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An Integrated Model of Social Capital and Open Innovation: Examining the Mediation Effect of Knowledge Acquisition and Knowledge Integration

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ABSTRACT

Purpose: Understanding the various effects that exist among social capital, knowledge acquisition, knowledge integration, and open innovation is the main purpose of this study.

Design/methodology/approach: Data were gathered from 137 managers from Malaysian SMEs.

Findings: The results of the analysis revealed that SC dimensions had insignificant impact on OI practices. The results also showed that, knowledge integration influence OI practices and mediate the relationship between SC dimensions and OI practices. This study also found that there is a significant positive relationship between SC dimensions and OI thru knowledge integration. The findings of this study thus provide many benefits for researchers and practitioners despite the presence of some limitations.

Originality/value: This paper is original

Paper type: Research article

Keyword: *Knowledge Acquisition, Knowledge integration, Open innovation, Social capital*
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I. INTRODUCTION

Open innovation views both internal and external ideas as equally important sources of valuable ideas and emphasizes the importance of aligning open innovation with the business model of a firm (Chesbrough, 2003). Empirical research on open innovation has largely focussed on resource acquisition of large, technology-intensive firms (Chesbrough, 2003; Dodgson et al., 2006; Dyer et al., 2004; Huston & Sakkab, 2006; Henttonen & Lehtimäki, 2017). Open innovation in small and medium-sized enterprises (SMEs) has received considerably less attention than open innovation in large companies (Bogers et al., 2018;Chesbrough & S, 2014;Enkel E et al., 2020;Roundy, 2017). However, studies have shown that SME innovation activities benefit from open innovation (Wim Vanhaverbeke, 2017; Santoro et al., 2018). Studies indicate that innovation in SMEs has an inherent external focus, and the concept of open innovation is not new in SMEs.

In today's dynamic market, where uncertainty prevails, knowledge management-enabled businesses will compete. In recent years, researchers and business executives have begun to pay more attention in knowledge integration (Dahiyat, 2015, SergioCamisón-Haba et al., 2019). According to (SergioCamisón-Haba et al., 2019), knowledge integration is essential for improving organisational innovation abilities because they have a beneficial impact on social capital dimensions, which can lead to increased innovation. Despite the fact that activities such as knowledge integration, and social capital have been shown to aid companies in improving their innovation outcomes (Hossain & Kauranen, 2016), as well as the fact that it was critical in favour of identifying knowledge, absorption and selection (Crupi et al., 2020), the role of OI agreements in bridging the gap by connecting companies and individuals remains unclear.

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Furthermore, previous literature has failed to examine in detail how these arrangements can work in removing barriers to knowledge acquisition and integration, as well as social capital elements, in increasing the flow of knowledge across organisational boundaries. On this basis, knowledge perspective and social capital theory applied to describe the most critical feature of knowledge management, as well as the literature on the OI model to explore the role of OI arrangements in promoting awareness practices and social capital dimensions within organisations. Therefore, this study intends to evaluate open innovation overall performance by understanding the key elements that influence it SMEs as a key success factor for sustainable growth and development of the SMEs in the 21st century.

A. Social Capital

1. Structural Social Capital

The overall pattern of relationships among social actors can be described as structural social capital (structural SC) (Nahapiet & Ghoshal, 1998; Yang & Farn, 2009). According to Bolino et al., (2002), structural social capital can also be described as the degree to which actors in a social network are linked to one another. The structural dimension is regarded as an important factor in determining the network's performance and member contribution. It has to do with colleagues' mutual relations or network ties (Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998). The structural dimension of social capital, according to (Nahapiet & Ghoshal, 1998), is linked to knowledge sharing and related practices.

2. Relational Social Capital

The concept of relational social capital (relational SC) was first introduced in the literature from various perspectives. Relational SC, for example, are properties that are embedded in partnerships, such as confidence and trustworthiness, according to (Wu et al., 2008). Relational SC, according to (Chang and Chuang 2011), is concerned with the existence of relations between individuals in an organisation. (Nahapiet & Ghoshal, 1998 and Tsai & Ghoshal, 1998) define relational SC as strong partnerships built on trust. As a consequence, it's worried about the relationships' consistency, because it's relying on the actors' shared trust and appreciation. Relationships of accept as true with sell information sharing and transaction values, reducing switch fees even as growing performance and reliability (Jeffrey H. Dyer, 1998; Zaheer et al., 1998; Doh, S. & Ács, 2009).

3. Cognitive Social Capital

Cognitive social capital (cognitive SC) refers to tools that encompass common representations, perceptions, and systems of that mean amongst parties, in keeping with (Wu et al., 2008 and Van den Hooff & Huysman, 2009). The cognitive element of social capital, in keeping with (HsinChang & Shuang-ShiiChuang, 2011), is involved with the degree to which people in a social community proportion a shared revel in or understanding. This dimension's essential tools may be common vocabulary and codes. Cognitive SC is characterised by (Wasko, M. M. & Faraj, 2005) as tools that enable a group to exchange interpretations and definitions. According to (Smedlund, 2008), the cognitive measurement corresponds to norms and specifies the common policies of the game wherein actor cooperation is based.

B. Knowledge Acquisition

The essential advance in KM is to obtain ability, which requires overseeing and furthermore using existing data just as catching new data (Gilbert & Cordey-Hayes, 1996). As indicated by Sternberg, (1983), getting ability is an understanding methodology that includes separating by means of new data and furthermore saving it in the mind. In this way, knowledge acquisition is a fundamental process for both individual and furthermore organisational learning (Hergenhahn, B & Olson, 1997; Nonaka, 1994). It is likewise referred as externalization, which is a technique of perceiving experience in the external setting and changing it to be used within the business (Holsapple and Singh, 2001). As per (Zahra & George, 2002), knowledge acquisition is critical for a firm to perceive and comprehend just as gather data for the effectiveness of its activity's knowledge can be acquired from a scope of assets. For firms that have really restricted assets, they are destined to acquire knowledge from secondary data, for example, study posts, exchange diaries as well as expert assistance magazines (DanielJiménez-Jiméne & Juan G.Cegarra-Navarro., 2007). Firms' technical innovation is required to rise normally because of their consistent acquisition of knowledge (Darroch & McNaughton, 2020; (Gilbert & Cordey-Hayes, 1996). In a general public that changes quickly consistently, a company's capacity to protect and acquire knowledge is basic to its prosperity and endurance (Egbu, C.O., Hari & Renukappa, 2005).

C. Knowledge Integration

According to the literary works review, KI is commonly utilized interchangeably or to imply the exact same point as other concepts. Knowledge integration, according to (Kogut & Udo Zander, 1992), is the recombination of present understanding with prospective understanding in order to make use of and also

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implement it. Concurs that knowledge is an important competitive source that enables organisations to recombine existing knowledge to create brand-new capacities. Knowledge integration is the result of people's communications, and it contains both shared and incorporated understanding (Okhuysen & Eisenhardt, 2002). Individual expertise will certainly be incorporated to develop organisational expertise, which will be created communally gradually with relationships amongst people in organisations (Leonard & Sensiper, 1998). It involves a vibrant process of communicating, separating, working with, as well as structuring principles (Clark & Marcia C Linn., 2003). Given that the exact same expertise can be identified in different ways, knowledge integration is dependent on just how individuals know and also incorporate their separately held understanding.

D. Open Innovation

Open Innovation was created by Henry Chesbrough, a professor at the University of California, Berkeley. Chesbrough defines open innovation as follows:

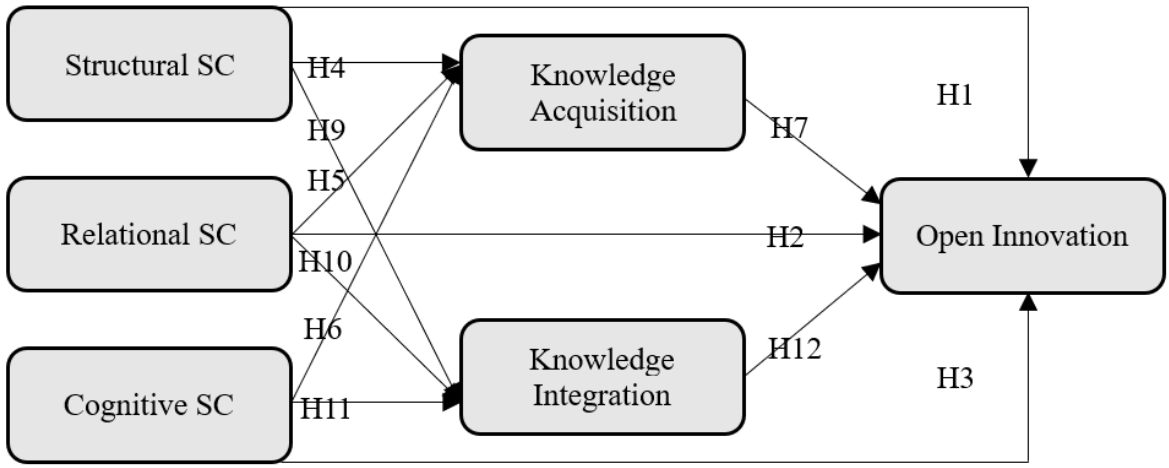
"the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough & Crowther, 2006).

This model emerged from Chesborough's introductory work on open innovation as an alternative model of innovation, as organisations seek to advance their technology and market using external and internal ideas, as well as internal and external resources.

II.FRAMEWORK AND RESEARCH HYPOTHESIS

A. Research Framework

Based on the literature review above, the research model was developed and its framework is depicted in Figure 1 below.



Mediation Paths:

H8a: SSC->KA->OI	H13a: SSC->KI->OI
H8b: RSC->KA->OI	H13b: RSC->KI->OI
H8c: CSC->KA->OI	H13c: CSC->KI->OI

Figure 1

B. Hypotheses Development

1. Structural Social Capital and Open Innovation

Organising is a notable and repeatedly related component of Open Innovation. It encompasses all activities connected to establishing and maintaining links with auxiliary SC's internal and external channels, as well as counting persons and associations (van de Vrande et al., 2009). The tools of Open Innovation are fraught with risk, both in terms of locating superior collaborators and in terms of the outcomes of such partnerships.

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Structural SC will be critical in making the best decisions about choosing the right partners, forming legal collusions, and ensuring their success in this situation. The following hypothesis was established based on the discoveries of previous ideas about:

H1: Structural SC has a significant positive relationship with open innovation.

2. Relational Social Capital and Open Innovation

Open innovation is based on collaboration with both internal and external collaborators to gain capital for the organisation (Chesbrough, 2003). As a result, the connection between relational SC and open innovation appears to be self-evident, provided that open innovation's meaning highlights the relational aspect. Collaboration is a natural feature of open innovation. The latter facilitates and encourages innovation growth by encouraging businesses to connect a broad variety of innovations, trust, share capital, and exchange expertise (Jeffrey H. Dyer, 1998). Furthermore, both external and internal partnerships can assist companies in innovating by combining solutions and information from both within and beyond the firm's boundaries (Andrew B. Hargadon, 1999). As a consequence, the second hypothesis is as follows:

H2: Relational SC has a significant positive relationship with open innovation.

3. Cognitive Social Capital and Open Innovation

Cognitive SC refers to resources that give a convergence of objectives, culture, and wants, as well as a shared knowledge of the relationship's behavioural standards (Tsai & Ghoshal, 1998). A lack of cognitive social capital in the workplace can lead to conflict and opportunistic behaviour (William G. Ouchi, 1980), all of which have a negative impact on efficiency. Furthermore, the time and money spent settling conflicts has been said to detract from the production and execution of new solutions due to a lack of similar culture and compatible goals (Holcomb & Michael A Hitt, 2007). As a consequence, cognitive social capital continues to be a determinant of innovation capability: common ideals and priorities are especially relevant in relation to creative practices, taking into account the higher risk that these investments entail (Villena et al., 2011). The following hypothesis was created based on the above discussion:

H3: Cognitive SC has a significant positive relationship with open innovation.

4. Structural Social Capital and Knowledge Acquisition

A highly connected network is successful. Redundant ties make it possible for network members to find potentially useful information and foster the trust needed to enable the transition and retention of that knowledge (J. Dyer & Nobeoka, 2000). As a result, these networks' features are perfect for capitalising on emerging resources and exchanging information and expertise in cooperative exchanges (Rowley et al., 2000). As a result, when a group of people is closely connected, they share a heuristic that makes collaborative work and interpretation of others' ideas and feelings easier and more straightforward (Hansen, 1999). Several studies in this area demonstrate that structural SC has an effect on knowledge acquisition (Brian Uzzi, 1997; Tsai & Ghoshal, 1998; Lane & Lubatkin, 1998). As a result, network density is defined as an important factor in sustaining and maintaining information flows (Yli-Renko et al., 2001). As a result, we suggest the following hypothesis:

H4: Structural SC has a significant positive relationship with knowledge acquisition.

5. Relational Social Capital and Knowledge Acquisition

Having a high degree of relational SC makes it easy to share sensitive information and valuable knowledge while still lowering the likelihood of opportunistic behaviour. Confidence in exchange relationships has a direct influence on the acquisition of new abilities, according to (Brian Uzzi, 1997). Between organisations in cooperative partnerships, trust makes for more openness and more productive knowledge acquisition. Furthermore, (Koka & John E Prescott, 2002) discovered that when stakeholders have a high degree of confidence in one another, they would have more access to knowledge. (Glaser & Weber, 2007) discovered a correlation between trust and knowledge acquisition more recently. Firms who trust their social networks would be able to accumulate and incorporate more valuable knowledge. As a result, businesses obtain information from their networks' trustworthy connections. The following hypothesis expresses these arguments:

H5: Relational SC has a significant positive relationship with knowledge acquisition.

6. Cognitive Social Capital and Knowledge Acquisition

To promote the understanding of norms and values among parties, cultural continuity between partners is required (Lane et al., 2001; Mowery et al., 1996). Organizational distance, on the other hand, has a negative impact on knowledge flows. Cultural differences and misunderstandings can impede knowledge and learning acquisition (Bernard L. Simonin, 1999). Common goals, including shared values, have an effect on knowledge learning and human capital growth. There are less misunderstandings of collaboration systems as companies

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have the same perceptions of how to behave. This extends the options for sharing ideas and resources, as well as assessing the possible importance of those exchanges (Tsai & Ghoshal, 1998). As a result, the cognitive dimension not simplest has a tremendous impact, but it is critical to the acquisition of external knowledge in firms. Hence, in conditions where the firms involved reap a more stability with their desires and way of life, they're more capable of gain get entry to external know-how. This definition can be formalised as follows: Based on the foregoing discussion, the following hypothesis was developed:

H6: Cognitive SC has a significant positive relationship with knowledge acquisition.

7. The Relationship between Knowledge Acquisition and Open Innovation

According to Chesbrough & Crowther, 2006; Grimpe & Wolfgang Sofka, 2009; Kuen-HungTsai & Jiann-ChyuanWang, 2009; Nieto & Lluís Santamaría, (2010); Segarra et al., (2012) have discovered that the quest for knowledge is becoming more popular in low-tech sectors.The fact that knowledge is now more broadly spread, as well as the need – including in companies with highly qualified R&D departments – to find and communicate with external sources of knowledge, is the explanation for this movement toward looking for external knowledge as a source of innovation (Chesbrough & Crowther, 2006). The following hypothesis were established based on the results of previous studies:

H7: Knowledge acquisition has a significant positive relationship with open innovation.

8. The Mediating Effect of Knowledge Acquisition

According to Nguyen & Lam, (2017) emphasised the importance and impact of knowledge acquisition on innovation, emphasising that knowledge acquisition will enable organisations to advance further via innovation. (Dahiyat, 2015) discovered that acquiring knowledge improved innovation. Based on above discussion, it should be noted that prior studies have paid attention to empirically examining the effects of social capital on knowledge acquisition and the effects of knowledge acquisition on innovation. However, no empirical research has been undertaken to evaluate the mediating between knowledge acquisition and open innovation, the function of social capital is important. As a result, the goal of this investigation is to fill in the gaps by looking at the presence of such ties in emerging nations like Malaysia, as well as within the context of Malaysian SMEs. As a result of these considerations, the following hypothesis emerge.

H8a: Knowledge acquisition mediates the relationship between structural SC and open innovation.

H8b: Knowledge acquisition mediates the relationship between relational SC and open innovation.

H8c: Knowledge acquisition mediates the relationship between cognitive SC and open innovation.

9. Structural Social Capital and Knowledge Integration

Higher structural SC raises the likelihood that more on-display characters will contribute, change, and use facts from all individuals within the firm. Data searching, replacing, and unitizing activities are essential to knowledge integration (Tiwana & Ephraim McLean, 2005) and have a significant effect on innovation outcomes (Alguezaui & Raffaele Filieri, 2010; Filieri, 2014). In accordance with previous assertions, the following hypothesis emerges from this investigation:

H9: Structural SC has a significant positive relationship with knowledge integration.

10. Relational Social Capital and Knowledge Integration

Relational SC has an impact on knowledge integration through two different techniques (Robert et al., 2014). First, it allows people to explain their decision to engage and enables for the flow of more relevant information. In a relationship, to reveal intimate know-how because she or he trusts the receiver to address the knowledge carefully and to utilise it accurately for the best of the firm. Second, the openness fosters knowledge integration by increasing the number (Dirks & Ferrin, 2002), quality, and types of information and knowledge conveyed (Andrews & Delahaye, 2002) as well as facilitating the use of that knowledge. As a result, it is hypothesised that the close proximity of social SC facilitates knowledge integration:

H10: Relational SC has a significant positive relationship with knowledge integration.

11. Cognitive Social Capital and Knowledge Integration

The cognitive measurement of social capital examines the extent to which on-screen actors have a shared vision and perspective on their task (Mathieu et al., 2000). Members of a cognitive SC team may communicate with one another, create correct explanations and expectations about their job, and then coordinate their activities and adjust their behaviours to the task's demands (Robert et al., 2014). In this approach, cognitive SC are critical for optimal data and knowledge integration (Nahapiet & Ghoshal, 1998). People are less likely to know what wants exist at work, what results to degree, or what models are in use if they don't have a cognitive SC. People may be compelled to learn in this hazy atmosphere, but they may not know what to learn or how to memorise together. In the following manner:

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H11: Cognitive SC has a significant positive relationship with knowledge integration.

12. The Relationship between Knowledge Integration and Open Innovation

Knowledge integration plays a critical role in open innovation creation by helping people comprehend, acquire, and advance their knowledge. Companies collaborate with one another to identify and create relevant knowledge and resources. Knowledge integration from outside the company adds more knowledge components into the firm, increasing the number of possible advances. As a consequence, merging various and evolving external capabilities will contribute to the development of hitherto untapped data, which businesses may then employ to develop cutting-edge technologies (Benitez-Amado et al., 2018). According to Woei Hung, (2008), corporations can conceal and coordinate pools of knowledge if they intend to use them to solve a problem. To summarise, gathering knowledge isn't enough to improve development efficiency (Brunswicker & Vanhaverbeke, 2015), and organisations must coordinate their capabilities to get strong market esteem.

H12: There is a positive and significant relationship between knowledge integration and open innovation

13. The Mediating Effect of Knowledge Integration

Social capital energises knowledge integration across representatives via structural SC, relational SC, and cognitive SC. Inadequate focus has been paid to the components that will elucidate these relationships, and query about what is necessary to address and obtain the forms through which social capital effects open innovation. Following that, efforts to fill this gap in the writing by investigating the effects of social capital (structural SC, relational SC, and cognitive SC) on open innovation through the intervening section of knowledge integration.

H13a: Knowledge integration mediates the relationship between structural SC and open innovation.

H13b: Knowledge integration mediates the relationship between relational SC and open innovation.

H13c: Knowledge integration mediates the relationship between cognitive SC and open innovation.

III. RESEARCH METHODOLOGY

A. Survey

The survey was designed by adopting readily-established constructs from the published literature. The items used to measure social capital dimensions (structural capital, relational capital and cognitive capital) were adopted from (SaukHau & MinhyungKang, 2016; SaukHau & Young-GulKim, 2011; Chow & Lai Sheung Chan, 2008; Chao-Min Chiu, 2006). The items used to measure knowledge integration dimensions were adopted from (Robert M. Grant, 1996; Mohan J. Dutta-Bergman, 2004; Matusik & Heeley, 2005; Kenney & Gudergan, 2006; Ouyang, 2008), and items used to measure open innovation dimensions adopted from (Hau, Y., Kim et al., 2013). Respondents were asked to evaluate their agreement or disagreement with the statements provided using a 5-point Likert Scale where 5 indicated strong agreement and 1 indicated strong disagreement. The survey was initially prepared in English. Necessary modifications were made as needed.

B. Population and Sample

The population for the research consisted of SME companies in the Klang Valley area, which is Malaysia's biggest contributor and sprawling zone, and where the chances of open innovation are greatest. In total, 857 organisations were discovered. Many of these organisations' information was gleaned from credible sources. The entire administration of the questionnaire took about 8 months to complete (April 2020 until November 2020). The questionnaires were distributed via e-mail to the targeted respondents. In addition, 787 questionnaires were sent via e-mail, and 137 responses were collected via e-mail.

A total of 137 available responses were deemed "clean" and thus included in the data review. In this study, the response rate was 17 percent. Given that some recent related studies in the Asian context (Abulrub & Lee, 2012) recorded response rates of less than 7%, this can be considered a good response rate. A pre-test was performed, however, before the questionnaires were sent out to the 'real' managers.

C. Validity and Reliability

The reliability of the study constructs was tested using Cronbach's coefficient. All the constructs showed a reliability of $\alpha \geq 0.70$ implying a good reliability and internal consistency. Reliability tests were also performed for the overall constructs and the results also showed a reliability of $\alpha \geq 0.70$ for the overall constructs.

ISSN : 2597-4785 (ONLINE)
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IV. RESULTS

Convergent validity can be evaluated by the average variance extracted (AVE) values, which refers to the degree the construct identifies the variance of its indicators. The threshold value of (AVE) must be reported if it exceeds 0.50 (Hair et al., 2011). In addition, confirmatory factor analysis (CFA) is another indicator of convergent validity by using (PLS-SEM). The convergent validity is realized if the indicators or variables of each construct load exceeds 0.70 on their construct more than the other constructs (Hair et al., 2011).

Table 4.16 shows the items loading and the (AVE) values for all reflective constructs. As a result, the loading for all items in reflective construct is reported to have values above 0.70, in addition, (AVE) values exceeds the cut-off point 0.50. Consequently, the convergent validity is achieved among all constructs.

Table 1. Item loadings and AVE for constructs

Item Loading	*Original Sample*	*Sample Mean*	*Standard Deviation*	*Standard Error*	*T Statistics*	*AVE*
			Structural Social Capital			*0.706*
SSC1	*0.859*	*0.859*	*0.026*	*0.026*	*33.575*	
SSC2	*0.850*	*0.851*	*0.025*	*0.025*	*34.317*	
SSC3	*0.863*	*0.863*	*0.024*	*0.024*	*35.664*	
SSC4	*0.787*	*0.785*	*0.057*	*0.057*	*13.702*	
			Relational Social Capital			*0.656*
RSC1	*0.795*	*0.798*	*0.031*	*0.031*	*25.877*	
RSC2	*0.829*	*0.828*	*0.032*	*0.032*	*26.001*	
RSC3	*0.832*	*0.830*	*0.034*	*0.034*	*24.694*	
RSC4	*0.783*	*0.779*	*0.044*	*0.044*	*17.668*	
			Cognitive Social Capital			*0.737*
CSC1	*0.823*	*0.821*	*0.033*	*0.033*	*24.849*	
CSC2	*0.892*	*0.891*	*0.020*	*0.020*	*44.783*	
CSC3	*0.853*	*0.851*	*0.031*	*0.031*	*27.560*	
CSC4	*0.865*	*0.864*	*0.023*	*0.023*	*37.153*	
			Open Innovation			*0.579*
OI1	*0.758*	*0.760*	*0.036*	*0.036*	*21.297*	

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OI2	*0.815*	*0.812*	*0.030*	*0.030*	*27.402*	
OI3	*0.761*	*0.758*	*0.037*	*0.037*	*20.614*	
OI4	*0.790*	*0.788*	*0.035*	*0.035*	*22.742*	
OI5	*0.829*	*0.829*	*0.031*	*0.031*	*26.331*	
OI6	*0.752*	*0.749*	*0.051*	*0.051*	*14.670*	
OI7	*0.741*	*0.738*	*0.049*	*0.049*	*15.037*	
OI8	*0.621*	*0.618*	*0.067*	*0.067*	*9.338*	
			Knowledge Acquisition			*0.672*
KA1	*0.809*	*0.809*	*0.031*	*0.031*	*26.106*	
KA2	*0.827*	*0.824*	*0.046*	*0.046*	*17.831*	
KA3	*0.817*	*0.814*	*0.042*	*0.042*	*19.648*	
KA4	*0.826*	*0.825*	*0.030*	*0.030*	*27.795*	
			Knowledge Integration			*0.699*
KI1	*0.794*	*0.791*	*0.038*	*0.038*	*20.741*	
KI2	*0.868*	*0.868*	*0.022*	*0.022*	*39.973*	
KI3	*0.849*	*0.848*	*0.026*	*0.026*	*32.441*	
KI4	*0.831*	*0.831*	*0.029*	*0.029*	*28.666*	

The current study has seven (07) direct hypotheses as shown in Table 2 and Fig. 2. All direct hypotheses (H4, H6, H11, H13, H14) were accepted as the t-value was greater than 1.96. Moreover, PLS (SEM) bootstrapping was selected to observe the mediation effect. Hair et al., (2011) explained that this is one of the suitable techniques while analyzing through the small sample. Moreover, by following the recommendations of (Hair et al., 2011), while examining the mediation effect, the procedure of (Preacher & Hayes, 2004 ; Preacher & Hayes, 2008) was followed and the in-direct effect was examined. Hence, the current study analyzed the effect of R&D department as a mediator through Smart PLS 3.0 (Ringle et al., 2009) by bootstrapping method and did the re-sampling of 500 to examine the t-value.

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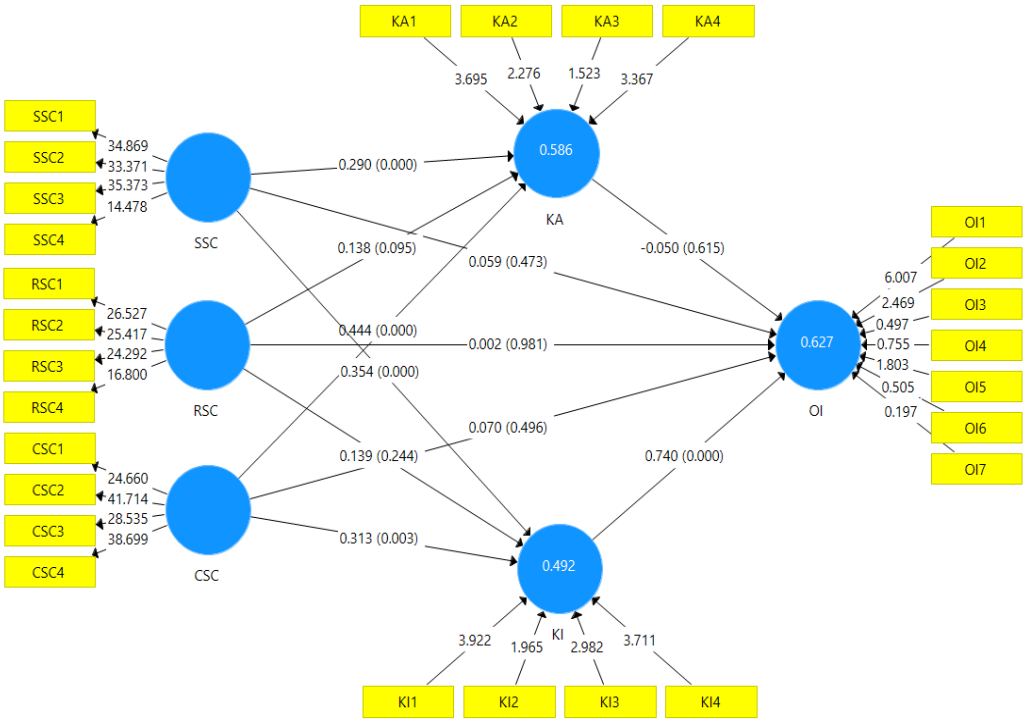

Figure 2

Table 2.

Hypotheses				*Original Sample*	*Standard Error*	*P Values*	*Decision*
H1	*SSC*	→	*OI*	*0.059*	*0.083*	*0.477*	*Not supported*
H2	*RSC*	→	*OI*	*0.002*	*0.102*	*0.982*	*Not supported*
H3	*CSC*	→	*OI*	*0.070*	*0.104*	*0.498*	*Not supported*
H4	*SSC*	→	*KA*	*0.290*	*0.076*	*0.000*	*Supported*
H5	*RSC*	→	*KA*	*0.138*	*0.081*	*0.089*	*Not supported*
H6	*CSC*	→	*KA*	*0.444*	*0.087*	*0.000*	*Supported*
H7	*SSC*	→	*KI*	*0.354*	*0.084*	*0.000*	*Not supported*
H11	*RSC*	→	*KI*	*0.139*	*0.120*	*0.246*	*Supported*
H12	*CSC*	→	*KI*	*0.313*	*0.106*	*0.003*	*Not supported*
H13	*KA*	→	*OI*	*-0.050*	*0.099*	*0.618*	*Supported*

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H14	*KI → OI*	*0.740*	*0.077*	*0.000*	*Supported*	

Figure 3 and Figure 4 illustrate direct and indirect effects. Additionally, Table 3 provides summary of the tested hypotheses. It is clear that t-value is more than 1.96. Therefore, the mediation effect is significant. Hence, R&D department mediates the relationship. Hence, H15 and H17 are accepted.

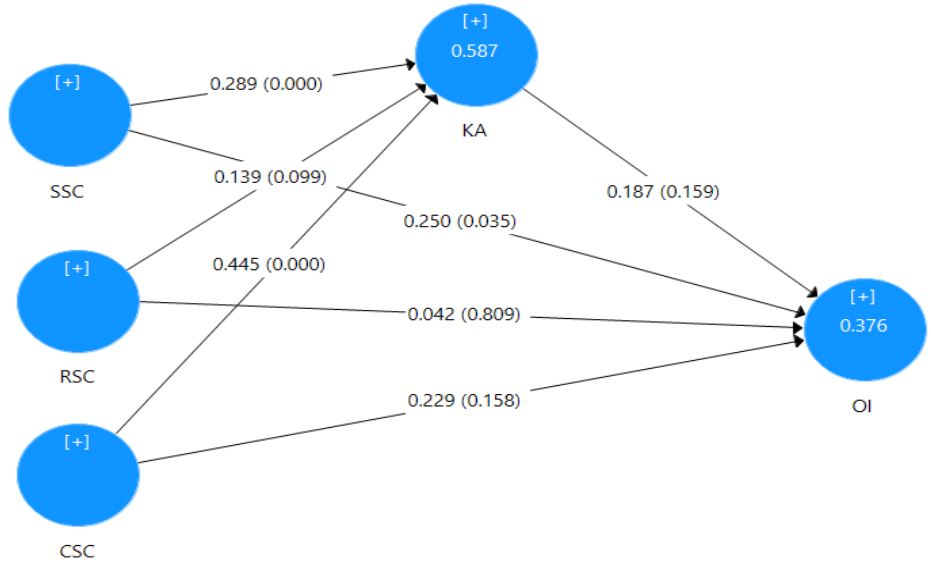

Figure 3

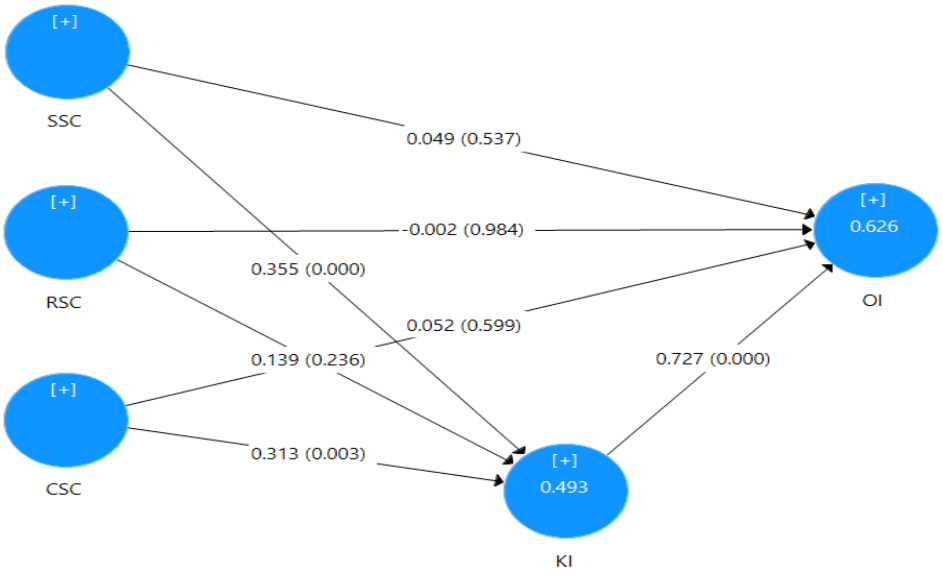

Figure 4

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ISSN : 2597-4750 (PRINTED)

Table 3.

Research hypothesis	*Direct Effect*	*Direct Effect with Mediator*	*Indirect Effect*	*VAF*	*Mediation*
Hypothesis 8 – KA mediates the relationship between SSC and OI	*0.310*	*Not Significant*			
Hypothesis 9 – KA mediates the relationship between RSC and OI	*Not Significant*				
Hypothesis 10 – KA mediates the relationship between CSC and OI	*0.308*	*Not Significant*			
Hypothesis 15 – KI mediates the relationship between SSC and OI	*0.310*	*0.355*	*0.258*	*50%*	*Partial Mediation*
Hypothesis 16 – KI mediates the relationship between RSC and OI	*Not Significant*				
Hypothesis 17 – KI mediates the relationship between CSC and OI	*0.308*	*0.313*	*0.228*	*50%*	*Partial Mediation*

V. DISCUSSION AND CONCLUSION

In conclusion, the purpose of this study was to assess the influence of social capital, knowledge acquisition and knowledge integration on open innovation, as perceived by middle to higher level managers in Malaysian SMEs. The results have indicated that 7 hypothesises posed a significant and positive impact on the open innovation of Malaysian SMEs.

As a general conclusion, it was successfully proven in this research that the criteria used to establish the open innovation framework could be useful in conceptualizing the factors that govern the occurrence and effectiveness of knowledge. For SMEs, to improve knowledge management within a firm can pose as a huge challenge. Therefore, the SMEs might find this study beneficial as this study provides the basic guideline for re-evaluating the methods to enhance their open innovation in a relatively inexpensive and practical way, so that a higher knowledge acquisition and knowledge integration can be attained. From the research perspective, a more thorough understanding on how open innovation concepts can affect the behaviors of knowledge management can be achieved by studying the open innovation, contributing to the ever-important open innovation studies.

REFERENCES

Abulrub, A. H. G., & Lee, J. (2012). Open innovation management: challenges and prospects. *Procedia-Soc. Behav. Sci*, *41*, 130–138.

Alguezaui, S., & Raffaele Filieri. (2010). Investigating the Role of Social Capital in Innovation: Sparse versus Dense Networks. *Investigating the Role of Social Capital in Innovation: Sparse versus Dense Networks*, *14*(6), 891–909. https://doi.org/10.1108/13673271011084925

Andrew B. Hargadon. (1999). Group Cognition And Creativity In Organizations. *Research on Managing Groups and Teams*, *2*, 137–155.

Andrews, K. M., & Delahaye, B. L. (2002). Influences On Knowledge processes In Organizational Learning: The Psychosocial Filter. *Journal of Management Studies*, *37*(6), 797–810. https://doi.org/10.1111/1467-6486.00204

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

Benitez-Amado, J., Castillo, A., Lloréns, J., & Braojos, J. (2018). IT-enabled knowledge ambidexterity and innovation performance in small U.S. firms: The moderator role of social media capability. *Inf. Manag*, *55*, 131–143.

Bernard L. Simonin. (1999). *Ambiguity and the process of knowledge transfer in strategic alliances*. https://doi.org/https://doi.org/10.1002/(SICI)1097-0266(199907)20:7<595::AID-SMJ47>3.0.CO;2-5

Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open innovation: research, practices, and policies. *California Management Review*, *60*(2), 5–16.

Bolino, M., Turnley, W. H., & Bloodgood, J. . (2002). Citizenship Behavior and The Creation of Social Capital in Organizations. *Academy of Management Review*, *27*, 505–522.

Brian Uzzi. (1997). Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness. *Administrative Science Quarterly*, *42*(1), 35–67. https://doi.org/https://doi.org/10.2307/2393808

Brunswicker, S., & Vanhaverbeke, W. (2015). Open Innovation in Small and Medium-Sized Enterprises (SMEs): External Knowledge Sourcing Strategies and Internal Organizational Facilitators. *Journal of Small Business Management*, *53*, 1241–1263.

Chao-Min Chiu. (2006). Understanding Knowledge Sharing in Virtual Communities: An Integration of Social Capital and Social Cognitive Theories. *Decision Support Systems*, *42*(3), 1872–1888. https://doi.org/10.1016/j.dss.2006.04.001

Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*.

Chesbrough, H., & Crowther, A. K. (2006). Beyond high tech: Early adopters of open innovation in other industries. *R&D Management*, *36*(3), 229–236.

Chesbrough, H., & S, B. (2014). A fad or a phenomenon? The adoption of open innovation practices in large firms. *Research Technology Management*, *57*(2), 16–25.

Chow, ing S., & Lai Sheung Chan. (2008). Social Network, Social Trust and Shared Goals in Organizational Knowledge Sharing. *Information & Management*, *45*(7), 458–465. https://doi.org/10.1016/j.im.2008.06.007

Clark, D. B., & Marcia C Linn. (2003). Designing for Knowledge Integration: The Impact of Instructional Time. *Journal of the Learning Sciences*, *12*(4), 451–494. https://doi.org/10.1207/S15327809JLS1204_1

Crupi, A., Del Sarto, N., Di Minin, A., Gregori, G. L., Lepore, D., Marinelli, L., & Spigarelli, F. (2020). "The digital transformation of SMEs – a new knowledge broker called the digital innovation hub." *Journal of Knowledge Management*, *24*(6). https://doi.org/10.1108/JKM-11-2019-0623

Dahiyat, S. E. (2015). An integrated model of knowledge acquisition and innovation: Examining the mediation effects of knowledge integration and knowledge application. *International Journal of Learning and Change*, *8*(2), 101–135. https://doi.org/10.1504/IJLC.2015.074064

DanielJiménez-Jiméne, & Juan G.Cegarra-Navarro. (2007). The performance effect of organizational learning and market orientation. *Industrial Marketing Management*, *36*(6), 694–708. https://doi.org/https://doi.org/10.1016/j.indmarman.2006.02.008

Darroch, J., & McNaughton, R. B. (2020). Examining the Link between Knowledge Management Practices and Type of Innovation. *Journal of Intellectual Capital*, *3*(3), 210–222. https://doi.org/10.1108/14691930210435570

Dirks, K. T., & Ferrin, D. L. (2002). Trust in leadership: Meta-analytic findings and implications for research and practice. *Journal of Applied Psychology*, *87*(4), 611–628. https://doi.org/https://doi.org/10.1037/0021-9010.87.4.611

Dodgson, M., Gann, D., & Salter, A. (2006). *The role of technology in the shift towards open innovation: the case of Procter & Gamble*. https://doi.org/https://doi.org/10.1111/j.1467-9310.2006.00429.x

Doh, S., & Ács, Z. (2009). Innovation and Social Capital: A Cross-Country Investigation. *Industry and Innovation*, *17*, 241–262.

Dyer, J. H., Kale, P., & Singh, H. (2004). *When to Ally and When to Acquire*.

Dyer, J., & Nobeoka, K. (2000). Creating and Managing a High Performance Knowledge Sharing Network: The Toyota Case. *Strategic Management Journal*, *21*, 345-367. https://doi.org/http://dx.doi.org/10.1002/(SICI)1097-0266(200003)21:3<345::AID-SMJ96>3.0.CO;2-N

Egbu, C.O., Hari, S., & Renukappa, S. (2005). Knowledge management for sustainable competitiveness in small and medium surveying practice. *Structural Surve*, *23*(1), 7–21.

Enkel E, Bogers, M., & Chesbrough, H. (2020). Exploring open innovation in the digital age: A maturity model and future research directions. *R&D Management*, *50*(1), 161–168.

Filieri, R. (2014). What makes online reviews helpful? A diagnosticity-adoption framework to explain informational and normative influences in e-WOM. *Journal of Business Research*, *68*(6), 1261–1270. https://doi.org/10.1016/j.jbusres.2014.11.006\nhttps://ejwl.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=101922563&site=ehostlive\nhttp://linkinghub.elsevier.com/retrieve/pii/S0148296 31400349X.

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

Gilbert, M., & Cordey-Hayes, M. (1996). Understanding the process of knowledge transfer to achieve successful technological innovatio. *Technovation*, *16*(6), 301–312.

Glaser, M., & Weber, M. (2007). Overconfidence and trading volume. *Geneva Risk Insur Rev*, *32*, 1–36. https://doi.org/https://doi.org/10.1007/s10713-007-0003-3

Grimpe, C., & Wolfgang Sofka. (2009). Search patterns and absorptive capacity: Low- and high-technology sectors in European countries. *Research Policy*, *38*(3), 495–506.

Hair, J. F., Ringle, C., & Sarstedt, M. (2011). PLS-SEM: Indeed, a Silver Bullet. *Journal of Marketing Theory and Practice*, *19*, 139–152.

Hansen, B. E. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal of Econometrics*, *93*(2), 345–368.

Hau, Y., Kim, B., Lee, H., & Kim, Y. (2013). The effects of individual motivations and social capital on employees' tacit and explicit knowledge sharing intentions. *Int. J. Inf. Manag*, *33*, 356–366.

Henttonen, K., & Lehtimäki, H. (2017). Open innovation in SMEs: Collaboration modes and strategies for commercialization in technology-intensive companies in forestry industry. *European Journal of Innovation Management*, *20*(3). https://doi.org/10.1108/EJIM-06-2015-0047

Hergenhahn, B, R., & Olson, M. . (1997). *An Introdution to Theories of Learning (5th ed)*. Prentice-Hall.

Holcomb, im R., & Michael A Hitt. (2007). Toward a Model of Strategic Outsourcing. *Journal of Operations Management*, *25*(2). https://doi.org/10.1016/j.jom.2006.05.003

Hossain, M., & Kauranen, I. (2016). "Open innovation in SMEs: a systematic literature review." *Journal of Strategy and Management*, *9*(1), 58–73.

HsinChang, H., & Shuang-ShiiChuang. (2011). Social capital and individual motivations on knowledge sharing: Participant involvement as a moderator. *Information & Management*, *48*(1), 9–18. https://doi.org/https://doi.org/10.1016/j.im.2010.11.001

Huston, L. N., & Sakkab, N. Y. (2006). Inside Procter & Gamble's New Model for Innovation: Connect and Develop. *Harvard Business Review*, *84*(3), 58–67.

Jeffrey H. Dyer. (1998). *Effective interim collaboration: how firms minimize transaction costs and maximise transaction value*. https://doi.org/https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<535::AID-SMJ885>3.0.CO;2-Z

Kenney, J. L., & Gudergan, S. (2006). Knowledge integration in organizations: An empirical assessment. *J. Knowl. Manag*, *10*, 43–58.

Kogut, B., & Udo Zander. (1992). Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science*, *3*(3). https://doi.org/10.1287/orsc.3.3.383

Koka, B. R., & John E Prescott. (2002). Strategic Alliances As Social Capital: A Multidimensional View. *Strategic Management Journal*, *23*(9), 795–816. https://doi.org/10.1002/smj.252

Kuen-HungTsai, & Jiann-ChyuanWang. (2009). External technology sourcing and innovation performance in LMT sectors: An analysis based on the Taiwanese Technological Innovation Survey. *British Journal of Educational Technology*, *38*(3), 518–526. https://doi.org/https://doi.org/10.1016/j.respol.2008.10.007

Lane, P. J., & Lubatkin, M. (1998). *Relative absorptive capacity and interorganizational learning*. https://doi.org/https://doi.org/10.1002/(SICI)1097-0266(199805)19:5<461::AID-SMJ953>3.0.CO;2-L

Lane, P. J., Salk, J. E., & Lyles, M. A. (2001). *Absorptive capacity, learning, and performance in international joint ventures*. https://doi.org/https://doi.org/10.1002/smj.206

Leonard, D., & Sensiper, S. (1998). The role of tacit knowledge in group innovation. *California Management Review*, *40*, 112–132.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., & Salas, E. (2000). The Influence of Shared Mental Models on Team Process and Performance. *Journal of Applied Psychology*, *85*(2), 273–283. https://doi.org/10.1037/0021-9010.85.2.273

Matusik, S., & Heeley, M. B. (2005). Absorptive Capacity in the Software Industry: Identifying Dimensions That Affect Knowledge and Knowledge Creation Activities. *Journal of Management*, *31*, 549–572.

Mohan J. Dutta-Bergman. (2004). Primary Sources of Health Information: Comparisons in the Domain of Health Attitudes, Health Cognitions, and Health Behaviors. *Health Communication*, *16*(3), 273–288. https://doi.org/https://doi.org/10.1207/S15327027HC1603_1

Mowery, D. C., Oxley, J. E., & Silverman, B. S. (1996). *Strategic alliances and interfirm knowledge transfer*. https://doi.org/https://doi.org/10.1002/smj.4250171108

Nahapiet, J., & Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *Academy of Management Review*, *23*, 242–266.

Nguyen, T. H. T. B., & Lam, A. H. (2017). Financial development, international trade, and stock market integration: Evidence in six southeastern Asia countries. *Journal of Economics & Development*, *19*(3), 5–17.

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

Nieto, M. J., & Lluís Santamaría. (2010). Technological Collaboration: Bridging the Innovation Gap Between Small and Large Firms. *Journal of Small Business Management*, *48*(1), 44–69. https://doi.org/10.1111/j.1540-627X.2009.00286.x

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, *5*(1), 14–37. https://doi.org/https://doi.org/10.1287/orsc.5.1.14

Okhuysen, G. A., & Eisenhardt, K. M. (2002). Integrating knowledge in groups: How formal interventions enable flexibility. *Organization Science*, *13*, 370–386. https://doi.org/http://dx.doi.org/10.1287/orsc.13.4.370.2947

Ouyang, H. (2008). Resources, absorptive capacity, and technology sourcing. *Int. J. Technol. Manag*, *41*, 183–202.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, *36*, 717–731.

Preacher, K. J., & Hayes, A. F. (2008). Contemporary approaches to assessing mediation in communication research. In A. F. Hayes, M. D. Slater, & L. B. Snyder (Eds.). In *The Sage sourcebook of advanced data analysis methods for communication research*. Thousand Oaks.

Ringle, C., Götz, O., Wetzels, M., & Wilson, B. (2009). *On the Use of Formative Measurement Specifications in Structural Equation Modeling: A Monte Carlo Simulation Study to Compare Covariance-Based and Partial Least Squares Model Estimation Methodologies*.

Robert, K., Jones, D. O. B., Tyler, P. A., & Rooij, D. Van. (2014). Robert et al. 2014 Supp. In *Supporting Information Marine Ecology*.

Robert M. Grant. (1996). Toward A Knowledge-Based Theory of the Firm. *Strategic Management Journal*, *17*(S2), 109–122. https://doi.org/10.1002/smj.4250171110

Roundy. (2017). PT. Hybrid organizations and the logics of entrepreneurial ecosystems. *International Entrepreneurship and Management Journal*, *13*(4), 1221–1237.

Rowley, T., Krackhardt, D., & Dean Behrens. (2000). Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strategic Management Journal*, *21*(3). https://doi.org/10.1002/(SICI)1097-0266(200003)21:3<369::AID-SMJ93>3.0.CO;2-M

Santoro, G., Ferraris, A., Giacosa, E., & Giovando, G. (2018). How SMEs engage in open innovation: A survey. *Journal of the Knowledge Economy*, *9*(2), 561–574.

SaukHau, Y., & MinhyungKang. (2016). Extending lead user theory to users' innovation-related knowledge sharing in the online user community: The mediating roles of social capital and perceived behavioral control. *International Journal of Information Management*, *36*(4), 520–530. https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2016.02.008

SaukHau, Y., & Young-GulKim. (2011). Why would online gamers share their innovation-conducive knowledge in the online game user community? Integrating individual motivations and social capital perspectives. *Computers in Human Behavior*, *27*(2), 956–970. https://doi.org/https://doi.org/10.1016/j.chb.2010.11.022

Segarra, R., N Ojeda, J. P., J García, A. R.-M., I Ruiz, R. H., J A Burón, J. I. I. E., & Gutiérrez, M. (2012). Longitudinal changes of insight in first episode psychosis and its relation to clinical symptoms, treatment adherence and global functioning: one-year follow-up from the Eiffel study. *Eur Psychiatry*, *27*(1), 43–49. https://doi.org/10.1016/j.eurpsy.2010.06.003

SergioCamisón-Haba, A.Clemente-Almendros, J., & TomasGonzalez-Cruz. (2019). How technology-based firms become also highly innovative firms? The role of knowledge, technological and managerial capabilities, and entrepreneurs' background. *Journal of Innovation & Knowledge*, *4*(3), 162–170.

Smedlund, A. (2008). The knowledge system of a firm: social capital for explicit, tacit and potential knowledge. *J. Knowl. Manag*, *12*, 63–77.

Sternberg, R. J. (1983). Components of human intelligence. *Cognition*, *15*(1–3), 1–48. https://doi.org/https://doi.org/10.1016/0010-0277(83)90032-X

Tiwana, A., & Ephraim McLean. (2005). Expertise Integration and Creativity in Information Systems Development. *Journal of Management Information Systems*, *22*(1), 13–44.

Tsai, W., & Ghoshal, S. (1998). Social Capital and Value Creation: The Role of Intrafirm Networks. *Academy of Management Journal*, *41*, 464–476.

van de Vrande, V., de Jong, J., Vanhaverbeke, W., & de Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, *29*(6–7), 423–437.

Van den Hooff, B., & Huysman, M. (2009). *Managing knowledge sharing: emergent and engineering approaches*, *Information & Management*. *46*(1), 1–8.

Villena, V. H., Revilla, E., & Choi, T. (2011). The dark side of buyer-supplier relationships: A social capital perspective. *Journal of Operations Management*, *29*(6), 561–576.

ISSN : 2597-4785 (ONLINE)
ISSN : 2597-4750 (PRINTED)

Wasko, M. M. & Faraj, S. (2005). Why Should I Share? Examining Social Capital and Know-ledge Contribution in Electronic Networks of Practice. *MIS Quarterly*, *2*(1), 35−57.

William G. Ouchi. (1980). Markets, Bureaucracies, and Clans. *Administrative Science Quarterly*, *25*(1), 129–141.

Wim Vanhaverbeke. (2017). *Managing Open Innovation in SMEs*. Cambridge University Press. https://doi.org/10.1017/9781139680981

Woei Hung. (2008). *Problem-Based Learning*. ErlbaumEditors: M. Spector, D. Merrill, J. van Merrienböer, M. Driscoll. https://doi.org/10.1007/978-1-4419-1428-6_210

Wu, W., Chang, M., & Chen, C. (2008). *Promoting Innovation through the Accumulation of Intellectual Capital, Social Capital, and Entrepreneurial Orientation*. Entrepreneurship.

Yang, S., & Farn, C. (2009). Social capital, behavioural control, and tacit knowledge sharing - A multi-informant design. *Int. J. Inf. Manag*, *29*, 210–218.

Yli-Renko, H., Erkko Autio, & Sapienza, H. J. (2001). Social Capital, Knowledge Acquisition, and Knowledge Exploitation in Young Technology-Based Firms. *Strategic Management Journal*, *22*(6-7), 587–613. https://doi.org/10.1002/smj.183

Zaheer, A., McEvily, B., & Vincenzo Perrone. (1998). No TitleDoes Trust Matter? Exploring the Effects of Inter-Organizational and Inter-Personal Trust on Performance. *Organization Science*, *9*(2), 141–159. https://doi.org/10.1287/orsc.9.2.141

Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, *27*(2), 185–203.