liu *et al*., 2013; Liu and Yang, 2020). Extending the mediating effect of Liu and Yang (2020), the mechanism of organizational reciprocity, and the view of structure/strategy fit (Chandler, 1962), we thus focus on how organizational reciprocity influences the relationship between network structure and firm performance, as mediated by organizational agility. Accordingly, with a high level of organizational reciprocity, a firm with a superior network structure has organizational agility greater than that of other firms and thus exhibits superior performance. Therefore, we offer the next hypothesis.

H2: Organizational reciprocity moderates the strength of the mediated relationship between network structure and firm performance through organizational agility, such that the mediated effect is stronger when

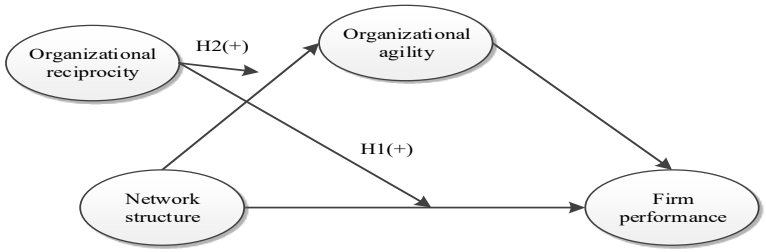

Figure 1
The theoretical research model and hypotheses

3. Methodology

organizational reciprocity is high rather than low.

3.1 Sample and data

We take survey data from Taiwan SMEs to test the research model. Specializing in high-technology manufacturing, research, and development, Taiwanese SMEs have become major partners in the global telecommunications supply chain. Having partners enables Taiwanese SMEs to develop by exploiting network resources and thus overcome their scarcity of economic resources and enhance their capabilities in sensing and responding to market dynamics.

SMEs typically do not disclose their behavioral and financial information simultaneously. Muthusamy and White (2005) argued that senior executives or managers in an alliance have a better grasp of alliance dynamics and are suitable interviewees during discussions of alliance network issues. Therefore, to obtain a representative sample for the research topic, a survey was administered to senior executives of Taiwanese SMEs enrolled in an executive master's degree in a business administration (EMBA) program. These executives were regarded as having a precise understanding of and rich experience with operations, strategies, market variations, and alliance relationships. In all, 400 online and paper questionnaires were distributed to respondents who were mid- or high-level executives with over 7 years of business experience. Of these, 230 valid questionnaires were employed to test the research hypotheses.

For the detection of non-response bias, we conduct an independent-sample t test (Armstrong and Overton, 1977) on early and late responses, finding the difference to be not statistically significant (p = 0.2). Following Lindell and Whitney (2001), we use a confirmatory factor analysis (CFA) model to detect the impact of common method bias (CMB). CMB dimensions explain 42.983% of the variance of all items, indicating that CMB is not a serious problem. We also compare the multifactor CFA model with the single-factor CFA model. The chi-square value of the multifactor CFA model is 1,171.56 (df = 413), while the chi-square value of the single-factor CFA model is 4,237.18 (df = 435), yielding a difference of 3,065.62. The comparison implies that the multifactor CFA has a better goodness of fit. The hypothesized model may therefore be considered free from CMB.

3.2 Measures

This study explores whether a network structure conditional on organizational reciprocity fosters superior internal organizational agility and superior firm performance. The measure of each construct is identified according to the extant literature and assessed on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

3.2.1 Network structure (NS)

Network structure refers to the structural characteristics of a network and comprises three major elements: tie intensity, degree centrality, and betweenness centrality (Wincent *et al*., 2010). We therefore measure network structure as a second-order construct with three subconstructs and 12 items (Liu and Yang, 2020). The overall Cronbach's alpha of the items is 0.967.

3.2.2 Organizational reciprocity (OR)

Organizational reciprocity refers to the pursuit of perceived fairness of transactions among strategic partners. Organizational reciprocity is measured with 8 items (Lee and Yang, 2014). The respondents considered the degree to

which the firm and its partners are able to commit to sharing resources to attain common goals and benefits. The Cronbach's alpha of the items is 0.954.

3.2.3 Organizational agility (OA)

Organizational agility refers to a firm's abilities to identify and respond to environmental changes and opportunities by rapidly reconfiguring and integrating all resources and procedures. It is measured as a second-order construct with two subconstructs: sensing ability and response ability. Adapted from Tallon and Pisonneault (2011), a seven-item scale is employed to assess the variation in organizational agility. The overall Cronbach's alpha is 0.910.

3.2.4 Firm performance (FP)

In this study we employ a subjective assessment to evaluate SME performance, because of the reluctance of firm executives to simultaneously reveal financial data and internal operation information. We then utilize a four-item scale adapted from Liu and Yang (2020) to assess the variation in performance. The Cronbach's alpha is 0.910.

4. Results

4.1 Measurement model

To validate the measurement model, we evaluate the index of model fit, scale reliability, and validity by using CFA. Regarding the goodness of fit for the hypothesized model, the results are $\chi 2 = 1{,}171.56$; degrees of freedom (df) = 413, $\chi 2/df = 2.837$; comparative fit index = 0.909; goodness of fit index = 0.87; non-normed fit index = 0.909; and root mean square error of approximation = 0.09. These results indicate that the research framework and the actual data are a good fit (MacCallum and Hong, 1997).

We next further assess the scale's reliability by using the composite reliability and estimating the average variance extracted (AVE). For each latent construct, as expected, the composite reliability ranges from 0.789 to 0.961 (i.e.,

over 0.7); the AVE value ranges from 0.556 to 0.857 (over 0.5), indicating adequate scale reliability. The descriptive statistics and reliability analysis results are summarized in Table 1.

Table 1

A summary of descriptive statistics and reliabilities

Constructs	Indicator	Mean	SD	Factor loading	CR	AVE
Network structure (NS)						
Tie intensity (TI)	TI1	3.222	1.036	0.865***	0.935	0.783
	TI2	3.335	0.942	0.909***		
	TI3	3.304	0.973	0.887***		
	TI4	3.130	1.102	0.877***		
Degree centrality (DC)	DC1	2.974	1.023	0.917***	0.960	0.857
	DC2	3.096	0.993	0.932***		
	DC3	2.952	1.054	0.933***		
	DC4	3.161	0.991	0.920***		
Betweenness centrality (BC)	BC1	3.074	1.152	0.942***	0.966	0.878
	BC2	2.978	1.191	0.987***		
	BC3	2.957	1.189	0.964***		
	BC4	3.309	1.108	0.849***		
Organizational reciprocity (OR)	OR1	3.174	1.123	0.715***	0.957	0.737
	OR2	3.143	1.058	0.890***		
	OR3	3.348	0.981	0.872***		
	OR4	3.213	1.087	0.901***		
	OR5	3.1	1.119	0.863***		
	OR6	3.396	0.982	0.853***		
	OR7	3.013	1.119	0.892***		
	OR8	3.157	1.020	0.867***		
Organizational agility (OA)						
Sensing ability (SA)	SA1	3.883	1.006	0.890***	0.942	0.802
	SA2	3.809	0.993	0.923***		
	SA3	3.704	1.061	0.868***		
	SA4	3.778	0.988	0.901***		
Response ability (RA)	RA1	3.426	1.020	0.736***	0.789	0.556
	RA2	3.383	1.157	0.685***		
	RA3	3.509	0.988	0.811***		
Firm performance (FP)	FP1	3.465	1.072	0.758***	0.908	0.712
	FP2	3.43	1.079	0.856***		
	FP3	3.448	1.080	0.905***		
	FP4	3.609	1.017	0.849***		

*** $p<0.01$.

We assess scale validity by considering both convergent validity and discriminant validity. All AVE values exceed 0.5, confirming the scale's convergent validity. We then conduct $\chi 2$ difference tests to evaluate discriminant validity, in which discriminant validity is confirmed if the $\chi 2$ difference for any pair of constructs is larger than 3.84 (at the significance level of .05). As Table 2 indicates, the $\chi 2$ difference ranges from 77.52 to 867.111 and is thus over 3.84, thus achieving discriminant validity. Thus, the measurement model is appropriate to test the research hypotheses for the constructs.

4.2 Hypotheses estimation approach

We further examine the hypotheses of the research model. The research framework depicts a first-stage moderated model (Edwards and Lambert, 2007) - that is, the impact of network structure on firm performance is mediated by organizational agility, and the direct and indirect effects between network structure and firm performance are moderated by organizational reciprocity. Hayes's (2013) PROCESS macro (Model 8) for SPSS is used to estimate effects among network structure, organizational reciprocity, organizational agility, and firm performance. In addition, item parceling is employed to scale data transformation so as to gain more definitive rotational results (Matsunaga, 2008).

4.2.1 Direct effect and indirect effect

The direct effect of network structure on firm performance is 0.268

Table 2

Results of the $\chi 2$ difference test

Construct	TI	DC	BC	OR	**SA**	RA
DC	252.229***	-				
BC	330.54***	563.525***	-			
OR	204.823***	222.192***	867.111***	-		
SA	724.783***	814.818***	838.285***	817.153***	-	
RA	165.93***	168.89***	188.741***	169.118***	77.52***	-
FP	492.678***	522.772***	550.469***	503.837***	458.351***	98.574***

*** $p<0.01$.

($p < .01$; Table 3), and the 95% bootstrap confidence interval is 0.159-0.378. This result indicates that a superior network structure endows SMEs with more social capital, information, and innovation activities and thus leads to outstanding firm performance. Next, we explore the indirect influence of network structure on firm performance through organizational agility. The mediated effect in the network structure-organizational agility-firm performance model is 0.153 ($p < .01$) and the 95% bootstrap confidence interval is 0.070-0.226. Moreover, the direct effect of network structure on firm performance is still significant after considering the indirect effect of organizational agility, essentially demonstrating that the impact of network structure on firm performance is partially mediated by organizational agility. These results echo RBV regarding promoting firm performance in that a firm can create unique advantages in terms of its performance as a result of integrating intangible network advantages and internal operational capabilities to detect and respond to market dynamicity.

4.2.2 Moderated effect and moderated mediation effect

To explore the moderated effect of organizational reciprocity on the relationships among network structure, organizational agility, and firm performance, we use the first-stage moderated model developed by Edwards and Lambert (2007) to estimate path coefficients by using the following equations:

$$OA = a_0 + a_1 NS + a_2 OR + a_3 NS*OR + e_1, \quad (1)$$

Table 3
Testing of the direct and indirect effects

Effect	Coeff. (SE)	95% bootstrap CI
Direct effect		
NS →FP	0.268^{***} (0.055)	[0.159, 0.378]
Indirect effect		
NS →OA→FP	0.153^{***} (0.039)	[0.070, 0.226]

Notes: Bootstrap CI was estimated by2,000 bootstrap samples.

*** $p<0.01$.

$$FP = b_0 + b_1 NS + b_2 OR + b_3 OA + b_4 NS*OR + e_2. \quad (2)$$

Organizational reciprocity moderates the network structure-firm performance path. As Table 4 indicates, b4 is equal to 0.321 ($p < .01$), and the 95% bootstrap confidence interval is 0.215-0.427. These results indicate that the direct effect of network structure on firm performance conditional on organizational reciprocity is significant, thus supporting Hypothesis 1.

In testing the network structure-organizational agility-firm performance path conditional on organizational reciprocity, the effect of this first-stage moderated mediation model depends on whether the network structure-organizational agility path moderated by organizational reciprocity is significant. The results show that the coefficient (a_3) of network structure x organizational reciprocity on organizational agility is 0.436 ($p < .01$), indicating that first-stage moderation is significant. Moreover, the impact (b_3) of organizational agility on firm performance in the second stage is 0.336 ($p < .01$). Thus, the result for the combination supports our proposition that the indirect effect of organizational agility on the relationship between network structure and

Table 4

Testing of the moderated effect and moderated-mediation effect

Variable		First stage (OA) Coeff. (SE)	95% bootstrap CI		Second stage (FP) Coeff. (SE)	95% bootstrap CI
Constant	a_0	7.573*** (0.506)	[6.576, 8.569]	b_0	4.725*** (0.738)	[3.271, 6.178]
NS	a_1	-1.530*** (0.192)	[-1.907,-1.152]	b_1	-1.093*** (0.224)	[-1.536,-0.651]
OR	a_2	-1.202*** (0.165)	[-1.527,-0.877]	b_2	-0.774*** (0.190)	[-1.148,-0.401]
OA				b_3	0.336*** (0.069)	[0.201, 0.472]
NS *OR	a_3	0.436*** (0.043)	[0.351, 0.521]	b_4	0.321*** (0.054)	[0.215, 0.427]
F		4.332***			89.038***	
R^2		0.374			0.487	

*** $p<0.01$.

firm performance is significantly conditional on organizational reciprocity. In addition, constructing the index equation of moderated mediation as Equation 3 verifies the significance of the moderated mediation effect. The slope in Equation 3 can be regarded as the index, and its significance can be used to judge the existence of the moderated mediation effect. Table 5 indicates that the index is 0.146, and that the 95% bootstrap confidence interval ranges from 0.045 to 0.280 and does not include zero. Thus, Hypothesis 2 is supported. These results imply that organizational reciprocity increases the mediating effect of organizational agility on the relationship between network structure and firm performance.

Moderated mediation index: $(a_1 + a_3\ OR)\ b_3 = -0.514 + 0.146\ OR.$ (3)

5. Discussion

An SME can acquire a superior competitive advantage by exploiting the deployments and operations within its networks and relationships. How this can be achieved, however, requires further clarification. Wincent *et al*. (2010) indicated that superior performance arises by acquiring the benefits of external resources and social capital and by reducing risk costs through the development of a superior network structure. Moreover, these benefits for agility and

Table 5

Testing for the index of the moderated mediation effect

Model	Values of OR[1]	First stage[2]	Second stage	Conditional indirect effect	
				Coeff. (SE)[3]	95% bootstrap CI
NS-OA-FP	2.256	-0.547	0.336	-0.184 (0.091)	[-0.406,-0.048]
	3.186	-0.141	0.336	-0.048 (0.049)	[-0.166, 0.029]
	4.116	0.264	0.336	0.088 (0.050)	[0.007, 0.205]
Moderated-mediation index				0.146**(0.059)	[0.045, 0.280]

Notes: ** $p<0.05$.

[1] Values for OR are the mean and plus/minus one SD from mean.

[2] The coefficients of the first stage are estimated by $a_1 + a_3$* the values of OR.

[3] The coefficients of conditional indirect effects are calculated by Equation 3.

performance can be further strengthened under reciprocal and fair partnerships and through their relational capital. Our current study addresses this idea by employing a moderated mediation model that integrates network structure and organizational agility to analyze whether an SME's performance can improve through engagement in organizational reciprocity. The results offer the following contributions to existing knowledge.

First, the study results confirm that superior performance arises from the acquisition of network resources through strategic partnerships (Liu and Yang, 2020). This is consistent with RBV, because a superior network structure can help SMEs access rare and valuable resources and capabilities, which are key for obtaining competitive advantages and achieving superior performance (Newbert, 2008). Second, organizational agility gives a linking mechanism that connects network structure to firm performance. The present study refines the current understanding of the effect of resources on capability by identifying network positions and resources as critical antecedents to the effects of internal agility on firm performance. Third, in line with RBV, the results confirm that adopting cooperative roles improves organizational dynamic capability to help an organization achieve superior performance, implying that a firm that holds a superior network position has the advantage of accessing external network resources and information. An SME can exploit these resources to understand market trends and react to them effectively when opportunities arise, resulting in the firm outperforming its competitors. Fourth, because firms that combine superior network resources and internal agility are more likely to create value or obtain resources in novel ways, they have additional entrepreneurial and first-mover advantages to boost growth and profitability performances (Chen *et al*., 2017). This finding may explain why firms in a favorable network structure benefit from the effects of integrating external resources with organizational agility (Gulati, 2007; Gulati *et al*., 2011; Lavie, 2006; Yang and Liu, 2012).

The present study also addresses the dilemma of structural status and reciprocity in strategic network research - specifically, whether firms should allocate their limited resources to improving their structural position or to

maintaining close connections with a small number of partners. The results demonstrate that both are critical for SMEs and that reciprocity plays a facilitatory role for firms hoping to improve their structural status and performance. Because firms operate differently in interfirm relationships, advantages are derived from network resources or the series effect of the resource-agility combination, which varies depending on their reciprocal behaviors. Reciprocity ensures the quality of network relationships and an organization's constructive integration into the network structure, thus facilitating cooperative and economic rent-creating transactions. Accordingly, by participating in networks and holding critical positions, SMEs can overcome resource deficiencies and obtain VRIN resources to sustain competitive advantages.

Networking with more members, interacting more frequently with network members, and acquiring an important position in the network are well-recognized approaches to strengthening the effects of networking. However, network relationship management, engagement in intensive and reciprocal contact with group members, and acquisition of important positions in the network are not easily accomplished tasks. They all require resources, manpower, time, and energy. Compared with large enterprises, SMEs are inferior in these areas. In addition, balancing contributions among network members, reducing opportunism, establishing norms, and supervising the behavior of members increase transaction costs and offset the positive effects of the network structure. Therefore, only the mutually beneficial dedication of network members can ensure the quality of networking, foster close connections among group members, and embed the group firmly within the network. In this way the networking social capital can be integrated, extended, and sustained.

6. Conclusions

This study presents a framework for considering the network structure-firm performance nexus mediated by agility and moderated by organizational reciprocity. It makes three primary contributions to the literature. First, it

confirms the significance of the role played by the network structure and its relationship to firm performance. According to RBV and the social capital theory, a good network structure enables firms to obtain external complementary resources and information, enrich their knowledge of opportunities and threats, and create valuable, rare, inimitable, and embedded resources, which are the key determinants in acquiring a competitive advantage (Newbert, 2008). However, concerns regarding uneven structural positions or unequal relations, free-riding behaviors and opportunism of network members, unrewarded payouts, delayed or diluted outcomes, obtainment of redundant resources, ineffective investment in network establishment, and discrete connections can push firms to hesitate in becoming a part of any network. This hesitation in choosing partners and building relationships hinders the acquisition of external resources, and the establishment of the reciprocity mechanism mitigates these concerns. Reciprocal behavior among network members fulfills trust and commitment through cooperative transactions, orients collective network goals (Wincent *et al*., 2010), and links cooperation processes to numerous quality resources, enabling firms to take advantage of a strategic network structure and acquire opportunities for sustainable development.

Second, this study addresses that reciprocal relationships have a significant and positive impact on firms' structural position and organizational agility and performance, implying that both structural position and reciprocity influence corporate performance. As observed by Wincent *et al*., reciprocity plays a facilitatory role in structural status and organizational performance. From the perspective of obtaining network resources, the status of the network structure represents the state of access to other firms and the possibility of obtaining external resources. Moreover, the degree of benefit depends on the reciprocal behavior of partners and on social norms. Cooperation among network members through reciprocal relationships enables firms to obtain external resources and plays a key role in strengthening their responses to and perception of the market.

Third, reciprocal partnerships are also essential for an SME to acquire a sustainable competitive advantage. In contrast to traditional cooperative

relationships based on self-interest, mutually beneficial partnerships aim to maintain long-term and continuous interactions. Focal firms sacrifice some of their own interests to respond to the friendly and fair behaviors of others for the establishment of beneficial long-term cooperative relationships, reduction of transaction costs and risks, and achievement of better performance. Furthermore, reciprocal behaviors increase the possibility of cooperation with additional firms and alliances. This enhances structural status, which in turn helps towards obtaining resources and information that managers can combine with development strategies to acquire sustainable competitive advantages.

6.1 Limitations and future research

Several limitations of this study should be considered. First, the survey objects are senior executives who participated in an EMBA program. Although they met the requirements proposed by Muthusamy and White (2005) for suitability in discussions of alliance networks, and the number of responses met the requirements for the research method, sufficient sample representativeness is not guaranteed.

Second, in terms of the questionnaire responses, factors such as differences in personal subjective perceptions, understanding of the company's overall operating conditions, and stances on protecting commercial interests might affect the completeness of the research and cause inevitable errors in the results. Therefore, probability and random sampling can be applied in future studies to examine related research areas.

Finally, this study explores network structure as an antecedent of organizational agility and firm performance, with organizational reciprocity as moderators of network structure, organizational agility, and firm performance. However, whether the influence of the network structure is contingent on other organizational factors, such as family governance, remains uncertain. According to the agency theory and the concept of socioemotional wealth, the influence of management ties on firm performance differs between family firms and non-family firms (Lee, 2019). Thus, the influence of family governance may

moderate the effects of management ties and resources. Future studies should refine this model by considering the effect of family governance.

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Appendix A: Questionnaire

Network structure

Compared with our competitors,…

Degree centrality

1. The company cooperates with more suppliers.
2. The company has more customers and cooperates with more distributors.
3. The company cooperates with more of its other internal business departments.
4. The company cooperates with more strategic partners.

Tie intensity

1. The company interacts more frequently with its suppliers.
2. The company interacts more frequently with its customers and distributors.
3. The company interacts more frequently with its other internal business departments.
4. The company interacts more frequently with its strategic partners.

Betweenness centrality

1. The company acts more as an intermediary or contact mechanism between suppliers and their cooperating companies.
2. The company acts more as an intermediary or contact mechanism between customers and distributors and their cooperating companies.
3. The company acts more as an intermediary or contact mechanism between other internal business departments.
4. The company acts more as an intermediary or contact mechanism between strategic partners.

Organizational reciprocity

1. The company is willing to share resources with its suppliers.
2. The company's suppliers are willing to engage in resource sharing.
3. The company is willing to share resources with its customers and distributors.
4. The company's customers and distributors are willing to engage in resource sharing.

5. The company is willing to share resources with other business departments.
6. The company's other business departments are willing to engage in resource sharing.
7. The company is willing to share resources with strategic partners.
8. The company's strategic partners are willing to engage in resource sharing.

Organizational agility

Sensing ability

Compared with our competitors,

1. The company is more effective in collecting information about its customers.
2. The company is more effective in collecting information about its competitors.
3. The company has more detailed information about its suppliers and service providers.
4. The company pays more attention to the major concerns of its competitors.

Response ability

Compared with our competitors,

1. The company is more effective in responding to customers' expectations.
2. The company is more effective in responding to competitors' actions.
3. The company is more effective in exploiting suppliers' resources and capabilities to enhance its products and services.

Firm Performance

Compared with our competitors,

1. The company is more successful in development.
2. The company has a shorter service time in terms of the delivery of products and services.
3. The company is more profitable in products and services.
4. The company has more innovative products and services.