

Human resources management and open innovation: the role of open innovation mindset

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There is growing interest in the role of strategic human resource management (SHRM) in managing employees and supporting their capacity for innovation in high-tech firms. In this paper, using dynamic capabilities theory we examine the role of SHRM in supporting open innovation (OI) performance of employees in four US multinational technology firms. We introduce OI mindset as a new concept that is critical for organisations engaging in OI and conceptualise it as consisting of values, attitudes, and beliefs that capture an individual's openness towards knowledge sourcing and sharing inside and outside organisational boundaries. We examine the mediating role of OI mindset on the relationship between SHRM and OI performance. Our results confirm three hypotheses and that OI mindset mediates the relationship between SHRM and OI performance. These findings demonstrate the utility of OI mindset and the important role of SHRM in predicting OI performance. We draw implications for theory and HR practice in the Asia-Pacific region.

Keywords: Asia-Pacific MNEs, open innovation, open innovation mindset, strategic HRM, technology

Key points

- 1 Technology firms should invest in SHRM practices such as selective hiring and training to develop like-minded employees.
- 2 We advocate technology firms to invest in SHRM practices to develop relationships with external partners.
- 3 Implementing SHRM practices that emphasise collaboration incentivises employees to participate in knowledge exchange.
- 4 Managers can influence open innovation by establishing a shared mindset through specific SHRM practices.

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Accepted for publication 23 November 2020.

Introduction

As organisations have pivoted to conduct business in a ‘new world’ impacted by the catastrophic effects of coronavirus (COVID-19), the role of strategic human resource management (SHRM) has never been more important (Zhou et al. 2020). The importance of SHRM is further highlighted by the emerging complexity of managing employees and their capacity for innovation in high-tech firms (Herzenberg, Alic and Wial 2018). As companies develop external collaborations with suppliers and customers to become more innovative, HR managers must find ways to develop potential relationships with employees outside of their organisational borders (Lengnick-Hall and Lengnick-Hall 2002; Zhou, Wu and Li 2019).

Open innovation (OI) is defined as ‘the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively’ (Chesbrough 2006, 1). According to Chesbrough and Bogers (2014), OI describes a ‘distributed innovation process that relies on knowledge flows managed intentionally across the boundaries of organisations to improve their innovation success’ (p. 3). We argue that these external knowledge flows are especially critical to the success of technology firms. This is especially relevant in the Asia-Pacific region, where nearly 40% of global GDP, and a contribution of 60% of global growth occurs from MNEs operating in the Association of South East Asian nations (International Labour Organisations 2016).

In this study, we conceptualise the mutual inflow (sourcing) and outflow (sharing) of knowledge as knowledge sharing and sourcing (KSS) (Herzog 2011; Lichtenthaler and Ernst 2006). KSS represents the mutual sharing and sourcing of knowledge at the employee level which translates into the inflow and outflow of knowledge at the organisational level, ultimately driving OI performance.

While the majority of research has taken place at the organisational level, we shift our focus of OI to the micro-level as there is a growing interest in assessing OI at the individual level of the organisation (Bogers, Foss and Lyngsie 2018; Gassmann, Enkel and Chesbrough 2010; Paul, Roijakkers and Mortara 2017). To do this, we introduce OI mindset (von Briel and Recker 2017; Gomezel and Rangus 2018; Salampasis, Mention and Torkkeli 2015) as a new concept that is critical for organisations engaging in OI. We define OI mindset as an individual’s values, attitudes, and beliefs that capture an individual’s openness towards KSS inside and outside the organisational boundaries that are used as knowledge structures to make decisions regarding KSS which is critical to OI performance.

OI research has theorised the importance of SHRM by suggesting that employees’ characteristics and SHRM can influence the implementation of OI (Bogers et al. 2017, 2018; Salampasis et al. 2015). A few studies have also empirically examined the human intra-organisational aspects of OI (Papa et al. 2018; Corral de Zubielqui et al. 2019). Employee’s knowledge acquisition positively affects innovation performance and HRM moderates the relationship between knowledge acquisition and innovation performance (Papa et al. 2018). If organisations place great importance on SHRM practices, there is a significant

positive relationship between knowledge sourcing and innovativeness. SHRM literature has examined the impact of HRM practices on organisational innovation (Lin and Sanders 2017) but not yet paid sufficient attention to the OI paradigm (Chesbrough 2003). We extend the research in this area by focusing on OI.

In this paper, we empirically examine the relationship between SHRM and OI, as well as the mediating role of OI mindset. Underpinning this research is dynamic capability theory (Bogers et al. 2019; Teece 2007). Dynamic capabilities are defined as ‘the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments in which there is deep uncertainty’ (Teece, Pisano and Shuen 1997, 516). We suggest that OI mindset (von Briel and Recker 2017; Gomezel and Rangus 2018; Salampasis et al. 2015) as a dynamic capability enables OI and is a key mediating mechanism of the relationship between SHRM and OI. We argue that it is the responsibility of line managers to create conditions for OI mindset to take place. To support line managers, SHRM takes the lead role in establishing management practices that enable an OI mindset to facilitate OI through KSS. Hence, we address our research question: *how can SHRM enable OI through an OI mindset?*

We make two contributions with this paper. First, our theoretical contribution is that we contribute to greater understanding of the intersection between the SHRM and OI literatures, and examine the process through which OI mindset enables KSS and subsequently OI (Vanhaverbeke, Chesbrough and West 2014), using dynamic capability theory (Bogers et al. 2019; Teece 2007). Second, by shedding light on the role of OI mindset in bridging the link between SHRM and OI, we are able to provide HR managers with a systematic SHRM approach to further strengthen the OI in their organisations.

Mindset as a dynamic capability

In this paper, we propose that OI mindset is a dynamic capability (Bogers et al. 2019; Teece 2007) and is critical to open innovation performance. According to dynamic capability theory, a firm’s dynamic capabilities are central in its efforts to address changing business conditions in which there is uncertainty (Chesbrough and Teece 2003; Teece 2007). Through the ability to integrate, build, and reconfigure internal and external competence, companies can address rapidly changing environments (Bogers et al. 2019). Key for sustainable growth is the firm’s ability to recombine and reconfigure assets and structures as the economy, markets, and technologies change through three organisational processes: sensing, seizing, and transforming capabilities. This requires shifting resources such as talent and money to where they will deliver the most value (Teece 2007). Hence, a company with strong dynamic capabilities must be able to attract external high caliber talent and motivate them to share their knowledge through sensing (Huang, Davison and Gu 2008; Lee et al. 2019; Teece 2007). The sensing-capability can assist companies in identifying and evaluating valuable external knowledge and establish cross-boundary collaboration outside the business (Bastos 2001). It is critical to be able to attract a range of ideas, and then evaluate, select, and remove the bad ones (Bogers et al. 2019). At the same time, this company needs to still retain a strong internal R&D capability to be able to provide

valuable internal knowledge that the external high caliber talent is potentially interested in sourcing knowledge (Lee et al. 2019). Successful OI is not only about outsourcing R&D, it is about leveraging and enhancing internal capabilities and be able to adapt and integrate external knowledge. Hence, the seizing capability (Teece 2007) is required for an OI firm to successfully use knowledge from external sources by purposefully coordinating the external knowledge flow (Pan et al. 2015). Moreover, the OI firm must bring together knowledge and relational mechanisms through the configuration of their OI strategy. As relational mechanisms reflect the values shared among partners (Li, Poppo and Zhou 2010), integrating external knowledge may cause disruption and require a cultural change (Minbaeva 2013; Salampasis et al. 2015). OI success depends largely on developing a culture/mindset that promotes collaboration and overcomes the Not Invented Here (NIH) and Not Sold Here (NSH) syndromes (Chesbrough 2006; Salampasis et al. 2015). The NIH syndrome refers to a stage where knowledge sourcing is perceived as an expense rather than a benefit, which leads to an unfavorable attitude toward knowledge sharing. The NSH syndrome refers to when sharing knowledge is perceived as a loss of control, resulting in an unfavorable attitude towards knowledge sharing and distributing internal knowledge outside the organisation (Chesbrough 2006; Herzog and Leker 2010). Hence, companies need to realign their organisations to integrate external knowledge sources which often requires transforming capability (Bogers et al. 2019; Teece 2007). SHRM through the creation of an OI mindset plays an important role in KSS and ultimately OI.

Building on this, we argue that the starting point for the development of OI capabilities (Chesbrough and Teece 2003) through SHRM is the development of an employee's open innovation mindset (OI mindset) among employees and managers (von Briel and Recker 2017; Gomezel and Rangus 2018; Salampasis et al. 2015). This OI mindset consists of capabilities such as openness (van Oostrom and Fernandez-Esquinas 2017), positive attitudes towards KSS (von Briel and Recker 2017), creativity (De Brentani 2001), risk and failure tolerance (Mortara et al. 2010), as well as integrative complexity (Tadmor and Tetlock 2006). OI mindset is an important dynamic capability can be established through SHRM to promote KSS among employees (Lee et al. 2019; Nedon 2015) and to overcome individual barriers such as employee's negative attitudes toward KSS (Burcharth, Knudsen and Søndergaard 2014; Katz and Allen 1982). We argue that a shared OI mindset is also critical to motivate external high caliber talent to share their knowledge with internal R&D teams and associated members (Lee et al. 2019). By implementing SHRM practices (e.g. selective recruitment) managers may create conditions for OI mindset to emerge. Hence, OI mindset through SHRM plays an important role in enabling KSS both internal and external to the organisation and ultimately OI. In the next section, we examine the relationship between SHRM and OI.

Strategic human resources management in open innovation

In this paper, we define Strategic Human Resource Management as 'the pattern of planned human resource developments and activities intended to enable an organisation achieve its goals' (Wright and McMahan 1992, 298). We focus on SHRM because it plays

a critical role in innovation (Colakoglu et al. 2019). In the SHRM literature, several conceptual frameworks argue a link between SHRM and a firm's innovation performance (Chen and Huang 2009; Looise and van Riemsdijk 2004; Ravichandran and Bano 2016). Moreover, some empirical studies have been conducted to demonstrate how HRM can foster firm innovativeness (Aagaard 2017; Laursen and Foss 2003; Zhou, Hong and Liu 2013). Although there are studies presenting evidence that HRM systems relate positively to innovation (e.g. Colakoglu et al. 2019; Laursen and Foss 2014; Seeck and Diehl 2017), to the best of our knowledge, there is no empirical research on the impact of SHRM on OI.

Drawing from dynamic capability theory (Bogers et al. 2019; Teece 2007), we suggest that SHRM can support the company to address rapidly changing environments and the need for innovation (to compete in the marketplace) by integrating, building, and reconfiguring internal organisational capabilities of employees and external partners (employees of other organisations that are OI partners). SHRM can assist the company in building sensing, seizing and transforming capabilities through management practices such as job rotation, semi-autonomous work teams, training and development, incentives for team performance and information sharing (Helfat et al. 2009). Such SHRM practices can be used to encourage and reward KSS within and external to the organisation and thereby support OI performance. SHRM can attract external, as well as internal high caliber talent by investing in selective recruitment, training and development, reward/incentive systems, information sharing and semi-autonomous work teams to support OI – that is the simultaneous use of KSS within and external to the organisation (Foss, Laursen and Pedersen 2011; Hansen, Güttel and Swart 2019; Hong, Zhao and Stanley Snell 2019). Thus, we hypothesise the following:

Hypothesis 1: SHRM is positively related to OI performance.

Open innovation mindset and human resources management

Successful OI is about enhancing internal capabilities and being able to adapt to and integrate knowledge from external sources (Bogers et al. 2019). Companies need to employ SHRM practices such as semi-autonomous work teams, positive relationships between leaders and subordinates (e.g. Leadership-Member Exchange (LMX), transformation leadership; Guan and Frenkel 2020) and rewards for KSS (Bogers et al. 2019). Employees may have a tendency to reject solutions from the outside (i.e. NIH syndrome) (Antons et al. 2017; Katz and Allen 1982), which is why the seizing capability is not only critical for technological adaptation and integration, but also for the human side of open innovation (Bogers et al. 2018). The seizing capability implies investing in internal R&D which can be achieved by building an OI mindset through SHRM practices to enable employees to commercialise ideas, set incentives for KSS and establish cross-boundary collaboration outside the business. The OI mindset concept is closely connected to the entrepreneurial mindset (Gomez and Rangus 2018). In the context of entrepreneurship, individual

openness is referred as being inclined towards learning, searching for novelty and seeking feedback which facilitates knowledge sourcing (Martínez-Román and Romero 2013). Thus, employees who are open to learn, benefit from variety and alertness as they are prepared to develop new, valuable ideas for their organisation (Salter et al. 2015). We argue that SHRM practices can create value and norms (Cavanagh, McNeil and Bartram 2013; Gouldner 1960) that influence positive attitudes towards KSS (i.e. OI mindset). SHRM, therefore, plays a critical role in building an OI mindset through flat-hierarchies such as semi-autonomous work teams, job rotation, performance management systems, information sharing and reward/incentive systems that emphasise R&D team collaboration internal and external to the organisation (Jia et al. 2020; Kwon, Cho and Song 2019; Wattoo, Zhao and Xi 2020). Thus, we hypothesise the following:

Hypothesis 2: SHRM is positively related to OI mindset.

SHRM, OI mindset and OI performance

OI occurs at the individual or team level (Kim, Kim and Lee 2015), therefore, employees play a key role in the relationship an organisation has with its external stakeholders (Zhang et al. 2015). Their knowledge, skills, and capabilities are crucial to sustaining an organisation's innovation processes and improving their innovation performance (Chen and Huang 2009; Laursen and Foss 2003; Scarbrough 2003). Integrating external knowledge may cause disruption and require a cultural change (Bogers et al. 2019). OI success depends largely on developing a culture/mindset that promotes collaboration and overcomes the NIH and NSH syndromes (Chesbrough 2006; Salampasis et al. 2015). The more open employees are, the greater KSS, which leads to improved OI performance (Fosfuri and Tribó 2008; Rangus and Černe 2019). However, a change in mindset requires transforming capability (Teece 2007). Building on this, we argue that the starting point for the development of OI capabilities is the development of an employee's OI mindset (von Briel and Recker 2017; Gomezel and Rangus 2018; Salampasis et al. 2015).

SHRM can impact employees' attitudes and behaviors in the workplace through developing a mindset that facilitates the process of employee engagement in task work (Taghavi 2019). Building on previous research, we argue that SHRM can facilitate employee engagement in KSS through developing an OI mindset by providing supportive HR practices (Taghavi 2019). Employee involvement in decision making, rewards for team performance, semi-autonomous teamwork and informational sharing motivate employees and ensure employees have opportunities to innovate (Batt 2002). This mirrors innovation research that shows that an environment that facilitates innovation provides employees' encouragement and autonomy (Amabile 1996). Supportive HR practices can be selective hiring, training and development and designing challenging job assignments (Story et al. 2014). Focusing on the lower level of OI research enables exploring broader sets of factors that may determine how OI leads to superior

performance at the company level (Gomezal and Rangus 2018; Vanhaverbeke et al. 2014). Thus, we hypothesize the following:

Hypothesis 3: OI mindset mediates the relationship between SHRM and OI performance.

Method

Sample and procedure

The data collected in this study were from R&D departments in four multinational companies with their home base in the United States. We chose to test our hypotheses using data from R&D departments are involved in OI and collaboration with internal as well as external partners. We chose the United States as study location, since the United States continues to be the country with the largest investments in R&D according to the Global R&D Funding Forecast 2018, a title it has held for the past 50 years and still leads the global ranking in R&D spending (Innovation Research Interchange's Annual Survey 2019). The MNEs used in this study have offices and subsidiaries in the Asia-Pacific region in China, Japan, Singapore and Indonesia. These offices and subsidiaries operate within the technology sector and currently engage in collaboration with internal and external partners.

We sent out two surveys to employees of R&D teams across two time periods and were able to match 249 surveys from employees that completed both surveys. To minimise the impact of common method variance, the data were collected three months apart (Podsakoff, MacKenzie and Podsakoff 2012). Further to this, items from individual scales were scattered throughout both surveys. Each survey measured the same constructs, as well as collecting demographic data.

Prior to undertaking data analysis, we utilised the latent variable method to test for the effect of common method variance (Podsakoff 2003). The results indicated that the items accounted for 29% of the total variance for the study, indicating that common method variance was not a pervasive problem.

Moreover, as we have introduced OI mindset as a key mechanism operating between SHRM and OI performance, we decided to conduct an Exploratory Factor Analysis (EFA) of the items which make up OI mindset to identify the underlying relationships between the items that make up the construct. We examined all of the items that make up openness, creativity, positive attitude towards KSS, and risk and failure tolerance. Integrative complexity was not included in the EFA as this subdimension was based on qualitative responses.

Measures

OI mindset

OI mindset is made up of the following five dimensions: openness, creativity, positive attitude towards KSS, risk and failure tolerance, and integrative complexity. Openness

consists of 10 items. A sample item for openness is ‘I see myself as someone who is original, comes up with new ideas’ (John and Srivastava 1999). Creativity consists of 13 items. A sample item for creativity is ‘I suggest new ways to achieve goals or objectives’ (Zhou and George 2001). Positive attitudes towards KSS based on the NIH syndrome consists of nine items. A sample item is ‘I like to work with nonrelated or less related subject area’ (Antons et al. 2017). Positive attitudes towards KSS based on the NSH syndrome consists of four items. A sample item is ‘I have negative attitudes to having other partners receiving and using my knowledge and technology’ (Burcharth et al. 2014). Risk tolerance consists of eight items. A sample item is ‘I enjoy taking risks in most aspects of my life’ (Zhang, Highhouse and Nye 2019). Failure tolerance consists of four items. A sample item is ‘I understand when you try something new, you sometimes fail (reverse scored)’ (Danneels 2008). Finally, for integrative complexity, respondents were asked to list arguments supporting the use for knowledge exchange across organisations (‘pro’) (Carroll and Bright 2010; Czaja, Bright and Cottrell 2016). They were also asked to list arguments against supporting the use for knowledge exchange across organisations (‘con’).

Strategic human resource management

In this study, SHRM was measured based on the HPWS scale developed by Takeuchi et al. (2007) and consist of 21 items. The 21 items represent five dimensions: job design, selection, training, performance, and compensation. Each item was slightly adapted to start with ‘in our teams’. A sample item from the job design dimension is ‘in our team, employees are involved in job rotation’. A sample item from the selection dimension is ‘in our team, selection is comprehensive (uses interviews, tests, etc)’. A sample item from the training dimension is ‘in our team, training is continuous’. A sample item from the performance dimension is ‘in our team, performance is based on objective, quantifiable results’. A sample item from the compensation dimension is ‘in our team, our compensation is contingent on performance’.

Open innovation performance

OI performance was measured based on the Inbound and Outbound OI scale developed by Naqshbandi, Tabche and Choudhary (2019). Inbound OI consists of six items. A sample item for Inbound OI is ‘My team constantly scans the external environment for inputs such as technology’ (Naqshbandi et al. 2019). Outbound OI consists of four items. A sample item for Outbound OI is ‘In my team, external technology commercialization is restricted to technologies that are not used internally’ (Naqshbandi et al. 2019).

Results

Table A1 presents the results of the EFA.

Initial Eigen values indicated that the first two factors explained 31% and 10% of the variance respectively. The third, fourth, and fifth had Eigen values over one, and explained 4%, 3% and 3% of the variance. Solutions for four factors and five factors were examined

using oblique and orthogonal rotations, and the four-factor solution which explained 49% of the variance was preferred because it has theoretical support and the insufficient number of primary loadings and difficulty in interpreting the fifth factor. There was little difference between the four-factor oblique and orthogonal solutions therefore, both were examined before using an oblique solution. Overall, this EFA indicated that there were four distinct factors that underly the construct.

Table A2 presents the descriptive statistics, reliabilities and correlations among the focal variables.

According to Aguinis and Vandenberg (2014), control variables should only be used when there is a clear, theory-based reason for inclusion. Therefore, we did not include control variables in our analyses. We conducted (OLS), and mediation regression analyses to test the three hypotheses.

Table A3 presents the results of the results of the OLS regression for 1.

Results of the OLS regression indicate support for 1, which shows that SHRM ($b = 0.45$, $s.e. = 0.45$, $p < 0.001$), is a significant predictor of OI Performance. Hypothesis 1, therefore, is supported.

Table A4 presents the of the OLS regression for 2.

Results of the OLS regression supported 2, which states that SHRM ($b = 0.17$, $s.e. = 0.04$, $p < 0.001$), is a significant predictor of OI mindset.

Hypothesis 3 predicted OI mindset would mediate the relationship between SHRM and OI performance. Figure 1 presents the results of the mediation regression for 3.

Regression analysis was used to investigate the hypothesis that OI mindset mediates the relationship between SHRM and OI performance. Results indicated that OI mindset mediates this relationship. As Figure 1 illustrated, the standardied regression coefficient between SHRM and OI mindset was statistically significant, as was the standardied regression coefficient between OI mindset and OI performance. We tested the significance of the indirect effect using bootstrapping procedures. Unstandardied indirect effects were computed for each of the 5000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped indirect effect was .03 and the 95% confidence interval ranged from 0.12 to 0.42. Thus, the indirect effect was statistically significant, and 3 is supported.

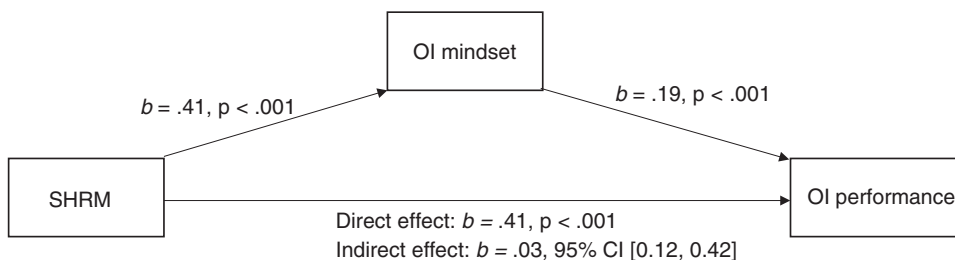


Figure 1 OI mindset mediating the relationship between SHRM and OI performance

Discussion

This paper examined the process through which OI mindset enables OI performance (Vanhaverbeke et al. 2014). Moreover, this paper provides empirical evidence of the effect of SHRM on OI. Underpinned by dynamic capability theory, we reported a positive association between SHRM and OI performance (Colakoglu et al. 2019; Laursen and Foss 2014; Seeck and Diehl 2017). This supports our argument to develop OI capabilities through SHRM (Chesbrough and Teece 2003).

Specific SHRM practices such as rewards or incentives for KSS (Bogers et al. 2019) and cross-boundary collaboration outside the business create an environment conducive to OI (Diaz-Fernandez, Bornay-Barrachina and Lopez-Cabrales 2015). Moreover, our results indicate that SHRM is positively related with OI mindset. SHRM practices such as selective hiring, training and development of like-minded people, can be implemented to build an OI mindset among OI teams and to manage uncertainty, ambiguity and collaboration. To overcome OI challenges caused by communication barriers through different mindsets, attitudes and behaviors, the organisation needs to invest resources in appropriate training to encourage R&D employees to KSS inside and outside the organisation, as well as across cultural and functional boundaries (Ibarra, Kilduff and Tsai 2005; Kang, Morris and Snell 2007; Zhou et al. 2013). SHRM practices such as job enrichment, job rotation and a high level of job security (Hansen et al. 2019; Lepak and Snell 2002) can create a shared OI mindset among internal R&D employees.

According to the literature, OI success depends largely on developing such a mindset that promotes collaboration and enables R&D employees and managers to overcome the NIH and NSH syndrome (Chesbrough 2006; Salampasis et al. 2015). In line with this, our results show that OI mindset mediates the relationship between SHRM and OI performance (Vanhaverbeke et al. 2014). These results reinforce the importance of OI mindset (i.e. positive attitudes towards KSS, creativity, openness, risk and failure tolerance, and integrative complexity) through SHRM practices as vehicles to increase OI performance (Chesbrough 2006; Salampasis et al. 2015). OI managers can create dynamic capabilities through implementing SHRM such as recruitment, training and development and reward systems and hence facilitate the translation of an OI mindset into KSS and OI performance (Bogers et al. 2019; Lee and Kelley 2008; Teece 2007).

Theoretical implications

This study focuses on the micro-foundations of OI and offers two key theoretical implications. The primary contribution of our study is examining the process through which OI mindset enables OI performance through KSS by drawing from dynamic capability theory (Bogers et al. 2019). While previous OI literature has mainly discussed the organisational mindset conceptually (Salampasis et al. 2015), this study argues that employees play a key role for the implementation of OI (Kim et al. 2015; Zhang et al. 2015). Hence, this

research suggests employees' OI mindset as an enabler for OI as starting point for the development of OI capabilities through SHRM practices (Chesbrough and Teece 2003).

In the SHRM literature, several conceptual frameworks suggest a link between SHRM and a firm's innovation performance (Chen and Huang 2009; Looise and van Riemsdijk 2004; Ravichandran and Bano 2016). However, these frameworks have not been empirically tested. By examining multiple mediating mechanisms, this study makes an important contribution to unpacking the process through which OI mindset influences OI performance. Through dynamic capability theory, we have illustrated the process through which SHRM practices can facilitate employee engagement in KSS and increase OI performance through developing an OI mindset among employees. By doing this, we add to the SHRM and OI literatures, by examining the theoretical link between OI mindset and OI performance.

We introduce OI mindset as a new concept that is critical to enable OI. Since a consistent conceptualisation of individuals' openness in the context of OI has remained remarkably elusive, this paper provides a definition of OI mindset along with dimensions making up this concept. Moreover, we have empirically examined OI mindset dimensions through an EFA and found that the items making those dimensions (openness, positive attitudes towards KSS, creativity, willingness to take risks, failure tolerance, and integrative complexity) load heavily on their respective factors. The EFA lends further theory- and literature-consistent support to the concept of OI mindset.

Implications for HR practice

This study extends the role of SHRM in contemporary businesses and provides a number of practice implications for OI and SHRM managers in the high-tech industry. Specifically, this study showed that creating an OI mindset among employees through SHRM practices is critical for OI performance. Consistent with previous studies (e.g. Colakoglu et al. 2019; Laursen and Foss 2014; Seeck and Diehl 2017), there is a link between SHRM and OI performance. Our findings show technology firms should invest in SHRM practices such as selective hiring, training and coaching. Through the development of like-minded people, an OI mindset among OI employees can be created and used to manage uncertainty, ambiguity and collaboration.

Moreover, implementing SHRM practices that encourage an OI mindset and emphasise collaboration both inside and outside the organisation such as job rotation, semi-autonomous teams, selective recruitment, training and development, knowledge sharing and rewards, incentivises employees to participate in KSS. Such SHRM practices can facilitate the translation of an OI mindset into OI performance by promoting KSS. Hence, SHRM and OI managers can influence OI performance by establishing an OI mindset among employees with the support of specific SHRM practices. We would advocate technology firms to invest in SHRM practices to be able to develop employee relationships with external OI partners (Lengnick-Hall and Lengnick-Hall 2002). Overall, this study contributes to more nuanced understanding of how SHRM leads to practice of innovation internally and externally.

Implications for the Asia-Pacific region

OI represents a huge potential key for success in the Asia-Pacific region, as economies shift from 'traditional' economies to 'knowledge' economies (Clarke and Lee 2018). Knowledge economies are economies in which growth is dependent on the quantity, quality, and accessibility and usefulness of ideas, creativity, and innovation, rather than the simply material means of production (Clarke and Lee 2018). Many multinationals have offices and staff within the Asia-Pacific region, and as the world economy recovers from the COVID-19 pandemic, so too will organisations. It therefore becomes imperative as organisations in the Asia-Pacific regions increase their productivity, they begin to engage in SHRM practices – such as selective recruitment – that can potentially create room for OI mindset to filter throughout an organisation.

Traditionally, MNEs that are based in the Asia-Pacific region, and Asian MNEs that have offices in the United States have been seen to be less strategic in their people management (Cooke, Xiao and Chen 2020; Kim and Cooke 2018). For example, SHRM practices in Chinese MNEs need to go beyond adopting existing approaches that have evolved in Western cultures, and be able to respond to the external and internal environments in which it operates (Cooke et al. 2020). As such, MNEs in the AsiaPacific region looking to tap into the potential benefits of OI need to use SHRM practices that carry distinct institutional and cultural characteristics that are distinctive in the nations in which they operate (Cooke et al. 2020).

Limitations and conclusion

This study has two main limitations. First, it is cross-sectional in nature, and therefore causality cannot be stated definitively. A longitudinal study (i.e. data collected across the space of a year, in multiple waves of survey data collection) would allow future researchers to see the extent of OI mindset's facilitation of OI performance. Second, we were restricted by the number of participants and organisations even though they were across four multinational companies, they were all located in the United States. The scope of our study could have been extended to analyse not only American multinational companies, but also multinational companies based in other locations. Overall, we have been able demonstrate the important role of SHRM creating an OI mindset among employees that ultimately predicts OI performance. These findings provide greater understanding of the process through which SHRM can support the development of OI at a time when organisations are faced with enormous uncertainty and complex challenges.

Aurelia Engelsberger (MSc. in Work and Organisational Psychology) is a PhD student at RMIT University in Melbourne. Her research is situated on the intersection of open innovation and human resources management and she examines the role of strategic human resources management and the enablers for open innovation in contemporary organisations.

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Dr. Jillian Cavanagh spent many years as a legal practice manager and consultant, where she was responsible for areas such as human resource management. Currently she is a senior lecturer at RMIT Melbourne. Her research is predominantly focused on the areas of workplace learning, student learning and retention.

Professor Timothy Bartram joined RMIT University in Melbourne as Professor of Management in February 2018. Much of his research is multi-disciplinary in nature and promotes the innovative use of HRM especially in the healthcare sector inclusive of hospitals, healthcare industry and medical associations and unions.

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Appendix

Table A1 Summary of exploratory factor analysis results for open innovation mindset measure

Items	Factor				Dimension
	1	2	3	4	
I see myself as someone who is original and comes up with new ideas	.72	-.17	-.38	.02	Openness
I see myself as someone who is curious about many different things	.71	-.23	.08	-.17	
I see myself as someone who is ingenious, a deep thinker	.63	-.05	-.30	-.05	
I see myself as someone who has an active imagination	.63	-.04	-.24	-.17	
I see myself as someone who is inventive	.72	-.06	-.30	.08	
I see myself as someone who values artistic, aesthetic experiences	.41	-.03	-.14	-.13	
I see myself as someone who prefers work that is routine	.43	.11	.04	.31	
I see myself as someone who likes to reflect, play with ideas	.64	.03	-.04	-.08	
I see myself as someone who has few artistic interests	.40	.09	-.25	-.24	
I see myself as someone who is sophisticated in art, music, or literature	.41	.10	-.25	.02	
I suggest new ways to achieve goals or objectives	-.08	.70	-.01	.15	Creativity
I come up with new and practical ideas to improve performance	-.22	.75	.09	.14	
I search out new technologies, processes, techniques, and/or product ideas	-.05	.72	.22	.04	
I suggest new ways to increase quality	-.05	.71	.34	.13	
I'm a good source of creative ideas	-.16	.71	.16	.13	
I'm not afraid to take risks	.20	.65	.33	-.24	
I promote and champion ideas to others	-.11	.69	.34	-.04	
I exhibit creativity on the job when given the opportunity to	-.15	.81	.35	-.30	
I develop adequate plans and schedules for the implementation of new ideas	-.05	.61	.20	.02	
I often have new and innovative ideas	-.08	.76	.15	.07	
I come up with creative solutions to problems	-.15	.78	.35	.10	
I often have a fresh approach to problems	-.12	.68	-.15	-.38	
I suggest new ways of performing work tasks	-.01	.66	-.06	.24	

Table A1 (*continued*)

Items	Factor				Dimension
	1	2	3	4	
I like to work with nonrelated or less related subject areas	-.05	-.06	.56	.25	Positive attitude toward KSS
I have sympathies for other knowledge partners	-.18	-.00	.66	.17	
I look forward to talks and speeches from other knowledge partners	.03	-.11	.72	.03	
Collaborating with other knowledge partners generate more overhead than benefit	.11	-.13	.68	.03	
I think that different knowledge backgrounds may be helpful for the progress of a project	.21	-.12	.74	.05	
I doubt that I could achieve significant results applying methods sourced from other knowledge partners	.09	.05	.73	-.03	
I network across different knowledge partners	-.33	.12	.52	.11	
I look for opportunities to exchange with persons having a different knowledge background	-.13	.23	.67	.00	
In addition to the challenges of my own discipline, I seek new ones at the interfaces to other disciplines	.19	.10	.68	-.12	
I have negative attitudes to having other partners receiving and using my knowledge and technology	-.32	.18	.74	-.11	
I regard external technology as an equivalent exploitation mode to the application of technologies in my products and services	.21	.10	.73	-.11	
I have often sold/revealed my own knowledge and technologies to other partners	.02	.11	.52	-.05	
I'm positive towards developing new ideas, solutions and technologies for other partners	.08	.31	.67	.21	

Table A1 (continued)

Items	Factor				Dimension
	1	2	3	4	
I believe that failure is a necessary part of success	.10	.30	-.08	.54	Risk and failure tolerance
I understand that when you try something new, you sometimes fail	-.06	.09	-.06	.49	
I accept failure as an inevitable by-product of taking a lot of initiatives	.20	.04	-.12	.42	
I see a mistake as an opportunity to learn	-.11	-.14	-.09	.68	
I think taking risks makes life more fun	.21	-.30	-.08	.74	
My friends would say that I'm a risk taker	-.08	-.08	.02	.73	
I enjoy taking risks in most aspects of my life	-.05	.31	-.06	.53	
I would take a risk even if it meant I might get hurt	.13	.07	.10	.68	
Taking risks is an important part of my life	-.04	-.02	-.03	.50	
I commonly make risky decisions	.28	-.22	-.20	.45	
I am a believer of taking chances	.20	-.11	.11	.53	
I am attracted, rather than scared, by risk	-.22	-.05	.13	.46	

$N = 249$.

Extraction Method: Principal Axis Factoring. Factor loadings over 0.4 appear in bold.

Table A2 Descriptive statistics and correlations

Variable	Mean	SD	1	2	3
1. OI performance	3.35	.50	(.82)		
2. SHRM	3.41	.59	.53***	(.90)	
3. OI mindset	3.03	.65	.28***	.27***	(.74)

$N = 249$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Cronbach's alpha (reliability) on diagonal in parentheses. 1. OI performance = Open Innovation Performance; 2. SHRM = Strategic Human Management; 3. OI mindset = Open Innovation Mindset.

Table A3 OLS regression analysis: SHRM predicting OI performance

Variables	B	SE	β
Constant	1.83	.16	
SHRM	.45***	.45	.53***
R^2	.29***		
ΔR^2	.29**		

$N = 249$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A4 OLS regression analysis: SHRM predicting OI mindset

Variables	<i>B</i>	SE	β
Constant	2.54	.13	
SHRM	.17***	.04	.28
R^2	.08***		
ΔR^2	.08**		

$N = 249$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.