

# Time Orientation and Sequential Coherence as Novel Determinants of Open Innovation Performance

S.R. Yapa<sup>1\*</sup>, R. Senathiraja<sup>2</sup>, J. Poesche<sup>3</sup> and I. Kauranen<sup>4</sup>

<sup>1</sup>*Faculty of Management & Finance, University of Colombo, Sri Lanka*  
shantayapa@gmail.com<sup>1</sup>

<sup>2</sup>*Faculty of Management & Finance, University of Colombo, Sri Lanka*  
luxumy@gmail.com<sup>2</sup>

<sup>3</sup>*Department of Industrial Engineering & Management, Aalto University, Finland*  
jurgem.poesche@hotmail.com<sup>3</sup>

<sup>4</sup>*Department of Industrial Engineering & Management, Aalto University, Finland*  
ilkka.kauranen@gmail.com<sup>4</sup>

## INTRODUCTION

Openness has become a strategy for organizations (Chesbrough, 2017) and a trend in innovation management (Lopez & Carvalho, 2018). It has attracted wide academic attention (Kim et al, 2015). Open innovation (OI) encourages organizations to collaborate with external organizations in harnessing new knowledge to accelerate internal innovations and also to partner with external organizations to early commercialize innovations (Chesbrough, 2003). Through a pilot study done in 2017 using 160 managers of 114 business organizations, we found that OI is popular among organizations in Sri Lanka.

Despite its popularity as a strategy to promote innovations in organizations, there is criticism against open innovation claiming that it does not always increase innovation performance (Lee & Shin, 2017; Yapa, et al., 2018). Cheng & Shiu (2015) emphasize that the relationship between OI and innovation performance is not direct and increased OI may reduce innovation performance (Lauritzen & Karafyllia, 2019; Bengtsson, et al, 2015). Scholars regularly point out the necessity to identify novel determinants to understand performance differences in open innovation initiatives. Having conducted two qualitative inquiries the authors identified two novel variables namely time orientation and sequential coherence that can explain differences in innovation performance of open innovation initiatives. We selected the local software industry that records varying levels of innovation performance in open innovation initiatives for an empirical study as it constitutes a fertile ground.

---

\* Corresponding Author

## **OBJECTIVES**

The objectives of this research paper is to (1) discuss the limitations of existing variables in explaining innovation performance, (2) present a conceptual model incorporating the novel determinants and (3) to explain the theoretical background of the proposed conceptual model. Therefore, this article is best described as a concept paper that shows the progression of a research study beginning with the identification of theoretical and empirical gaps, results of two qualitative studies done after a comprehensive literature review, results of subsequent empirical studies done to further test the findings of the qualitative studies and finally a conceptual model that will be used for the final phase of the research study. We justify our conceptual model in terms of its novelty and appropriateness.

## **LITERATURE REVIEW**

Using the key words open innovation and innovation performance we short listed and reviewed 218 peer reviewed journal articles in the Thomson Reuters Web of Science database and also referred 105 similar articles found in Scopus, JStore and Google Scholar. Among the mostly used theories and variables in explaining open innovation performance are absorptive capacity (Cohen & Levinthal, 1990; De Zubielqui *et al.*, 2016), organizational inertia (Huang *et al.*, 2013; Godkin, 2010), dynamic capabilities (Teece *et al.*, 1997), cognitive distance (Inaun & Schenker-Wicki, 2012; Nootboom *et al.*, 2007), search depth and breadth (Laursen & Salter, 2006; Greco *et al.*, 2016), and ambidexterity (March, 1991; Ferrari, 2011). As open innovation goes beyond the boundaries of a focal firm (Munir *et al.*, 2018; Powell *et al.*, 1996), the above theories mainly focusing on internal factors fall short in explaining innovation performance differences of OI initiatives (Cheng & Huizing, 2014; Bengtsson *et al.*, 2015).

The theoretical gaps identified are as follows. Given the strengths and weaknesses of a firm who will be the most appropriate organization to partner with for OI initiatives is not answered by existing theories. Why do organizations record varying innovation performance in different OI initiatives with the same partner (Cheng & Huizing, 2014; Bengtsson *et al.*, 2015)? Can an organization learn equally from any other organization (Von Krogh *et al.*, 2018)? Why do organizations succeed with some partner firms and fail with others in their OI initiatives (Bengtsson *et al.*, 2015)? As the interface between the organizations in boundary crossing innovations are important (Hargrave & van de Van, 2006; Geels, 2004; Bogers *et al.* 2017), how does knowledge flow across the boundaries of firms and what factors influence it are important areas to understand. These are some of the questions existing theories cannot answer in full.

Among many factors used to measure innovation performance, product and process innovations (Bianchi *et al.*, 2015; Greco *et al.*, 2016), contribution of new products to the revenue (Moretti & Biancardi, 2017; Roper *et al.*, 2013; Berchicci, 2013), revenue growth (Caputo *et al.*, 2016; Dahlandar &

Gann, 2010), export performance (Guan & Ma, 2003; Gkypali *et al*, 2018) and number of patent applications submitted (Caputo *et al*, 2016; Berchicci, 2013; Faems *et al*, 2010; Greco *et al*, 2016; Greco *et al*, 2017) are used in this study.

A key observation made in the literature review is that alignment and coordination being factors studied in inter-organizational studies have not been adequately studied in empirical studies on open innovation. Results of a pilot study we conducted by way of interviews with key people in 5 leading software firms and 3 joint research laboratories of a leading university further justified the necessity of paying attention to alignment and coordination for the success of OI initiatives. Goal complementarity (Pullen *et al*, 2012; Duysters and Man, 2003; Behnam *et al*, 2018), resource complementarity (Haythornthwaite, 1996; Tichy *et al*, 1979 & Pullen *et al*, 2012) and knowledge complementarity (Hopkins *et al*, 2011; De Mattos *et al*, 2018; Kogut & Zander, 1992) can be considered as different measurable dimensions under alignment. Similarly, ease of communication, monitoring and reporting can be used in measuring coordination (Naqshbandi, 2016; Lu *et al*, 2017; Arashpour *et al*, 2017). We borrow the term convergence from the actor network theory to bundle alignment and coordination, to be tested as a factor that can influence innovation performance of open innovation initiatives. Our quest for the look out of novel determinants led us to conduct two qualitative inquiries as described in the next two sections.

## **TIME ORIENTATION**

We conducted a case study covering a major open innovation initiative of a leading software firm in Sri Lanka. As we found through this qualitative study, time orientation differences among OI partners have the potential in explaining the innovation performance variance. Time orientation refers to the expectation of an OI partner on how fast an OI initiative can be implemented, how early the investment can be recovered and the desire to embrace new technology. Accordingly, we identified implementation time, payback period and future orientation as three dimensions of time orientation. This new variable was subsequently tested with data collected from 281 practicing managers from diverse industry sectors in order to understand the ability to generalize the results. We found that time orientation differences significantly moderate innovation performance in open innovation initiatives.

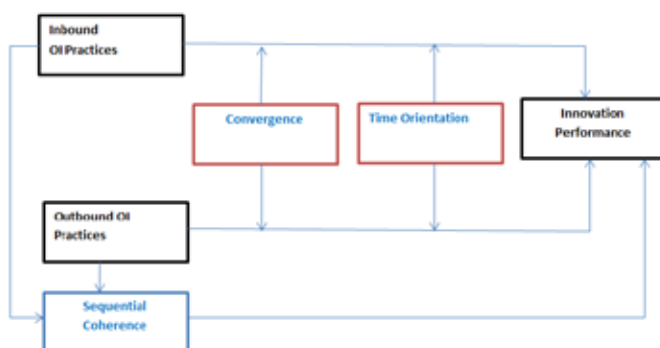
## **SEQUENTIAL COHERENCE**

Boundary conditions matter in innovation performance (Enkel *et al*, 2009; Brunswicker & Vanhaverbeke, 2015) and sequential coherence has the potential to explain why some succeed while others fail in open innovation. A qualitative inquiry we made using 5 technology based organizations revealed that sequential coherence that facilitates the knowledge transfer at boundary level influence innovation

performance in open innovation initiatives. Sequential coherence refers to the reciprocal result of the pushing effects induced by individuals of a teaching firm and the pulling effects induced by individuals of a learning firm that enables knowledge to flow across the boundaries of firms (Yapa *et al*, 2019). 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. This novel determinant was subsequently tested empirically with the data collected from the above sample of 281 managers from diverse industry sectors. We observed that sequential coherence mediates the relationship between both inbound and outbound open innovation and innovation performance.

### CONCEPTUAL MODEL

We give below the proposed conceptual model for the final phase of the research.



**Figure 1: The conceptual model**

As discussed earlier, inter-organizational convergence has two dimensions identified namely alignment and coordination. The agency theory (Arrow, 1971; Wilson 1968) and the resource dependence theory (Pfeffer & Salancik, 2003) explain the two variables of alignment and coordination respectively. Time orientation is explained by the transaction economic theory (Williamson, 1975). Sequential coherence can be justified using the dynamic capability theory (Teece, 1997) and the knowledge based view of the organization.

### METHODOLOGY

We follow the mix methodology in conducting the subject research as we use both qualitative and quantitative techniques. As shown in Figure 1 above, we plan to test the assumed relationships by

collecting data from over 100 software firms operate within Colombo district. A questionnaire with 30 questions is used and data collection is currently in progress. We plan to use structured equation modelling and other data analysis techniques.

## **DISCUSSION & IMPLICATIONS**

Managers and academics lack a proper understanding of the mechanisms involving the boundaries of the innovation process (Enkel *et al*, 2009). Brunswicker & Vanhaverbeke (2015) suggest that research on open innovation should investigate the interrelation between boundary conditions and a firm's nature of openness. OI is extensively used by organizations to promote innovations. Although, some succeed with increased innovation performance, some fail in their OI initiatives. Findings from our research will enable practicing managers to improve innovation performance of their organizations. Sequential coherence demands managers to scan the boundaries of the organization where cross-border knowledge flow happens and take appropriate corrective actions. Similarly, time orientation suggests managers to be mindful about the differences in time orientation among OI partners which can hinder or halt innovation performance. In addition to these primary findings through which we offer two novel determinants to open innovation literature, we also test convergence by way of alignment and coordination among OI partners which can bring useful insights to researchers and practicing managers.

## **KEYWORDS**

Open innovation, innovation performance, time orientation, sequential coherence

## **ACKNOWLEDGEMENT**

A paper on Sequential Coherence was presented at the International Conference on Business Research (ICBR 2019) of the Faculty of Business, University of Moratuwa.

## **REFERENCES**

- Arashpour, M., Abbasi, B., Arashpour, M., Hosseini, M. R., & Yang, R. (2017). Integrated management of on-site, coordination and off-site uncertainty: theorizing risk analysis within a hybrid project setting. *International Journal of Project Management*, 35(4), 647-655.
- Behnam, S., Cagliano, R., & Grijalvo, M. (2018). How should firms reconcile their open innovation capabilities for incorporating external actors in innovations aimed at sustainable development?. *Journal of Cleaner Production*, 170, 950-965.
- 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.
- 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.
- 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.
- 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.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative science quarterly*, 128-152.
- Dahlander, L., & Gann, D. M. (2010). How open is innovation?. *Research policy*, 39(6), 699-709.
- de Mattos, C. A., Kissimoto, K. O., & Laurindo, F. J. B. (2018). The role of information technology for building virtual environments to integrate crowdsourcing mechanisms into the open innovation process. *Technological Forecasting and Social Change*.
- De Zúbelqui, 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.
- Duysters, G., & Man, A. P. (2003). Transitory alliances: an instrument for surviving turbulent industries?. *R&D Management*, 33(1), 49-58.
- Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. *R&D Management*, 39(4), 311-316.
- Faems, D., De Visser, M., Andries, P., & Van Looy, B. (2010). Technology alliance portfolios and financial performance: value-enhancing and cost-increasing effects of open innovation. *Journal of Product Innovation Management*, 27(6), 785-796.
- Ferrary, M. (2011). Specialized organizations and ambidextrous clusters in the open innovation paradigm. *European Management Journal*, 29(3), 181-192.
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research policy*, 33(6-7), 897-920.
- Gkypali, A., Arvanitis, S., & Tsekouras, K. (2018). Absorptive capacity, exporting activities, innovation openness and innovation performance: A SEM approach towards a unifying framework. *Technological Forecasting and Social Change*, 132, 143-155.
- Godkin, L. (2010). The zone of inertia: absorptive capacity and organizational change. *The Learning Organization*, 17(3), 196-207.
- Greco, M., Grimaldi, M., & Cricelli, L. (2016). An analysis of the open innovation effect on firm performance. *European Management Journal*, 34(5), 501-516.
- Greco, M., Locatelli, G., & Lisi, S. (2017). Open innovation in the power & energy sector: Bringing together government policies, companies' interests, and academic essence. *Energy Policy*, 104, 316-324.
- Guan, J., & Ma, N. (2003). Innovative capability and export performance of Chinese firms. *Technovation*, 23(9), 737-747.
- Hargrave, T. J., & Van de Ven, A. H. (2006). A collective action model of institutional innovation. *Academy of management review*, 31(4), 864-888.

- Haythornthwaite, C. (1996). Social network analysis: An approach and technique for the study of information exchange. *Library & information science research*, 18(4), 323-342.
- Hopkins, M. M., Tidd, J., Nightingale, P., & Miller, R. (2011). Generative and degenerative interactions: positive and negative dynamics of open, user-centric innovation in technology and engineering consultancies. *R&D Management*, 41(1), 44-60.
- 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.
- Inauen, M., & Schenker-Wicki, A. (2012). Fostering radical innovations with open innovation. *European Journal of Innovation Management*, 15(2), 212-231.
- 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. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization science*, 3(3), 383-397.
- Lauritzen, G. D., & Karafyllia, M. (2019). Perspective: leveraging open innovation through paradox. *Journal of Product Innovation Management*, 36(1), 107-121.
- 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.
- Lee, B., Cho, H. H., & Shin, J. (2015). The relationship between inbound open innovation patents and financial performance: evidence from global information technology companies. *Asian Journal of Technology Innovation*, 23(3), 289-303.
- 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.
- Lu, P., Yuan, S., & Wu, J. (2017). The interaction effect between intra-organizational and inter-organizational control on the project performance of new product development in open innovation. *International Journal of Project Management*, 35(8), 1627-1638.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization science*, 2(1), 71-87.
- Moretti, F., & Biancardi, D. (2018). Inbound open innovation and firm performance. *Journal of Innovation & Knowledge*.
- Munir, H., Linaker, J., Wnuk, K., Runeson, P., Regnell, B. (2018) Open innovation using open source tools: A case study at Sony Mobile. *Empir 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.
- Nooteboom, B., Van Haverbeke, W., Duysters, G., Gilsing, V., & Van den Oord, A. (2007). Optimal cognitive distance and absorptive capacity. *Research policy*, 36(7), 1016-1034.
- Pfeffer, J., & Salancik, G. R. (2003). *The external control of organizations: A resource dependence perspective*. Stanford University Press.
- 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.
- Pullen, A. J., Weerd-Nederhof, P. C., Groen, A. J., & Fisscher, O. A. (2012). Open innovation in practice: goal complementarity and closed NPD networks to explain differences in innovation performance for SMEs in the medical devices sector. *Journal of product innovation management*, 29(6), 917-934.
- Roper, S., & Xia, H. (2014). Unpacking open innovation: Absorptive capacity, exploratory and exploitative openness and the growth of entrepreneurial biopharmaceutical firms. *Enterprise Research Centre*.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, 509-533.
- Tichy, N. M., Tushman, M. L., & Fombrun, C. (1979). Social network analysis for organizations. *Academy of management review*, 4(4), 507-519.
- Von Krogh, G., Netland, T., & Wörter, M. (2018). Winning With Open Process Innovation. *MIT Sloan Management Review*, 59(2), 53-56.

- Williamson, O. E. (1975). Markets and hierarchies: analysis and antitrust implications: a study in the economics of internal organization.
- 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).
- Yapa, S.R., Senathiraja, R., Poesche, J. and Kauranen, I. (2019). Sequential Coherence: A Novel Determinant of Open Innovation Performance. *American Journal of Industrial and Business Management*, 9, 1781-1799.  
<https://doi.org/10.4236/ajibm.2019.99117>