

# Operational Research Framework of Open Innovation Business Model Strategic Plan for Malaysian Small Medium Business Enterprise in Software Industry

Soffri Yussof<sup>1</sup>, Mohd Naz'ri Mahrin<sup>2</sup>, Aini Suzana Ariffin<sup>2</sup>

<sup>1</sup>*Faculty of Computing and Informatics, University Malaysia Sabah, Labuan International Campus, Labuan, Malaysia*

<sup>2</sup>*Razak Faculty of Technology and Informatics, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia*

<sup>1</sup>*soffri@ums.edu.my, <sup>2</sup>mdnazrim@utm.my*  
*<sup>2</sup>ainisuzana@utm.my*

## Article history

Received:  
12 April 2022

Received in revised  
form:  
31 May 2022

Accepted:  
15 June 2022

Published online:  
30 June 2022

\*Corresponding  
author  
soffri@ums.edu.my

## Abstract

*Malaysian Small and Medium Enterprises (SMEs) are the critical factors of the nation's economic growth. Limited studies on their systematic strategy on aligning the business model innovation (BMI) into the inbound open innovation (IOI) spectrum were examined. Therefore, the focus of this study is to access necessitate IOI and BMI strategies that can contribute to a systematic strategy. As a result, the primary purpose of this study is to present the entire operational framework that will be utilised to formulate the Strategic Plan inclusive of the IOI and BMI strategies. The operational research framework consists of four phases, Phase 1: Systematic Literature Review, Phase 2: Semi-structured interview, Phase 3: Formulation of Open Innovation Business Model Strategic Plan (OIBM-SP), and Phase 4: Evaluation OIBM-SP. The result of this study is the formulation of OIBM-SP for Malaysian SMEs in the software industry.*

**Keywords:** open innovation, inbound open innovation, business model innovation, strategic plan, balanced scorecard

## 1. Introduction

Small and medium enterprises (SMEs) play an essential role in the Malaysian economy and are the pillar of the country's economic development. In 2020, the SMEs in Malaysia had recorded a substantial contribution at 38.2% of RM1,343 billion of RM512 billion in the Gross Domestic Products (GDP) [1]. Malaysian SMEs are categorised into five categories: agriculture, construction, services, manufacturing, and mining & quarrying. In addition, the software industry falls under the services category. Services and manufacturing sectors remained the main drivers of SMEs' GDP activities, representing more than 80% of SMEs' GDP.

SMEs in the software industry have been associated with technological innovation to stimulate growth through invention and innovation. However, due to many SMEs' limited research and development resources worldwide, SMEs faced the constraints of lacking a formal process for developing innovative products or services [2]–[5]. Although previous research has focused mainly on large companies facilitating innovation, it is suggested that greater attention should be given to the SME sector to leverage innovation advantages in their organisations. [6].

Most SMEs do not adopt structural processes when implementing innovation in the business model [7]. According to Bogers et al. (2018), business model innovation (BMI) leverages the knowledge flows across organisations and creates an innovation ecosystem through open innovation. The implementation of BMI has been verified in the strategy-making process in which the business model (BM) serves as a framework for strategic planning [8]. However, it is indicated that most SMEs do not have a systematic strategy for implementing open business models [9], [10]. Therefore, this paper aims to understand the operational research framework of the inbound OI strategies and BMI strategies, which are to be formulated into an open innovation business model strategic plan for Malaysian SMEs in the software industry.

The following describes the structure of this paper. Section 2 discusses the selection of research approaches applied in this study. Section 3 covers the activities carried out as part of the methodology for this study. Finally, in Section 4, the researcher brought the work to a close.

## **2. Methodology**

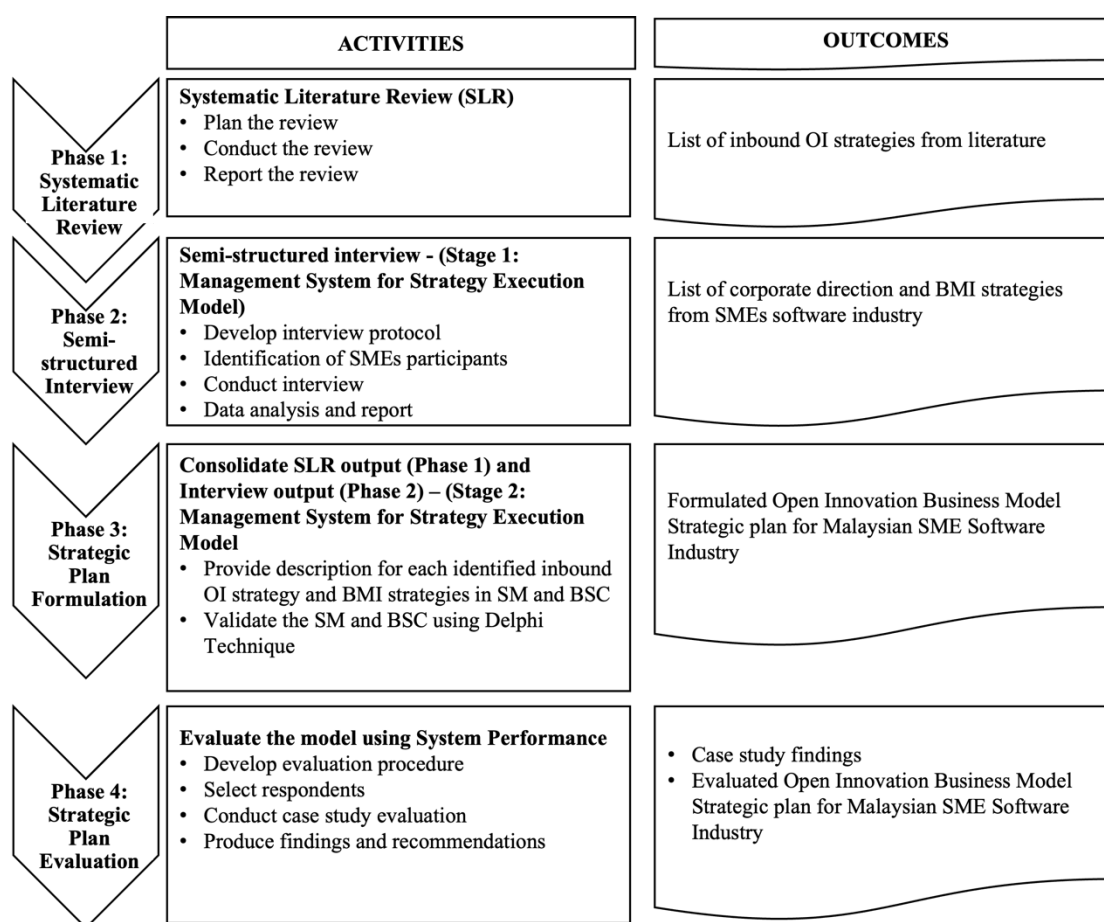
This section outlines the research methodologies that the researcher adopted in this study. First, the researcher chooses the research methods, including data collecting, data analysis and interpretation, evaluation, and appropriate procedures for the investigations. The approach is determined by the types of information that the researcher seeks from the study participants. Next, the researcher divided the study according to the research objectives. Each research objective is segregated into four phases (Figure 1). Figure 1 outlined the operational research framework consisting of phases, each phase's activities, and phase outcome.

Phase 1 commences with a Systematic Literature Review (SLR) to investigate inbound OI strategies based on the existing strategy implemented by SMEs from the literature review. Phase 2 will investigate BMI strategies in the context of the software industry from the SMEs perspective using a semi-structured interview. Phase 3 is the formulation of OIBM-SP using the Delphi Technique based on the consolidated data from phase 1 and phase 2. Phase 4 is the final phase to evaluate the OIBM-SP utilising a case study method.

### **2.1. Phase 1: Systematic Literature Study (SLR)**

This phase seeks to achieve the first research objective, which is to investigate inbound OI strategies for SMEs in the software industry from the perspective of the literature. SLR is one of the most often used techniques for assessing current research in information systems. An SLR entails identifying, selecting, analysing, and synthesising prior research on

a given subject and its presentation in a comprehensible manner to integrate what is known and unknown about the subject [11]. Applying systematic review principles will help minimise bias (systematic error), lessen chance effects, increase the legitimacy and authority of the resulting evidence, and provide more trustworthy outcomes to draw conclusions and make decisions [12]. Additionally, one of the benefits of conducting an SLR is becoming aware of the range of research and theoretical foundations in a particular topic [13]. Hence, the researcher chose the SLR approach because it is a highly systematic and clearly defined process. To conduct the review, SLR guidelines by Keele (2007) were adopted [14]. The SLR is divided into three primary steps in this study: plan the review, conduct the review, and report on the review. Each of the steps entails several activities. As a result of Phase 1, this SLR generates a list of inbound OI strategies.



**Figure 1. Operational Research Framework**

## 2.2. Phase 2: Semi-structured Interview

This phase attempts to accomplish the second research objectives, which is to investigate BMI strategies for SMEs software industry from practitioners' point of view. Interviewees are interviewed personally and in a conversational rather than structured manner [15]. Semi-structured interviews exhibit several benefits, namely, less intrusive to the interviewee. In addition, semi-structured interviews allow two-way communication to

confirm what is known and provide a learning opportunity. The interview guidelines took into consideration Merriam (2009) suggestion as given below [16]:

- a. The interview instrument will be developed based on literature findings
- b. Selection of the potential respondents with the criteria of first-level manager position or higher in the SME, minimum three years of full-time professional work experience, and at least one year of experience in innovation collaboration
- c. The researcher contacted selected respondents through email and telephone, and once they consented to participate, they will be scheduled for an interview based on their preferences.

The targeted SMEs are retrieved from SME Corporation (SME Corp) as a central coordinating agency under the Ministry of Entrepreneur Development and Cooperatives (MEDAC) coordinates for SMEs across Malaysia. For data collection, purposive sampling identifies participants that will best answer the second research question [17]. Therefore, purposive sampling is utilised in this study since the researcher is aware of the target participant criteria and sought out individuals who met those requirements.

A semi-structured interview protocol is developed to facilitate the SME respondents' interview session. The interview protocol is critical to ensuring consistency in interviewing techniques and topic flow. The questions in the interview protocol are designed based on the literature findings. The interview session will be conducted face-to-face, and the date, time, and location of the interview session will be confirmed based on the respondent's request.

### **2.3. Phase 3: Strategic Plan Formulation**

This phase attempts to fulfil the third objective to formulate the OIBM-SP for the Malaysian SMEs' software industry. The study selected Grounded Theory and Delphi technique to achieve the third objective. Grounded Theory provides a relevant framework for data analysis, where data are acquired from various sources [18]. The study employs information from the enhanced analysis of research literature, which is SLR, and semi-structured interviewing techniques. Open, axial, and selective coding approaches were used in conjunction with Grounded Theory to conduct data analysis in accordance with the theories identified by the study. These coding phases were used in the study since it has become the most commonly executed phases in Grounded Theory. Grounded Theory is selected as it provides a significant means of analysing data collected from several sources [18]. The output will be finalised by using constant comparison and memoing procedures. Continuous comparison compares the frequency with which they occur to similarly labelled data from other categories. The deliverable of this stage will be a finalised selected OI strategy and BMI strategies to be fit into Strategy Map (SM).

Finalised inbound OI strategy is the consolidated result from Phase 1 incorporated with BMI strategies from Phase 2 that represent the primary strategic objectives based on the four perspectives of Balanced Scorecard (BSC). This consolidated output from phases 1 and 2 will be integrated into SM and BSC. An SM provides an architecture in a single-page illustration of all strategic objectives [19]. Each strategic theme from SM will be subdivided into logical, manageable, and understandable sub-strategies. These sub-strategies are BSC components to provide meaningful and actionable strategic objectives. The sub-strategic objective measures are derived from the consolidated analysis in phase 2 of the study. According to Kaplan and Norton (2008), each strategic objective's

measurements, targets, and initiatives are defined in BSC components [19]. However, setting targets and initiatives is excluded in this study because the components of setting targets and initiatives are based on each SME strategy characteristic [19]. The Delphi Technique is used to validate the findings.

The Delphi technique is widely used and well-accepted to reach a consensus on facts estimates requested from experts within specific subject areas. [20]. The Delphi Technique is a method for gathering expert opinion while developing a theory or validating a notion for future inventions. The fundamental goal of this method is to achieve the most constant consensus among experts on specific subjects. As a result, the Delphi technique has become widely used in conducting IT research studies, particularly for discovering and rating issues for administrative decisions.

The questionnaire for each Delphi process round is designed with the appropriate assessment item to accomplish the method objectives. The questionnaire will be developed based on the proposed inbound OI strategy and BMI strategies that form into SM and BSC perspectives from the consolidated process. The questionnaire as the survey instruments will be reviewed by experts, namely the content validity, to determine the questionnaire has an appropriate level of content validity. The use of content validity improves the validity and reliability of Delphi technique outcomes [21].

Since the Delphi technique focuses on eliciting expert opinion over a short period, the selection of experts is eligible to be invited to participate related to the backgrounds and experiences concerning the target issue and capable of contributing judgment of reaching consensus [22], [23]. In addition, expertise implies that individual panellists have more knowledge of the subject, have some work experience, or are members of a relevant professional association [24]. Four requirements for a panel of experts adopted in this Delphi technique based on the following criteria [24], [25]:

- a. Knowledge and experience in BSC or strategic management
- b. Ability to participate
- c. Time allocation for three rounds of Delphi
- d. Effective communication skills

The expert comprises a panel of academics, practitioners, and related agencies dealing with SMEs (e.g., SME Corporation). Expert sampling is used to determine the potential expert. Expert sampling is non-probability sampling in which experts are identified based on the requirements in the area of expertise and the ability to participate in the study [26]. Before the Delphi is conducted, the experts are contacted via email to request participation in the study.

#### **2.4. Phase 4: Strategic Plan Evaluation**

This phase attempts to fulfil the fourth and final objective to evaluate the OIBM-SP aligned with the Malaysian SMEs software industry. Case study research is the most frequently used qualitative method and the most established and published methodology in information system research [15]. The case study technique is an empirical investigation that utilises numerous sources of information to examine a contemporary phenomenon in its real-world context, mainly when the distinction between phenomenon and environment is not readily apparent. According to Yin (2003), a research purpose can be exploratory, descriptive, explanatory, or improvement-oriented. This study is exploratory research that assists in defining the research's purpose and identifying the essential concerns and

variables. The case study was chosen because it is well-suited for investigating a contemporary occurrence in its naturalistic setting and serves as a point of convergence for examining the subject from various perspectives [27].

A case study is used to evaluate the proposed model in this study. [27]. Positivist, critical, and interpretative are the three main types of case study research [28]. Positivist case studies were used in this study to evaluate the appropriateness of OIBM-SP and its applicability in the software business and confirm the model evaluation.

In terms of evaluation criteria, the researcher adopted evaluation criteria by the Balanced Scorecard Institute (2000). There are two evaluation components, namely System Performance and Strategic Performance ("Evaluation of a BSC System and its Implementation", 2000). System Performance evaluates the technical aspect and the structure of the SM and the BSC. While Strategic Performance evaluates strategic results involve a specific duration of the evaluation. Eventually, this study applied a cross-sectional time frame that indicates System Performance evaluation is applied.

### 3. Result and Discussion

Thematic analysis was performed on twenty selected articles that resulted in four themes: 1) market-based inbound open strategy, 2) crowd-based inbound innovation strategy, 3) collaborative inbound open innovation strategy, 4) network-based inbound open innovation strategy. These four themes generate eleven sub-themes. Table 1 shows the inbound open innovation strategy and indicator strategy as the sub-themes. The result are the preliminary findings of Phase 1 identified in this study.

**Table 1. Inbound open innovation strategies and indicators strategy list**

No.	Inbound Open Innovation Strategies	Indicator ID	Indicator Strategy Name
1.	Market-based inbound open innovation strategy	In1 In2 In3 In4 In5	Stakeholders engagement co-creation IP in-licensing R&D outsourcing Technology in-licensing
2.	Crowd-based inbound open innovation strategy	In6	Crowdsourcing
3.	Collaborative inbound open innovation strategy	In7 In8 In9	Universiti collaboration Collaboration with research centres R&D alliances
4.	Network-based inbound open innovation strategy	In10 In11	External networking Incubators

## 4. Conclusion

This paper outlined a detailed explanation of the operational research framework flow. The operational research framework provides a methodology overview of each phase and the entire study. The justification for each method used in every phase was also discussed in terms of the reasoning behind its inclusion. The findings from Phase 1 are carried forward to Phase 2 for further investigation into practitioners' responses in the Malaysian SMEs software industry.

## Acknowledgement

The authors would like to express their gratitude to Universiti Malaysia Sabah, Universiti Teknologi Malaysia, and other individuals for their generous assistance and encouragement.

## References

- [1] Department of Statistics Malaysia, "Department of Statistics Malaysia Press Release Small and Medium Enterprises 2020," 2020.
- [2] H. Bouwman, S. Nikou, and M. De Reuver, "Digitalization , business models , and SMEs : How do business model innovation practices improve performance of digitalizing SMEs ?," *Telecommunications Policy*, vol. 43, no. 9, p. 101828, 2019, doi: 10.1016/j.telpol.2019.101828.
- [3] C. E. De Marco, I. Martelli, and A. Di Minin, "European SMEs' engagement in open innovation When the important thing is to win and not just to participate, what should innovation policy do?," *Technological Forecasting and Social Change*, vol. 152, no. October 2018, p. 119843, 2020, doi: 10.1016/j.techfore.2019.119843.
- [4] S. Hungund and V. Mani, "Benchmarking of factors influencing adoption of innovation in software product SMEs: An empirical evidence from India," *Benchmarking*, vol. 26, no. 5, pp. 1451–1468, 2019, doi: 10.1108/BIJ-05-2018-0127.
- [5] C. Lu, B. Yu, J. Zhang, and D. Xu, "Effects of open innovation strategies on innovation performance of SMEs: evidence from China," *Chinese Management Studies*, 2020, doi: 10.1108/CMS-01-2020-0009.
- [6] A. N. Aisha, I. Sudirman, J. Siswanto, and Y. Yassierli, "An Analysis of Core Competencies and Business Performances in Software SMEs : A Conceptual Framework," in *International Conference on Industrial Enterprise and System Engineering (IcoIESE 2018)*, 2019, vol. 2, no. IcoIESE 2018, pp. 189–194. doi: 10.2991/icoiese-18.2019.34.
- [7] M. Heikkilä, H. Bouwman, and J. Heikkilä, "From strategic goals to business model innovation paths: an exploratory study," *Journal of Small Business and Enterprise Development*, vol. 25, no. 1, pp. 107–128, 2018, doi: 10.1108/JSBED-03-2017-0097.
- [8] M. N. Cortimiglia, A. Ghezzi, and A. G. Frank, "Business model innovation and strategy making nexus: Evidence from a cross-industry mixed-methods study," *R & D Management*, vol. 46, no. 3, pp. 414–432, 2016, doi: 10.1111/radm.12113.
- [9] R. Gatautis, E. Vaiciukynaitė, and A. Tarute, "Impact of business model innovations on SME ' s innovativeness and performance," *Baltic Journal of Management*, vol. 14, no. 4, pp. 521–539, 2019, doi: 10.1108/BJM-01-2018-0035.
- [10] M. Heikkilä and H. Bouwman, "Business Model Innovation in European SMEs - Descriptive analysis of quantitative survey and case survey data," no. June, pp. 543–560, 2018, doi: 10.18690/978-961-286-170-4.38.
- [11] D. Denyer and D. Tranfield, "Producing a Systematic Review," *The SAGE Handbook of Organizational Research Methods*. pp. 671–689, 2009.
- [12] B. Kitchenham, "Procedures for Performing Systematic Reviews," *Keele UK Keele University (2004)*, vol. 33, no. TR/SE-0401, pp. 1–28, 2004, doi: 10.1.1.122.3308.
- [13] S. A. Albliwi, J. Antony, and S. A. H. Lim, "A systematic review of Lean Six Sigma for the manufacturing industry," *Business Process Management Journal*, vol. 21, no. 3, pp. 665–691, 2015, doi: 10.1108/BPMJ-03-2014-0019.
- [14] S. Keele, "Guidelines for performing Systematic Literature Reviews in Software Engineering," *EBSE Technical Report*, vol. 5, 2007, doi: 10.1541/ieejias.126.589.
- [15] J. Recker, *Scientific Research in Information Systems : A Beginner's Guide*. 2013.
- [16] S. B. Merriam, *Qualitative Research: A Guide to Design and Implementation*. 2009.

- [17] J. W. Creswell, *Research design: Qualitative, quantitative and mixed method approaches*, vol. 91. 2014.
- [18] A. Strauss and J. Corbin, *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, 2nd edn*. Thousand oaks, CA: Sage publications, 1998. doi: 10.1177/1350507600314007.
- [19] R. S. Kaplan and D. P. Norton, *The Execution Premium - Linking strategy to operation for competitive advantage*. 2008.
- [20] N. Dalkey and O. Helmer, "An experimental application of the Delphi method to the use of experts," *Management Science*, vol. 9, no. 3, pp. 458–467, 2016.
- [21] S. L. Kanniah and M. N. B. Mahrin, "Secure software development practice adoption model: A delphi study," *Journal of Telecommunication, Electronic and Computer Engineering*, vol. 10, no. 2–8, pp. 71–75, 2018.
- [22] C. C. Hsu and B. A. Sandford, "The Delphi technique: Making sense of consensus," *Practical Assessment, Research and Evaluation*, vol. 12, no. 10, pp. 1–8, 2007.
- [23] J. Baker, K. Lovell, and N. Harris, "How expert are the experts? An exploration of the concept of 'expert' within Delphi panel techniques.," *Nurse Res*, vol. 14, no. 1, pp. 59–70, 2006, doi: 10.7748/nr2006.10.14.1.59.c6010.
- [24] K. Q. Hill and J. Fowles, "The methodological worth of the Delphi forecasting technique," *Technological Forecasting and Social Change*, vol. 7, no. 2, pp. 179–192, 1975, doi: 10.1016/0040-1625(75)90057-8.
- [25] S. S. Hussein, M. N. Mahrin, N. Maarop, and N. A. A. Bakar, "A Delphi Technique as a Method to Obtain Consensus in Validation of EA Readiness Assessment Model," *Open International Journal of Informatics (OIJI)*, vol. 6, no. 2, pp. 22–32, 2018.
- [26] S. Keeney, F. Hasson, and H. P. McKenna, "A critical review of the Delphi technique as a research methodology for nursing," *International Journal of Nursing Studies*, vol. 38, no. 2, pp. 195–200, 2001, doi: 10.1016/S0020-7489(00)00044-4.
- [27] R. K. Yin, "Case study research and applications: Design and methods," *Thousand Oaks, CA: Sage*, vol. 5, pp. 1–53, 2003.
- [28] M. D. Myers and H. K. Klein, "A set of principles for conducting critical research in information systems," *MIS Quarterly: Management Information Systems*, vol. 35, no. 1, pp. 17–36, 2011, doi: 10.2307/23043487.
- [29] "Evaluation of a BSC System and its Implementation," *Balanced Scorecard Institute*, 2000. [balancedscorecard.org](http://balancedscorecard.org)