

Do, Bich Ngoc; Nguyen, Van Dung; Le, Minh Thi Hong; Do, Hai-Ninh; Pham, Thi Truc Ly

## Article

Firm's innovation activities across ASEAN countries: Examining the impacts of management experience, management practices and the moderating role of female CEOs

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\*Corresponding author: Van Dung Nguyen, Institution Organization: School of International Business and Marketing, University of Economics Ho Chi Minh City (UEH), District 3, Ho Chi Minh city 700000, Vietnam  
E-mail: [dungnv@ueh.edu.vn](mailto:dungnv@ueh.edu.vn)

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Southampton, United Kingdom

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## MANAGEMENT | RESEARCH ARTICLE

# Firm's innovation activities across ASEAN countries: Examining the impacts of management experience, management practices and the moderating role of female CEOs

Bich Ngoc Do<sup>1</sup>, Van Dung Nguyen<sup>1\*</sup>, Minh Thi Hong Le<sup>1</sup>, Hai-Ninh Do<sup>1</sup> and Thi Truc Ly Pham<sup>1</sup>

**Abstract:** This study investigates the roles of management experience and management practices towards innovation activities across ASEAN nations. Notably, the moderating role of the female CEOs in the management experience management practices—innovation relationship is also examined. The data came from the World Bank's Enterprise Survey, consisting of 180,000 enterprises worldwide. This study extracted data from seven economies in ASEAN (Vietnam, Thailand, Indonesia, Philippines, Malaysia, Laos, and Cambodia). To deal with the hierarchical/multilevel structure of the study's data set, the study uses the multilevel mixed-effects ordered logit model. The findings reveal that both management practices and management experience have positive impacts on innovation activities, particularly product innovation. Furthermore, this paper highlights the positive moderating role of female CEOs in the management experience management practices—innovation relationship.

**Subjects:** Corporate Governance; Entrepreneurship and Small Business Management; International Business

**Keywords:** ASEAN countries; female CEOs; innovation; management experience; management practices

### 1. Introduction

There is growing research on firm innovation in all sectors as it is a vital determinant of a firm's growth and performance. Notably, the Covid-19 pandemic generates huge challenges and turbulence, and worldwide firms have to try their best to survive. Millions of businesses have to redesign and reconsider many aspects such as their business model (Dovbischuk, 2022), management leadership, or supply chain management (Sarkis, 2020). Among those determinants of business resilience, the innovation capability is emphasized by extant literature (Cuel et al., 2022; Li et al., 2021; Xie et al., 2022) as it provides a series of new ideas and models to match with uncertainties flexibly.

Prior studies regarding firms' innovation have focused on broad topics, including determinants of innovation and outcomes of innovation. In the first line, scholars have found many determinants of innovation, consisting of inbound and outbound factors. The inbound factors include leadership, capabilities, firm structure, knowledge management, and gender diversity. On the other hand, the second line focuses on the results of innovation. Innovation is a fundamental driver of sustainable development and the survival and success of businesses (He & Shen, 2019; Zhong

et al., 2021). Porter (1992) and Solow (1957) both emphasized how innovation is frequently seen as the most important factor in determining an economy's competitiveness.

Driving from the first line of literature, according to the literature review conducted by Zhang et al. (2021), scholars widely examined the role of leadership and traits of leaders under the internal capability category which either reinforces or hampers innovation. However, other factors, including the roles of management practices and management experience in firm innovation have been still a blur. Furthermore, a greater proportion of empirical studies look into the gender diversity of business cases by concentrating on the connections between female directors and business performance (Ali et al., 2016; Carter et al., 2010). The increasing proportion of female CEOs around the world demonstrates the importance of female leadership. Due to the distinctive qualities of female CEOs, a great deal of research has focused on their performance. Notwithstanding, the research results revealed controversial findings on the role of female CEO in innovation. Some research has shown the positive impact of females on firms' innovation outcomes since they have the higher life experience to conquer inequality (Wu et al., 2021). While the other showed a negative impact because women seem to have lower levels of emotional stability (Tahir et al., 2021). The reason behind this contrasting finding might come from the country where studies have been conducted. Last but not least, in cross-country studies, the moderating impacts of women's managers and skills are not widely researched.

Based on the aforementioned research gaps, this study strives to investigate the impacts of management practices and management experience of the top management team on firms' innovation in ASEAN countries. Furthermore, the moderating role of female CEOs is also examined. The study adopted the data collected by the World Bank's Enterprise Survey. This data set consists of 151 countries and 180,000 enterprises. For the context of the ASEAN area, we use the World Bank's Enterprise Surveys data for seven economies (Vietnam, Thailand, Indonesia, Philippines, Malaysia, Laos, and Cambodia).

This study's findings emphasize the vital role of female leadership as well as management practices and management experience in innovation performance, particularly in ASEAN countries. Firstly, management experience is associated with new product development across examined nations. Secondly, the role of management practices contributes to innovation performance by leveraging the new practices for management structure has been revealed. Finally, the most highlighted finding is the positive moderating role of female CEOs in the management experience/management practices—innovation relationship.

This study has a theoretical contribution as the first attempt to investigate the moderating role of female CEOs in the management experience/management practices—innovation nexus. We argue that the majority of female leadership is transformational (Arun & Joseph, 2021; Eagly et al., 2003). Transformational leaders establish good relationships and networks with their followers to enhance information sharing and organizational communication (Zuraik & Kelly, 2019). Thus, employees can understand managers' expectations from the dialogue clearly. Moreover, this leadership style empowers employees to be creative in their thoughts and actions so that a nurturing innovation environment is created. As a result, female CEOs strengthen the management experience management practices—innovation relationship.

Apart from the theoretical contributions, several practical implications are also generated. We highlighted the role of female CEOs in the science and technology field. Firstly, it not only helps ASEAN countries to change their stereotypes about women's abilities in management but also provides evidence to support career pathways. Secondly, both management practices and management experience play a vital role in bolstering innovation. It shows the urgent requirements for firms and leaders to improve overall specialized knowledge for all management levels in firms so that they can gain fresh sight to apply to new business activities. Moreover, in the business world

of uncertainties, innovation is the method to leverage competitive advantages to be sustainable. Hence, these findings emphasize how firms can achieve innovation performance.

The rest of the paper is organized as follows: section 2 reviews the literature to propose the hypotheses. Section 3 discusses the data and empirical method. Section 4 shows the results. The next section presents the discussions and managerial implications. The next section shows the contributions. The last section discusses the limitations and future research.

## **2. Literature review**

This research is based on the resource-based view as a theoretical signpost to conceptualize research models and hypotheses. Resources-based view theory (Barney, 1991) emphasized the use of internal resources to build and sustain competitive advantages and business performance (Anzola-Román et al., 2018). In this research setting, we assess internal attributes such as management experience and management practices.

As mentioned in the prior section, the main aim of this paper is to examine the role of management experience and overall management practices on innovation outcomes of firms across ASEAN countries. In particular, in this study, innovation outcomes will be measured with the impacts of management experience and management practices; the role of female CEOs will be investigated as a moderator.

### **2.1. Management experience and innovation**

Management experience is defined as an accumulated cognitive ability that leaders achieve throughout his/her career pathway (Matemilola et al., 2018). Those abilities will affect overall firms' strategic performance. In the field of innovation, two theories have been adopted to predict the relationship between management experience and innovation activities, including social capital theory (developed by Becker, 1975) and human capital theory (Nafukho et al., 2004).

Navigated by the term of Jain (2010), individual experience refers to accumulated knowledge and resources for solving tasks and enhancing performance. For a top management team, managing experience can be determined as the prior knowledge, skills, resources, and cumulative capabilities of business management. After a long period of working, managers gradually accumulated experience which later influenced strategic management and firms' performance (Crowley & Bourke, 2018).

Under the landscape of social capital theory, social capital resources refer to available networks to leverage entrepreneurship (Hidalgo et al., 2021) and innovation outcomes (Belso-Martínez et al., 2020). Those are vital for managers to boost the generic strategy decision (Swanson et al., 2020) and leverage business performance (Belso-Martínez et al., 2020). Managers can accumulate resources such as networking, including internal and external relationships by handling different tasks during business operations to adapt to further circumstances (Demirkan, 2018). Precisely, inbound relationship resources and personal experience might help managers exploit new ideas and solutions from the right person and reallocate alternatives if any unexpected event happens. Outbound relationships extend the choices to handle business constraints during business operations. Recent studies regarding innovation constraints show that the lack of resources is the main determinant of innovation failure (Seenaiyah & Rath, 2018). Thus, those management experience and resources influence performance in general and innovation activities in particular.

On the other hand, human capital theory draws attention to the vital role of human capital in achieving outstanding individuals' and firms' outcomes (Jiao et al., 2021). In more detail, experience is one key element of human capital, which can be developed by working experience and academic education. Prior studies have revealed that the academic experience of top management groups can leverage innovation performance as they will form their decision-making based on facts and data and boost internal capability (Shen et al., 2020). Additionally, work experience

contributes to all different stages from exploiting ideas to handling unforeseen problems during innovation implementation.

The majority of prior studies on management experience agreed that management experience might influence innovation activities (Jain & Huang, 2022; Shen et al., 2020). However, many scholars measured the experience of top management teams based on their academic knowledge background (Yang & Xu, 2021), especially overseas training (Yang et al., 2019). Other scholars emphasized job mobility to foster functional backgrounds related to jobs' requirements and detect market opportunities (Crowley & Bourke, 2018; Jia et al., 2022). In this study, we will assess management experience by measuring the length of experience in the current sector to estimate the impact on innovation activities.

We propose the first hypothesis to predict the relationship between management experience and innovation activities as follows.

**H1: Management experience has a positive impact on innovation.**

## **2.2. Management practices and innovation**

Another vital issue that the authors strive to investigate is the relationship between management practices and innovation activities. Management practices are defined as new working approaches to leverage the business working system (IGI Global Dictionary). These practices are adopted multi-disciplinarily in the business operation process (Blindenbach-Driessen & Van Den Ende, 2010). Prior studies have drawn attention to management practices in different areas such as knowledge management, human resource management, or supply chain management; however, there has been little attention on the role of management practices in innovation.

Firstly, to improve the working process, knowledge management (KM) was revealed as a key determinant. A majority of KM studies have shown a direct relationship between KM and innovation, such as Hussinki et al. (2017) and Dávila et al. (2019). It focuses on facilitating intangible resources, such as new knowledge, to be applied and advanced at all stages of business operation. KM supports the creation, dissemination, and application of new knowledge (Dávila & Dos Anjos, 2021). This new knowledge might enable firms to create new products, new processes, and new applications.

Besides, there is a growing concern about the firm's innovative performance with human resources (HR) practices. HR functions include staffing, training and development, and motivation (Aboramadan et al., 2019). These activities focus on increasing individual performance and commitment within firms (Crowley & Bourke, 2018). As a result, individual performance might add value to innovation (Van Loon & Van Wassenhove, 2020). On the other hand, the commitment between employees and employers enhances the psychological safety of individuals, which is an antecedent of innovation (Van Loon & Van Wassenhove, 2020). Thus, we believe that HR practices contribute to firms' innovation activities.

When it comes to supply chain management (SCM), it can be divided into two parts, including upstream partners and downstream partners. New practices in SCM require firms to conduct continual improvement in the whole business process from upstream to downstream to eliminate waste and errors (Jimenez-Jimenez et al., 2019). Furthermore, firms must cooperate with downstream partners such as customers and retailers to generate new ideas that are close to market needs (Mushtaq & Peng, 2020). These practices can support business innovation. Despite the clear linkages between new methods in SCM with a firm's performance (Das, 2018) and innovation (Silva et al., 2019), other researchers suggest that standardization as a result of waste elimination might reduce organizational diversity (Shalley & Gilson, 2017). However, to implement upgraded SCM

practices such as Total Quality Management, firms must implement hard conditions such as organizational learning, technology adoption, and resource management (Demirkan, 2018; Escrig-Tena et al., 2018). All these hard conditions have proven to contribute to innovation success.

It can be concluded that all management practices refer to the new implementation to improve efficiency and effectiveness. Following the argument of Cozzarin (2017), those activities can be categorized as organizational innovation activities. Extant research has shown that organizational innovation activities are an input that contributes to the overall innovation of the firm such as Le Bas et al. (2015), Azar and Ciabuschi (2017), and Anzola-Román et al. (2018). Therefore, management practices are likely to influence innovation outcomes.

To sum up, previous studies have highlighted the role of management practices in each functional department. However, there has been a lack of attention to overall management practices. Hence, in an attempt to partially address these controversial outcomes, the authors would like to predict the relationship between overall management practices and firms' innovation activities in the second hypothesis as follows.

## **H2: Management practices have a positive impact on innovation.**

### **2.3. The moderating role of female CEOs**

Over time, the attitude towards gender equality has witnessed a tremendous transformation. Several global organizations have centrally hosted forums to focus on women's empowerment in their social and economic achievement. Furthermore, many governments in Asia have started to accept women's role in society (Prabowo & Setiawan, 2021) to enable them to participate in social activities, especially in the business sector.

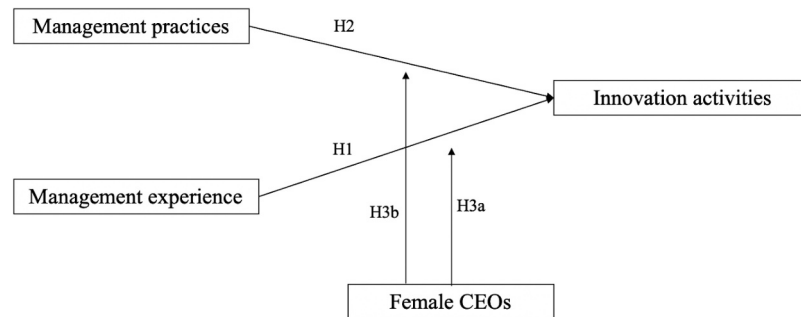
From the prior literature, there have been no conclusive findings on the role of female CEOs in firm performance and innovation. Some studies have shown that females pose a negative impact on innovation because of their lower risk-taking propensity (Tahir et al., 2021), instability of emotions, etc. However, other papers draw contradictory results as they prove the positive impact of female CEOs on innovation (Prabowo & Setiawan, 2021). Indeed, to explain this contradicting finding, Na and Shin (2019) discovered the presence of culture as the main antecedent for this difference.

This study focuses on ASEAN countries where they share some cultural similarities. According to Hofstede's dimensions, ASEAN countries are collectivist and have a high power distance level, which shows that people tend to experience hierarchical order and inequality (Hofstede, 2013). Notably, those nations have persistent impacts from Confucianism culture on society's stereotypes. Confucian values highlight the role of man in the family and social dominance. They have the right to achieve high status and become leaders in both their families and society. For women, their society's status is inferior as dependents in the family (Vu & Yamada, 2020). Women in those nations have to undergo social discrimination (Arun et al., 2020), which triggers them to take the initiative and achieve higher social order. If only women could overcome these obstacles, they could become CEOs. Furthermore, in a recent study by Na and Shin (2019), women are likely to generate higher rates of new working methods when it comes to firms' turbulence. Therefore, it can be said that conquering problems is women's instinct to leverage their varied experience and management practices to conquer challenges posed by innovation.

On the other hand, prior studies revealed that the main determinant leading to innovation success is leadership style. Among the three main leadership styles, which are transactional, transformational, and laissez-faire, transformational leadership has proved to have the highest impact on innovation (Wu et al., 2021). Transformational leaders establish good relationships and



Figure 1. Research model.



networks with their followers to enhance information sharing and organizational communication (Zuraik & Kelly, 2019). Thus, employees can understand managers' expectations from the dialogue clearly. Moreover, this leadership style empowers employees to be creative in their thoughts and actions so that a nurturing innovation environment is created. According to the recent systematic research of Eagly et al. (2003) and Arun and Joseph (2020), the findings indicated that the majority of female leadership is transformational. Departing from these standpoints, the authors propose two hypotheses on the moderating role of female CEOs on the relationship between management experience/management practices and firm innovation.

**H3a: Female CEO positively moderates the management experience—innovation relationship.**

**H3b: Female CEO positively moderates the management practices—innovation relationship.**

Figure 1 provides the conceptualization model with all hypotheses presented.

### 3. Methodology

#### 3.1. Data source

The information used in this investigation came from the World Bank's Enterprise Surveys, which included a total of 180,000 enterprises across 154 countries (World Bank, 2022). In-person interviews with company owners and senior managers are conducted to gather more than 100 indicators about the characteristics of businesses and their evaluations of the environment in which they operate. In addition, these statistics are compiled using methods that are both standardized and consistent throughout the whole process, which enables comparisons across countries (Luo & Bu, 2016; World Bank, 2022). For the context of the ASEAN, we use the World Bank's Enterprise Surveys data for seven economies (Vietnam, Thailand, Indonesia, Philippines, Malaysia, Laos, and Cambodia). We base our analysis on the most current surveys, conducted in 2015 or 2016. Finally, we have 4,143 observations representing 23 distinct manufacturing sectors.

#### 3.2. Variables

##### 3.2.1. Dependent variable

The dependent variable in this study is *Innovation*. *Innovation* is a categorical variable, showing the degree of radicalness or novelty of product innovation (0 = no innovation, 1 = innovation but only new to the firm, 2 = innovation and new to the market) (Karakara & Osabuohien, 2020; Tojeiro-Rivero & Moreno, 2019).

##### 3.2.2. Independent variables and moderator

*Management experience*: *Management experience* is measured as the top manager's years of experience in the current sector.



*Management practice:* Management practice is constructed as a dummy variable, = 1 if the firm answered “Yes” to the question “During the last three years, has this establishment introduced any new or significantly improved organizational structures or management practices?”, = 0 otherwise.

*Female CEO:* Female CEO is constructed as a dummy variable, = 1 if the firm answered “Yes” to the question “Is the Top Manager female?”, = 0 otherwise.

### 3.2.3. Control variables

Following previous studies on determinants of innovation (Barasa et al., 2017; Fonseca et al., 2019; Silva, Gomes, Lages et al., 2019), the following control variables are employed.

*R&D:* Dummy variable, = 1 if the firm answered “Yes” to the question “During the last three years, did this establishment spend on formal research and development activities?”, = 0 otherwise.

*Foreign:* Dummy variable, = 1 if foreign individuals, companies, or organizations own more than 50% of the firm’s capital, = 0 otherwise.

*Firm age:* The number of years in operation of the firm in log form.

*Firm size:* The total employees of the firm in log form.

*Country:* Categorical variable of each country. There are 7 countries: Vietnam, Thailand, Indonesia, Philippines, Malaysia, Laos, and Cambodia.

*Industry:* Categorical variable for two-digit industrial classification of the firm.

### 3.3. Empirical method

It is essential to take into consideration that the structure of our dataset is hierarchical. To be more specific, businesses are nested inside industrial sectors, and industrial sectors are nested within nations. Because observations inside the same cluster tend to link to one another, the hierarchical data may generate a non-independence issue. This problem manifests itself as inaccurate standard errors when the data are analyzed using conventional statistical methods (McCoach, 2019).

Techniques for multilevel modeling have been developed as a means of overcoming the shortcomings of classic regression models when used for the estimation of hierarchical data. In light of this, we will analyze our hierarchical data with the help of the multilevel mixed-effects ordered logit model, which is an advancement of the traditional ordered logit model (StataCorp, 2017). A multilevel model provides the capacity to explicitly incorporate heterogeneity and complicated variances. The multilevel mixed-effects ordered logit model is estimated with the *meologit* command in Stata. The *meologit* procedure uses ordered responses to fit mixed-effects logistic models. The conditional distribution of the response given the random effects is thought to be multinomial, and the logistic cumulative distribution function is used to figure out the chance of success (StataCorp, 2017).

### 4. Results

Table 1 presents the descriptive statistics. There are nearly 7% of firms conducting “Innovation but only new the firm”, and more than 14% of firms had “Innovation and new to the market”. Nearly 18% of firms performed new management practices. The average management experience is nearly 18 years. Moreover, 30% of firms have female CEOs.

Table 2 reports the pairwise correlations. The pairwise correlation coefficients between independent and control variables are lower than 0.5, suggesting that there are no signals of multicollinearity (Dormann et al., 2013).

**Table 1. Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Innovation	4,143	0.352	0.715	0	2
No innovation	3,270 (78.93 %)				
Innovation but only new the firm	288 (6.95 %)				
Innovation and new to the market	585 (14.12 %)				
Management practice	4,083	0.176	0.381	0	1
Management experience	3,932	17.754	10.164	2	70
Female CEO	4,108	0.306	0.461	0	1
R&D	4,066	0.151	0.358	0	1
Foreign ownership	4,116	10.457	27.390	0	100
Firm age (log)	4,143	2.783	0.630	0	5.081
Firm size (log)	4,143	3.999	1.535	0.693	14.509

Source: Authors' analysis

Table 3 presents the multilevel mixed-effects ordered logit estimation results. Regarding the hierarchical data issue, the likelihood-ratio tests comparing the multilevel mixed-effects ordered logit with standard ordered logit regression are reported in each model. It is interesting to find that the likelihood-ratio test statistics are statistically significant in all models. Therefore, the multilevel mixed-effects ordered logit is preferred to the standard ordered logit regression in estimating this specific data set.

Regarding hypothesis testing, first, the coefficient of *Management experience* is positive and statistically significant in Model 1. This indicates that management experience has a positive impact on innovation activities, which provides strong support for H1.

Second, the coefficient of *Management practice* is positive and statistically significant in Model 1. This indicates that management practices have a positive impact on innovation activities, which provides strong support for H2.

Third, the coefficient of the interaction term *Management experience x Female CEO* is positive and statistically significant in Model 2. This indicates that the female CEO positively moderates the management experience—innovation activities relationship, which provides strong support for H3a.

Finally, the coefficient of the interaction term *Management practice x Female CEO* is positive and statistically significant in Model 3. This indicates that the female CEO positively moderates the management practices—innovation activities relationship, which provides strong support for H3b.

## 5. Discussions and implications

This research employs Barney's (1991) theory of a firm's internal resources as the foundation for executing innovative activities. The findings indicate that internal resources, such as the combination of management practices, management experience, and R&D efforts, have a significant impact on the efficacy of innovation initiatives. In all three models, the position of female CEO has a favorable moderating influence on innovative efforts. The practical management experience and expertise will assist female CEOs to make informed judgments in a traditionally male-

**Table 2. Pairwise correlations**

Variable	1	2	3	4	5	6	7
1. Management practice	1						
2. Management experience	0.0039	1					
3. Female CEO	-0.0460***	0.0349**	1				
4. R&D	0.3979***	0.0067	-0.0104	1			
5. Foreign ownership	0.1013***	-0.0914***	-0.0804***	0.1014***	1		
6. Firm age (log)	0.0564***	0.4121***	0.0117	0.0556***	-0.0478**	1	
7. Firm size (log)	0.2574***	0.0028	-0.0412***	0.2731***	0.2953***	0.1861***	1

\* p < .10; \*\* p < .05; \*\*\* p < .01

Source: Authors' analysis

**Table 3. Estimation results**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
Management practice	1.349*** (0.107)		1.232*** (0.118)
Management experience	0.011** (0.005)	0.015*** (0.005)	
Female CEO	0.328*** (0.104)	0.085 (0.203)	0.201* (0.119)
Management experience x Female CEO		0.017* (0.010)	
Management practice x Female CEO			0.446** (0.215)
R&D	1.263*** (0.110)	1.581*** (0.105)	1.268*** (0.107)
Foreign ownership	-0.003 (0.002)	-0.003* (0.002)	-0.003* (0.002)
Firm age (log)	0.237*** (0.083)	0.218*** (0.082)	0.297*** (0.074)
Firm size (log)	0.065** (0.032)	0.135*** (0.031)	0.050 (0.032)
/cut1	3.208 (0.350)	3.213 (0.351)	3.096 (0.348)
/cut2	3.809 (0.352)	3.790 (0.353)	3.706 (0.350)
Country (var(_cons))	0.463 (0.263)	0.461 (0.262)	0.472 (0.267)
Country > Industry (var (_cons))	0.050 (0.035)	0.057 (0.036)	0.042 (0.032)
Wald $\chi^2$	459.82	350.93	484.66
Prob > $\chi^2$	0.0000	0.0000	0.0000
	LR test vs. ologit model: $\chi^2 = 179.53$	LR test vs. ologit model: $\chi^2 = 195.09$	LR test vs. ologit model: $\chi^2 = 197.9$
	Prob $\geq \chi^2 = 0.0000$	Prob $\geq \chi^2 = 0.0000$	Prob $\geq \chi^2 = 0.0000$
Observations	3,799	3,746	3,974

Standard errors in parentheses. \* p < .10; \*\* p < .05; \*\*\* p < .01

Source: Authors' analysis

dominated profession. This research contributes even more significantly to gender equality by validating the capabilities of women in ASEAN, where gender equality is still a social struggle.

Researchers have looked at both inbound and outbound factors that affect innovation and how it turns out, such as practices and experience as a leader. The increasing number of female CEOs worldwide illustrates the importance of female leadership. Female CEOs have unique qualities, and much research has been done on how well they do their jobs. This paper looks at how management practices and the experience of top executives affect innovation in ASEAN countries. In addition, the moderating role of female CEOs is being investigated to provide insights into female

leadership. The results discussed in the preceding section provide insightful practical and theoretical implications.

The following original and novel conclusions can be drawn:

**Management experience:** first, the paper shows that management experience is linked to new product development of firms in the manufacturing sector. In innovation activities, internal resources make it easier to come up with new ideas and put them into action. Managers' knowledge, skills, capabilities, and relationships are referred to as "management experience." The paper adds to the literature and social capital theory about how internal resources in business operations can affect entrepreneurship and innovation (Nasution et al., 2011; Parida et al., 2012).

**Management practices:** secondly, managers make decisions to adjust the management structure or create a new management structure, which will have a positive effect on innovation. Positive management practices are driven by organizational innovation, which has a positive impact on innovation activities (Çakar & Ertürk, 2010; Jung et al., 2003).

**Female CEOs:** thirdly, female CEOs have a positive moderating impact on the management experience/management practices—innovation relationship. This has important implications for corporate boards and policymakers, and it stresses how important it is to get more women on corporate boards so that diversity can be used to its fullest. They bring a wide range of values, perspectives, backgrounds, and skills to the board (Al-Qahtani & Elgharbawy, 2020). This shows that female CEOs can manage innovation and creativity well in ASEAN businesses. The results of this study may help dispel stereotypes about how hard it is for women to succeed in a field like innovation (Suseno & Abbott, 2021). The results from this study match the results of previous studies done in Europe using other data sources (Javaid et al., 2021; Prabowo & Setiawan, 2021). It helps reduce gender discrimination in the workplace, especially at the senior management level. Stephan and El-Ganainy (2007) found that most people in this position are men, especially when the work involves technology and new ideas.

In addition, regarding control variables, R&D activities, company size, and age of enterprises also have a positive impact on the innovation activities of enterprises.

Fourthly, **R&D activities** are currently very effective and necessary to increase business efficiency. R&D activities are costly, requiring capital, human resources, and infrastructure, making investment difficult. Furthermore, businesses are hesitant to invest in R&D activities because they fear taking risks and not knowing whether they will succeed. The results of this study show that the cost of R&D helps businesses make their innovation activities more effective (Shaikh & O'Connor, 2020). As a result, it is necessary to spend money on R&D activities, and it is necessary to have an available budget for R&D activities, followed by marketing activities to raise customer awareness about the business's innovation activities (Papanastassiou et al., 2020).

**Firm size**, fifthly, also plays an important role in managing and promoting enterprise innovation activities (Nielsen & Huse, 2010). In particular, we find that smaller firms are less likely to innovate compared to larger firms.

**Firm age**, lastly, has a positive impact on firm innovation. Our results suggest a robust positive correlation between firm size and innovation as shown in previous studies (Dezsö & Ross, 2012).

## 6. Contributions

To carry out innovation activities effectively, the most important thing still comes from internal resources, including the skills and experience of the management, innovative management practices, female CEOs, and R&D activities conducted by skilled staff. Several practical implications can be drawn from this study. First, the role of female CEOs is recognized, and they also make

significant innovations in their management decisions. Therefore, it is advisable to choose a female CEO, even in the fields of technology and science, which have been previously only in charge of males. Furthermore, while female CEOs are new and necessary, those who have management and practical experience will indeed result in successful innovation activities. The findings of this study have a significant impact on women's trust in their abilities, particularly in ASEAN countries. This study's findings will clearly show how to change stereotypical views about female managers, particularly in innovation activities. Furthermore, women-owned businesses will gain confidence in their management roles. Assuming they are qualified through prior experience and training in management, female CEOs play an equally crucial role compared to their male counterparts. This significantly reduces the disparities in women's and men's perceptions of the management role. Thus, the salaries, bonuses, and benefits of female CEOs should be the same as those of male CEOs (Bugeja et al., 2012). Like males, they need to be given the opportunity to learn and develop their abilities.

Second, this research shows that businesses in ASEAN with both management practices and experience do well in innovation activities. It bolsters faith that companies will keep investing in innovation, and that such efforts will eventually be successful as a result of the aforementioned accumulation of experience. In light of this, leaders should keep going even if an innovation activity they have just launched does not bear immediate fruits. In line with the external literature on technical innovation, which contends that many innovative ideas and skills emerge from external sources, it may be said that knowledge is the impetus for the adoption of new management approaches. This could be helped by managers who improve their specialized knowledge and keep it up-to-date with new information. As highlighted by Bogers et al. (2019) and Zahra (2021), the development of managers' knowledge will be enhanced by information from specialized magazines, large market research firms, and technological know-how.

Third, R&D serves as the primary platform for achieving higher innovation capability and, subsequently, economic independence. However, R&D requires a substantial financial investment in people as well as in facilities (Sarpong et al., 2022). Foresightful R&D investment choices and management that keep up with trends require that even leaders keep up with new information in their respective fields.

Finally, innovation is also strongly influenced by the firm age and firm size. Indeed, big and established businesses often have more financial and human resources for innovation. Since they will have a big effect on how well local innovation and the business and production sector work, the state needs to support these businesses so that they can be the engine of innovation development. This will then assist small and new enterprises in innovation efforts.

## 7. Limitations and future research

This study relies on huge cross-sectional data, so it would be interesting to see if the same holds for longitudinal data in follow-up studies. It is important to keep in mind that the primary focus of this research was on ASEAN's manufacturing sector. Research in the future could examine if the same holds for firms in the service industry.

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### Author details

Bich Ngoc Do<sup>1</sup>  
ORCID ID: <http://orcid.org/0000-0002-9391-0534>  
Van Dung Nguyen<sup>1</sup>  
E-mail: [dungnv@ueh.edu.vn](mailto:dungnv@ueh.edu.vn)  
ORCID ID: <http://orcid.org/0000-0002-3800-909X>  
Minh Thi Hong Le<sup>1</sup>  
ORCID ID: <http://orcid.org/0000-0003-2698-6552>  
Hai-Ninh Do<sup>1</sup>  
ORCID ID: <http://orcid.org/0000-0002-2630-0146>

Thi Truc Ly Pham<sup>1</sup>

ORCID ID: <http://orcid.org/0000-0002-0560-8029>

<sup>1</sup> Institution Organization: School of International Business and Marketing, University of Economics Ho Chi Minh City (UEH), Ho Chi Minh city, Vietnam.

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