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Dr. Phung Duy Quang

Faculty of Technology and Data
Science, Foreign Trade
University, Hanoi, Vietnam

Hoang Nam Quyen

Student K61, School of
Economics and International
Business, Foreign Trade
University, Hanoi, Vietnam

Factors influencing new product development capability of small and medium-sized enterprises in the manufacturing and processing industry in Vietnam amid the economic crisis

Dr. Phung Duy Quang and Hoang Nam Quyen

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Abstract

This paper analyzes the impact of factors influencing the new product development capability of small and medium-sized enterprises (SMEs) in Vietnam, using data from Vietnamese SMEs in the manufacturing and processing industry across Northern provinces from 2007 to 2011. By applying a panel data model to estimate the model, it is shown that factors such as business performance, export activities, technology enhancement, ownership structure, and the year factor affect SMEs' capability to create new products. These empirical findings provide policy-planning evidence for SMEs in the manufacturing and processing industry in Vietnam, supporting sustainable business development.

Keywords: Small and medium-sized enterprises, panel data model, new product development capability, economic crisis

Introduction

The manufacturing and processing industry in Vietnam is one of the key pillars of the economy, significantly contributing to GDP growth and generating high-added value. The development of this sector not only directly impacts economic growth but also has a spillover effect on other industries and the economy as a whole. During the period from 2011 to 2020, Vietnam's manufacturing and processing industry demonstrated its role as a growth driver, accounting for an average of 14.9% of GDP and achieving an impressive average growth rate of 10.44% per year, which is higher than the overall economic growth rate. This indicates the increasing dependence of the economy on the sustainable development of this sector.

In the second quarter of 2024, Vietnam's manufacturing and processing industry experienced a diverse range of export and import activities. Certain export products, such as footwear, textiles, and electronics, saw robust growth, reflecting a recovery in these manufacturing sectors. However, imports of raw materials like crude oil, wood, and fabric also rose significantly, showing the sector's reliance on foreign supplies (General Statistics Office, 2024).

Despite its crucial role in economic growth, Vietnam's manufacturing and processing industry still faces many limitations. Notably, small and medium-sized enterprises (SMEs), which constitute a large proportion of the sector, are grappling with various challenges during the economic crisis, yet they play a vital role in driving the sector's development. One of the major issues the manufacturing and processing industry faces is the low localization rate of products. The heavy reliance on imported raw materials and components makes domestic production vulnerable to global market fluctuations. This not only reduces the competitiveness of products but also limits the industry's sustainable development. SMEs, with their flexibility and adaptability, play an essential role in product diversification and meeting domestic market demand. However, these enterprises often struggle with limited access to capital, technology, and markets, which hinders their ability to invest in research and development, improve product quality, and scale up production.

Corresponding Author:

Dr. Phung Duy Quang

Faculty of Technology and Data
Science, Foreign Trade
University, Hanoi, Vietnam

Studies by international authors, such as Aleksander Jakimowicz and Daniel Rzczkowski (2019) ^[1], and Andrew Chan *et al.* (2023) ^[2], have analyzed factors affecting corporate resilience through improved operational efficiency, based on historical data.

Given the importance of profitability for SMEs in Vietnam's manufacturing and processing industry, as well as for the economy in general, it is essential to study the factors influencing new product innovation post-economic crisis among SMEs in this sector to enhance their competitiveness. The initial part of this paper introduces the necessity of analyzing the factors impacting the profitability of SMEs in Vietnam's manufacturing and processing industry. The remainder of the paper is organized as follows: Section 2. Research Data, Section 3. Model and Estimation Results, Section 4. Conclusion and Policy Implications.

Research Data

The data used in this article is sourced from a survey of small and medium-sized enterprises (SMEs) in the manufacturing and processing industry, conducted by the Institute of Labor Science and Social Affairs (ILSSA), the Central Institute for Economic Management (CIEM), and the Department of Economics at the University of Copenhagen (DoE), Denmark, with technical support from the Danish International Development Agency (DANIDA). The survey was conducted in nine provinces and cities, including Hanoi, Hai Phong, Ho Chi Minh City, Phu Tho, Nghe An, Quang Nam, Khanh Hoa, Lam Dong, and Long An. This survey is carried out every two years, with a consistent data collection methodology. The sample sizes are as follows: 2,635 enterprises in 2007, 2, 659 enterprises in 2009, and 2,552 enterprises in 2011.

The dataset includes information on SMEs in the manufacturing and processing industry, such as details about business owners, business performance indicators (revenue, profit, investment capital, labor force, inventory, interest expenses, etc.), labor-related indicators, employment data, and information on government support for SMEs.

Model and Estimation Results

Model and Variable Description

In this model, the dependent variable, New Product, is binary. Therefore, a logistic regression model (Logit) is used.

The Logit model applies where the dependent variable Y is binary, taking values of 0 and 1. If we denote the independent variables (influential factors) as X_j (for $j = 2, \dots, k$), the probability that the dependent variable Y equals 1 is given by the formula below:

$$p_i = \frac{e^{\beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki}}}{1 + e^{\beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki}}} \quad (1)$$

Notation

$$\beta = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_k \end{pmatrix} \quad \text{và} \quad X = (1, X_2, X_3, \dots, X_k); \quad X_i = (1, X_{2i}, X_{3i}, \dots, X_{ki}); \quad i = 0, \dots, n$$

The logit model can be written as:

$$p_i = \frac{e^{X_i \beta}}{1 + e^{X_i \beta}} = \frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)}$$

With $\beta_1, \beta_2, \dots, \beta_k$

the unknown coefficients that need to be estimated.

Equation (2) is referred to as the logistic distribution function.

In this function, $X\beta$ ranges from $-\infty$ to $+\infty$, so p takes values from 0 to 1, and p_i is nonlinear with both X_j and the parameters β . The panel data regression model that evaluates the impact of various factors on the likelihood of product creation by small and medium-sized enterprises (SMEs) in the manufacturing and processing industries in this study is structured as follows:

$$\text{New_product}_{it} = \beta_0 + \beta_1 \text{Profit}_{it} + \beta_2 \text{Sector}_{it} + \beta_3 \text{Ownership}_{it} + \beta_4 \text{Export}_{it} + \beta_5 \text{Year}_i + \beta_6 \text{Process}_{it} + c_i + u_{it} \quad (3)$$

New product: The new product variable takes the value "yes" or "no," encoded as:

$$\text{New_product} = \begin{cases} 1 & \text{if the enterprise have a new product} \\ 0 & \text{if the enterprise does not have a new product} \end{cases}$$

- **Profit:** Theoretically, a company's business performance may impact its ability to generate new products. If a company operates inefficiently with low profits due to a limited consumer base or low selling prices, it may need to improve or replace products to create better ones with higher competitiveness. Therefore, the author includes Profit as an independent variable in the model.
- **Export:** In practice, companies that export are often affected by economic crises. Hence, the author incorporates the Export variable into the model to assess its impact on the likelihood of introducing new products.
- **Process:** When a company enhances its technology or production processes, it contributes to the creation of new products. Thus, the author includes the production process variable (Process) in the model, expecting it to have a positive impact on the likelihood of introducing new products.
- **Ownership:** The ownership form of the enterprise is also expected to affect its ability to create new products. In this study, the Ownership variable takes the value "0" if the ownership form is a household enterprise or a sole proprietorship, and "1" if the ownership form is a partnership, cooperative, limited liability company, joint-stock company, joint venture, or state-owned enterprise.
- **Year:** The year factor is also included in the model to assess the impact of crises on the likelihood of introducing new products.

Table 1: Descriptive Statistics of Variables

Variable	N	Mean	Dtd. Dev.	Min	Max
New product	5453	.0328265	.1811964	0	1
Profif	5453	14.43712	1.823452	6.848143	26.11426
Sector	5453	3.036581	.8429165	1	3
Ownership	5453	.2185852	.4123334	0	1
Export	5453	.0630621	.2460968	0	1
Process	5453	.120281	.3055689	0	1

Source: Author's calculations using E-Views software.

The Hausman test indicates that the random effects model is more appropriate. The estimation results (Table 2) show that: The variables Export, Process, and Sector are statistically significant at the 1% level, while the variables Ownership and Year are statistically significant at the 5% level. The

coefficients of these variables are positive. The Profit variable is statistically significant at the 10% level, and its coefficient

is also positive.

Table 2: Regression Results of Factors Affecting New Product Creation

Independent Variable	Coef.	OR	Std. Err (Robust)	T	P> t
Profit	-.1081167	.897523	.0412418	-2.62	0.026
Sector					
2	.2080374	1.231259	.2267928	0.92	0.359
3	.6487892	1.913223	.2019857	3.21	0.000
Ownership	.5812091	1.788199	.2193252	2.65	0.025
Process	1.249314	3.487949	.1912914	6.53	0.000
Export	.8415728	2.320013	.2817294	2.99	0.000
Year					
2009	-.5212718	0.593765	.2164166	-2.41	0.027
2011	-.4652848	0.627956	.2124113	-2.19	0.032

Source: Author's calculations using E-Views software.

Conclusion and Policy Implications

Based on the estimated model results, the authors of the article propose the following policy implications:

When businesses innovate their production technology processes, they are 3.5 times more likely to introduce new products compared to businesses that do not innovate their production technology processes (Assuming other factors remain unchanged and calculated at the mean value). This is consistent with the fact that when businesses change their production processes to improve labor productivity, they are often able to introduce new products that are better suited to the market and consumer preferences.

Exporting businesses are 2.32 times more likely to introduce new products compared to non-exporting businesses (Assuming other factors remain unchanged and calculated at the mean value). This can be explained by the fact that exporting businesses are more flexible in their production activities, as the products they manufacture are not only supplied domestically but also exported to foreign markets where consumers tend to be more demanding and have higher requirements. However, this also presents an opportunity for businesses to innovate and develop new products that are better suited to the market, especially foreign markets. Additionally, the international environment is often more volatile, and export policies can change, meaning businesses are more likely to innovate and adapt their products accordingly.

Moreover, the regression results also show that industry type affects the likelihood of businesses creating new products. Businesses in the petrochemical, metal, non-ferrous, and assembly industries are more likely to create new products than those in the food processing industry. This is also consistent with reality, as the food processing industry generally has readily available raw materials, lower product costs, and a largely stable domestic market. Therefore, changing products and creating new products to compete is not usually the primary objective for businesses in this sector. In contrast, businesses in resource-based industries (Such as oil, coal, etc.) often face resource depletion, prompting them to innovate their production processes and improve products to meet market demand.

The ownership structure of businesses also affects their ability to create new products. Businesses that are corporations, cooperatives, limited liability companies, joint-stock companies, state-owned enterprises, or joint ventures are more likely to create new products than family businesses or private enterprises. This is in line with the fact that family businesses or private enterprises often face financial and technical constraints, so their ability to create new products is

lower compared to businesses with stronger financial resources and technical expertise.

A 1% increase in average profit will result in a business's likelihood of creating new products being 89% of the initial value (Assuming other factors remain unchanged and calculated at the mean value).

The regression results also show that, compared to 2007, businesses in 2009 (After the crisis) had a 41% lower likelihood of creating new products. After the 2008 crisis, the likelihood of businesses introducing new products continued to drop by approximately 37% in 2011 compared to 2007. This can be explained by the fact that the economic crisis of 2008 created challenges for small and medium-sized enterprises, forcing them to focus on creating new products to recover and grow.

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