

Towards an insight into the adoption of Open Innovation by SMEs in Vietnam

Phuong Thanh Do, Ha Anh Le, Nguyen Ngan Ha Pham,
Le Chau Tran, Tien Dat Le
Department of Management and Marketing
Swinburne University of Technology, Vietnam
Cau Giay District, Hanoi City, Vietnam
{thanhdp.swin, haanhlee.work, phamnguyenngha1521995,
tranlechau090201 & dat.letien167}@gmail.com

Thi Bich Hanh Tran
Department of Management and Marketing
Swinburne University of Technology,
Vietnam
Cau Giay District, Hanoi City, Vietnam
hanhhtb2@fe.edu.vn

Abstract—This study aims to identify the influential factors of OI adoption by SMEs in Vietnam, in order to provide useful theoretical and practical recommendations for SMEs to adopt OI effectively. Based on a survey of 56 Vietnamese SMEs, this study identified two drivers including improving capability and expanding network orientation, and four main barriers, including knowledge, collaboration, organisation, and financial strategy. Notably, the study found that collaboration barriers and network expansion orientation are factors that vastly impact the adoption of OI.

Index Terms—Open Innovation, hindering factors, driving factors, SMEs, Vietnam.

I. INTRODUCTION

The adoption of Open Innovation (OI) has been an emerging topic in the past decades. While there is a wealth of studies on the model of OI practices adoption in large multinational firms, little research focuses on small and medium-sized enterprises (SMEs) and developing countries. In the current scenario of globalisation and digitalization, Vietnam's SMEs ecosystem has developed dynamically in terms of technology and open innovation (OI). Along with the birth of small and medium enterprises, Vietnam's economy shows extremely stable development. Recent research showed that SMEs in Vietnam have a high potential for innovation [1]. Companies and organisations are encouraged to innovate, and many have started to open their boundaries and rely on external knowledge. However, not all SMEs can grasp the opportunities and challenges that OI poses. In particular, SMEs still face both theoretical and practical difficulties in adopting OI.

In Vietnam, research about different aspects of open innovation for MSMEs and SMEs is poor. Furthermore, open innovation is still young and fragmented in the Vietnam context while R&D departments have only been invested and focused on by large companies. In the world of the wide dimension of knowledge, short product life cycles, and high worker mobility, the ability to adopt innovation faster is vital for any enterprise to achieve a sustainable competitive advantage.

In addition, SMEs should open up to OI due to its strength in flexibility, and high adapting to market change, despite some challenges about finance and resources [2].

Last but not least, OI provides benefits for each segment of the national innovation system. Precisely, for the government, it will increase enterprises' productivity, facilitate

technology development. For companies, it will provide solutions for their pressing problems as well as chances for partnership. For SMEs and startup companies, it will help them to overcome the entry barriers, collaborate with potential stakeholders, customers, and experts [3]. Therefore, this study aims at investigating the influential hindering factors and driving factors for the adoption of open innovation by SMEs in Vietnam. The generated findings will be particularly useful for managers of SMEs in Vietnam to manage innovation more effectively.

II. THEORETICAL BACKGROUND

A. Literature Review

1) Open Innovation

Open innovation (OI) was first defined by Chesbrough in 2003 as: "Value ideas can come from outside or inside the company and can go to market from inside to outside the company as well" [4]. In other words, OI is the process in which ideas can flow both from internal and external environments, and then become new offerings or new ideas for businesses. According to Manual (2005), OI contains four different types of innovation that can encompass large changes in firms' activities: product innovation, process innovation, organisational innovation, and marketing innovation [5, 6]. Furthermore, there are three pathways for OI to occur: Outside in process (Inbound); Inside out process (Outbound) and coupled process.

OI has increasingly been investigated by research in a variety of contexts and areas. The adoption of OI has been proven to bring numerous advantages to small and large enterprises. OI is deemed as a tool to explore ideas for enterprises to contribute a significant impact on customer satisfaction and efficiency. In addition, the lack of using OI might lead to irreparable losses, which are usually preferred to restriction in a new market and loss of competitive advantage in domestic and international markets [7].

Small and medium enterprises play a fundamental role in world economics, as most economic structures are composed of SMEs. Due to the increase in competitors, new technologies and customers' needs, it is vital for SMEs to achieve sustainable competitiveness. However, SMEs around the world have to deal with challenges when applying OI because they lack internal finance, human, and organisational resources [8].

In the Vietnam context, in recent years, the Vietnam government has paid more attention to OI. There are new policies and recommendations for enterprises to enhance the quality of products, competitive advantage and provide opportunities for domestic firms to take part in the value global chain [9].

The World Bank and OCDE suggest that Vietnam administrators should improve public administration for the innovation system and strengthen human resources for OI, enhancing the innovation system in enterprises and placing business in the heart of OI [8]. Especially, Covid 19 crisis can be a stimulating factor for enterprises and SMEs to transform and boost a competitive advantage against rivals [9]. As a result, in the new era, the speed of technology is changing day by day and investing in technology is increasingly expensive. The adoption of OI is a crucial factor for SMEs to compete with competitive tension in the market.

2) *Open innovation by small and medium enterprises from various contexts*

In a foreign context, a study by Robert Stanisławski [10] has shown determinant factors that encourage enterprises to have greater openness. The research attended to both external and internal determinants. By and large, it identified market determinants as one of the most crucial factors affecting the use of OI in SMEs, and the external determinants are more important for SMEs than for large companies. Additionally, the earlier researches by Santoro et al. [6]; Bigliardi and Galati (2016) [11] both illustrate factors that limit the implementation of OI for SMEs, and suggest the process for managers to increase openness in their business.

In the Vietnam context, recently there is one standout report of BambuUp illustrating the information about the OI landscape in Vietnam in 2021. This report provides an innovation startup ecosystem map (Innovation) which is comprehensive, and multi-dimensional with an emphasis on 11 outstanding areas: FMCG, Retail, Education, Finance, Healthcare, Martech & Salestech, Logistics & Supply Chain,... The report is one of the first benchmarks to provide a database and assessment in a wide range of sectors for enterprises in Vietnam [9]. While we have some significant articles in the Vietnam context investigating distinct aspects of OI, there is no research that has been found to empirically examine factors that drive or prevent open innovation for SMEs. Most of the research and articles pay attention to large companies with strong R&D departments and resources, instead of SMEs with reluctant internal finance and human assets.

B. *Previous models of the adoption of OI*

Over eighteen years, researchers have examined the factors that affect SME adoption of OI. In 2003, Chesbrough [13] introduced his innovative model of open innovation. From there, while there are several studies on the model of OI practices adoption in major multinational corporations, SMEs received little attention. According to Van de Vrande et al.'s [14] research, the resource and motivational environments of SMEs have distinctive characteristics. Following a systematic review by Usman, Roijakkers, Vanhaverbeke, and Frattini [15], among all articles on OI in SMEs, the topic of OI adoption accounted for fourteen percent, and Van de Vrande et al.'s article is the most cited, providing a foundation of motivations and challenges in OI adoption for

future research. Other studies have revisited this issue, including Savitskaya, Salmi, and Torkkeli (2010), Teirlinck and Spithoven (2013), and Verbano, Crema, and Venturini (2015) [16-18]. Regarding the predecessors, Bigliardi and Galati's research in 2016 [11] offered a model for conceptualizing the hindering variables, which included a synthesis of seventeen components from prior studies. Despite the fact that the list of OI practices is narrow, this is the first empirical study to analyze the barriers to OI adoption.

Moreover, a study [19] by Novandari, Suliyanto, and Kartawan analyzed the four factors motivating the adoption of OI by SMEs in Indonesia. The criteria were developed based on Parida (2012) and Van de Vrande et al.'s research (2009) [20], [14]. This research uncovered four characteristics that motivate SMEs to collaborate with external parties: market insight orientation, capability improvement orientation, network expansion orientation, and idea generation orientation. In addition, Stanisławski's [10] research centered on internal and external drivers in order to investigate the factors influencing the adoption of OI among SMEs. According to the findings, both determinants have a significant impact on OI implementation. Overall, it appears that the research model based on previously tested research is highly applicable. However, it is evident that little study and model testing has been conducted in Vietnam. The table below presents Novandari, Suliyanto, and Kartawan's concept [19] of four drivers of SME adoption of OI.

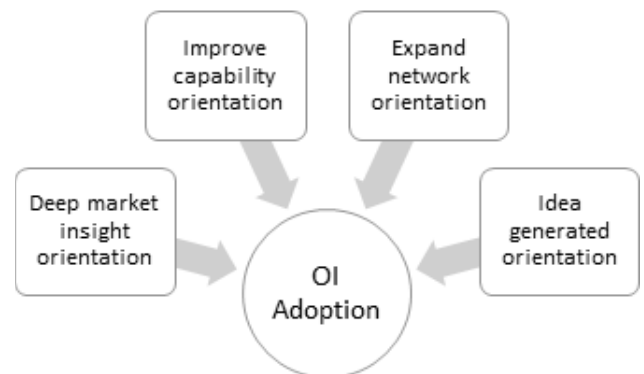


Fig. 1. Novandari, Suliyanto, and Kartawan's model of driving factors of OI adoption in SMEs.

C. *Hypothesis development and research model*

Based on prior research findings, a combination of both motivating and hindering factors is developed, aiming to have an exclusive research model to evaluate Vietnam SMEs' open innovation adoption.

One of the advantages that companies can acquire by implementing open innovation practices is accumulating knowledge, which can assist them in their innovation development [14]. However, lacking compatibility in parties' knowledge of OI projects or inefficiency in IP protection can cause adverse outcomes on OI projects [11], [17], [21]. Therefore:

Hypothesis 1: Knowledge barriers negatively impact the adoption of OI.

Collaboration is significant for the OI adoption process, as it is the foundation for exchanging information between stakeholders (universities, companies, research centres)

leading to innovation openly [13]. However, there are some hindrances in collaboration aspects negatively affecting the OI adoption process such as business culture differences, opportunistic partners' behaviours, miscommunication between parties; and collaborators incompatibility [17], [18], [22]. Hence:

Hypothesis 2: Collaboration barriers negatively affect OI adoption.

Internal environment and operation can adversely influence the OI adoption process. For example, inept management affects the internal flow of knowledge and information, causing inefficiency in knowledge sharing and unproductive working performance [17]. Additionally, resistance to innovation and organizational complexity cause difficulties influencing business's efforts in developing effective joint-innovation projects [18], [23]. Therefore:

Hypothesis 3: Organisational barriers negatively affect the adoption of OI.

For open innovation, strategic alignment and financial resources are two significant aspects [24]. Compatible business objectives with working styles and sufficient financial resources can assist OI stakeholders to develop effective joint-innovation projects [25]. Therefore, being unable to bear the R&D cost and IP protection expense cause financial barriers in SMEs' OI adoption process [14], [17], [18], [23]. Additionally, loss of know-how, IP uncertainty and opportunistic behaviors lead to strategic barriers in SMEs' OI adoption [26]. Therefore:

Hypothesis 4: Financial and Strategic barriers negatively influence the adoption of OI.

The fundamental premise of the open innovation concept is to effectively unite the internal and external flow of information and knowledge, therefore accumulating market understandings for business expansion [27]. Market understanding is one of the driving forces for OI adoption in SMEs, as it enables stakeholders to share knowledge and acquire up-to-date market insights, therefore accelerating novel ideas and innovative technologies development [28], [29], [30]. Thus:

Hypothesis 5: Market insight orientation positively affects the adoption of open innovation.

Innovation capabilities represent to what extent a business can unite internal and external flow of knowledge, identify compatible novel ideas, continuously innovate and implement it successfully in product and service development [29], [31], [32], [34]. SMEs tend to encounter insufficient financial resources, unsuitable operation tactics and low business performance affecting their ability to innovate therefore, by taking part in joint-innovation projects can enhance innovation capabilities [29], [30], [33]. Hence:

Hypothesis 6: Innovation capabilities orientation positively affects open innovation adoption.

Network is considered as the premise for business to implement and adopt the open innovation model, therefore increasing the success rate of joint-innovation projects [27], [35]. By expanding the network, businesses can access external resources, gain more market opportunities, and improve innovation capabilities [20], [29], [35], [36], [41]. Therefore:

Hypothesis 7: Network orientations positively affect the adoption of open innovation.

Developing ideas based on current market insights, then incorporating those ideas and knowledge into the creation of new goods and services in innovation projects is one of the fundamental premises of implementing an open innovation model into organizations [20], [35]. Additionally, prior research [37], [38] have indicated a positive correlation between idea creation and company front-end performance [41]. This performance refers to what extent SMEs can use their knowledge and idea creation to acquire a competitive advantage and succeed in innovation initiatives [35], [37], [40]. Therefore:

Hypothesis 8: Idea orientation positively influences the adoption of open innovation.

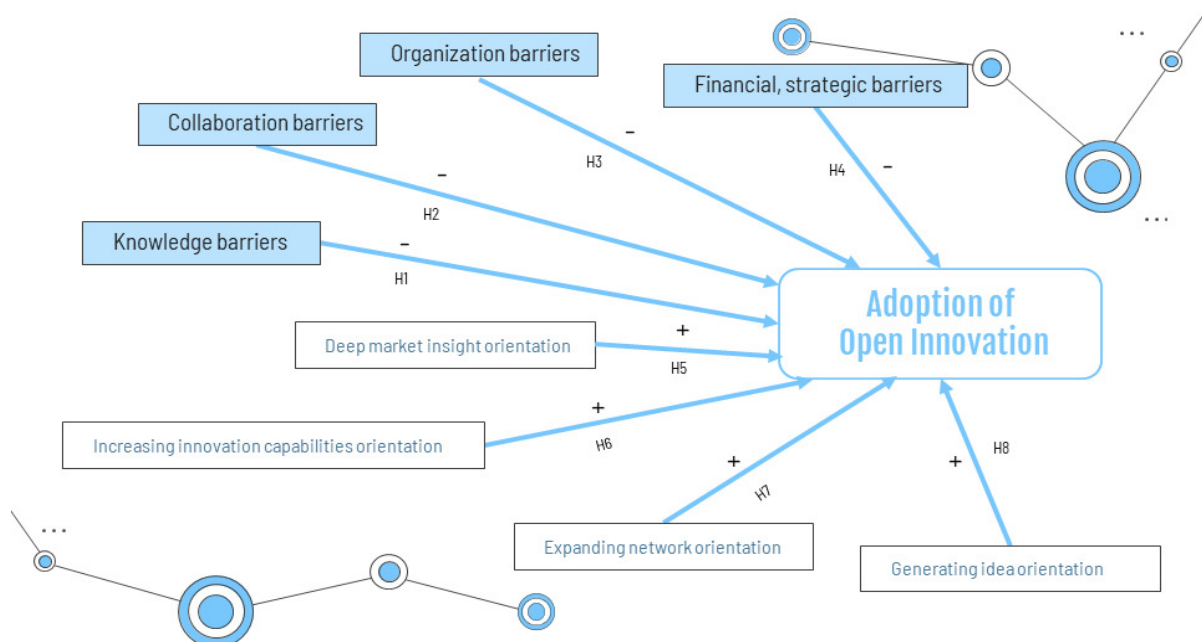


Fig. 2 Research Model

III. RESEARCHING METHOD

A. Sample design and data collection

The study was conducted with the participation of overall 56 respondents who are the representatives of enterprises in Vietnam. Due to the context of this study which is focusing on researching the open innovation in Vietnam's SMEs, so, after the cleaning data process, 8 of 56 collected answers have been cleared out because the enterprises' sizes were over the range. Therefore, the sample size of this study was 48. Most of the samples came from Hanoi counted for 75%. The majority of the sample was enterprises with total capital lower than 3 billion VND accounting for 43%, coming up is the enterprise with total capital from 3 to 20 billion VND counted for 32%. The two most popular forms of business among these samples are limited liability companies and joint-stock companies counted for 41% and 39%, respectively.

The questionnaire was originally created in English by adopting various scales from multiple experts in global with 3 main sections. During the data collecting process, the questionnaire has been translated into Vietnamese to enhance the understandability. All of the data collecting process was conducted online through the link created on Google form: "https://docs.google.com/forms/d/1hi_pWcHxcYDKSrdvZS6xTL8FGDgTwtwqi-LERd_RSNA/edit?ts=61719327". The link is then shared on various SMEs groups on social platforms, Vietnam business associations and directly through email.

B. Measure

To measure the adaptation of OI in SMEs, six composite indicators measuring the distinguished components of OI in SMEs initiated by Aineias Gkikas in 2018 were adopted [39]. Knowledge and technology outsourcing activities is a sample item of this scale. Developed by Bigliardi and Galati in 2016, seventeen items measuring the impacts of 4 elements that are considered as the barrier factors of OI implementation in SMEs were adopted. A sample item of this scale can be mentioned is economic/financial issues [11]. To

measure the level impacts of separated driven factors on adopting OI in SMEs, ten different motives to implement OI developed by Van de Grande, Jeroen P.J, and Vanhaverbek in 2009 were taken. To keep up with current market developments, customers, increase growth and/or market share is an example item of this scale. Cronbach's Alpha and Composite Reliability have been used as the indicators to assess the scale used in this study. All the scales having the value of Cronbach's Alpha higher than 0.6 has indicated the reliability of the scale used in this study. Moreover, the value of composite reliability for all the scales are higher than 0.5 have also proved for the high level of reliability of this study's scale.

IV. RESULTS

A. Reliability and validity

For measuring the reliability and validity of study's scale and the data set capturing from survey collecting process, Cronbach's Alpha and the Composite Reliability has been used. The value of Cronbach's Alpha showed that all the variables tested in this study have a Cronbach's Alpha value greater than 0.6, as demonstrated by the outcome. These findings indicate sufficient reliability for all variables measured in the study.

Composite reliability was calculated as part of this study, and the result indicated that all variables have composite reliability values greater than 0.5. These data have demonstrated that the measurements used in the study are adequately valid. In short, the study's variables' measures are all sufficiently reliable and valid.

Correlational values were determined among variables, and the results of correlation tests are as follows: All the variables, with the exception of financial strategic barriers (FSB) and collaboration barriers (CB), have been shown to have a significant correlation when taken as a whole.

B. Hypothesis Testing

Single regression has been used in this study for hypothesis testing. The results of regression analysis are presented in

TABLE I
THE CORRELATION OF VARIABLES

Variables	1	2	3	4	5	6	7	8	9
1.AOI									
2.KB	.309*								
3.CB	.128	.109							
4.OB	.339*	.654**	.354*						
5.FSB	.270	.726**	.194	.819**					
6.DMIO	.323*	.237	.296*	.243	.238				
7.IICO	.369**	.419**	.478**	.473**	.441**	.604**			
8.ENO	.216*	.234	.403**	.288*	.255	.751**	.688**		
9.GIO	.339*	.285*	.224	.342*	.296*	.630**	.493**	.718**	

Note. AOI: Adopting open innovation; KB: Knowledge barriers; CB: Collaboration barriers; OB: Organisation barriers; FSB: Financial strategic barriers; DMIO: Deep market insight orientation; IICO: Increasing innovation capabilities orientation; ENO: Expanding network orientation; GIO: Generating idea orientation

*. Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed).

the table below in which most of the proposed hypotheses are supported.

Based on the data in Table III, the adoption of OI by SMEs is significantly and negatively impacted by each of the four types of barriers: knowledge barriers (KB), collaboration barriers (CB), organizational barriers (OB), and financial strategic barriers (FSB). With Sig = .010, CB has the greatest negative impact on OI adoption of the four factors. Also, the adoption of OI by SMEs is significantly influenced by the motivating factors of deep market insight orientation (DMIO) and expanding network orientation (ENO) in which ENO has a greater impact on OI adoption. In contrast, the adoption of OI is not significantly correlated with the two factors of increasing innovation capabilities orientation (IICO) or generating idea orientation (GIO) with Sig > 0.05. The findings of SMEs in the Vietnam context have provided numerous ways and suggestions for SMEs in Vietnam. This will be elaborated on in the below parts.

V. DISCUSSION AND CONCLUSION

The objective of this study was to shed new light on the adoption of OI by SMEs in Vietnam, with an emphasis on identifying motivating and inhibiting factors. Using quantitative data from surveys of managers of SMEs in Vietnam, the study uncovered intriguing findings regarding the adoption of OI by SMEs in the commercial setting of Vietnam. Four major hurdles, including knowledge, cooperation, organization, and financial strategy, as well as two drivers, including enhancing capability and extending network orientation, were shown to be strongly associated with the adoption of open innovation by SMEs. Notably, among the hurdles, cooperation barriers exhibit the most detrimental effects, although network development direction and market insight orientation are equally influential variables in the adoption of OI. The results of the four key impediments to the adoption of OI are similar to those discovered by Bigliardi and Galati (2016) concerning SMEs in Italy [11]. The conclusion that just two driving variables, network development orientation and market insight orientation, are associated with the adoption of OI by SMEs in Vietnam contradicts

Novandari et al. (2018)'s study that all four driving elements are favorable to the adoption of OI [12].

This study has two main theoretical contributions. First, the study advanced the extant literature on open innovation with the addition of a framework with both hindering and motivating factors for the adoption of open innovation. The present study's framework is more comprehensive in comparison with the prior studies, which examined the influences of the factors separately. Previous studies relating to open innovation in Vietnam are OI applications in Vietnam SMEs [42], and the implementation of the OI model in knowledge sharing in universities [43]. These studies have proposed a starting point in presenting the crucial role of open innovation in business operations as well as the university's flow of knowledge. However, their findings have not identified the barriers and the drivers of open innovation adoption in Vietnam, leading to businesses not accumulating understanding regarding this aspect, thus being unable to develop adequate policies and implementations of the open innovation model in organizational structure and operations. Therefore, findings in this study have theoretical contributions relating to hindrances and motivators in open innovation adoption in Vietnam SMEs, thus assisting companies in developing policies and making implementations in the operations. Second, the study extended the database of OI adoption in literature with empirical evidence of SMEs in the Vietnam context - an under-researched Asian developing economy for the study of open innovation. To be specific, research results indicate that SMEs in Vietnam find it challenging to implement OI in their enterprises due to knowledge hurdles, organizational barriers, and financial strategic constraints. In contrast, orientation toward skill enhancement and orientation toward idea development are two criteria that do not influence the adoption of OI by SMEs. SMEs in Vietnam view developing network orientation as the primary driver driving them to OI, followed by market insight orientation.

In line with the hypothesis, this study presents practical recommendations. First, SME managers must identify the factors that influence the adoption of open innovation (OI) and create high-conscious strategies to expand their network

TABLE II
HYPOTHESES TESTING

<i>Direct effects</i>	<i>Coefficients</i>	<i>T - values</i>	<i>Sig.</i>	<i>Outcomes</i>
KB → Adopting OI (H1)	0.323	2.314	.025	Supported
CB → Adopting OI (H2)	0.369	2.692	.010	Supported
OB → Adopting OI (H3)	0.316	2.260	.029	Supported
FSB → Adopting OI (H4)	0.339	2.446	.018	Supported
DMIO → Adopting OI (H5)	0.309	2.200	.033	Supported
IICO → Adopting OI (H6)	0.128	0.878	.385	Unsupported
ENO → Adopting OI (H7)	0.339	2.442	.019	Supported
GIO → Adopting OI (H8)	0.270	1.905	.063	Unsupported

of partners. In specific, managers should promote strategic plans and risk management towards the four significant barriers hindering OI adoption, including managing organizational knowledge, preventing collaboration, financial and strategic barriers, and organizational barriers. For instance, transparency in Intellectual Property–Rights during inbound and outbound practices can prevent unclear or ambiguous actions between partners. Second, expanding networks and market insights, and involving all members of the organization, particularly managerial staff, is essential. This awareness can be raised and effectively applied if enterprises exhibit proper attention through meetings and a suitable reward system. Further, research by the R&D department can provide profound insights into potential opportunities and challenges in the existing ecosystem. Although adopting OI provides vast opportunities to gain competitive advantages, policy development remains a challenge. Thus, the model hopes to assist SMEs in building effective collaboration platforms based on incentives related to financial and mutual knowledge, and policymakers in enacting transparent policies, thereby consolidating SMEs' propensity to implement OI practices in Vietnam.

However, this study has certain limitations. Importantly, the data collection method was conducted online during the Covid-19 outbreak, and there were challenges in collecting responses from SMEs to the quantitative survey; hence, the generalizability of the study's findings is limited. Future studies should presumably collect data on a wider size and scale. To increase the generalizability of the findings, researchers may reevaluate the model using a larger number of SMEs. Finally, research may re-evaluate the model in different circumstances, such as in other industries or countries.

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