Architecture Image Studies
AIS Scientific Journal

Vol.6, Issue 3, pp.157-163, 2025
DOI: https://doi.org/10.62754/ais.v6i3.196

https://journals.ap2.pt/index.php/ais/index

Strategies to Foster Open Innovation in Malaysian Small and Medium Enterprises

Ganagambegai Laxamanan[1], Laxamanan Kurappa[2]

Abstract

Innovation has long been considered as a prominent growth engine to brace competitiveness of the firm in the market. Innovation plays a key role in providing sustainability and growth for the company. But yet firms are not clear about the type of innovation management practices that need to be adopted for generating an idea and developing a product. A shortened product life cycle, constantly growing research and development costs, more rapid information flows, and increasingly interconnected customers have supported a paradigm shift toward an open approach to innovation. A firm needs to choose between Open Innovation (OI) practices and Closed Innovation practices for sustainable development. OI has become one of the most recent topics for research in the area of innovation management. OI is a pioneering mechanism with an increasing number of studies in literature with large organizations and in the context of Europe and the West. There are still a number of issues unclear in OI Theory due to its wide range of concepts. This paper aims to critically review the existing literature and develop a conceptual framework to establish a relationship between Firms, OI Practices, SME Characteristics, and firm performance. The paper establishes a need for studies in the area of OI among small and medium segments of the technology-oriented industry. The paper also presents the research questions and research objectives of the study along with hypotheses and concludes with the need for research and the contribution that will be made from this study to the world of academia.

Keywords: *Open Innovation, Closed Innovation, In-bound Open Innovation, Outbound Open Innovation and SME*

Introduction

Innovation has long been acknowledged as a critical tool for driving sustainable growth and maintaining competitive advantage (Drucker, 1985). Both large enterprises and small and medium-sized enterprises (SMEs) view innovation strategies as essential for business expansion (Yifeng, 2011; Mashilo & Iyamu, 2012). While innovation significantly boosts competitiveness in large firms, it has an even more profound impact on market share growth for SMEs (The Star, 2015). However, SMEs often face challenges when attempting to implement innovative practices (Lakovleva, 2013). In recent years, the approach to innovation management has evolved significantly (Chesbrough, 2003). One of the most prominent developments is Open Innovation (OI), which has gained substantial attention in both academic and industry circles (Wang & Tang, 2013). The field of innovation management has increasingly embraced OI as a key paradigm (Mazini et al., 2013). Defined by Chesbrough (2003), Open Innovation involves "the purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation." OI models emphasize that companies can leverage a broad spectrum of knowledge sources—including customers, competitors, and researchers—to enhance their innovation processes and maximize intellectual property usage (West & Gallagher, 2006). Adopting OI practices can significantly increase a company's potential for business growth through the development of new products (Freel, 2006). Given the rising importance of OI, it is crucial to assess the extent to which these practices have been adopted among technology-based SMEs in Malaysia. This study specifically investigates the need for Open Innovation methods within software-producing SMEs. The paper is organized as follows: a review of relevant literature, presentation of the conceptual framework, research questions and objectives, hypothesis formulation, analysis and discussion of results, conclusions, and limitations of the study.

[1] Senior Lecturer, FPTT, Kampus Teknologi Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Melaka, Malaysia.
[2] Senior Lecturer,NILAI EDUCATION Sdn Bhd. No. 1, Persiaran Universiti, Putra Nilai, 71800 Nilai, Negeri Sembilan.

Literature Review

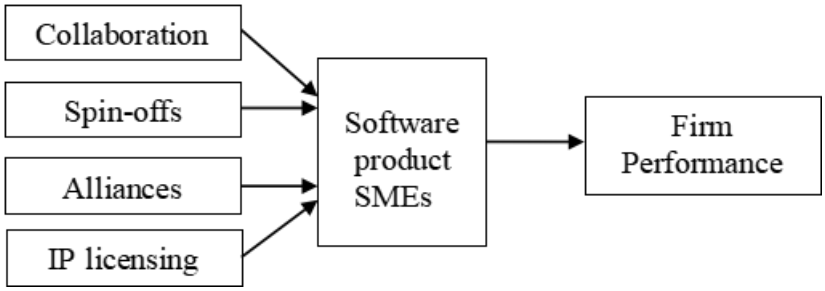
This section presents a review of the relevant literature examined for this study. Lichtenthaler (2008) highlights that despite the growing shift toward open innovation, many firms continue to rely on closed innovation models. He also emphasizes the importance of exploring open innovation practices specifically within small firms to better understand how openness relates to organizational capabilities and culture.

V. Van de Vrande et al. (2009) found that small and medium-sized enterprises (SMEs) in the Dutch manufacturing and service sectors are more actively engaged in open innovation practices than smaller-scale firms. Their research indicates that SMEs are primarily driven by market-oriented motives when adopting open innovation yet often face cultural challenges in implementation. They also emphasize the need for broader studies across different regions to better understand adoption patterns. Huang et al. (2010) argue that open innovation can significantly reduce research and development costs while opening new avenues for business growth. Similarly, Jayawardhana, Surangi A., and Surangi H. (2010) suggest that the adoption of open innovation strategies has a strong impact on the development and sustainability of SMEs, especially among women entrepreneurs in the craft sector, who show a positive inclination toward such practices. Gumus and Cubukcu (2011) note that awareness of open innovation remains low among Turkish firms and stress the importance of cultivating an innovation-driven culture for achieving sustainable growth. Xin and Wang (2011) point out that SMEs need open innovation more for support than for transformation into larger enterprises. They assert that a firm's characteristics aren't strictly determined by its chosen innovation model, and advise careful selection of innovation practices, particularly given the limited research on how specific open innovation types affect firm performance. Xu and Zheng (2012) explore the definition, origins, and theoretical foundations of open innovation, highlighting the importance of identifying the key factors that influence its adoption. Huizingh (2010) also contends that many aspects of open innovation remain poorly understood and that there is still a considerable knowledge gap regarding its effective implementation.

Kafouros and Forsan (2012) emphasized the importance of studying collaboration between universities and businesses, as well as integrating open innovation with corporate performance. Similarly, Tian and Feng (2010) explored the various sources of external technology in open innovation, identifying not only competitors but also suppliers, users, universities, research institutes, and R&D service firms as key contributors. Abulrub and Lee (2012) argued that both the size and type of a business significantly influence the adoption of open innovation practices. Their study, which included both large and small firms, suggested that future research should focus specifically on SMEs. Balasubrahmanya (2012) highlighted that internal technical capabilities in SMEs and their innovation orientation enhance their ability to seek and benefit from external support. He also stressed the need to investigate what kinds of external support are most beneficial for SMEs in the Malaysian context. Lukas et al. (2012) found that sustainable and effective innovation relies heavily on collaborative processes to maintain competitiveness. Janeiro et al. (2013) observed that successful firms often partner with universities, pointing to a direct relationship between external knowledge sources and innovation outcomes. Their research calls for a deeper understanding of why some firms seek external partnerships more than others and how this access affects innovation performance. Rangus and Drnovšek (2013) identified customer and employee involvement, along with pre-venturing activities, as key open innovation practices. Their study also revealed that while large companies are more active in open innovation, smaller firms tend to focus on licensing or selling their intellectual property. Ades et al. (2013) analyzed innovation processes in three companies and found that cultural barriers often hinder open innovation efforts. Segers (2013) highlighted strong collaborative networks in Belgium among universities, venture capitalists, large firms, and biotech startups. He noted that most groundbreaking innovation stems from university-based spin-offs and stressed the need to further study open innovation practices and firm performance, particularly in high-tech industries. Revutska (2013) viewed the shift to open innovation as a strategic transformation, enabling faster commercialization and broader knowledge sharing among startups and spin-offs. She also emphasized the role of university education centers in fostering and commercializing innovation. Deegahawature (2014) suggested that companies typically implement inbound open innovation at moderate levels and must carefully consider their internal capabilities and environmental uncertainties. His work contributes to the open innovation literature by stressing the relevance of firm capacity but falls short in addressing the role of external actors like academia in technology development. Finally, Kafouros and Forsan (2012) also acknowledged that industry-specific factors, such as weaker intellectual property protections, could lead to varied outcomes in open innovation studies.

Research on Open Innovation (OI) reveals that most prior studies have been predominantly conducted in Western contexts. Despite this growing body of work, there remains a notable lack of comparative studies examining both open and closed innovation practices within the technology sector. Empirical research by Lichtenthaler (2008), Van de Vrande et al. (2009), Tian and Feng (2010), Gumus and Cubukcu (2011), and Abulrub and Lee (2012) has primarily focused on the adoption of open innovation, with minimal attention paid to its implementation dynamics or outcomes. Only a limited number of studies—such as those by Mazzola et al. (2012), Cozzarin (2004), and Santos et al. (2014)—have explored the relationship between open innovation practices and firm performance, and these have largely centered on European and North American firms. Moreover, there is little to no systematic evidence assessing how specific OI approaches impact organizational performance (Sisodiya et al., 2013 Nouri-Shamsi et al., 2025; Wang et al., 2022; Verawati, et al., 2025; Anatol'evich & Chuyue., 2024). This gap highlights the critical need for research that compares various open innovation practices and evaluates their influence on firm performance across diverse regional and industry contexts.

Conceptual Framework for the Study



The study examines the process of open development—used here as the independent variable—by analyzing how software companies implement various collaborative activities. These practices include partnerships with academic institutions, manufacturers, clients, and R&D laboratories or firms, either as part of the product development team or as independent collaborators. Additional indicators include strategic alliances and intellectual property (IP) licensing. These elements are visually represented in Figure 1.

Research Questions

This study aims to investigate the conceptual framework illustrated in Figure 1 by addressing the following research questions:

1. What is the current level of awareness and adoption of open innovation practices among small and medium-sized enterprises (SMEs) in the computer technology sector?
2. To what extent do open innovation practices impact the overall performance of these firms?

Research Objectives

1. To address the research questions, this study is guided by the following objectives:
2. To assess the level of awareness and acceptance of Open Innovation practices among SMEs.

Hypothesis Statement

To effectively measure the research objectives, the following hypotheses are proposed. Hypotheses H1a and H2a correspond to Research Objective 1, while H3a addresses Research Objective 2:

H1a: Firms demonstrate a significant level of awareness regarding Open Innovation practices.

H2a: Firms exhibit a significant level of adoption of Open Innovation practices.

H3a: Open Innovation practices have a significant impact on firm performance.

Research Methodology

Primary data was collected using a structured questionnaire distributed via Google Docs. The survey link was emailed to CEOs, CTOs, and Product Heads of various innovative software SMEs. The sample includes a balanced mix of core product, service, and consumer-oriented firms within the software product category. Out of 40 companies approached, 30 responded, resulting in a 75% response rate.

Dependent Variable and Independent Variable

The reliability of the questionnaire was assessed using a consistency test. Cronbach's α was calculated and found to be 0.742 for 47 items measured on an ordinal scale. For the 6 items related to firm performance, the Cronbach's α was 0.683, while for items assessing open innovation approaches and practices, it was 0.725. All values fall within an acceptable reliability range. The awareness of the term *"Open Innovation"* among companies stands at 46.7%. Despite this, results from a one-sample test indicate a substantial understanding of the concept. As shown in Table 1, the t-value is 5.037, which is statistically significant at the 95% confidence level, leading to the acceptance of hypothesis H1a. This confirms that a significant number of firms are familiar with the term.

However, the actual adoption rate of open innovation practices is 43%. A one-sample test also reveals that firms are inclined to adopt or have already adopted such practices. Table 2 shows a t-value of 4.709, which is statistically significant at the 95% confidence interval, supporting the acceptance of hypothesis H2a. This suggests that the firms in the study demonstrate a willingness to implement open innovation strategies.

Table 1: One Sample test on Awareness of OI

	Awareness of OI		t	df	Sig.(2-tailed)
	Yes	No			
Aware of the term "Open Innovation"	46.6%	53.3%	5.04	29	.00

Source: Author

Table 2: One Sample test on Adoption of OI

	Awareness of OI		t	df	Sig.(2-tailed)
	Yes	No			
Adoption of Open Innovation Practices	43%	57%	4.71	29	.00

Source: Author

Table 3: Model Summary of Regression

R	R Square	Adjusted R Square	St. Error of the estimated	F	df	Sig.	Durbin-Watson
0.67	0.45	0.28	0.99	2.60	7	.04	2.01

Source: Author

Table 4: Summary of Coefficients

Independent Variables	Standardize Coefficients		t	Sig.
	B	Std. Error		
(Constant)	6.38	1.31	-	.00
Collaboration with universities	0.40	0.21	1.95	.06
Collaboration with Suppliers	0.46	0.23	2.08	.05
Collaboration with R&D labs	-0.17	0.26	-0.66	.52
Collaboration with customers	-0.38	0.25	-1.48	0.15
Licensing idea/technology IPR to partners	-0.19	0.18	-1.07	0.3
Alliance for new product development	-0.30	0.23	-1.31	0.20
Spin-off my product teamto develop a	0.16	0.19	0.86	0.40

Limitation and Conclusions

This study highlights that open innovation remains a relatively new concept, particularly among Malaysian small and medium enterprises (SMEs). However, businesses are receptive to adopting new practices. While the term itself may be unfamiliar, companies are already engaging in open innovation strategies, which contribute to improved performance. Collaboration plays a crucial role in open innovation and is widely embraced as a key factor for success. Partnerships with suppliers and academic institutions are preferred over collaborations with customers and R&D laboratories. Meanwhile, spin-offs and intellectual property remain emerging concepts that require further exploration.

The findings suggest that a broader sample could yield more comprehensive insights and warrant further research. To ensure survival and sustainable growth, SMEs must continue developing their open innovation capabilities, which could propel them to the next level. A limitation of this study is the small sample size, which is confined to firms in Malaysia's southern region. Future research should expand the scope to provide a more holistic view of open innovation adoption across various sectors and regions.

Acknowledgement

We would like to express our gratitude to Malaysian SMEs for their valuable contributions and insights throughout this research process.

REFERENCES

[1] Abdul-Hadi G. Abulrub and Junbae Lee. "Open innovation management: challenges and prospects", Procedia - Social and Behavioral Sciences, 41, 2012, 130-138.

[2] Ades et al., "Implementing Open Innovation: The case of Natura, IBM and Siemens", Journal of Technology Management & Innovation, 8, 2013, 12-24.

[3] Balandin, S., "Experience and Vision of Open Innovations in Russia and Baltic Region: the FRUCT Program", IEEE, 8, 2010, 5-10.

[4] Balasubrahmanya, M.H., "External Support and Innovation Performance of MEs in Bangalore: Role of Firm Level Factors", IEEE, 2012, 65-70.

[5] Budiono, A. and Loice, R, "Business Process Reengineering in Motorcycle Workshop X for Business Sustainability", Procedia Economics and Finance 4, 2012, 33-43.

[6] Deegahawature, "Capabilities and Implementation of Inbound Open Innovation: Evidence from LMTFirms in Technologically Less Advanced Countries", European Journal of Business and Management, 6, 2014, 286-

[7] Gumus B, and Cubukcu A, “Open Innovation Survey in Top Turkish Companies”, IEEE 2011,1-6.Hakkim R. and Heidrick T, “Open Innovation in the Energy Sector”, IEEE, 2008, 565 571.
[8] Henry Chesbrough,. “The era of open innovation”, Sloan Management Review, 44 , 2003, 35- 41.Henry Chesbrough, “Open Innovation: The new imperative for creating and profiting from Technology”, Harvard Business Review, 2004,10-20.
[9] Henry Chesbrough, Wim Vanhaverbeke,. and Joel West, “Open Innovation Researching a new Paradigm”, Oxford university Press, 2006, 1-27.
[10] Huang T, Wang W, Yun K., Tseng C, and Lee C, “Managing technology transfer in open innovation: The case study in Taiwan”, Modern Applied Science, 4, 2010, 2-11.
[11] Huizingh E, “Open innovation: State of the art and future perspectives”, Technovation, 2010, 1-8.
[12] Janerio P, Proenca I, and Goncalves V, “Open innovation: Factors explaining universities as service firm innovation sources”, Journal of Business Research, 2013, 2017-2023.
[13] Jayawardhana A, and Surangi H, “Open innovation practices in women owned handicraft manufacturing smes: a case from central province, Sri Lanka”, In: ICBI. 20101-16.
[14] Jianzhong, L. 2010. Research on the Mechanism of Hi-tech Enterprises' Open Innovation on the Basis of Knowledge Chain. IEEE, 163-167.
[15] Jonthan Y, and Athreyi K, “Exploring innovation through open networks: A review and initial research questions”, Management Review, 25,2013, 69-82.
[16] Kafouros M, and Forsan N, “The role of open innovation in emerging economies: Do companies profit from the scientific knowledge of others?”, Journal of World Business, 47, 2012, 362-370.
[17] Kolaskar A, Anand S, and Goswami A, “Innovation in India”, National Knowledge Commission, 2007,7-31.
[18] Lakovleva T, “Open Innovation at the Root of Entrepreneurial Strategy: A Case from the Norwegian Oil Industry”, Technology Innovation Management Review, 2013, 17-22.
[19] Lichtenthaler U, “Open Innovation in Practice: An Analysis of Strategic Approaches to TechnologyTransactions”, IEEE transactions on engineering management, 55, 2008, 148-157.
[20] Lukac D, Rihter J. D, Rogic M, and Mikela M, “Open Innovation Model in the ICT Industry – The Case of the German Telekom”, IEEE, 2012, 48-51.
[21] Mashilo M, and Iyamu I, “The Openness of the Concept of Technology Open Innovation”, IEEE, 2012, 487-492.
[22] Mazinia S. R. et al., “Open innovation and user’s involvement in new product development: a case study in the automotive sector”, Product: Management & Development, 11, 2013, 49-55.
[23] Munkongsujarit S, and Srivannaboon S, “Key Success Factors for Open Innovation Intermediaries for SMEs: A Case Study of iTAP in Thailand”, IEEE, 2011, 1-10 Peter Drucker, “Innovation and Entrepreneurship: practice and principles”, London: Heinemann, 1985, 1-6.
[24] Revutska N, “Open innovation as a strategic model of modern business”, European Scientific Journal, 1, 2013, 1857-7881.
[25] Segers, P. 2013. Strategic Partnerships and Open Innovation in the Biotechnology Industry in Belgium. Technology Innovation Management Review, 23-28.
[26] Sun X, and Wang Q, “Open Innovation in Small and Medium Enterprise under the view of Knowledge Management”, IEEE, 2011, 4690-4693.
[27] Susanne D, and Pirjo S, “Success Factors of Open Innovation - A Literature Review” International Journal of Business Research and Management, 4, 2013, 111-131.
[28] The Star. (2015, April 24). Malaysia aims for 4% annual productivity growth – Business News | The Star Online. The Star.
[29] Tian D, and Feng Y, “The Categories of External Technology Sources in Open Innovation”, IEEE, 2010, 1-4.
[30] Venturini and Verbano, “Openness and innovation: an empirical analysis in firms located in the Republic of San Marino”, International Journal of Engineering, Science and Technology, 5, 2013, 60-70.
[31] Vrandea,V. et al. “Open innovation in SMEs: Trends, motives and management challenges”, Technovation, 29, 2009, 423-437.
[32] Wang W, and Tang J, “Mapping Development of Open Innovation Visually and
[33] Quantitatively: A Method of Bibliometrics Analysis”, Asian Social Science, 9, 2013, 254-269.
[34] West J, and Gallagher S, “Challenges of open innovation: the paradox of firm investmentin opensource software”, R&D Management, 36, 2006, 319-331.
[35] Wim Vanhaverbeke, “Rethinking Open Innovation Beyond the Innovation Funnel”, Technology Innovation Management Review, 2013, 6-10.
[36] Xu Y, and Zheng J, “Open Innovation Literature Review and Outlook”, IEEE, 2012, 558 562.
[37] Yifeng Xie, “Open Innovation of small and medium sized enterprises and R& D Public Services Platform: A case about the VIC model of Zhangjiang Hi-tech Park”, IEEE, 2011, 1-5.

[38] Nouri-Shamsi, M., Soltani-Gerdefaramarzi, S., Ghasemi, M., & Yarami, N. Sesame-residue biochar as a sorbent for salinity ions: capacity, isotherm, and kinetics. Environment and Water Engineering. 11(3), 305-315.

[39] Wang, C.-H., & Wu, K.-C. (2022). Interdisciplinary Collaborative Learning with Modular Programming and Information Visualization of Urban Smart Spaces. Journal of Advances in Technology and Engineering Research, 8(1). https://doi.org/10.20474/jater-8.1.3

[40] Verawati, Y., & Rustiarini, N. W. (2025). Unraveling the Determinants of Budgetary Slack: A Study of Participation, Information Asymmetry, and Organizational Factors. Journal of Advanced Research in Social Sciences and Humanities, 10(2), 1-9.

[41] Anatol'evich, V. U., & Chuyue, Y. (2024). Mobile IT-diagnostic system for Alzheimer's disease recognition. Journal of Advances in Health and Medical Sciences, 10(1). https://doi.org/10.20474/jahms-10.3