IMPACT OF FACTORS AFFECTING INNOVATION INTENTION OF ENTERPRISES IN NORTHERN MIDLANDS AND MOUNTAINS REGION OF VIETNAM

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Abstract: ***This study investigates the factors influencing innovation intention among enterprises in the Northern Midlands and Mountains region of Vietnam. Using survey data from 420 firms, the research applies exploratory factor analysis and multiple linear regression to identify the key determinants. The findings reveal eight significant factors affecting innovation intention, including science and technology, capital resources, institutional and policy factors, firm size, owners' attitudes and characteristics, entrepreneurial education, business sector, and entrepreneurial experience. Based on these results, the study proposes several strategies to foster innovation and enhance competitiveness, such as integrating science and technology into production and management, improving access to preferential and venture capital, reforming innovation-support policies, expanding market linkages, fostering an innovation-oriented culture, and promoting experience sharing and training programs. The findings provide practical implications for policymakers and enterprises in promoting innovation capacity and sustainable business development in Vietnam's mountainous regions.***

• Keywords: *innovation intention, Northern Midlands and Mountains region, enterprises, Vietnam.*

Date of receipt: 19th Feb., 2025
Date of receipt revision: 20th May, 2025
Date of delivery revision: 12th Mar., 2025
Date of approval: 25th Jun., 2025

DOI: https://doi.org/10.71374/jfar.v25.i5.13

1. Introduction

Innovation is a critical driver of national development and constitutes a core activity within enterprises to generate product value that meets market demands. According to the Law on Science and Technology (2013), "innovation refers to the creation and application of achievements in technical solutions, technology, and management practices to enhance socio-economic development, productivity, quality, and the added value of goods and products." As noted by Blank (2010), innovative enterprises are characterized by "disruptive business ideas that generate exceptional growth value," thereby creating market differentiation.

Article 17 of the Law on Supporting Small and Medium - sized Enterprises (2017) defines "Innovative startups as small and medium-sized enterprises (SMEs) established to realize business ideas based on the exploitation of intellectual property, technology, or novel business models, with the potential for rapid growth". An enterprise is considered an innovative startup if it meets the following criteria, an enterprise must meet the following criteria: it must be a legal entity, utilize intellectual property, science and technology, or apply a new business model, and demonstrate high growth potential. Decision No. 844/QĐ-TTg (2016) further affirms that innovative startups are businesses capable of rapid growth based on leveraging intellectual assets, technologies, or new models, and must be within five years of their initial business registration.

Mavlutova et al. (2020) emphasize that innovative entrepreneurship is grounded in the exploitation of intellectual property and the application of science and technology to business operations to improve products, services, or processes thus enabling rapid organizational growth. According to these authors, an innovative startup is an enterprise established for no more than five years, operating based on the utilization of intellectual property, science and technology, or a new business model, with high growth potential. Similarly, Kim et al. (2018) argue that innovation is an essential requirement for businesses, encompassing innovations in processes, technology, cognition, and mindset.

The Northern Midlands and Mountainous region of Vietnam is widely regarded as the nation's economic "poverty core." The estimated per capita GRDP of the region is VND 68 million, with the highest poverty rate in the country 11.29%, equating to approximately 364,681 poor households. As of the end of 2023, Vietnam had a total of 996,758 enterprises, yet newly established firms in this region accounted for only 4.95% of the national total (Ministry of Planning and Investment, 2024). Accordingly, to promote innovation within enterprises in this region,

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it is essential to analyze the extent to which various factors influence innovation intentions. This analysis will inform recommendations to foster innovative thinking among enterprises, stimulate business growth, enhance competitiveness, and support integration into the global economy and sustainable development.

2. Theoretical Background and Research Model

2.1. Theoretical Overview

The Theory of Reasoned Action proposed by Fishbein and Ajzen (1975) posits that an individual's intention is determined by two key components: attitude toward the behavior and subjective norms.

Shapero and Sokol's Entrepreneurial Event Theory (1982) asserts that when an individual perceives a business opportunity as both desirable and feasible especially when prompted by a triggering event they are likely to initiate a venture. This theory has significantly contributed to later studies on entrepreneurial processes and startup behavior.

The Theory of Planned Behavior by Ajzen (1991) builds on psychological foundations to explain how personal beliefs can translate into specific behaviors. According to the theory, attitude toward behavior, perceived social norms, and perceived behavioral control are the three main predictors of individual behavior.

The Entrepreneurial Potential Theory by Krueger and Brazeal (1994), derived from Ajzen's framework, emphasizes that an individual's entrepreneurial potential is heavily influenced by personal characteristics.

In Vietnam, various studies have investigated factors influencing innovation intention among enterprises, including those by Nguyen Ngoc Thuc (2009), Phan Anh Tu et al. (2017), and Vu Quynh Nam et al. (2023). These studies identify multiple factors such as entrepreneurial education, firm size, capital, entrepreneurial experience, personal attitudes and traits, institutional policies, and science and technology as determinants of innovation in enterprises.

2.2. Research Model and Hypotheses

Numerous studies suggest that education significantly affects entrepreneurial intention and motivation (Wang et al., 2004; Blank, 2013). According to Gloor et al. (2011) and Xu & Chen (2015), education is a crucial success factor for entrepreneurship. Vu Quynh Nam et al. (2023) also confirms that entrepreneurial education positively influences entrepreneurial intention.

H1: Entrepreneurial education positively affects the innovation intention of enterprises.

Firm size refers to the scale and scope of a business and is assessed based on several indicators such as number of employees, revenue, profit, and assets (Driesen et al., 2006). According to the Law on Supporting Small and Medium Enterprises (2017), firms are categorized as large, small and medium-sized, or microenterprises. Vu Quynh Nam (2023) indicates that larger firms are more likely to engage in innovation compared to smaller ones.

H2: Firm size positively affects the innovation intention of enterprises.

North et al. (2013) emphasize that capital is a crucial enabler of entrepreneurship and innovation. Similar views are echoed by Nguyen Thao Nguyen (2018) and Seung Hoo Jin et al. (2019), who classify startup capital into personal savings, financial support from family and friends, credit, equity investments, and public funding programs. Gloor et al. (2011) also include venture capital funding as an essential financial resource.

H3: Capital resources positively affect the innovation intention of enterprises.

Schuller (2001) defines entrepreneurial experience as the accumulated knowledge gained through practical work over time. Wang et al. (2011) emphasize that entrepreneurial success is tied to production, sales, and management experience. According to Zhang et al. (2006) and Vu Quynh Nam et al. (2023), having at least five years of experience is crucial for successful startup ventures.

H4: Entrepreneurial experience positively affects the innovation intention of enterprises.

Personal attitudes and traits are significant predictors of entrepreneurial intention (Cheng et al., 2015; Kabir et al., 2017). These traits may include a need for power, self-awareness, adaptability, flexibility, and decisiveness (Nguyen Thao Nguyen, 2018; Driesen et al., 2006; Xu et al., 2015). Nguyen Hai Quang et al. (2017) further emphasizes the role of behavioral awareness and self-control in fostering innovation within firms.

H5: Personal attitudes and characteristics of the firm owners affect the innovation intention of enterprises.

Davidsson et al. (2010) define institutions as the rules, norms, and organizational structures that shape

social behavior. North et al. (2013) further categorize institutions into formal constraints (laws, regulations) and informal constraints (norms, conventions). Policies can thus either promote or hinder innovation within enterprises (Vu Quynh Nam et al., 2023; Nguyễn Ngọc Thức, 2020). Xu and Chen (2015) also confirm that policy support is a critical factor in fostering entrepreneurship.

H6: Institutional frameworks and policy support positively affects the innovation intention of enterprises.

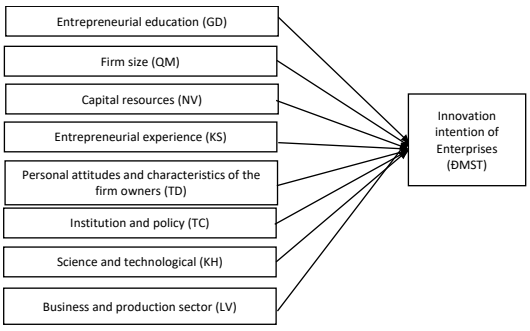
Science and technology play a central role in driving business innovation (Tomi Heimonen, 2012; Blank, 2013). Vu Quynh Nam et al. (2023) assert that science and technology enhance product quality, optimize business processes, and enable firms to meet market demands and deliver higher customer value. Tomi Heimonen (2012), Mekonnin (2015), and Mukson et al. (2021) all confirm that science and technology are decisive factors in innovation.

H7: Science and technology positively affect the innovation intention of enterprises.

The business sector encompasses all activities related to the production, processing, and delivery of goods and services to meet market demand. This includes agriculture, forestry, fisheries, industry, trade, and tourism. Mukson et al. (2021), along with Nguyen Hai Quang et al. (2017) and Nguyen Ngoc Thuc (2020), argue that the sector in which a startup operates significantly influences its innovation behavior.

H8: The Business and production sector affects the innovation intention of enterprises.

Figure 1. Research Model



3. Research Methodology

To address the research objectives, the authors employed Exploratory Factor Analysis (EFA) and regression modeling based on survey data collected from 420 startup enterprises (DNKN) operating in the Northern Midlands and Mountainous region of Vietnam.

Sampling Methodology:

During the 2019 - 2023 period, a total of 31.211 new businesses were established in this region (Ministry of Planning and Investment, 2024). Using Slovin's formula, the minimum sample size was determined to be 395. The research was conducted across 14 provinces in the Northern Midlands and Mountainous area, with a target of surveying approximately 30 enterprises per province, totaling 420 enterprises (420 questionnaires). Of the 420 distributed questionnaires, 400 were valid and used for analysis.

Table 1. Descriptive Statistics of the Respondent Sample

Firm Size	Proportion (%)
Micro-enterprises	88,67
Small and medium-sized enterprises	6,89
Medium-sized enterprises	3,33
Large enterprises	1,11
Total	**100**

Business Sector	Proportion (%)
Industry	12,00
Trade and Services	67,11
Agriculture, Forestry and Fisheries	17,33
Others	3,56
Total	**100**

Each questionnaire, in addition to collecting general information about the respondents, included a set of questions designed using a 5-point Likert scale (from "strongly agree" to "strongly disagree").

4. Results and Discussion

Assessment of Scale Reliability and Observed Variables:

The item-total correlation coefficients of all observed variables were greater than 0,3, indicating acceptable levels of internal consistency. Furthermore, the Cronbach's Alpha coefficients for all factors exceeded 0,6, confirming that the constructs are reliable and suitable for Exploratory Factor Analysis (EFA).

Table 02. Cronbach's Alpha and Item-Total Correlation Coefficients

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Personal attitudes and characteristics of the firm owners: Cronbach's Alpha = 0,756				
TD1	15.336	4.818	.605	.681
TD2	15.040	5.060	.583	.690
TD3	14.982	4.873	.611	.679
TD4	14.700	6.377	.444	.741
TD5	14.787	6.436	.397	.753
Capital resources: Cronbach's Alpha =0,853				
NV1	7.072	2.603	.688	.829
NV2	7.220	2.411	.788	.733
NV3	7.072	2.640	.699	.818
Entrepreneurial education: Cronbach's Alpha =0,820				
GD 1	7.491	2.048	.671	.754
GD2	7.394	1.950	.673	.752
GD3	7.585	1.910	.676	.749
Entrepreneurial experience: Cronbach's Alpha =0,890				
KS 1	15.908	14.863	.763	.862
KS2	15.886	15.410	.651	.881
KS3	15.751	14.974	.802	.856
KS4	15.703	15.636	.730	.867

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
KS5	15.751	16.019	.643	.881
KS6	15.615	15.929	.665	.877
Science and technological: Cronbach's Alpha = 0,848				
KH1	22.278	13.759	.538	.839
KH2	22.209	14.188	.591	.829
KH3	22.231	13.917	.622	.824
KH4	22.018	13.931	.645	.821
KH5	22.368	13.871	.604	.827
KH6	22.112	14.411	.569	.832
KH7	22.134	13.993	.693	.815
Firm size: Cronbach's Alpha = 0,763				
QM1	7.260	2.258	.586	.694
QM2	7.397	2.168	.616	.660
QM3	7.422	2.006	.588	.695
Business and production sector: Cronbach's Alpha = 0,601				
LV1	10.083	4.678	.322	.574
LV2	10.177	4.653	.287	.595
LV3	10.755	3.128	.597	.335
LV4	10.812	3.639	.356	.563
Institution and policy: Cronbach's Alpha = 0,860				
TC1	19.260	10.266	.606	.845
TC2	19.336	10.050	.606	.845
TC3	19.419	9.940	.541	.861
TC4	19.267	9.668	.760	.817
TC5	19.339	9.957	.715	.826
TC6	19.300	9.863	.714	.826

The results of the model validity test show that the Kaiser-Meyer-Olkin (KMO) value is 0,922 > 0,5, with a significance level (Sig.) of 0,000. This indicates that the observed variables are linearly correlated with the representative factors and that the dataset is suitable for Exploratory Factor Analysis (EFA).

Table 03. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.922
Bartlett's Test of Sphericity	Approx. Chi-Square	5150.465
	df	420
	Sig.	.000

The Model's Explained Variance for the Observed Variables:

The results in Total Variance Explained Table of SPSS show that the cumulative variance explained is 62,541%, meaning that 62,541% of the variation in the factors is accounted for by the observed variables.

Table 04. Rotated Factor Loadings for the Dependent Variable

Observable variable	Factor loading
.813	.771
.816	.773
.799	.837
.800	.826
.805	.823

The results of the rotated factor loadings for the dependent variable show that the lowest factor loading is 0,771, which is greater than 0,5, indicating a strong correlation between the observed variables and the representative factor. Therefore, the innovation in enterprises is a valid representative construct for the observed variables.

Regression Analysis:

Table 05. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.890[a]	.845	.809	.26831349

Table 06. Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.098	.050		.341	.685
	NV	.201	.050	.201	3.418	.001
	TD	.098	.050	.098	2.246	.000
	KS	.084	.050	.054	1.458	.001
	KH	.212	.050	.212	4.643	.000
	QM	.132	.050	.132	3.001	.000
	LV	.088	.050	.088	1.662	.002
	TC	.198	.050	.198	2.872	.000
	GD	.097	.050	.097	2.863	.047
a. Dependent Variable: ĐMST						

The regression results, using enterprises' innovation intention as the dependent variable, indicate that 84,5% of the variance in innovation intention is explained by the following independent variables: entrepreneurial education, firm size, capital resources, entrepreneurial experience, personal attitudes and traits, institutional and policy factors, science and technology, and the business sector. The remaining 15.5% is attributed to other factors not included in the model. The results are statistically significant at the 99% confidence level.

Discussion:

The regression model analysis shows that all variables included in the model are statistically significant, with Sig. values less than 0,05. The unstandardized regression coefficients are all greater than zero, indicating that the independent variables are positively correlated with the dependent variable. Therefore, all proposed hypotheses are accepted. Based on the unstandardized coefficients presented in Table 07, the regression model can be expressed as follows:

ĐMST = 0,098 + 0,201NV + 0,098TD + 0,084KS + 0,212KH + 0,132QM + 0,088LV + 0,198TC + 0,097GD.

This result indicates that all independent variables included in the model are positively associated with the innovation intention of enterprises. Specifically, a one-point increase in capital (NV) leads to a 0,201-point increase in innovation intention; a one-point increase in personal attitudes, perspectives, and traits (TD) results in a 0,098-point increase; a one-point increase in entrepreneurial experience (KS) increases innovation intention by 0,084 points; a one-point increase in science and technology (KH) increases innovation intention by 0,212 points; a one-

point increase in firm size (QM) leads to a 0,132-point increase; a one-point increase in the business sector (LV) leads to a 0,088-point increase; a one-point increase in institutional and policy support (TC) results in a 0,198-point increase; and a one-point increase in entrepreneurial education (GD) raises innovation intention by 0,097 points.

Table 07. Determining the Relative Importance of Influencing Factors

Independent Variable	Absolute Value	%
Science and Technology (KH)	0,212	19,63
Capital Resources (NV)	0,201	18,61
Institutional and Policy Support for Enterprises (TC)	0,198	18,33
Firm Size (QM)	0,132	12,22
Personal attitudes and characteristics of the firm owners (TD)	0,098	9,07
Entrepreneurial education (GD)	0,097	8,98
Business and production sector (LV)	0,088	8,15
Entrepreneurial experience (KS)	0,054	5,00
Total		**100**

The results of the factor importance analysis indicate that science and technology (KH) contributed the highest proportion at 19,63%, followed by capital (NV) at 18,61%, institutional and policy support (TC) at 18,33%, firm size (QM) at 12,22%, Personal attitudes and characteristics of the firm owners (TD) at 9,07%, entrepreneurial education (GD) at 8,98%, business sector (LV) at 8,15%, and finally, entrepreneurial experience (KS) with the lowest contribution of 5%.

5. Conclusion and Recommendations

The research findings identify eight key factors influencing the innovation intention of enterprises: science and technology, capital resources, institutional frameworks and policy support, firm size, personal attitudes and traits, entrepreneurial education, business sector, and entrepreneurial experience. Among these, science and technology exert the strongest influence on enterprises' innovation intention, followed by capital, policy environment, firm size, personal traits, education, business sector, and lastly, entrepreneurial experience, which has the weakest effect.

To effectively enhance innovation intentions among enterprises in the Northern Midlands and Mountainous region, a comprehensive and coordinated policy framework should be adopted, including but not limited to: (i) integration of advanced technologies into operational practices; (ii) expansion of accessible financing channels; (iii) improvement of institutional mechanisms and incentive structures; (iv) enterprise scaling through collaborative networks; (v) capacity-building through targeted training programs; (vi) strategic sector alignment; and (vii) experiential learning to reinforce innovative behavior *Firstly*, enterprises should adopt and integrate science and technology into their production, business operations, and management practices.

Secondly, enterprises should proactively seek credit sources, especially preferential loans, and improve access to venture capital to support innovative entrepreneurship.

Thirdly, businesses need to engage with central and local government policies, particularly those promoting innovation and investment.

Fourthly, it is important to leverage all available internal resources to expand firm size, while also establishing strong linkages among enterprises, between enterprises and households, and across regions to scale operations and markets.

Fifthly, business owners and employees should enhance their awareness, skills, and competencies in both management and production, and equip themselves with knowledge in market dynamics, financial management, and technical operations to better enable innovation.

Sixthly, entrepreneurs should participate in training programs on business startup to effectively understand and apply innovation in enterprise management.

Seventhly, enterprises should strategically choose business sectors aligned with their local comparative advantages, prioritizing innovation in agriculture which accounts for a large share of the region's economic structure.

Eighthly, since business success requires not only production but also market development, accumulating practical experience for both business owners and workers is essential for sustained innovation and growth.

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