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The linkage between open innovation, absorptive capacity and managerial ties: A cross-country perspective

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ABSTRACT

The paper addresses the concepts of inbound open innovation and outbound open innovation as the key elements of the open innovation by incorporating managerial ties and absorptive capacity from a cross-country perspective. This study draws on a cross-sectional sample of 530 companies based in France, Malaysia and the UAE collecting data collect from middle and top managers working in different industries. The results show the mediating effect of perceived absorptive capacity in the relationship of external managerial ties and open innovation (inbound and outbound). Most specifically, managerial ties affect inbound open innovation in all the three surveyed countries while managerial ties relate positively to outbound open innovation in France and the UAE. The mediating role of absorptive capacity is evident in the cases of France and the UAE. Finally, the paper concludes, highlighting the implications of the study findings and its limitations. The paper will help to understand the connection between managerial ties and absorptive capacity that may lead to the successful operations of open innovation.

Introduction

Due to the globalization of markets, rapid technological changes, and mobility of the knowledge workforce over the years, there has been a perceptible shift in the way organizations innovate (Cui, Wu & Tong, 2018). Innovation is no longer a result of technological development and the transformation of products and services within an organization only. Instead, knowledge available outside its border is a vital source of innovation. This opportunity has led to the facilitation of an open innovation culture in many organizations (Cui et al., 2018). Due to enhanced interactions and connectivity furnished by improved information technology, many firms engage in innovation tasks in an "open" manner by joining hands with other organizations, educational/research institutions, and other external sources of knowledge. The extant research demonstrates that while internal sources of knowledge are essential, external sources are also necessary for a firm to attain the desired level of innovativeness and maintain a superior capability in introducing innovations (Medase & Abdul-Basit, 2020).

The open innovation paradigm aims at helping organizations achieve a competitive advantage based on the two-way knowledge and resource sharing (Chesbrough & Crowther, 2006). This two-way knowledge and resource sharing process comprise inbound open innovation (knowledge inflows) and outbound open innovation (knowledge outflows) – models which have been proposed as the organizations' innovation success (Chesbrough, 2003; Von Hippel, 2005). Inbound open innovation is the exploration and establishment of new associations with external entities to enhance the innovative capabilities of an organization by focusing on knowledge inflows (Chesbrough & Crowther, 2006). On the other hand, outbound open innovation is the exploitation of an organization's expertise and capabilities by commercializing them and focusing on knowledge outflows (Vanhaverbeke, 2006).

While initially inbound open innovation garnered most of the researchers' attention, the outbound dimension also has of late come under scrutiny. At the same time, after the initial focus on open innovation in developed countries, several studies have also focused on open innovation in the developing world. In this sense, the research on open innovation has spread geographically with empirical evidence coming from diverse country and industry contexts. Despite the increased focus on studying open innovation worldwide, the concepts of inbound open innovation and outbound open innovation as

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key elements of the research by incorporating managerial ties and absorptive capacity from a cross-country perspective warrants study. To fill this research gap, this paper aims to understand open innovation in the context of three countries (i.e., France, the UAE and Malaysia) chosen due to their diverse contexts.

In France, the government is paying particular attention to knowledge and resource transfer between public and private organizations. It is also taking initiatives to enhance international connectivity and cooperation to achieve a competitive advantage and increase the productivity of the organizations (Naqshbandi & Jasimuddin, 2018). The UAE has introduced several programs countrywide to promote innovation and create an innovation-conducive climate. In Malaysia, open innovation research is gaining momentum and it is the most promising country and the potential open innovation hub in Asia (Lindegaard, 2011).

Open Innovation helps enterprises improve their innovation processes based on the collaborative creation and development of ideas and products (Carbone, Contreras & Hernandez, 2010). There has been a growing interest among scholars and practitioners in the area of inbound and outbound open innovation (Jasimuddin & Naqshbandi, 2019). A few studies have touched upon on the notion of managerial ties and open innovation. Several scholars (e.g., de Araújo Burcharth, Knudsen & Søndergaard, 2014; Naqshbandi, 2016) attempted to address the relationship between managerial ties and open innovation (de Araújo Burcharth et al., 2014; Naqshbandi, 2016). The current body of research indicates that the innovation pace of a firm depends on the capabilities developed. However, the firms that lag in the innovation process can compensate for this by actively networking for resources and capabilities (Hilmersson & Hilmersson, 2021). The extant literature thus shows support for the relationship of managerial ties with the managers of external organizations, and other sources of knowledge - which facilitate the interconnectivity, alliance, and cooperation, and thereby help organizations to exploit the internal and external resources to enhance organizational outcomes (Acha & Cusmano, 2005; Lawson, Petersen, Cousins & Handfield, 2009). Therefore, managerial bonds of an organization's managers with managers of other organizations, government representatives, educational institutions and research centers can help a firm enhance open innovation outcomes (Leiponen, 2006; Naqshbandi, 2016; Peng & Luo, 2000).

Although research interests in managerial ties and open innovation is growing, limited empirical research is focused the impact of managerial ties and absorptive capacity on open innovation. Several scholars (Blohm, Köroglu, Leimeister & Krcmar, 2011 Huang & Rice, 2012; Rangus, Drnovšek, Di Minin & Spithoven, 2017) attempted to connect the relationship between open innovation and absorptive capacity. Huang and Rice (2012) empirically examine the impacts of openness on innovation, showing that investment in absorptive capacity has a declining marginal effect on the innovation performance of new processes. Rangus et al. (2017)) address the mediation effect of absorptive capacity on the relationship between open innovation and innovation performance. Blohm et al. (2011) develop a theoretical framework for value appropriation in open innovation communities that combines open innovation in terms of open innovation communities with absorptive capacity. Huang and Rice (2012) test for the significance of interaction effects between open innovation strategies and absorptive capacity, finding support for the idea that effective knowledge absorption capabilities are of vital importance in the facilitation of innovation effectiveness.

Others (Naqshbandi, Kaur & Ma, 2015) have proposed the mediating role of absorptive in the association between managerial ties and open innovation. Such scholars contend that organizations need to explore, convert, and utilize external and internal knowledge to enhance open innovation outcomes (Naqshbandi, 2016). Hence, the ability to explore, convert and utilize the external knowledge along with the internal resources known as the absorptive capacity is vital to any organization (Gao, Xu & Yang, 2008; Zahra & George, 2002). The ties of managers with other knowledge resources enable the organizations to find and utilize the relevant information available externally and use it along with the internally available information and ideas to facilitate the innovation process. Against this backdrop, it is important to examine the relationship of external managerial ties with inbound and outbound open innovation as mediated by perceived absorptive capacity. We thus study how absorptive capacity can intervene in the managerial ties-open innovation relationship from a multi-country perspective.

This study contributes on several counts. It is one of the few to examine the phenomenon of open innovation in a multi-country context to ensure generalization to similar contexts. The study also brings greater clarity to the open innovation debate with the literature related to absorptive capacity and managerial ties. From a practitioner's perspective, organizations can repose greater confidence in the study's findings, given that the data collected from different contexts. An understanding of the peculiarities of the context is to enhance the success of organizations in the open innovation paradigm, and enable them to utilize the ties of their managers to exploit and commercialize the internal and external knowledge resources to maximize organizational outcomes.

The remainder of the paper is structured as follows. We review the literature and develop hypotheses. We then describe the methods used and the procedures adopted to carry out this study. The results is presented next, followed by a detailed discussion of the findings. The last section of the paper presents the implications of the study, its limitations, and the recommendations for future research.

Literature review and theoretical background

Managerial ties and inbound open innovation

Managerial ties is an important element that helps firms to cope with uncertainty in formal institutional systems and secure external resources (Fan, Liang, Liu & Hou, 2013). Geletkanycz and Hambrick (1997) defined managerial ties as executives' boundary-spanning activities and their associated interactions with external entities. Most specifically, managerial ties are relationships with suppliers, buyers, competitors, and other stakeholders (e.g., political officials or government organizations) (Kull, Mena & Korschun, 2016; Peng & Luo, 2000). These kinds of network relationships are distinctly different and can provide unique kinds of strategic resources to firms for innovation (Fan et al., 2013).

According to Chesbrough and Crowther (2006), inbound open innovation explores and establishes new associations with other organizations to enhance a firm's innovative capabilities. To explore and utilize the valuable business information available in different markets for organizational benefits, managerial ties are known to play an important role (Li & Zhou, 2010; Naqshbandi & Kaur, 2014). This is because relevant managerial ties help organizations establish collaborative networks with other organizations for mutual business success (Wong & Ellis, 2002). According to Smirnova, Torkkeli, Podmetina and Väätänen (2012), it is imperative to collaborate with different organizations to attain long-term strategic goals. Recent research shows that managerial ties can interact with other organizational variables and enhance sustainable product innovation (Thongsri & Chang, 2019).The fact that organizational level collaboration results in gaining access to others' networks and provides an opportunity to benefit from externally available resources and knowledge (Thorelli, 1986).

However, firms face numerous difficulties in establishing and maintaining networks for innovative activities (Naqshbandi & Kaur, 2014). Such challenges exist due to the complexities of relationships with different players such as consumers (Von Hippel, 2001; Von Hippel & Katz, 2002), sellers (Emden, Calantone & Droge, 2006),

and other collaborating organizations (Chesbrough, 2003). Despite these challenges, the importance of these collaborative networks cannot be underestimated for organizational learning and innovation (Gilsing & Nooteboom, 2005). In this context, organizations rely on the ability of their managers to establish strong ties with other organizations and similar players (Chiaroni, Chiesa & Frattini, 2011). Organizations typically focus on building good relationships among their employees (i.e., creating organizational harmony) to maximize the benefits of collaboration and knowledge sharing (Naqshbandi, Kaur & Ma, 2015; Jasimuddin, 2012).

Additionally, organizations encourage their employees to forge managerial ties with other organizations, research centers/institutions and relevant government officials. State institutions can bolster firms' innovation activities by supporting knowledge diffusion, technology transfer, funding searches, and project management (Hofman & Bruij, 2010). This helps in utilizing the internal knowledge of organizations and assimilating it with the externally available knowledge resources to enhance innovation outcomes (Chesbrough & Crowther, 2006; Dyer & Singh, 1998). A key governmental priority is its investment in innovation, which means investment in human and creative capital (Nurse & Ye, 2013). Institutional support plays a vital role for firms by ensuring access to rare resources, funding, financing, and project support (Li & Zhou, 2010). When firms have strong institutional networks, they can more easily gain access to critical external resources and accurate and timely information (Wang & Chung, 2013; Zhang, Qi, Wang, Zhao & Pawar, 2018).

It is important to note that besides focusing on ties with managers working in other organizations, firms also place importance on knowledge resources available in universities and research centers/institutions and attempt to benefit from ties with government officials. Managerial ties with government officials are particularly important in developing and under-developed countries where appropriability regimes are relatively weaker than developed countries. In such economies, the absence of market-supporting institutions, transparent laws, or clear regulations make it worthwhile for organizations to build managerial ties (Gao et al., 2008). Hence, managerial ties with government representatives are considered vital. Such ties can help a firm benefit in legislative activities and legal consultations (Peng & Luo, 2000), in acquiring scarce human resources (Li & Zhou, 2010), in gaining access to unique and valuable resources (Zhu & He, 2010) and in establishing safe and reliable contacts (Levin & Cross, 2004). All of which can help a firm strengthen its innovation-related activities. The above discussion leads to the following hypothesis.

H1. Managerial ties between employees of different organizations is positively related to inbound open innovation.

Managerial ties and outbound open innovation

Outbound open innovation implies that firms can search for external players that have better fitting business models to exploit and commercialize a particular technology than just depend on internal paths to market (Vanhaverbeke, 2006). While managerial ties are important for inbound open innovation, such ties can also help enhance outbound open innovation outcomes. Managerial resources, in particular managerial ties, with other organizations are important for acquiring, integrating, transforming, and using external resources (Badir, Frank & Bogers, 2020; Naqshbandi, 2016; Zahra & George, 2002).

At the same time, managerial ties play an important role during the exploitation and commercialization of knowledge resources (Gilsing & Nooteboom, 2005). Along with managerial ties with other firms, the role of ties with research centers and institutions in innovation-related activities of organizations is well established (Rasiah & Govindaraju, 2009). Universities and research centers provide a fertile ground for creating knowledge resources that benefit organizations (Naqshbandi & Kaur, 2014). To take it forward, organizations need to establish networks of cooperation with external players, including managers, researchers and other officials, to exploit the knowledge resources and technology they own (Fabrizio, 2006). Thus, managerial ties with the relevant external players help a firm exploit and commercialize its knowledge and technology (Naqshbandi & Kaur, 2014). Based on this discussion, the following hypothesis is presented:

H2. Managerial ties between employees of different organizations is positively related to outbound open innovation.

The mediating role of absorptive capacity in the relationship between managerial ties and inbound open innovation

Absorptive capacity is a popular concept in contemporary management literature (Jasimuddin, Li & Perdikis, 2015; Naqshbandi & Jasimuddin, 2018). Cohen and Levinthal (1990) define it as the firm's ability to recognize the value of external knowledge, assimilate and use for commercial ends. The notion of absorptive capacity is described as a dynamic capability by some scholars. In this regard, Zahra and George (2002) define absorptive capacity as the ability of a firm to explore and exploit the knowledge. Parallel to this, Kotabe, Jiang and Murray (2011) go further by contending knowledge acquisition can only enhance new product market performance with the presence of realized absorptive capacity.

Managerial ties are known to positively affect firm performance (Jiang, Guo, Wei & Wang, 2018). Managerial ties help organizations acquire knowledge and ideas that the organizations use for multiple beneficial purposes (Colyvas et al., 2002; Dahlander & Gann, 2010; Gassmann, Enkel & Chesbrough, 2010). Similarly, managerial ties with varied external sources of knowledge help organizations make the best use of the knowledge resources available within the firm's boundaries (Chesbrough & Crowther, 2006; Dyer & Singh, 1998). Therefore, many organizations prefer to share valuable their knowledge via advanced and elastic networks to get maximum benefits from the internal and external knowledge sources (Dittrich & Duysters, 2007; Jasimuddin, 2018).

While managerial ties with managers working at other firms are a good source of knowledge, managers' associations with other research and educational institutions also facilitate organizational innovation by providing systematic and technical assistance (Peng & Zhou, 2005). Additionally, organizations can receive several benefits (e.g., related to technology and human resources) and gain institutional support (Li & Zhou, 2010; Luo & Tung, 2007) by establishing managerial relationships with government officers (Peng & Luo, 2000). At the same time, to make the most use of the ties of their managers, organizations need to enhance their absorptive capacity to build internal resources by exploring and utilizing external ideas and knowledge (Lichtenthaler, 2009). Su and Yang (2018) report that a positive linkage exists between managerial ties and exploratory innovation which is strengthened by an organization's absorptive capacity. It is thus important to improve the innovative environment inside the organizations for smooth functioning and strong associations among workers (Barney, 1986; Vrontis, Bresciani & Giacosa, 2016).

The managerial ties can enhance organizations' absorptive capacity and help them obtain, integrate, and assimilate the externally available information (Naqshbandi, 2016). At the same time, the vital role of absorptive capacity in supporting inbound open innovation is highlighted by several past studies (Kyriakopoulos & De Ruyter, 2004; Minbaeva, Pedersen, Björkman, Fey & Park, 2003; Naqshbandi, 2016; Parida, Westerberg & Frishammar, 2012). Also, the impact of managerial ties and absorptive capacity on innovation is explained by Gao et al. (2008). Several other studies (e.g., Cohen & Levinthal, 1989; Wang & Han, 2011) have also noted that the organizations that own internal knowledge resources possess higher levels

of absorptive capacity for better exploitation of external information and ideas. Further, Naqshbandi (2016) studied the underlying mechanism of how absorptive capacity plays a role in the relationship between managerial ties and open innovations. The fact that the organizations in which managers have strong bonds with other organizations are well placed in gaining and using the external knowledge resources in multiple ways. Based on these arguments, we have formulated the following hypothesis.

H3. Absorptive capacity mediates the relationship between managerial ties and inbound open innovation.

The mediating role of absorptive capacity in the relationship of managerial ties with outbound open innovation

The past literature makes it clear that managerial ties lead to relationship-based capabilities of the organizations (Zhang & Li, 2008) and such capabilities result in the exploration and exploitation of the external and internal knowledge resources and opportunities (Lee, Pae & Wong, 2001; Zahra & George, 2002). For the stability and prosperity of organizations in general and innovative organizations in particular, the external environment is critical (Eisenhardt & Martin, 2000). Therefore, besides being beneficial for the acquisition of new expertise, knowledge and technology, organizations need to develop and maintain strong bonds with external entities to be able to accrue maximum benefits from internal knowledge and innovative capabilities (Cohen & Levinthal, 1989; Sivadas & Dwyer, 2000; Todorova & Durisin, 2007). Spithoven, Clarysse and Knockaert (2010) stated that managerial ties facilitate the organizations to establish absorptive capabilities in multiple ways such as by developing the skills to explore and utilize the innovative capabilities in profitable ways, and by enhancing the capacity to scour and discover the opportunities for commercialization available in the external environment.

Many past studies support the role of absorptive capacity in helping organizations gain multiple forms of knowledge and using it beneficially for the organizations in different contexts (Kazanjian, Drazin & Glynn, 2000; Kyriakopoulos & De Ruyter, 2004; Lane, Salk & Lyles, 2001; Morgan-Fleming, Simpson, Curtis & Hull, 2010; Zahra & George, 2002). Based on the logic that an organization's absorptive capacity improves its awareness of itself and the opportunities available in the external environment. It follows that absorptive capacity can help an organization in exploiting externally its existing resources or technologies that would rather fit an external entity's business model more than the firm that develops the resources or technology. Based on this discussion, we propose the following hypothesis.

H4. Absorptive capacity mediates the relationship between managerial ties and outbound open innovation (Fig. 1).

Method

Sampling and procedures

The data for this study were collected from three countries: France, the United Arab Emirates (UAE) and Malaysia using convenience sampling. Top three innovation economies by income group is the rationale behind selecting these countries. For example, Malaysia leads the middle-income group rankings. The UAE is taking from the high-income economies. France is one of the world's largest IMF advanced economies. In terms of Global Innovation index (GII), all of them belong to the top 40 of the most innovative economies (i.e., France (11th), the UAE (33rd) and Malaysia (36th)) (WIPO, 2021).

Table 1
Country wise respondent distribution (n = 530).

Country	Frequency	Percent
UAE	195	36.8
France	172	32.5
Malaysia	163	30.8

The units of analysis in this study were companies based in these countries. The data came from six (6) different industry categories: pharmaceuticals, office machinery and equipment, medical, precision and optical instruments, transport equipment, chemical products and other industries. A multi-industry sampling design and a cross-country perspective helped to broaden the generalizability of the findings (Katsikea, Theodosiou, Perdikis, & Kehagias, 2011; Islam, Jasimuddin & Hasan, 2017; Jasimuddin, Mishra & Almuraqab, 2017). Middle and top managers were chosen as respondents since they can be considered appropriate to answer questions related to managerial ties and open innovation activities of their respective organizations.

Before visiting the organizations, appointments were made through telephone for the distribution of the questionnaire. A self-addressed postage-paid envelope and a cover letter were attached with the questionnaires, stating clearly the purpose of conducting this research (Almuraqab, Jasimuddin & Mansoor, 2021). Moreover, a web address of the online version of the survey was designed for the participants interested in responding electronically (Li, Ragu-Nathan, Ragu-Nathan & Rao, 2006).

172 usable responses were collected from France, which constituted a response rate of 32.5%. In total, 195 usable responses were obtained from the UAE, representing a response rate of 35.5%. A total of 163 usable responses were collected from Malaysia, which constituted a response rate of 30.8%. Table 1 displays the country wise respondent distribution of the study. To maintain consistency and ensure appropriate responses, the survey questionnaire was distributed among middle and top managers. All three datasets were collected using the same instrument at three different times. Appropriate data cleaning techniques were used. Accordingly, responses with more than 10 percent missing values were discarded and the responses with disengaged answers and outliers were removed (Hair, Black, Babin & Anderson, 2010). The relevant statistical analyses showed that the data met the assumption of multivariate techniques such as normality, linearity and homoscedasticity.

Measurements

Managerial ties was measured by three items: the "Ties with managers at other firms", "Ties with government officials" (Peng and

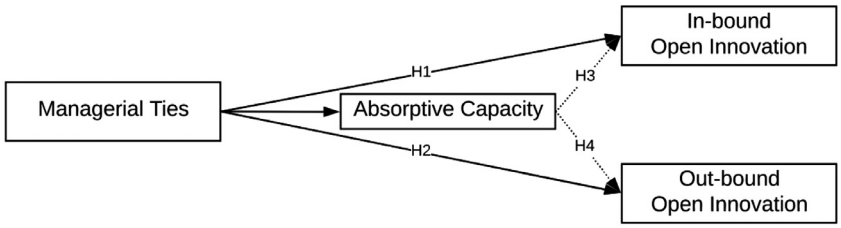

Fig. 1. Research framework.

Luo (2000) and "Ties with researchers at universities and other research centers" (Ramos-Vielba, Fernández-Esquinas. & Espinosa-de-los-Monteros 2010). Slight modifications were done to the measures to suit the contexts investigated and all the responses were captured on a 7-point Likert scale ranging from "very little" to "very extensive." An example item is: "to what have the managers at your firm utilized personal ties, networks, and connections with University researchers for R&D activities and formal consulting work."

Absorptive capacity was measured with 10 items adopted from past research (Flor, Alfar, Zarco & Oltra, 2013)), based on a seminal work (Jansen, Van Den Bosch & Volberda, 2005). Managers rated each item on a scale of 1 (strong disagreement) to 5 (strong agreement). An example item for absorptive capacity is: "New opportunities to serve our clients are understood rapidly by my organization".

Inbound open innovation was measured with 6 items. The items were taken from past studies (Naqshbandi, 2016; Sisodiya, 2008). Managers rated each item on a scale of 1 (strong disagreement) to 5 (strong agreement). An example item for inbound OI is: "my organization constantly scans the external environment for inputs such as technology, information, ideas, knowledge, etc."

Outbound open innovation is measured, employing a 4-item scale developed by Lichtenthaler (2009), which draws on the seminal work of Jaworski and Kohli (1993). A sample item is: "Generally, in my organization all technologies are externally commercialized (i.e., sold to outside firms)."

Respondent profile

Table 2 illustrates the respondent profile. Multiple organizations in different industries in France, the UAE and Malaysia were approached for data collection. Of the 530 usable responses received in the three countries, 28.3% responses were collected from the pharmaceuticals industry, 36.2% from the office machinery and equipment industry, 21.9% from the medical, precision and optical instruments industry, 7.7% from the transport equipment industry, 4% from the chemical products and 1.9% from other industries. Most responses (64.7%) came from middle managers, while 35.3% were from top managers. 23.8% of respondents had worked for the current organizations for 0–5 years, 43.2% for 6–10 years, 27.5% for 11–15 years, and 5.5% for more than 16 years. Most of the surveyed organizations were operational for several decades. 11.5% of the firms had been operating for 0–10 years, 32.8% for 11–20 years, 28.3% for 21–30 years, 20.2% for 31–40 years and 7.2% for more than 41 years. Majority of the firms (44.5%) operated locally/nationally in their respective countries, while 29.8% operated regionally and 25.7% operated globally. The surveyed firms comprised publicly-owned firms (37.4%), privately-owned firms (34.5%), foreign firms (13%) and firms with joint ownership (15.1%).

Table 2
Respondent profile.

Demographics	Categories	Frequency	Percentage
Industry	Pharmaceuticals	150	28.3
	Office machinery and equipment	192	36.2
	Medical, precision and optical instruments	116	21.9
	Transport equipment	41	7.7
	Chemical products	21	4.0
	Other	10	1.9
Management Position	Middle Managers	343	64.7
	Top Managers	187	35.3
Working Experience	0–5 years	126	23.8
	6–10 years	229	43.2
	11–15 years	146	27.5
	Above 16 Years	29	5.5
Firm Age	0–10 years	61	11.5
	11–20 years	174	32.8
	21–30 years	150	28.3
	31–40 years	107	20.2
	Over 41Years	38	7.2
Market Orientation	Local/National	236	44.5
	Regional	158	29.8
	Global	136	25.7
Firm Ownership	Public	198	37.4
	Private	183	34.5
	Foreign	69	13.0
	Mixed/Joint Venture	80	15.1

Data analysis and findings

Descriptive statistics and bivariate correlations

Table 3 presents the mean, SD, Cronbach alpha (in parenthesis along diagonals) and correlation values for the variables of current study. The table shows the presence of a positive correlation of managerial ties with absorptive capacity ($r = 0.28$, $p < 0.01$), inbound open innovation ($r = 0.47$, $p < 0.01$) and outbound open innovation ($r = 0.36$, $p < 0.01$). Also, significant positive correlations of absorptive capacity with inbound open innovation ($r = 0.59$, $p < 0.01$) and outbound open innovation ($r = 0.44$, $p < 0.01$) were observed. Similarly, inbound open innovation was significantly and positively related to outbound open innovation ($r = 0.49$, $p < 0.01$).

In addition to computing descriptive statistics and correlations between variables for the whole dataset ($N = 530$), we also report correlations and descriptive statistics for each surveyed country, as shown in Table 4.

Validity and reliability of the measures

An exploratory factor analysis (EFA) was conducted to understand the underlying factor structure of the data. EFA helped us eliminate items that had low factor loadings or contributed to an unclear factor structure. The overall variance explained by the factors obtained during EFA was 58.73% and the Kaiser-Meyer-Olkin measure of sampling adequacy was acceptable at 0.92. In addition, Bartlett's test of sphericity was significant at 0.001 with $\chi 2$ value of 7119.84. Guided by the results of the EFA, we performed confirmatory factor analysis (CFA) (Hair et al., 2010). In reporting the model fit indices, we followed the guidelines of Hair et al. (2010) and reported χ^2/df, CFI and RMSEA. Two measurements models were developed in AMOS® v. 21: one, containing all the items; and second, including a refined list of items excluding the items that were eliminated due to low factor loading during the EFA. The model with all the measurement items showed a poor fit with the data (χ^2/df =3.57, CFI = 0.87 and RMSEA=0.070), while the refined model revealed an acceptable model fit (χ^2/df =2.70, CFI = 0.937 and RMSEA=0.033) and was thus retained for further analyses.

During the CFA, configural invariance was examined and evidenced. An acceptable model fit was obtained by estimating the model with three groups (data from France, the UAE, and Malaysia) freely without any constraints. In addition, to check for metric invariance, we examined the chi-square difference between a constrained model and an unconstrained model, which was observed to be non-significant. It is concluded thus that the measurements were

Table 3
Descriptive statistics and correlations.

Sr. No.	Variable	Mean	SD	1	2	3	4
1	Managerial Ties	3.67	1.02	(0.92)			
2	Absorptive Capacity	3.74	0.65	.28**	(0.81)		
3	Inbound Open Innovation	3.76	0.69	.47**	.59**	(0.86)	
4	Outbound Open Innovation	3.65	0.73	.37**	.44**	.49**	(0.81)

Note. $N = 530$; $^{**}p < 0.01$, "Cronbach's alpha" are reported in parenthesis.

Table 4
Country-wise correlations and descriptive statistics.

Country	Variable	Mean	Std. Deviation	N	1	2	3
France	1. Managerial Ties	3.29	0.66	172			
	2. Inbound OI	3.95	0.58	172	.511**		
	3. Outbound OI	3.65	0.60	172	.341**	.619**	
	4. Absorptive Capacity	3.94	0.60	172	.468**	.710**	.527**
UAE	1. Managerial Ties	3.34	0.85	195			
	2. Inbound OI	3.54	0.86	195	.670**		
	3. Outbound OI	3.38	0.79	195	.682**	.643**	
	4. Absorptive Capacity	3.60	0.78	195	.648**	.648**	.586**
Malaysia	1. Managerial Ties	4.47	1.06	163			
	2. Inbound OI	3.81	0.47	163	.482**		
	3. Outbound OI	3.99	0.67	163	−0.251**	−0.042	
	4. Absorptive Capacity	3.70	0.42	163	−0.033	0.029	0.055

**Correlation is significant at the 0.01 level (2-tailed).

invariant across the three-country groups. We further checked the discriminant validity and convergent validity of the study variables. Table 5 shows the values of AVE (average variance extracted) and CR (composite reliability). The AVE for all the variables is above 0.50, representing the convergent validity of the study variables (Hair et al., 2010), while composite reliability for each variable was above 0.7, showing that the measurements were consistent and reliable. Also, the inter-construct squared correlation estimates for all the variables were lower than the square root of the AVE values, indicating discriminant validity (Fornell & Larcker, 1981).

Control variables in the model

The survey questionnaire of the study included questions related to the demographics of the respondents. Analysis of variance (ANOVA) and independent Sample *t*-test were performed to check the impact of demographic constructs on outcome variables of the study. This study used several control variables to eliminate whatever effects these variables might have on open innovation. We controlled for this set of variables in the model to decrease the possibility of confounding effects on the variables of interest. The results of ANOVA and *t*-test showed that management position, firm age, market orientation and ownership type had significant mean differences in the case of inbound open innovation and were thus controlled for. Besides, industry type, management position, working experience, firm age, market orientation and ownership type showed significant mean differences in the case of outbound open innovation and were also controlled for during hypothesis testing.

Hypothesis testing

We employed linear regression in SPSS® v.21 to test the direct relationships proposed in this study. Regression results of all the direct hypotheses are shown in Table 6. As the data were collected from three different countries, the analyses were performed separately for each country to understand the underlying nuances. Simple regression was performed three times to test Hypothesis 1 and Hypothesis 2.

Hypothesis 1 (H1) proposed a significant and positive relationship between managerial ties and inbound open innovation. The results revealed that for all the three countries H1 was supported (France: β = 0. 37 $p < 0.00$; UAE: β = 0.67, $p < 0.00$; and Malaysia: β = 0.21, $p < 0.00$). Thus, managerial ties positively affected inbound open innovation in all the three surveyed countries. Likewise, Hypothesis 2 (H2) proposed a significant and positive relationship between managerial ties and outbound open innovation. The findings showed that H2 is supported for France (β = 0. 22 $p < 0.00$) and the UAE (β = 0.64, $p < 0.00$) while for Malaysia (β = −0.041, p = 0.08) H2 is not supported.

Table 5
Factor loadings, convergent & discriminant validity.

Construct	Items	Factor Loadings	CR	AVE	Sqr. AVE	Cronbach's Alpha
Managerial Ties	MTM1	0.8	0.811	0.518	0.720	0.925
	MTM2	0.844				
	MTM3	0.798				
	MTO1	0.845				
	MTO2	0.845				
	MTO3	0.86				
	MTU1	0.784				
	MTU2	0.827				
	MTU3	0.852				
Absorptive Capacity	ACAP1	0.665	0.865	0.516	0.719	0.776
	ACAP2	0.661				
	ACAP3	0.624				
	ACAP5	0.619				
	ACAP6	0.638				
Inbound Open Innovation	INOI1	0.659	0.921	0.796	0.892	0.862
	INOI2	0.759				
	INOI3	0.74				
	INOI4	0.683				
	INOI5	0.759				
	INOI6	0.706				
Outbound Open Innovation	OUTOI1	0.674	0.778	0.512	0.715	0.808
	OUTOI2	0.664				
	OUTOI3	0.767				
	OUTOI4	0.768				

Table 6
Country-wise results of simple regressions.

Country	Predictor variables	Inbound OI				Outbound OI			
		β	SE	t	R^2	β	SE	t	R^2
France	Managerial Ties	.37***	.060	6.27	0.33	.22***	.071	3.09	0.18
UAE	Managerial Ties	.67***	.055	12.23	0.44	.64***	.050	12.74	0.48
Malaysia	Managerial Ties	.21***	.032	6.57	0.23	−0.041	.043	−0.95	0.38

Notes: *** $p<0.001$.

Table 7
Absorptive capacity as a mediator between managerial ties and open innovation.

Indirect effect of managerial ties on inbound open innovation				
			Percentile bootstrap 95% confidence interval	
MT→ACAP→INOI (H3)	Estimate	Boot SE	Lower	Upper
France	0.289	0.049	0.2022	0.3963
UAE	0.234	0.054	.01422	0.3540
Malaysia	0.003	0.003	−0.0035	0.0090
Indirect effect of managerial ties on outbound open innovation				
			Percentile bootstrap 95% confidence interval	
MT→ACAP→OUTOI (H4)	Estimate	Boot SE	Lower	Upper
France	0.241	0.049	0.1602	0.3553
UAE	0.150	0.047	0.0688	0.2557
Malaysia	0.000	0.041	−0.0081	0.0091

Note: MT, managerial ties; ACAP, absorptive capacity; INOI, inbound open innovation; OUTOI, outbound open innovation.

To assess the mediating role of absorptive capacity in the relationship between managerial ties and inbound open innovation (H3) and outbound open innovation (H4), we used the *Process* macro developed by Preacher and Hayes (2008). The bootstrapping technique with bias-corrected confidence intervals and 5000 resamples was used. As Table 7 shows, for the data collected in France and the UAE, the indirect effect of managerial ties on inbound open innovation in the presence of absorptive capacity as a mediator was found to be significant since the upper and lower confidence intervals for inbound open innovation excluded zero (Hayes, 2013). Hence, H3 is supported in the case of France and the UAE only. Similarly, the mediating mechanism of absorptive capacity in the relationship between managerial ties and outbound open innovation is supported in the case of France and the UAE only since the upper and lower confidence intervals for inbound open innovation excluded zero (see Table 7). Hence, H4 is supported in the case of France and the UAE while no support is found for this hypothesis based on the data collected in Malaysia.

Discussion

The current study was conducted in three diverse country contexts (France, UAE, Malaysia) to examine the association of managerial ties with inbound and outbound open innovation. Moreover, the mediating role of absorptive capacity in these relationships was also explored. Overall, the findings supported all the hypotheses, though not in all the country contexts as depicted in Fig. 2.

Hypothesis 1 proposed a positive relationship between managerial ties and inbound open innovation and the findings in all the three-country contexts support this hypothesis. Thus, ties of managers of an organization with managers in other organizations, universities/research centers and government officials enhance inbound open innovation outcomes. The finding related to the effect of managerial ties with other managers in other organizations follows the expectations, as it is widely believed that inter-firm associations are one of the most vital sources of external ideas. These findings are broadly consistent with Qin and Shanxing (2010) study conducted in the context of manufacturing firms exhibiting innovative capabilities in China. The results also support the notion of Huston and Sakkab (2006)'s case study on Procter & Gamble, which showed that communication among stakeholders helps encourage the exchange of ideas and knowledge, resulting in enhanced innovation outcomes.

Along similar lines, Lindegaard (2011) highlighted the relevance of managerial ties with other organizations to form valuable networks that ultimately result in open innovation. Likewise, since educational and research institutions facilitate knowledge distribution and enhance innovative capabilities, it is no surprise that managers' ties with universities and/or other research centers improve inbound open innovation outcomes. The findings are largely in line with the results of several past studies (Chiaroni et al., 2011; Cohen, Nelson & Walsh, 2002; Krapez, Skerlavaj & Groznik, 2012; Leydesdorff, 2012; Naqshbandi & Kaur, 2014; Qin & Shanxing, 2010; Tödtling, Lehner & Kaufmann, 2009). These studies emphasie the role of managerial ties with external entities and the corresponding effect on a firm's innovation performance. The finding that managerial ties with government officials also improve inbound open innovation outcomes follows logic, particularly in the case of the UAE and Malaysia, where regimes of appropriability are relatively weaker. Hence, such ties prove helpful for organizations in several aspects, including attaining their innovation-related goals (Li, 2008; Naqshbandi & Kaur, 2014; North, 2006; Peng & Luo, 2000; Shu, Page, Gao & Jiang, 2012).

Hypothesis 2 proposed a positive link of outbound open innovation with managerial ties with managers in other organizations, universities/research centers and government officials. There is hardly a study available that relates managerial ties with outbound open innovation. The findings of this study support this hypothesis in France and the UAE, but not in Malaysia. It thus follows that the ties of a firm's managers with the managers of other organizations are essential to facilitate outbound open innovation (Naqshbandi & Kaur, 2014). Similarly, the ties of managers with educational

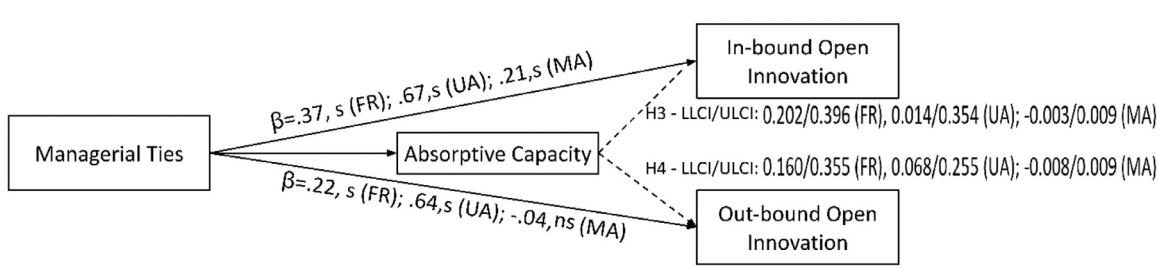

Fig. 2. Analytical results.**Note:** FR, France; UA, UAE; MA, Malaysia; s, significant; ns, not significant; LLCI, lower-limit confidence interval; ULCI, upper-limit confidence interval.

institutions and research centers are crucial for the achievement of outbound open innovation goals. The findings of this study support this notion. The past research notes on similar lines that universities and research centers are primary platforms for spreading knowledge and awareness, thus creating a fertile ground for innovative activities (Rasiah & Govindaraju, 2009).

These results align with the study of Naqshbandi and Kaur (2014), which was conducted in a multi-sector context in Malaysia. Their study analyzed the effect of different types of managerial ties on open innovation in industries with the high-tech sector in Malaysia. They concluded that in most industries and sectors, managerial ties with universities and government officials facilitate inbound open innovation while ties with managers at other firms do not affect inbound open innovation in any industry. It therefore follows that the importance of the bonds of managers of an organization with government officials can prove useful, particularly for the successful exploitation and commercialization of an organization's knowledge resources and technology. The finding of this study is also supported by the past studies which investigated the hypothesis and reported similar results (Naqshbandi, 2016; Naqshbandi & Kaur, 2014).

Hypothesis 3 of the study proposed an underlying mechanism of absorptive capacity in the association of managerial ties and inbound open innovation. This study found support for this link in two countries (i.e., France and the UAE), indicating partial support for Hypothesis 3. The extant literature supports the notion that managerial ties result in better relationship capabilities of organizations (Zhang & Li, 2008), which leads to the exploration of external opportunities, their acquisition as well as the exploitation of internal knowledge and other resources (Lee et al., 2001; Zahra & George, 2002). The results of the study found in France and the UAE are consistent with the results of Naqshbandi (2016). Naqshbandi (2016) conducted a study across multiple sectors in the UAE. They conclude that organizations with strong managerial bonds with other organizations, educational/research institutions and representatives of the government bodies are in a better position to benefit from external knowledge resources, than the organizations where managerial bonds are weak or non-existent. Further, the strong association of a firm's managers with other organizations results in an enhanced capability of gaining and utilizing external knowledge resources.

Its combination with internal resources helps the firm achieve higher absorptive capacity levels that ultimately support its innovation-related goals (Ferraris, Erhardt & Bresciani, 2017; Ferreras-Méndez, Fernández-Mesa & Alegre, 2016, 2015). The lack of support for H3 in the context of Malaysia is abstruse. It is suggested that further research look at the nuances involved. One possible way to look at the issue could be from the perspective of innovation intermediaries, studying whose role may increase our understanding of the role of absorptive capacity as well. A deeper examination into this becomes imperative. In this regard, Cohen and Levinthal (1989) and Wang and Han (2011) suggested that organizations with a good internal knowledge foundation may have a sophisticated level of absorptive capacity for better exploitation of external information and ideas.

Hypothesis 4 of the study is based on the underlying mechanism of absorptive capacity in the association of managerial ties with outbound open innovation. The findings show that the hypothesis is supported in the contexts of France and the UAE, while the data collected in Malaysia do not support this hypothesis. The supportive results for the mediating role of absorptive capacity in the contexts of France and the UAE are based on the fact that managerial ties with other organizations help an organization utilize the external knowledge resources effectively to build an innovative environment and facilitate gaining competitive advantage (Dyer & Singh, 1998).

Similarly, managerial ties with government officials facilitate the acquisition and utilization of external knowledge (Peng & Luo, 2000) which helps organizations enhance absorptive capacity (Rangus et al., 2017; Spithoven et al., 2010). This results in acquiring multiple forms of knowledge and further utilization of this knowledge to attain organizational goals (Kazanjian et al., 2000; Kyriakopoulos & De Ruyter, 2004; Lane et al., 2001; Morgan-Fleming et al., 2010; Zahra & George, 2002). The findings obtained in the contexts of France and the UAE are in line with the findings of Naqshbandi (2016) who suggested that managerial ties help managers sell improved and innovative solutions to the market for commercialization and that absorptive capacity acts as a bridge in this process. It needs further investigation as to why the hypothesis could not find support in the data collected in Malaysia. Here again, the role of intermediaries may hold the key to the understanding of why absorptive capacity mediates the managerial ties-outbound open innovation relationship in France and the UAE, but not in Malaysia.

Implications

Theoretically, this study contributes by providing a multi-country perspective to the relationship of managerial ties with inbound and outbound open innovation. A rich dataset compiled by collecting data from three countries was used to test the study's hypotheses. Being one of the first studies to do so, this study adds value by improving the generalizability of the findings and bringing greater clarity to the issue. The findings are crucial since open innovation research is maturing and themes and patterns that can apply cross-culturally need identification. The findings of the paper can be expected to benefit managers in diverse cultural setting since the data are sourced from varied cultural and country contexts.

The findings provide valuable insights for managers who may be particularly working across country borders or cultural contexts with suppliers, partners, or other external entities in a collaborative arrangement. The study also takes a nuanced approach by studying the mediating mechanism of absorptive capacity, which has often been cited as an important enabler of open innovation. From practitioners' perspective, the findings of this study can help managers do better in acquiring and using the internal and external resources available in any form (knowledge, ideas, human resources, etc.). Managers can accordingly benefit by building and encouraging their subordinates to build strong connections/bonds/ties with managers of other organizations and universities/research centers/government representatives. By adopting a collaborative approach and a two-way exchange process in terms of knowledge and other valuable resources, managers can build valuable networks to support the innovation-related goals of their organizations.

Limitations and future research directions

While the current study explores an important issue using a rich dataset and following established research standards, it is constrained by a few limitations. Firstly, the study does not segregate the three types of managerial ties and instead clubs them together as 'managerial ties'. Future research may establish the links between the three *types of managerial ties* and the other variables of interest to establish a better understanding of the relationships. Secondly, the dataset used in this study was collected cross-sectionally. Cross-sectional data has its limitations in that it may not be the most appropriate data for testing causal hypotheses (Naqshbandi, Singh & Ma, 2016). Future research may use longitudinal data to test the associations that form the subject matter of this study. Finally, further investigation can triangulate in-depth qualitative case studies and quantitative research to provide robust results.

Conclusion

This paper helps understand open innovation in the context of three countries (i.e., France, the UAE and Malaysia). Few studies have

focused on the connection between managerial ties absorptive capacity and open innovation and again absorptive capacity and open. The study discusses and examines management ties that have an impact on open innovation. Previous research focused on identifying the determinants of open innovation that promote innovation in general without adding the role that absorptive capacity plays in that process. However, as mentioned earlier, recently several authors (e.g., Huang & Rice, 2012; Rangus et al., 2017) attempted to connect the relationship between open innovation and absorptive capacity. Very few studies have highlighted the concepts of inbound open innovation and outbound open the phenomenon when analyzing open innovation from a cross-country perspective.

Despite the increased focus on studying open innovation worldwide, the paper addresses the concepts of inbound open innovation and outbound open innovation as the key elements of the open innovation by analyzing managerial ties and absorptive capacity from a cross-country perspective. Understanding the effect of management ties on open innovation using absorptive capacity as a mediator is essential. This study adds value by bringing the mediating effect of perceived absorptive capacity in the relationship of managerial ties and open innovation (inbound and outbound) from a cross-country perspective. Our model tested the assumed direct and positive relationship between management ties and open innovation while also attempting to understand the management ties effect on open innovation, using absorptive capacity as a mediator. One of the merits of this research design is that open innovation is analyzed from a cross-country perspective, enhancing the generalizability of the findings. The article provides useful insights for practitioners who wish to enhance open innovation activities and offers useful guidance to researchers, encouraging further study in this area.

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Appendix A

Measurement items.

Managerial ties; 9 items; (Peng & Luo, 2000; Ramos-Vielba, Fernández-Esquinas. & Espinosa-de-los-Monteros, 2010).

- Managers at supplier firms.
- Officials in industrial bureaus.
- University researchers for R&D activities and formal consulting work.
- Managers at buyer firms.
- University researchers for commercialization related to Intellectual Property Rights.
- Political leaders in various levels of the government.
- Managers at competitor firms.
- University researchers for training and transfer of personnel.
- Officials in regulatory and supporting organizations such as tax bureaus, state banks, commercial administration bureaus, and the like.

Absorptive capacity; 10 items; (Flor et al, 2013)

- New opportunities to serve our clients are understood rapidly by my organization.
- My organization analyzes and interprets changing market demands promptly.
- Employees in my organization record and store newly acquired knowledge for future reference.
- My organization quickly recognizes the usefulness of new external knowledge to existing knowledge.
- My organization incorporates external technological knowledge into our firm.
- My organization thoroughly grasps the opportunities new external knowledge offers our company.
- In my organization employees meet periodically to discuss consequences of market trends and new product development.
- Employees in my organization are clearly aware of how the firm's activities should be performed.
- My organization constantly reviews how to better exploit external knowledge.
- In my organization employees share a common language to refer to our products and services.

Inbound open innovation; 6 items; (Naqshbandi, 2016; Sisodiya, 2008)

- My organization constantly scans the external environment for inputs such as technology, information, ideas, knowledge, etc.
- My organization actively seeks out external sources of knowledge and technology (e.g., research groups, universities, suppliers, customers, competitors, etc.) when developing new products.
- My organization believes it is good to use external sources (e. g., research groups, universities, suppliers, customers, competitors, etc.) to complement its own R&D.
- My organization often brings in externally developed knowledge and technology to use in conjunction with our own R&D.
- My organization seeks out technologies and patents from other firms, research groups, or universities.
- My organization purchases external intellectual property to use in our own R&D.

Outbound open innovation; 4 items; (Jaworski & Kohli, 1993)

- Generally, in my organization all technologies are externally commercialized (i.e. sold to outside firms).
- In my organization, external technology commercialization is restricted to technologies that are not used internally (reverse coded).
- In my organization, external technology commercialization is restricted to relatively mature and proven technologies (reverse coded).
- In my organization, external technology commercialization is restricted to non-core technologies (reverse coded).

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