The impact of access to finance and business environment on firm innovation in Vietnam: Moderating role of working experience of top manager

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ABSTRACT

Innovation enables organizations to swiftly adapt to market dynamics, technological advancements, and the competitive environment, hence augmenting their competitive edge. Innovation endeavors provide challenges due to their substantial financial requirements, business environment, and the need for proficient management. This research examines the role of the business environment and access to finance in influencing firm innovation effectiveness, encompassing organisational innovation and product innovation, both individually and as a simultaneous combination of both innovation activities. The business environment comprises four factors such as business licensing and permits, corruption, customs and trade regulations, and an inadequately educated workforce. Additionally, this study explores the moderating role of manager working experience in accessing finance and firm innovation. The research used a large dataset of firm-level data (996 observations) from 2006 to 2016 in the World Bank Enterprise Survey specifically extracted for the Vietnamese market. The research methodology employs multinomial probit models to analyze datasets with layers of distinct financial access levels, including minor, moderate, significant, and severe obstacles, combined with alternate testing of four business environment factors. The research results highlight limitations in financial access at different levels, leading to a reduction in both organisational and product innovation. Customs emerge as the most significant barrier in the business environment for all levels of financial access, followed by licensing and permits, corruption, and the labor workforce as obstacles at varying degrees of financial access. Managerial working experience has mitigated obstacles to financial access for both organisational and product innovation. The study outcomes contribute to both theory and management implications.

1. Introduction

Innovation capability is essential for businesses seeking to contend with larger and more resource-rich rivals. Innovation enables firms to successfully adapt to changes in the marketplace, technology, and competitiveness (Ferreira, Coelho, & Moutinho, 2020); it additionally strengthens their competitive edge (Debbarma, Choi, Yang, & Lee, 2022); and increases productivity (Martin-Rojas, Garcia-Morales, & Gonzalez-Alvarez, 2019). When

comparing the innovation activities of Vietnamese enterprises with those of other countries will show the gap that Vietnamese enterprises need to strive for. In 2021, Vietnam's economy ranked 44th globally on the Global Innovation Index (GII), better than Thailand but around 5 points behind Malaysia among emerging nations (see Figure 1). The global innovation index for Vietnam from 2018 to 2021 is depicted in Figure 2; over these years, there was hardly any variation (see Figure 2). This indicates that Vietnamese enterprises could encounter specific challenges. However, innovation is essential for fostering economic development and enhancing competitiveness in the global market (Mendoza-Silva, 2021). Hence, the research investigates the determinants influencing the innovation endeavors of enterprises in the Vietnamese market throughout recent years.

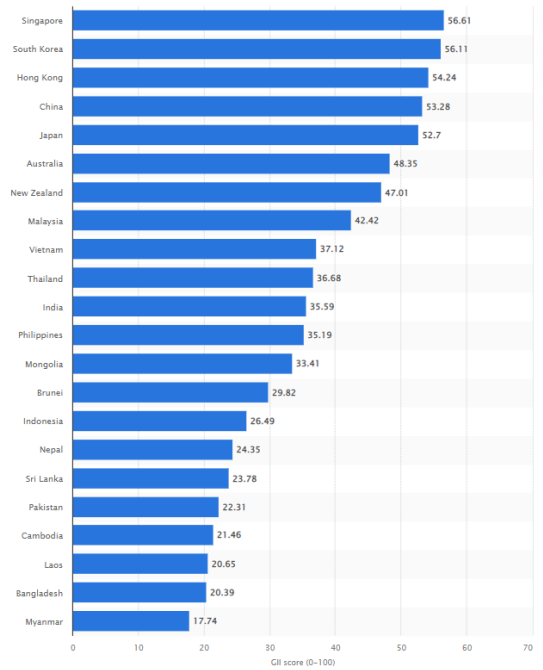

Figure 1. Global Innovation Index (GII) scores in Asia Pacific in 2020

Sources: Statista (2022)

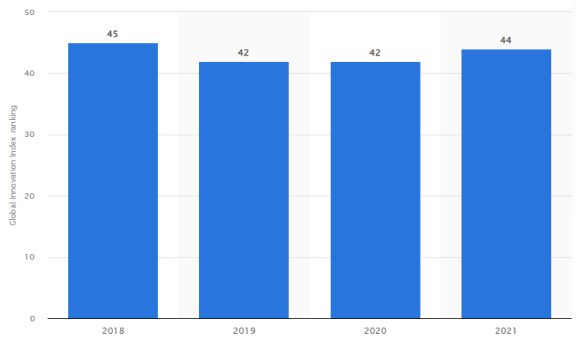

Figure 2. Global Innovation Index Rankings of Vietnam 2018 - 2021

Sources: Statista (2022)

Previous research has shown that different aspects of the business environment have an impact on firms' innovation (World Bank, 2022; Zhao, Yi, Zhan, & Guo, 2022), as well as highlighting the obstacles related to accessing capital that hinder such innovation (Beck & Demirguc-Kunt, 2006; Kim, Tran, La, & Nguyen, 2019). The business environment

encompasses both internal variables, such as personnel, management, and facilities, as well as external ones, such as regulations, tariffs, and corruption (Zhao et al., 2022). All of these elements have an influence on innovative activity. In addition, innovation activities primarily revolve around engaging in research and development endeavors to create novel products (Adu-Ameyaw, Danso, Hickson, & Lartey, 2022), which involve reorganizing the business to effectively respond to alterations (Wu & Huang, 2022), attracting exceptionally skilled personnel and procuring necessary equipment. Accomplishing this task requires access to potentially large resources from both governments and financial (Chundakkadan & Sasidharan, 2020). The ability of businesses to mobilize capital is very important to promote innovation activities. However, previous studies only considered the potential impact of the business environment and access to financial factors on business innovation activities individually. Given that a business is confronted with business environmental factors while simultaneously striving to obtain capital, how might the organization's innovation endeavors be affected? Prior research on the innovation activities of Vietnamese businesses has been disregarded to address this particular concern. This research will be devoted to comprehending this.

Due to difficulties in accessing finance, it is important to wonder whether having an experienced manager makes a difference. Experienced managers can evaluate risks and profitability when seeking financial resources for innovation projects, ensuring sustainability in capital use (Grama-Vigouroux, Saidi, Berthinier-Poncet, Vanhaverbeke, & Madanamoothoo, 2020). They often have good networks with banks, investors, and strategic partners, which allows them to make smart capital access options based on market developments (Shou, Shao, & Wang, 2023). In addition, the ability of experienced managers to adapt to fluctuations in the business and financial environment will help manage capital for innovation initiatives effectively as market and financial conditions change quickly (Davila, Epstein, & Shelton, 2013). It is therefore important to better understand the regulatory role of experienced managers, which will assist in the selection and placement of appropriate senior personnel to pursue innovation goals in the future.

This study draws upon data derived from the World Bank Business Survey (WBES), renowned for its comprehensive insights into innovation in Vietnam. The primary aim is to analyze the impact of both the business environment and financial accessibility on the innovation activities of businesses in Vietnam. Furthermore, the study endeavors to investigate the variations in these factors based on the size of the businesses, specifically large, medium, and small enterprises. The research also evaluates the regulatory role that experienced managers play in the strategic management of enterprises regarding access to capital for innovation initiatives. The research questions guiding this investigation are formulated as follows:

- To what extent does access to finance influence firm innovation (product innovation, product and organizational innovation, and organizational innovation)?

- To what extent do factors of the business environment affect firm innovation (product innovation, product, and organisational innovation, organisational innovation)?

How is the moderating role in the working experience of a top manager related to the relationship between access to finance and firm innovation?

2. Literature review and hypotheses development

Innovation is crucial for organisations, but it needs a substantial investment of resources and a lengthy period to provide returns (Davila et al., 2013). Access to funds is challenging due

to the uncertainty of the outcome and the intangible asset (Gennaioli, Shleifer, & Vishny, 2012). In addition, legal issues, such as the inability to secure the copyright of innovative goods and ideas, as well as the relatively high prevalence of corruption in Vietnam, contribute to the lack of required skills within the workforce to approach and implement new production methods or develop new goods (Beck & Demirguc-Kunt, 2006; Chundakkadan & Sasidharan, 2020). The company's scale is also a concern for investors (Ferreira et al., 2020). Moreover, the capacity and expertise of senior management to manage funds invested in productive innovation is a factor in the consideration of banks (Gennaioli et al., 2012; Ghosh, 2022). This paper considers the relationships between financial constraints, business environment, and firms' innovation; furthermore, the moderating role of top-manager experience is also examined. The following sections present the hypothesis arguments linked with the research objectives.

2.1. Access to finance obstacles and innovation

Firms' innovation has long been argued to be a vital source for organisations to sustain competitive advantages and business growth. A vast number of prior studies agreed that firms' innovation acts not only as a driver for business success (Zhang & Chen, 2020) but also for consumers and the whole national economic growth (Mendoza-Silva, 2021). Innovation can be new approaches, methods, outputs, models, or means of collaboration among organisations (Zhang & Chen, 2020). There are three types of innovation, including product, process, and organisational innovation (Ganzer, Chais, & Olea, 2017). Product innovation refers to the improvement and abilities of new product introduction (Cozzarin, 2017). Process innovation refers to the ability to implement new methods within organisation (Lloyd-walker, Mills, & Walker, 2014). Organisational innovation refers to implementing new business models and new management to respond to the external environment. As suggested by Ramirez, Parra-Requena, Ruiz-Ortega, and Garcia-Villaverde (2018), product and organisational innovation are two parts of a firms' innovation that interact and nourish by external information. Following, product and organisational innovation are used to measure the firm's innovation.

The relationship between financial availability and firms' innovation received scholarly interest according to the number of publications since the 2000s. Financial constraints refer to firms' inability to retain their cash flow (Pellegrino & Savona, 2017) and access the credit market (García-Pérez-de-Lema, Ruiz-Palomo, & Diéguez-Soto, 2021), further triggering the current firms' investment plan. Evidences from emerging and Asia countries confirmed the direct impact of access to finance and firms' innovation, such as Park, Song, Yoon, and Kim (2014). Product innovation consists of several stages, from research and development to commercialisation. Firms' inability to access sufficient cash flow triggers investment discontinuity for new projects (Ünlü & Alshebami, 2022). Wu and Huang (2022) exteneded the explanation of the obstacles in the commercialisation stage and the success of the innovation outputs. However, evidence taken from the Chinese market shows the bright side of financial constraints towards innovation efficacy. Agreeing with the shortages of finance will limit the firms' efforts in R&D and other phases, yet, firms with limited funds are likely to be more serious when deciding on investment projects compared to good cash-flow firms (Adu-Ameyaw et al., 2022). From the management aspect, the management board must evaluate all the projects carefully and proceed with deeper analysis to invest funds. It, in turn, will generate a greater success rate for innovative applications. Bringing it all together, the first hypothesis is generated as follows.

H1: Access to finance obstacles is associated with an increase in firm innovation ((a) Product innovation, (b) Product and Organisational innovation, c) Organisational innovation)

2.2. Business environment obstacles and innovation

Business environment refers to the setting in which firms are operating, and it would have a significant effect on the organisational performance (Wang, Zhang, Sun, & Zhu, 2016). Business environment obstacles pose difficulties for firm innovation. External environments are uncontrollable factors. Various policy instruments such as business licensing and permits, customs and trade regulations, labour requirements, and tax administration present government interventions in business operations and innovation activities (Zhuang, Ke, & Wang, 2019), especially product innovation. Specifically, the policies represent enormous challenges for firms in new product innovation and commercialisation, especially regarding regulations and documentary requirements. Besides, other external uncertainties would pose daunting challenges for businesses such as unfair competition, political instability, corruption, crime, theft, and disorder. On the other hand, the internal business environment also triggers the business growth. The internal environment includes factors that arise from the firm's business operations. Some studies figure out that limited capabilities to access resources or infrastructure such as land, transportation, and electricity are major constraints of business operations (Chavis, 2010; Wang et al., 2016). Several studies suggest other obstacles such as offering adequate training for human resources (Lee, Sameen, & Cowling, 2015).

When it comes to firms' innovation, it is highly impacted by the factors existing in the business environment. For instance, the number of days with custom clearance would affect firm performance. Difficulties coming from corruption and numerous days with customs clearance would hinder initiatives (Zhuang et al., 2019). Also, a poor labour force would stagnate performance improvement. However, such obstacles, in some circumstances, would also encourage innovative firms to move toward innovation. A study by Chundakkadan and Sasidharan (2020) revealed that licensing and permission systems improve intellectual property protection, which, in turn, reduces sunk costs of the initial stages of innovation. This creates a better legal environment and motivates firms to research and develop new products. complicated procedures, corruption, and inadequate labours require the firms to innovate existing organisational structures and develop more effective ones.

In a newly industrialised country like Vietnam, most firms tend to be flexible and innovative to adapt to market uncertainties. Vietnam follows a collectivist orientation in terms of cultural values. Employees tend to have a higher emotional commitment. When organisations suffer hard times, these attachments can encourage teamwork and internal collaboration Triguero-Sánchez, Peña-Vinces, and Ferreira (2022) explore and test alternative ideas. Additionally, the index of uncertainty avoidance in the ASEAN market is low to moderate level (from 30 to 64 according to Hofstede score) (Hofstede-Insights, 2023). The innovation can be improved according to (Mendoza-Silva, 2021). Taken together, the second hypothesis is proposed as follows.

H2: Business environment is associated with an increase of firm innovation ((a) Product innovation, (b) Product and Organisational innovation, c) Organisational innovation)

2.3. Moderator: Experience of top manager

The top manager is a vital contributor to strategic decision-making, especially during uncertainty. Under pressure of environmental obstacles and uncertainty, top managers play a vital role in strategic decision-making. Innovation is key to business survival, especially during uncertainty (Zhang & Chen, 2020). In the study of Davila et al. (2013), the execution of

inventive new ideas, seizes the initiative in innovation-related activities inside the company, and contributes to the overall transformation of running a business. CEO keeps an eye on corporate operations, from human to goods, researching and collecting ideas, and then sifting, executing, and assessing the most successful ideas (Grama-Vigouroux et al., 2020). An experienced top manager will identify the problem, create a budget to help managers solve the financial problems, find the right solution to reduce costs or meet with a counselor to discuss the feasible solution (Hoang & Xie, 2023). In addition, they also can build political connections to help alleviate higher-level financial impediments (Xu, Wu, & Cavusgil, 2013). To a larger extent, politically connected senior managers will be able to help solve difficult financial problems. The strong relationships with local authorities at different levels might reduce the time consumption for managers when searching and locating resources availability in urgent.

Furthermore, CEOs with rich experience might understand the employees' expectations and traits, which helps them provide contingent and appropriate rewards to inspire their followers engaging with the working process. The evidence found in some papers suggested that CEOs can be actors who deal with both the business environment and transfer possible Opportunities and threats to business outcomes (Peng, Tan, & Zhang, 2020). Hence, the final hypothesis is generated to clarify the important differences in factors affecting innovation activities:

H3: Top manager working experience moderates the relationship between access to finance obstacles and ((a) Product innovation, (b) Product and Organisational innovation, (c) Organisational innovation)

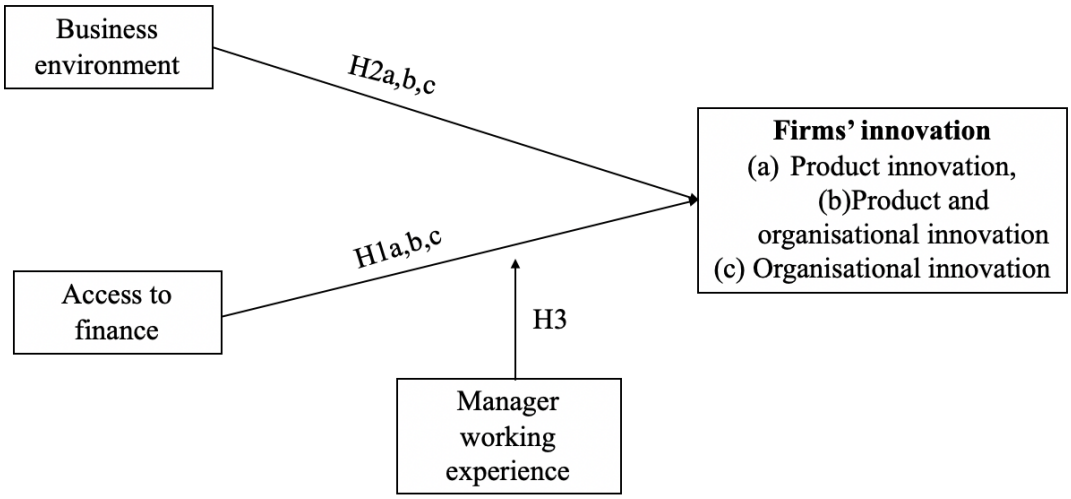

Figure 3. Research model

3. Methodology

3.1. Data collection and questionnaires

This study uses the 2015 Vietnam Enterprise Survey (Manufacturing Module) conducted by the World Bank. The investigation is based on responses from 996 companies that were chosen via a method known as stratified random sampling. It also includes a wide range of aspects of the environment in which businesses operate.

This survey has three stages of stratification: industry, establishment size, and region. At the industry stratification stage, the universe was segmented into five manufacturing industries and two service industries: 'Food and Beverages (ISIC Rev. 3.1 code 15), Garments (ISIC code 18), Non-metallic mineral goods (ISIC code 26), Fabricated metal products (ISIC code 28),

Other Manufacturing (ISIC codes 16,17, 19-25, 27, 29-37), Retail (ISIC code 52), and Other Services (ISIC codes 45, 50, 51, 55, 60-64, and 72)'. At the establishment size stratification stage, categories were used to determine size stratification in accordance with the specified definition for the rollout: small (five to nineteen workers), medium (twenty to ninety-nine employees), and big (more than 99 employees). The number of workers who were reported as being permanent and full-time was used to determine the employee count for the purposes of stratification. This seems to be an adequate definition of the labour force, given that seasonal, casual, or part-time work is not a frequent practice. The only exceptions to this are the construction and agriculture industries, both of which are excluded from the survey. At the region stratification stage, there were: '(1) Red River Delta, (2) North Central Area and Central Coastal Area, (3) South East, and (4) Mekong River Delta'.

3.2. Variables

The simultaneous presence of all three innovation activities, including product innovation, organisational innovation, and a combination of the two, were anticipated. Besides, the scale of businesses, including medium, and large firm size, was considered. Four different capital constraints (minor, moderate, major, serve), with four different environmental factors (licensing, corruption, customs, workforce), and two types of business ownership (private domestic, and private foreign) were examined. Therefore, there are 14 factors affecting the innovation of enterprises. The survey provided us with important data on enterprises' innovations of trade policy in business environment quality and access to financing, as well as the change in perceptions of these factors over the course of time in Vietnam. The following is a description of the specifics of several measuring tools. The details of each variable are shown in Table 1.

Table 1

Description of measurement instruments

Variables	Description
Independent variables 1 **Financial Access Obstacles**	Measuring the level of obstacles to access finance in the organisation. There are four levels of obstacles: Minor obstacle, Moderate obstacle, Major obstacle, and Very severe obstacle with 04 independent variables: (1) minor_financeobstacle; (2) moderater_financeobstacle; (3) major_financeobstacle; (4) severe_financeobstacle
Independent variables 2 **Business Environment**	Measuring a set of business environment factors, including business licensing and permits, corruption, customs and trade regulations, and inadequately educated workforce with 10 independent variables: (5) biggest_ocstacle_licensing; (6) biggest_ocstacle_corruption; (7) biggest_ocstacle_customs; (8) biggest_ocstacle_workforce; (9) mediumsize_sampling;

Variables	Description
	(10) largesize_sampling; (11) Precentage_byPrivateDomestic; (12) Precentage_byPrivateForeign; (13) EXP6to10MINORfinanceobstacle; (14) EXP6to10MODERATEfinanceobstacle.
Dependent variable category 1 **Product innovation**	Measuring the possibility to introduce new or significantly improve products or services.
Dependent variable category 2 **Product and Organisational innovation**	Measuring the possibility to introduce new or significantly improve products or services and new or significantly improve the organisational structures or management practices.
Dependent variable category 3 **Organisational innovation**	Measuring the possibility to introduce new or significantly improve the organisational structures or management practices.
Dependent variable category 4 (for reference) **No innovation**	Measuring the possibility **to not introduce** new or significantly improve products or services or new or significantly improve the organisational structures or management practices.

Control variables: Firm size, firm owned

We use firm size and firm ownership as control variables. The size is calculated as the log of the number of employees in the firm. Size stratification is defined following the standardised definition for the rollout: small (05 to 19 employees), medium (20 to 99 employees), and large (more than 99 employees), received from A.6 of the questionnaire.

Firm ownership includes four types: private domestic individuals, companies or organisations, private foreign individuals, companies or organisations, government or state, and others, received from B.2 of the questionnaire 'What percentage of this firm is owned by each of the following?'.

3.3. Methodology: Multinomial probit model vs multinomial logit model

In this study, firm innovation is considered as introducing new or significantly improved products or services or/and introducing any new or significantly improved organisational structures or management practices during the last three years. Therefore, our dependent variable includes four particular categories: (1) Product innovation; (2) Product and organisational innovation; (3) Organisational innovation; and (4) No innovation. This study focuses on testing hypotheses with the first three categories whereas the fourth one - No innovation will be included as a reference. In this case, as the dependent variable is categorical and unordered, the multinomial probit and logit models are most commonly used.

The combination of two discrete and random binary variables which represent Product innovation and Organisational innovation gives 04 outcomes with a structure of dependent variables between arbitrary states, which can be written as:

$$q = f(q_k^* = \max(q_a^*, \forall a \in \Omega), \quad (1)$$

$$p = f(p_t^* = \max(p_p^*, \forall p \in \Theta), \quad (2)$$

Where and represent respectively the (unobservable) utility of the n^{th} choice q in (Product innovation or not) and of the n^{th} choice p in (Organisational innovation or not); q and p are the discrete random variables; f(.) is the indicator function. Given (1) and (2), we have 4 mutually exclusive states of pair (q, p) as presented in the following table 2 where $v_1^*, v_2^*, v_3^*, v_4^*$ represents the measure of the value (or level of utility) associated with the four states indices 1 to 4:

Table 2

Structure of the dependent variable

q	p	State(s)	Utility
1	1	1	V_1^*
1	0	2	V_2^*
0	1	3	V_3^*
0	0	4	V_4^*

Model specifications can be chosen based on the covariance structure within ('within') and between ('across') and which can generate competing utility maximisation models:

(1) A (separate) univariate binary model (logit or probit) for each of these 02 decisions and whether they are binary and independent.

(2) A system of two bivariate equations (biprobit) that allows covariance (interdependence and simultaneity) between and if they contain only 02 elements (Product innovation or not and Organisational innovation or not, for instance).

(3) A multinomial simultaneous discrete choice model (multinomial logit model and multinomial probit model) that allows for simultaneity between decisions (e.g., (1) Product innovation only; (2) Product and organisational innovation; (3) Organisational innovation only; (4) No innovation).

In this research, the multinomial logit model is eliminated because of:

(1) With the often-erroneous Independence of Irrelevant Alternatives (IIA) assumption (i.e., the ratio of the probabilities of any two categories must be independent of the other available categories) (Cheng & Long, 2007), a property of the multinomial model is not necessarily respected. However, the multinomial probit model is computationally intensive but relaxes the IIA assumption.

(2) R-squared, the proportion of variance for the response variable explained by the predictors, is a goodness-of-fit measure often used in Ordinary Least Squares (OLS) regression. However, logistic regression is not equivalent to the R-squared found in OLS regression, which minimizes the squared differences between the predictions and the actual values of the predicted variable (Cameron & Windmeijer, 1997).

Some variants of pseudo-R-squared statistics can express the goodness-of-fit of the logistic regression model. McFadden, Kiser, and DeGroot (1973) suggested an alternative, known as the "likelihood-ratio index" or McFadden's pseudo R-squared, comparing a model without any predictor to a model including all predictors, based on the log-likelihood kernels for the intercept-only model and the full estimated model. McFadden's pseudo R-squared is defined as one minus the ratio of the log-likelihood with intercepts only and the log-likelihood with all predictors. If the slope parameters are all 0, McFadden's pseudo-R-squared is 0, but it is never 1, and the values of 0.2 to 0.4 for a McFadden's pseudo-R-squared represent an excellent fit.

The Likelihood-Ratio (LR) statistic, which follows the chi-square distribution, measures the goodness-of-fit of the multinomial probit model. This test compares the restricted model (only constant) with a model including all independent variables (unrestricted model). If the LR statistic is significant, we conclude that the inclusion of independent variables results in a better fit (Greene, 2012).

In fact, with our data, the multinomial logit model has Pseudo R^2 of 0.0682, which ranges from 0.2 to 0.4, indicating a not good model fit. On the other hand, the multinomial probit model uses the LR statistic for assessing how well the chosen model parameters explain the observed data. In fact, the LR statistic of the multinomial probit model is statistically significant (= -968.71017 with Prob > chi^2 = 0.0000, see Table 4), which means the multinomial probit model with all independent variables is a better fit (Dow & Endersby, 2004). Therefore, the multinomial probit model, which provides more accurate estimations than the multinomial logit model, is chosen for the analysis.

4. Result and discussion

The study results must be clear and concise. Use an appendix or additional documentation if needed.

4.1. Descriptive statistics

Table 3 shows the descriptive statistics, for the period 2006 - 2016. There are 996 observations, the variable innovation has four categories, the variable financial obstacles has four levels, the business environment variable has four types, the firm size variable has two types, and the owner type variable has two types.

Table 3

Variables description

Variable	Obs	Mean	Std. Dev.	Min
innovation	996	3.112	1.236	1
minor_financeobstacle	996	0.229	0.420	0
moderater_financeobstacle	996	0.164	0.370	0
major_financeobstacle	996	0.069	0.254	0
severe_financeobstacle	996	0.024	0.153	0
biggest_ocstacle_licensing	996	0.005	0.071	0
biggest_ocstacle_corruption	996	0.032	0.176	0
biggest_ocstacle_customs	996	0.029	0.168	0
biggest_ocstacle_workforce	996	0.150	0.357	0
mediumsize_sampling	996	0.345	0.476	0
largesize_sampling	996	0.264	0.441	0
Precentage_byPrivateDomestic	996	90.728	26.615	0
Precentage_byPrivateForeign	996	7.099	24.829	0
EXP6to10MINORfinanceobstacle	996	0.054	0.227	0
EXP6to10MODERATEfinanceobstacle	996	0.039	0.194	0

4.2. Multinomial probit regression

In this study, financial constraint is classified into four groups, including minor, moderate, major, and severe obstacles. The results show that all different levels of financial constraints show significant and positive relationships with both product and organisational innovation activities. The minor obstacles pose a more significant impact on Product Innovation ($\beta = 0.516$, $p < 0.01$) while the moderate obstacles have a direct impact on either Product Innovation ($\beta = 0.584$, $p < 0.01$) or Organisational Innovation ($\beta = 0.834$, $p < 0.01$). On the other hand, the major and severe constraints are strongly associated with the product and organisational innovations ($\beta = 1.066$ ($p < 0.01$) and $\beta = 1.611$ ($p < 0.01$), respectively).

Among business environmental factors, the analytical results show that both external and internal factors have some relations with different types of innovation. Specifically, customs and trade regulations indicate a significant relationship with firms that have either product innovation ($\beta = 1.236$, $p < 0.01$) or organisational innovation ($\beta = 1.114$, $p < 0.05$) or firms that have both two types of innovation (with $\beta = 0.989$, $p < 0.05$). Corruption is strongly associated with both product and organisational innovations ($\beta = 0.872$, $p < 0.05$), but reveals insignificant linkage with one type of innovation. Obstacles from workforce management have a positive relationship with organisational innovation ($\beta = 0.773$, $p < 0.01$) and insignificant nexus with the other innovation types. Interestingly, licensing and permission for business operations illustrate minor effects on innovation ($p < 0.1$).

In terms of the moderator, the experience of a top manager has an impact on minor and moderate financial obstacles and innovation. Specifically, Experiences Top Manager moderates to reduce the impact of minor financial obstacles to (2) Product and organisation innovation ($\beta = -1.222$, $p < 0.05$) and (3) Organisation innovation ($\beta = -1.038$, $p < 0.1$). Experiences Top Manager moderates to reduce the impact of moderate financial obstacles to (2) Product and organisation innovation ($\beta = -1.179$, $p < 0.1$), and does not affect residual levels of financial obstacles and innovation.

In the case of the control variable, Firm Size, only large firm size has a positive effect on (1) the Product innovation ($\beta = 0.499$, $p < 0.01$), (2) Product and organisation innovation ($\beta = 0.875$, $p < 0.01$), and (3) Organisation innovation ($\beta = 0.944$, $p < 0.01$). Medium firm size has a positive effect on (2) Product and Organisation innovation ($\beta = 0.655$, $p < 0.01$), and (3) Organisation innovation ($\beta = 0.521$, $p < 0.05$), other firm size types do not affect innovation. Thus, the impact of large firm size on innovation is generally more significant than that of medium firm size. In the case of the control variable, legal status does not affect any kind of firm innovation.

In the case of the control variables, firm ownership, only both Private Domestic and Private Foreign have negative effect on (2) Product and Organisation innovation ($\beta = -0.014$, $p < 0.05$; $\beta = -0.026$, $p < 0.01$); other firm owned types do not affect innovation. Thus, firm ownership surprisingly reduced innovation consequences (see Table 4).

Table 4

Multinomial probit regression

	(1)	(2)	(3)
VARIABLES	**Product innovation**	**Product and Organisational innovation**	**Organisational innovation**
minor_financeobstacle	0.516***	0.423**	0.461**
	(0.174)	(0.209)	(0.222)
moderater_financeobstacle	0.584***	0.602**	0.834***
	(0.201)	(0.236)	(0.246)
major_financeobstacle	0.454*	0.884***	0.577*
	(0.260)	(0.272)	(0.325)
severe_financeobstacle	1.066***	1.611***	0.634
	(0.408)	(0.416)	(0.623)
biggest_ocstacle_licensing	1.528	1.404	1.735*
	(0.931)	(1.018)	(1.007)
biggest_ocstacle_corruption	-0.145	0.872**	0.195
	(0.403)	(0.371)	(0.480)
biggest_ocstacle_customs	1.236***	0.989**	1.114**
	(0.363)	(0.451)	(0.462)
biggest_ocstacle_workforce	0.243	0.352	0.773***
	(0.183)	(0.218)	(0.211)
mediumsize_sampling	0.186	0.655***	0.521**
	(0.152)	(0.189)	(0.210)
largesize_sampling	0.499***	0.875***	0.944***
	(0.171)	(0.213)	(0.223)
Precentage_byPrivateDomestic	-0.006	-0.014**	0.002
	(0.006)	(0.006)	(0.009)
Precentage_byPrivateForeign	-0.009	-0.026***	-0.001
	(0.006)	(0.008)	(0.009)
EXP6to10MINORfinanceobstacle	-0.387	-1.222**	-1.038*
	(0.309)	(0.571)	(0.550)
EXP6to10MODERATEfinanceobstacle	-0.493	-1.179*	-0.408
	(0.375)	(0.607)	(0.455)
Constant	-0.804	-0.788	-2.615***
	(0.626)	(0.644)	(0.882)
Observations	996	996	996
Wald chi2(42) = 125.55 Prob > chi2 = 0.0000 Log likelihood = -968.71017			

Notes: Standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1

5. Conclusions & recommendations

5.1. Theoretical implications

This study has four theoretical contributions. First, the results of this study offer empirical evidence to confirm the importance of access to capital for innovation performance. The influence of financial constraints is moderate to strong on firm innovation, which is consistent with previous studies and is clearly emphasized in Vietnam. Nguyen, Uong, and Nguyen (2020) discussed possible sources of credit, including internal finance, such as cash and retained earnings, or external resources like equity finance and debt finance of SMEs in Vietnam. The study found a positive linkage between new technology and credit accessibility. Financial resources are important to enable firms to leverage productive assets, enhancing productivity, and obtaining economies of scale (Chen, Xiao, Wang, & Ye, 2023). Supporting these arguments, the analysis results in this study show that all levels of financial constraints affect innovation activities, including product innovation, product and organisational innovation, and organisational innovation, except severe financial constraints and organisational innovation. In particular, for product innovation, the severe financial constraints have a strong impact, while the other levels have a moderate impact. For product and organisational innovation, major and severe financial constraints have a strong impact; the remaining levels have a moderate impact. Organisational innovation and moderate financial constraints have a strong impact, while other levels have moderate effects, and severe financial constraints show no effect. Organisations focusing on product innovation or both types of innovation activities seem to be under more significant influence from financial obstacles regardless of their level. Nevertheless, organisations facing fewer financial obstacles tend to pay attention to orgnisational innovation, whereas the ones with severe obstacles seem to neglect initiatives for managerial restructure. Insufficient funds will limit the capability of the firms, especially in hiring skillful labors, investigating cutting-edge technology, or conducting extensive R&D for innovation. Consensus findings are highlighted by Freel (2007) when they investigate small firms in Northern Britain, and by Mina, Lahr, and Hughesy (2013) in their study with UK and US firms. These studies discussed the extent to which financial constraints express their roles in different specific types of innovation. Conversely, successful innovation itself also opens doors for revenue generation and cost reduction.

Second, the study provides evidence of the different roles of the business environment in a firm's innovation operations for each specific activity and to varying degrees. Specifically, licensing strongly affects organisational innovation but not product innovation or both types of innovation. Licensing allows acquiring external technologies or methodologies, that are often intertwined with a need to reconfigure internal organisational processes and structures. Meanwhile, corruption has a strong impact on both product and organisational innovation but does not affect each innovation activity. That means the influence of corruption on innovation performance is more obvious with firms that conduct more types of innovation. Customs strongly influence all types of firm's innovation activity. As such, customs have a very important role in relation to innovation, and this is related to government policy. The workforce has a strong impact on organisational innovation but not on the other two types of firm innovation. It can be seen that organisational innovation is significantly more affected by environmental factors than other types of firm innovation. Hoang and Bui (2019) also provided empirical evidence on the significant role of the business environment, such as institution factors (policies and government roles) and marketing factors (market type, customer requirements, and supplier support) towards innovation capability. Vu and Hoang (2021) found a relationship between the

business environment and innovation persistence of Vietnamese SMEs. The findings emphasizing the role of the business environment imply that government should further improve innovation-related policies to foster innovation practices in Vietnamese enterprises, particularly SMEs with limited resources.

Third, this research enriches the literature by indicating how experienced CEOs might aid in easing financial pressures and fostering business innovation. Using data, two groups of experienced CEOs are created: group 1 includes CEOs with experience of less than one year, and group 2 includes CEOs without any data. The findings demonstrate that an experienced team may improve innovation by incorporating new goods and processes while lessening small and moderate financial situations (García-Pérez-de-Lema et al., 2021). The working experience of the top manager strongly influences decision-making in the context of minor financial constraints and product and organisational innovation. Meanwhile, the working experience of the top manager has a strong influence only when making decisions in the context of moderate financial constraints and product and organisational innovation. Thus, the experience of the top manager will help the business be more innovative when it has minor and moderate financial constraints. Supporting findings on the importance of leadership were also highlighted by Hoang and Bui (2019) in the study of innovation in Vietnamese electronic firms. Similar results are discussed in the context of other developing countries such as Pakistan service and manufacturing firms (Afsar & Umrani, 2020), higher education (Al-Husseini, El Beltagi, & Moizer, 2021), and high-tech enterprises in China (Chen, Liu, Gong, & Xie, 2021).

Finally, this study highlighted the importance of controlling variables, such as firm size and type of business ownership, that show a significant impact on firm innovation. The role of firm scale in moderating the linkage between innovation and firm performance has been discussed and confirmed in previous studies such as Kijkasiwat and Phuensane (2020), Li et al. (2023), Farooq, Vij, and Kaur (2021). Specifically, large-scale enterprises will certainly have better innovation activities, which will have a strong impact on product and organisational innovation. In the meantime, in the case of medium-sized enterprises, there is a relative impact on product and organisational innovation and organisational innovation. Regarding the type of business ownership, the results are relatively context-specific in Vietnam. Private enterprise or private foreign investment reveals a negative effect on innovation activity, specifically product and organisational innovation. This would be explained by the resource constraints at private firms that limit the innovative practices in those.

5.2. Managerial implications

This study is among the pioneer papers to provide quantitative analyses of perceived business constraints in Vietnam. This study contributes some important managerial implications. First, the study indicates that financial constraints have a positive linkage with firm innovation, regardless of the obstacle level. The results imply that understanding the sources of financial difficulties and accessing capital from either macro or micro perspectives will help solve the problem. From the point of view of policymakers, legal support will help businesses reduce administrative procedures to access capital. The government also needs to pay attention to these factors so that it can better support businesses and achieve a more efficient economy. Besides the fact that financial shortage is an antecedent to force the firms to work smarter and effectively implement innovative ideas in business practices, financial support is essential for further activities. Therefore, the study recommends a higher liberalization in the Vietnamese financial sector to facilitate financial access and create more favorable conditions for firms. From the

firm's perspective, the possibility of financial accessibility strongly relies on individual firm strategies. They may prioritize maintaining internal resources or seeking for external funding for innovative and pilot practices. Different firms should proactively employ diverse approaches to manage and secure financial health.

Second, in terms of the business environment factors, both external and internal ones should be solved. Since *customs* have such a significant impact on innovation, the government must have a very close relationship between customs policies and innovative enterprises. There is a close connection between the import and export of products, apparatus, and machinery, as well as other policies. *Corruption* affects the management level and is related to the product, so departments that overlap with these two positions or roles must be aware to increase the efficiency of innovation and prevent waste. Therefore, rigorous restrictions to lessen corruption will aid in the favourable direction of this inventive activity (Pu & Lam, 2021). The research on customs practices reveals that they affect all three categories of innovation. This demonstrates how administrative processes such as customs and even corruption hinder innovation. Additionally, it is critical to understand why corporations find customs a significant nuisance and how to lessen corruption (for example, by significantly raising salaries compared to living standards and enhancing people's capacity to amass money) (Frésard, Hoberg, & Phillips, 2019). Controlling the business environment, especially from an individual firm's perspective, is inherently challenging. This implies a practical suggestion for firms to devise various strategies to adapt to the dynamic and demanding environment. Firms should have strategic foresight, fostering adaptability and resilience so that they are able to respond flexibly to any coming risks and uncertainties in the market.

At the operational level, the focus should be placed on the *licensing* of innovative products and services. Therefore, businesses must focus on the registration procedure and use of copyrighted products and services to increase competition and exclusivity and reduce legal issues. The *workforce*, or highly skilled and experienced employees, have an impact on innovation at the managerial level. To encourage organisational innovation, it is necessary to have a transparent recruitment process and a conducive work environment. Companies, educational institutions, and the government must invest more in educating students and employees in high-level skills to satisfy employment needs. This would be good evidence to encourage firms in developing countries to do innovation even though the political and legal systems of those nations have not yet offered as good business conditions as expected.

Third, businesses will benefit from selecting an *experienced manager* when confronting financial difficulties in innovation activities, especially in cases of minor and moderate severity. Businesses must be prepared for the possibility of external support, such as from the government, in the event of a severe financial crisis. The discovery sheds light on methods used in human resource management. Experience or seniority, in particular, would be taken into consideration as one of the management selection factors for the implementation of innovation. The results also demonstrate how top managers' expertise aids in identifying capital-based restructuring strategies and integrating corporate restructuring with product development. As a consequence, besides selecting experienced CEOs, it is crucial to provide the future generation of CEOs with experience. These CEOs should actively contribute to the growth of the network on management innovation while also continuously gaining expertise from other CEOs in the same sector, whether they are local or international (Gu, Hu, Zhang, & Hou, 2021).

Last but not least, it can be seen that the innovation is demonstrated as more effective for medium and large enterprises than small businesses in Vietnam, which is appropriate in terms of financial resources, equipment, people, and vision. To be able to create the nudges and boost current innovation activity, it is necessary to focus on medium and large enterprises. Due to the dearth of resources required for effective innovation, the government must also devote greater attention to assisting small enterprises.

5.3. Limitations and future research

Although this paper proposes some interesting findings, there remain some limitations that offer opportunities for future research. First, this study is solely based on the cross-sectional data conducted by the World Bank. The future study should consider extending the scope to pursue a longitudinal study. Second, the authors only focus on the Red River Delta, North Central Area and Central Coastal Area, South East, and Mekong River Delta regions in Vietnam. Further study can extend the research scope to examine certain region clusters to explore cross-country findings. This study demonstrates the necessity of providing CEOs with more experience, but it does not demonstrate how to provide present and prospective CEOs with more experience. Therefore, future research may address this question. Since corruption and customs are two significant roadblocks to innovation, future research should concentrate on figuring out how to minimize corruption, simplify the administrative process at customs, and apply digitalization. Finally, scholars also might consider extending to different sectors such as service, and provide a better comparison of findings.

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