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THE ROLE OF SEQUENTIAL COHERENCE IN OPEN INNOVATION: A QUALITATIVE INQUIRY

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ABSTRACT

Open innovation is a popular strategy among business firms to accelerate innovations. However, open innovation does not always increase innovation performance. Extant literature provides inconsistent and inconclusive arguments in respect of the relationship between open innovation practices and innovation performance. Existing theories mostly have an internal focus and fall short of explaining why some firms succeed in open innovation initiatives and why others fail. Open innovation is about knowledge flows. To understand how boundary conditions influence knowledge flows we made a qualitative inquiry by studying open innovation initiatives of five Sri Lankan firms. Under open coding, we reviewed data collected from lengthy discussions with key people in those firms to identify few general categories of information. Further analysis on this using axial coding revealed three factors that influence knowledge flows. We bundle those factors and describe as sequential coherence which can explain why some succeed while others fail in open innovation. Sequential coherence is measured through the push and the pull effects by willingness and ability of the participants of teacher firm and the preparedness and ability of the participants from the student firm respectively. We trust that our findings bridge a gap in open innovation literature. These initial findings could be generalized through a quantitative study with larger samples. Managerial implications of the finding is that ability to scan the entire chain of knowledge flow across boundaries and taking corrective measures for any bottlenecks or hindrances observed can bring better results from open innovation initiatives. Further, sequential coherence leads to multiple research opportunities in furthering our knowledge in open innovation.

Key words: open innovation, innovation performance, knowledge flow, boundary conditions, sequential coherence.

1. Introduction

Open innovation (OI) captures the increasing propensity of firms to work across their traditional boundaries of operations (Mina et al, 2014). According to Chesbrough (2017) openness is a strategy for firms. Openness has become a trend in innovation management (Lopez & Carvalho, 2018) and attracted wide academic attention (Kim et al, 2015). OI encourages organizations to open up their processes to harness external knowledge to accelerate internal innovations and also to use external paths in early commercialization of them (Chesbrough, 2003). Although the importance of acquiring external knowledge is widely accepted how the knowledge flow happens is little understood (Lakemond et al, 2016). Far less is known about with whom to partner in acquiring external knowledge (Lane & Lubatkin, 1998). OI does not always bring higher innovation performance and reasons for this are not adequately addressed in existing literature (Yapa et al, 2018). Many firms struggle to harness value from OI initiatives (Salter et al, 2015) as they fail to engage external actors (Dahlander & Piezunka, 2014). Challenges firms face involving external actors in OI have become a popular area for research (Foss et al, 2011; Afuah & Tucci, 2012; Hossain & Anees-ur-Rehman, 2016). The rationale of an organization to select the best partner organization among multiple candidates possessing the required knowledge cannot be explained by existing theories (West et al, 2006; Rusanen, 2013; Von Krogh et al, 2018).

The objective of this paper is to present our findings from a qualitative inquiry we undertook in answering why OI initiatives do not always lead to higher innovation performance. We address a gap in literature in understanding knowledge flows across boundaries. Open innovation demands permeability of organizational boundaries (Dahlander & Gann, 2010). Although OI is conceptualized as knowledge inflows and outflows at the level of organizational boundary most research work lacks focus on individuals involved in OI (Bogers et al, 2018). Managers and academics lack a proper understanding of the mechanisms involving the boundaries of the innovation process (Enkel et al, 2009a). Brunswicker & Vanhaverbeke (2015) suggest that research on open innovation should investigate the interrelation between boundary conditions and a firm's nature of openness. The boundary can be between partner firm and the lead firm or between internal departments of any organization be it the lead firm or a partner firm. Our findings will further enhance the understanding of factors influencing innovation performance in OI.

2. Literature Review

Extant literature on the relationship between open innovation and innovation performance provides inconsistent arguments and inconclusive results (Caputo et al, 2016; Cheng & Shiu, 2015; Bengtsson et al, 2015). Open innovation is a multifaceted phenomenon (Randhawa, 2016) that demands understanding across

various perspectives and levels of analysis (Bogers et al, 2017). In respect of determinants, processes and outcomes of OI, the multi-level framework introduced by Chesbrough & Bogers (2014) suggests examining the emerging perspectives within the organization, outside the organization, between organizations or in the broader context of industries. Networking in OI can be horizontal, vertical, or a combination of these and the corresponding network profile has a significant role in innovation performance (Hossain & Kauranen, 2015).

Popular theories and variables used to understand OI include absorptive capacity (Cohen & Levinthal, 1990; De Zubielqui et al, 2016), organizational inertia (Huang et al, 2013), search depth and breadth (Laursen & Salter, 2006; Greco et al, 2016), cognitive distance (Inaun & Schenker-Wicki, 2011), ambidexterity (Ferrari, 2011) and in-bound and out-bound OI practices (Enkel et al, 2009; Bianchi et al, 2015; West & Bogers, 2014; Fernandes et al, 2017; Popa et al, 2017). However, these theories mainly focus on internal factors and they do not adequately explain OI practices and differences in innovation performance (Cheng & Huizing, 2014; Bengtsson et al, 2015).

Many firms struggle to harness value from OI initiatives (Salter et al, 2015; Lee & Shin, 2015) as they fail to engage external actors (Dahlander & Piezunka, 2014). The interface between respective stakeholders becomes an important study object in boundary-crossing innovation activity (Bogers et al 2017). Challenges firms face involving external actors in OI have become a popular area for research (Foss et al, 2011; Afuah & Tucci, 2012; Felin & Zenger, 2014; Hossain & Anees-ur-Rehman, 2016). Lane & Lubatkin (1998) emphasize the importance of examining with whom a firm should partner in acquiring new knowledge.

Open innovation goes beyond the boundaries of the focal firm (Munir et al, 2018; Powell et al, 1996) and recent publications have persistently stressed the necessity of understanding the organizational and contextual factors that moderate the relationship between OI and innovation performance (Bengtsson et al, 2015). Key questions to be answered include; How do firms select OI partners (West et al, 2006)? From whom a firm can learn mostly (Von Krogh et al, 2018)? Why do firms record varying levels of success with different OI partners (Bengtsson et al, 2015)? What are the reasons for firms to record varying success in different OI projects with the same partners (Cheng & Huizing, 2014; Bengtsson et al, 2015)? What factors a firm will consider in selecting OI partners (Rusanen, 2013)? Therefore, it is apparent that the factors captured by existing OI theories and concepts do not sufficiently explain innovation performance.

The life cycle of innovation commences with exploration and ends with exploitation (March, 1991). Exploration generates new knowledge that will enable firms to introduce disruptive innovations and exploitation helps to early industrialize and commercialize them (Ferrary, 2011). OI usually begins with inbound activities

through which new knowledge is acquired and integrated with existing knowledge (Lakemond et al, 2016). It then spreads across the internal value chain from R&D to manufacturing and operations of the organization. Outbound OI refers to the transmission of knowledge or technology to an external environment (Cassiman & Valentini, 2016; Huizingh, 2011). In transmitting technology to the external environment organizations mainly export technical knowhow (Hung & Chou, 2013; Naqshbandi et al, 2016; Parida et al, 2012), knowledge (Hung & Chou, 2013) and intellectual property (Hung & Chou, 2013). Outbound OI enables the organization to use external paths for early commercialization where the internal knowledge is transferred to outside entities (Huizing, 2011; West & Bogers, 2014). Similarly, the process may begin with outbound OI which prompts an organization to innovate to meet the demands of the external party ready to commercialize. The organization may then look for external knowledge to innovate through inbound OI activities (Bianchi et al, 2015; Cheng et al, 2016; Kim et al, 2016; Lopez-vega, 2016).

Absorptive capacity defined as the ability of an organization to recognize the value of external knowledge, assimilate it and use for commercial ends (Cohen & Levinthal, 1990) is often used by researchers in explaining open innovation (West & Bogers, 2014). Desorptive capacity that can be considered as the reverse of absorptive capacity refers to the ability of releasing knowledge to partner firms (DellAnno et al, 2015). Based on the argument that a firm cannot learn equally from all other firms, Lane & Lubatkin (1998) introduced relative absorptive capacity. They argue that one firm's ability to learn from another firms depends on their (a) knowledge bases, (b) compensation policies and organization structures and (c) dominant logics. Spithoven et al (2010), De Zubielqui et al, (2016) and Kim et al (2016) have emphasized the positive relationship between absorptive capacity and innovation performance.

Lane & Lubatkin (1998) explain three methods for learning new external knowledge – passive, active and interactive where each provides a different type of external knowledge. They found that a student firm's absorptive capacity depends on (a) the specific type of new knowledge offered by the teacher firm, (b) the similarity between the student and teacher firm's compensation practices and organization structures and (c) the student firm's familiarity with the teacher firm's organizational problems.

3. Methodology: The Grounded Theory Approach

In grounded theory approach of qualitative research set procedures are used in analysis (Creswell, 1998). As advanced by Corbin and Strauss (1990) it comprises open, axial and selective coding. Open coding refers to a procedure for developing categories of information whereas axial coding refers to interconnecting the categories. Selective coding refers to building a story that connects the categories to end with a discursive set of theoretical propositions (Strauss & Corbin, 1990).

OI practices are popular among business organizations in Sri Lanka including software firms (Yapa & Senathiraja, 2017). However, software firms engaged in OI initiatives show varying innovation performance (Yapa et al, 2018). Despite the resources and infrastructure available, growth of the Sri Lankan software industry is below the expectations of its key stakeholders. The industry has just exceeded annual export revenue of US$ 1 billion, a target the key stakeholders set a decade back. In view of the non-availability of globally recognized Sri Lankan software brands and lack of major innovations in the industry, it is important to study the relationship between the OI practices in software firms and innovation performance. We selected five different case studies from Sri Lanka in this research. They include (1) a startup IoT firm offering automation solutions to manufacturing firms, (2) an award winning SME level software firm catering to banking and financial services industry, (3) a startup firm by three university students attempted to commercialize a medical innovation, (4) a subsidiary of a well-established software company trying to commercialize an automatic accident notification system and (5) a local brand of mobile phones where the products are outsourced from China as per the in-house designs and the embedded software is developed locally.

The first review of data collected from the lengthy discussions and interviews with the key people in those five firms enabled us to identify general categories such as strategic factors, leadership and human factors that influence knowledge flow. Creswell (1998) describes this as open coding. Goal alignment and complementarity in interests are the findings under strategic factors. Flexibility and managerial support are findings under the leadership category. Our phenomenon of interest which is boundary conditions were mostly explained through human factors. Further analysis on this described as axial coding (Creswell, 1998) revealed willingness to share knowledge, preparedness for learning and level of motivation are the factors influencing the knowledge flow. We bundle them as sequential coherence to offer as a proposition. Given below are two excerpts pertaining to sequential coherence from two of the firms mentioned above.

In innovations what is crucial is acquiring the required knowledge from the right partner. In doing so, you have to have the right team to interact with the partner firms, be flexible and adaptable to strange situations to get your work done. The soft skills the innovation team possesses in working with diverse innovation partners are very vital to succeed. Because, each partner has their own way of working as cultures are different. The challenge to us is assigning the most suitable people desirous of learning from our organization to work with the people from the partner firms who are desirous of teaching.

In innovating it is quite important to identify the right partners. When you have many similar options it is a challenge to select the most appropriate ones. It was not an

accident and we consciously selected the knowledge partner the best known local university for data security. Luckily, there were several resources with adequate exposure in to secure payments, information security and digital forensics. Common interests we shared pushed the project forward smoothly. Similarly, we partnered with the right bank who had the necessity of innovating in the front end activities. When we elaborated paperless deposits and withdrawals they readily accepted to partner with us. There again we assigned the right people from our end to work with the employees of our partner firms. Their preparedness to learn and share made it a success and reminded me again that fortune favors the prepared. We ended by introducing the best banking innovation in the country and also bringing glory and fame to the country winning an international award.

Key findings pertaining to the knowledge flow at boundary level of the student firms and the teacher firms of the above case studies prompt us to suggest sequential coherence as a factor that can influence innovation performance.

4. Results, Analysis & Discussion

We define sequential coherence as the reciprocal result of the push and pull effects by individuals of a teaching firm and the learning firm respectively that enables knowledge to flow across boundary of firms. We suggest that sequential coherence can be measured through the ability and willingness to teach by the teacher firm participants and the ability and readiness to learn by the participants of the student firm as we observed through the qualitative study done. We argue that sequential coherence can explain the relationship between OI initiatives and innovation performance. Much of the inter-organizational learning research use absorptive capacity which assumes a firm can equally learn from any other firm (Lane & Lubatkin, 1998). Assume that firm A needs to acquire external knowledge and both firm B and firm C possess the knowledge firm A is looking for. Who is the best partner for firm A? Can firm A equally learn from firm B or firm C? Absorptive capacity of firm A cannot explain this. Therefore, we suggest the use of sequential coherence.

We suggest that sequential coherence enables an organization to make use of its absorptive capacity. The boundary of firms become more porous with OI processes and increased interaction with external actors (Litchtenthaler, 2009). Sequential coherence focuses on the boundary conditions required for smooth cross border flow of knowledge and technology in both inbound and outbound OI practices. It focuses not only the ability but also the willingness of both the transferor and the recipient of knowledge. More than a measure of internal abilities, sequential coherence focuses on boundary conditions.

Although not used in organizational studies or OI literature before, sequential coherence is a term used in diverse disciplines such as education, chemistry,

physics and software development. Sequential coherence is explained in software development to highlight the importance of the ability of each component to integrate with the next component to give the desired outcome from the solution. We propose to use the term sequential coherence in explaining relationship between OI and innovation performance. We argue that by examining and influencing the degree of sequential coherence practicing managers may influence innovation performance in OI initiatives.

The innovation problem that demands a solution may vary through the product development process (Gronland et al., 2010). Some firms may be very active at the early stages and some may be very active in the later stages in the collaboration with partners (Lakemond et al, 2018). We argue that these variances at idea, implementation and commercialization stages can be explained through sequential coherence.

Purposive management of knowledge flows across boundaries is necessary in OI (Chesbrough & Bogers, 2014; Lakemond et al, 2016) and we argue that sequential coherence can explain and ensure a smooth knowledge flow. Managers should carefully examine sequential coherence between the lead firm of OI and each partner firm to achieve the expected innovation performance. As the strength of a chain is defined and constrained by the strength of its weakest link, sequential coherence of each boundary in the knowledge flow matters in ensuring a smooth flow of knowledge. It is through regular scans of the chain of knowledge flow managers can identify any drawbacks, bottlenecks and hindrances to take corrective action. Firm A being the lead firm cooperates with firm B as inbound OI partner to access knowledge. Sequential coherence between firm A and firm B matters in ensuring the knowledge flow happens. Similarly, firm A works with firm C as the outbound OI partner where firm C will assist firm A to early commercialize their innovations. The sequential coherence between firm A and firm C is important to ensure the knowledge flow to achieve the desired innovation performance. We argue that any hindrance of sequential coherence between firms may affect innovation performance.

OI is an inherently dynamic process that demands research to incorporate dynamic elements (Appleyard & Chesbrough, 2017). We argue that sequential coherence is a dynamic measure capable of influencing innovation performance in OI initiatives. Why do some open innovation initiatives lead to higher innovation performance and some fail (Cheng & Huizing, 2014; Bengtsson et al, 2015)? *Firm A succeeds with firm B in an OI initiative whereas a similar initiative firm A undertakes with firm C fails. If we examine only an ability that is pertaining to firm A we cannot explain why one initiative failed and the other succeeded.* We argue that sequential coherence can explain this and it is a pre-condition for absorptive capacity to work in favor of an organization.

Absorptive capacity describes the pulling effect caused by the firm in knowledge transfer and its use (Dell'Anno et al, 2015). Sequential coherence explains both the pulling effect and pushing effect required for successful knowledge flow between an organization and its OI partner firms. In this context, sequential coherence goes beyond absorptive capacity or desorptive capacity. Sequential coherence explains both the ability and the willingness from both sides of the story namely the teacher firm and student firm by going down to individual level and across organizations. In the case of inbound OI the pushing effect from partner firm and the pulling effect by the focal firm are important. Similarly, in the case of outbound OI the pushing effect by focal firm and pulling effect by partner firm are important.

Sequential coherence ensures that knowledge will flow smoothly from teacher firm to student firm in an unbroken manner. This transmission may happen through people via discussions, presentations and interactive learning (Kogut & Zander, 1996) and also through products and processes. Higher social interaction between firms facilitated through multiple ties enhances knowledge acquisition (Yli-Renko et al, 2001). Naqshbandi (2016) emphasizes the importance of managers to keep in touch with people from different firms in ensuring OI performance. If we compare knowledge flow across partner firms with the current flow of an electric circuit where components are considered as different firms, sequential coherence describes the soldered joints between various components. It is also similar to the cable lugs used in connecting different components. Capacity, performance and specifications of individual components will be of no use if we fail to make the proper connections. As an engineer quickly scans all the soldered joints between different components he assembled in a printed circuit board when it is found not working properly, a manager can examine the knowledge flow at boundaries when things are not moving in OI initiatives as expected. We argue that sequential coherence enables knowledge fusion.

There is growing interest on assessing OI at a more micro level than the organization (Bogers et al, 2018; Du et al, 2014; Salter et al, 2015; Dahlander et al, 2016; Ahn et al, 2017). However, individual level factors remain relatively ill understood (Bogers et al, 2017). Most research studies on OI have neglected the human aspect of it (Gassman et al, 2010; West et al, 2014). Salter et al (2014) emphasize the challenges faced by employees in OI initiatives. R&D employees need to allocate time to innovate within and also outside the firm (Dahlander et al, 2016).We argue that higher sequential coherence leads to improved innovation performance in OI initiatives. Practicing managers may use sequential coherence in influencing innovation performance in open innovation initiatives by taking action to address the four areas highlighted namely willingness and ability of participants from teacher firm and the preparedness and ability of student firm participants. OI research studies show that when adopting OI strategies organizations benefit differently and the reasons for these differences are not explained (Saebi et al, 2015). We believe that our findings support extant literature

and will increase the understanding on OI. We propose to test the new determinant of sequential coherence with a larger sample for generalizing it.

Further, it will be interesting to understand how sequential coherence can address issues of cognitive distance, search depth, organizational inertia and ambidexterity the regularly used variables in explaining innovation performance, through further research. For an example, we may test whether a high degree of sequential coherence influence search depth in OI initiatives. Whether attempting to engage in both inbound and outbound OI simultaneously may lead to waste of resources and efforts will be another area to be researched from a sequential coherence perspective. How sequential coherence can address stickiness of knowledge (Szulanski, 1995) will also be an interesting area for further research. Further, we may examine whether the opportunity for participants from teacher firms to learn from the student firm enhances the knowledge flow from teacher firm to student firm. Finally, a major area future researchers may explore is to study how individual factors such as attitudes, personality, perception and motivation of participants affect sequential coherence.

References

Afuah, A., & Tucci, C. L. (2012). Crowdsourcing as a solution to distant search. *Academy of Management Review*, *37*(3), 355-375.

Ahn, J. M., Minshall, T., & Mortara, L. (2017). Understanding the human side of openness: the fit between open innovation modes and CEO characteristics. *R&D Management*, *47*(5), 727-740.

Appleyard, M.M., Chesbrough, H.W., (2017), The dynamics of open strategy: from adoption to reversion. Long Range Plan. 50, 310-321.

Argyres, N. S., & Silverman, B. S. (2004). R&D, organization structure, and the development of corporate technological knowledge. *Strategic Management Journal*, *25*(8-9), 929-958.

Bengtsson, L., Lakemond, N., Lazzarotti, V., Manzini, R., Pellegrini, L., & Tell, F. (2015). Open to a select few? Matching partners and knowledge content for open innovation performance. *Creativity and innovation management*, *24*(1), 72-86.

Bianchi, M., Croce, A., Dell'Era, C., Di Benedetto, C. A., & Frattini, F. (2015). Organizing for inbound open innovation: How external consultants and a dedicated R&D unit influence product innovation performance. *Journal of Product Innovation Management*.

Bogers, M., Zobel, A.K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S. and Hagedoorn, J.(2017). The

open innovation research landscape: Established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, *24*(1), 8-40.

Bogers, M., Foss, N. J., & Lyngsie, J. (2018). The "human side" of open innovation: The role of employee diversity in firm-level openness. *Research Policy*, *47*(1), 218-231.

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*(4), 1241-1263.

Caputo,M., Lambert, E., Cammarano, A., Michelino, F. (2016). Exploring the impact of open innovation on firm performance. Management Decisions. 54, 1788-1812.

Cassiman, B., & Valentini, G. (2015). Open innovation: Are inbound and outbound knowledge flows really complementary?. *Strategic Management Journal*.

Cheng, C. C., & Huizingh, E. K. (2014). When is open innovation beneficial? The role of strategic orientation. *Journal of Product Innovation Management*, *31*(6), 1235-1253.

Cheng, C. C., & Shiu, E. C. (2015). The inconvenient truth of the relationship between open innovation activities and innovation performance. *Management Decision*, *53*(3), 625-647.

Cheng, C. C., Yang, C., & Sheu, C. (2016). Effects of open innovation and knowledge-based dynamic capabilities on radical innovation: An empirical study. *Journal of Engineering and Technology Management*, *41*, 79-91.

Chesbrough, H. (2003). The logic of open innovation: managing intellectual property. *California Management Review*, *45*(3), 33-58

Chesbrough, H. (2017). The Future of Open Innovation: IRI Medal Address The future of open innovation will be more extensive, more collaborative, and more engaged with a wider variety of participants. *Research-Technology Management*, *60*(6), 29-35.

Chesbrough, H., & Bogers, M. (2014). Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation,[w:] Open Innovation: New Frontiers and Applications, red. H. Chesbrough, W. Vanhaverbeke. *J. West, Oxford: Oxford University Press*.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative science quarterly*, 128-152.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative sociology*, *13*(1), 3-21.

Creswell, J. W. (1998). Qualitative inquiry and research design: Choosing among five traditions.

Dahlander, L., & Gann, D. M. (2010). How open is innovation?. *Research policy*, *39*(6), 699-709.

Dahlander, L., O'Mahony, S., & Gann, D. M. (2016). One foot in, one foot out: how does individuals' external search breadth affect innovation outcomes?. *Strategic Management Journal*, *37*(2), 280-302.

Dahlander, L., & Piezunka, H. (2014). Open to suggestions: How organizations elicit suggestions through proactive and reactive attention. *Research Policy*, *43*(5), 812-827.

De Zubielqui, G. C., Jones, J., & Lester, L. (2016). Knowledge inflows from market and science based actors, absorptive capacity, innovation and performance – A study of SMEs. *International Journal of Innovation Management*, *20*(06), 1650055.

Dell'Anno, D., & Del Giudice, M. (2015). Absorptive and desorptive capacity of actors within university-industry relations. *Journal of Innovation and Entrepreneurship*, *4*(1), 13.

Du, J., Leten, B., & Vanhaverbeke, W. (2014). Managing open innovation projects with science-based and market-based partners. *Research Policy*, *43*(5), 828-840.

Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. *R&d Management*, *39*(4), 311-316.

Fernandes, S., Cesario, M., Barata, J.M. (2017). Ways to open innovation: Main agents and the sources in the Portuguese case. *Technology in Society*, 51, 153-162.

Ferrary, M. (2011). Specialized organizations and ambidextrous clusters in the open innovation paradigm. *European Management Journal*, *29*(3), 181-192.

Foss, N. J., Laursen, K., & Pedersen, T. (2011). Linking customer interaction and innovation: The mediating role of new organizational practices. *Organization Science*, *22*(4), 980-999.

Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R&d Management*, *40*(3), 213-221.

Greco, M., Grimaldi, M., & Cricelli, L. (2016). An analysis of the open innovation effect on firm performance. *European Management Journal*, *34*(5), 501-516.

Grönlund, J., Sjödin, D. R., & Frishammar, J. (2010). Open innovation and the stage-gate process: A revised model for new product development. California management review, 52(3), 106-131.

Heath, C., & Staudenmayer, N. (2000). Coordination neglect: How lay theories of organizing complicate coordination in organizations. *Research in organizational behavior*, *22*, 153-191.

Hossain, M., & Anees-ur-Rehman, M. (2016). Open innovation: an analysis of twelve years of research. *Strategic Outsourcing: An International Journal*, *9*(1), 22-37.

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

Huang, H. C., Lai, M. C., Lin, L. H., & Chen, C. T. (2013). Overcoming organizational inertia to strengthen business model innovation: An open innovation perspective. *Journal of Organizational Change Management*, *26*(6), 977-1002.

Huizing, E.K.R.E.,(2011). Open innovation:State of the art and future perspectives. Technovation 31, 2-9.

Hung, K. P., & Chou, C. (2013). The impact of open innovation on firm performance: The moderating effects of internal R&D and environmental turbulence. *Technovation*, *33*(10), 368-380.

Inauen, M., & Schenker-Wicki, A. (2012). Fostering radical innovations with open innovation. *European Journal of Innovation Management*, *15*(2), 212-231.

Kim, B., Kim, E., & Foss, N. J. (2016). Balancing absorptive capacity and inbound open innovation for sustained innovative performance: an attention-based view. *European Management Journal*, *34*(1), 80-90.

Kim, N., Kim, D. J., & Lee, S. (2015). Antecedents of open innovation at the project level: empirical analysis of Korean firms. *R&D Management*, *45*(5), 411-439.

Kogut, B., & Zander, U. (1996). What firms do? Coordination, identity, and learning. *Organization science*, *7*(5), 502-518.

Lakemond, N., Bengtsson, L., Laursen, K., & Tell, F. (2016). Match and manage: the use of knowledge matching and project management to integrate knowledge in collaborative inbound open innovation. *Industrial and Corporate Change*, *25*(2), 333-352.

Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. Strategic management journal, 19(5), 461-477.

Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic management journal*, *27*(2), 131-150.

Levinthal, D. A., & March, J. G. (1993). The myopia of learning. *Strategic management journal*, *14*(S2), 95-112.

Lichtenthaler, U. (2009). Outbound open innovation and its effect on firm performance: examining environmental influences. *R&d Management*, *39*(4), 317-330.

Lopes, A.P.V.B.V. & Carvalho, M.M.D. (2018). Evolution of the open innovation paradigm: Towards a contingency conceptual model. *Technological Forecasting & Social Change,* 132, 284-298.

Lopez-Vega, H., Tell, F., & Vanhaverbeke, W. (2016). Where and how to search? Search paths in open innovation. *Research Policy*, *45*(1), 125-136.

Mina, A., Bascavusoglu-Moreau, E., & Hughes, A. (2014). Open service innovation and the firm's search for external knowledge. *Research Policy*, *43*(5), 853-866.

Munir, H., Linaker, J., Wnuk, K., Runeson, P., Regnell, B. (2018) Open innovation using open source tools: A case study at Sony Mobile. Empr Software Engineering, 23: 186-233.

Naqshbandi, M. M. (2016). Managerial ties and open innovation: examining the role of absorptive capacity. *Management Decision*, *54*(9), 2256-2276.

Nonaka, I., & Takeuchi, H. (1995). The Knowledge Creating. *New York*, 304.

Parida, V., Westerberg, M., & Frishammar, J. (2012). Inbound open innovation activities in high-tech SMEs: the impact on innovation performance. *Journal of small business management*, *50*(2), 283-309.

Popa, S., Soto-Acosta, P., & Martinez-Conesa, I. (2017). Antecedents, moderators, and outcomes of innovation climate and open innovation: An empirical study in SMEs. *Technological Forecasting and Social Change*, *118*, 134-142.

Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative science quarterly*, 116-145.

Randhawa, K., Wilden, R., & Hohberger, J. (2016), A bibliometric review of open innovation: Ssetting a research agenda. Journal of Production & Innovation Management. 33, 750-772.

Rusanen, H. (2013, January). Finding the right partners for innovation networks. In *ISPIM Conference Proceedings* (p. 1). The International Society for Professional Innovation Management (ISPIM).

Saebi, T., & Foss, N. J. (2015). Business models for open innovation: Matching heterogeneous open innovation strategies with business model dimensions. *European Management Journal*, *33*(3), 201-213.

Salter, A., Criscuolo, P., & Ter Wal, A. L. (2014). Coping with open innovation: responding to the challenges of external engagement in R&D. *California Management Review*, *56*(2), 77-94.

Salter, A., Ter Wal, A. L., Criscuolo, P., & Alexy, O. (2015). Open for ideation: Individual-level openness and idea generation in R&D. *Journal of Product Innovation Management*, *32*(4), 488-504.

Spithoven, A., Clarysse, B., & Knockaert, M. (2011). Building absorptive capacity to organise inbound open innovation in traditional industries. *Technovation*, *31*(1), 10-21.

Strauss, A., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Sage Publications, Inc.

Szulanski, G. (1995). Unpacking stickiness: An empirical investigation of the barriers to transfer best practice inside the firm. In *Academy of Management Proceedings* (Vol. 1995, No. 1, pp. 437-441). Briarcliff Manor, NY 10510: Academy of Management.

Vanhaverbeke, W. (2006). The interorganizational context of open innovation. *Open innovation: Researching a new paradigm*, 205-219.

Vanhaverbeke, W., & Cloodt, M. (2014). Theories of the firm and open innovation. *New frontiers in open innovation*, 256-278.

Von Krogh, G., Netland, T., & Wörter, M. (2018). Winning With Open Process Innovation. *MIT Sloan Management Review*, *59*(2), 53-56.

West, J., & Bogers, M. (2014). Leveraging external sources of innovation: a review of research on open innovation. *Journal of Product Innovation Management*, *31*(4), 814-831.

West, J., & Gallagher, S. (2006). Challenges of open innovation: the paradox of firm investment in open-source software. *R&d Management*, *36*(3), 319-331.

Yapa, S. R. & Senathiraja, R. (2017). Inbound open innovation: Whom to converge with and why? International Conference on the Humanities and the Social Sciences. ICHSS 2017, University of Peradeniya, Sri Lanka.

Yapa, S. R., Senathiraja, R., & Kauranen, I. (2018). Improving Innovation Performance by Convergence in Open Innovation: Evidence from Software Firms in Sri Lanka. *Vidyodaya Journal of Management*, *4*(1).

Yli-Renko, H., Autio, E., & Sapienza, H. J. (2001). Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms. *Strategic management journal*, *22*(6-7), 587-613.

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