

The Role of Innovation on Export Performance of Enterprises in Lao PDR

Chanthaphone Silipanyo¹, Bounlert Vanhnalat ²

¹ Institute for Industry, Commerce and Energy, Ministry of Industry and Commerce

ORCID: <https://orcid.org/0009-0006-9445-0775>

² Faculty of Economics and Business Management, National University of Laos

ORCID: <https://orcid.org/0009-0007-8145-4846>

HOW TO CITE:

Chanthaphone Silipanyo,
Bounlert Vanhnalat (2026). The
Role of Innovation on Export
Performance of Enterprises in Lao
PDR.
International Journal of Special
Education, 41(12s), 1481-1493

ABSTRACT:

Innovation is considered a crucial element for improving efficiency, reducing costs, and increasing export competitiveness. The objective of this study is to analyze the role of innovation types in the export performance of enterprises in Lao PDR by applying multivariate and logit models. The World Bank Enterprise Survey 2024, comprising 363 enterprises, serves as the basis for this research. The results reveal that adoption of innovations has increased with the size of the firm; small firms have limited financial and technical constraints, medium firms reveal moderate and efficient adoption, while large firms have more advantages in all types of innovation because of strong competitiveness and international connections. In terms of sectoral alignment, the service sector leads in terms of firm numbers, while manufacturing firms have a stronger capability to apply product and process innovation. In contrast, trade firms tend to have the lowest levels of innovation adoption. The OLS and logit estimation results indicate that firms that apply foreign technology have export values 4.51 times higher than those that do not use it.

Additionally, firms that use both improved process innovations and foreign technology have export values that are approximately 10.65 times larger than those of firms that do not, with statistical significance at the 1% level. Precisely, the results indicate that export promotion policies should focus on specific types of innovation to improve export performance at the firm level and support long-term economic growth. This study will help us understand how different innovation types affect export performance in developing countries and will provide invaluable guidance to policymakers who want to boost export growth.

Keywords: Innovation types, Export performance, Technology adoption and Lao PDR.

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.
Open access publication under the
terms and conditions
of the Creative Commons Attribution
(CC BY)
license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Export performance is a critical driver of economic growth, particularly in developing economies, where firms face resource constraints, limited market access, and structural challenges (Nguyen et

al., 2025). In the situation of Lao PDR, a small landlocked economy in Southeast Asia, export-oriented growth is essential for improving productivity, generating employment, and

integrating domestic firms into regional and global value chains. However, Lao enterprises face multiple obstacles, including low technological capacity, underdeveloped human capital, and limited access to finance, which constrain their ability to compete in international markets (Sisounonth & Chansomphou, 2023).

Innovation has been widely recognized as a key mechanism for enhancing firm competitiveness and export performance. Product innovation allows firms to differentiate their offerings, meet international quality standards, and respond to changing consumer demands, whereas process innovation improves efficiency, reduces costs, and increases production capacity (OECD, 2018). Moreover, investments in research and development and the adoption of foreign-licensed technology facilitate knowledge acquisition, technological upgrading, better products, and the development of capabilities that are critical for exports (Durmaz & Yildiz, 2020). The best model is South Korea's lessons, which show that using new technologies can help enhance production and Singapore's experience focuses on strategies: expenditure in R&D, and attracting Foreign Direct Investment.

Lao PDR has worked to encourage innovation by giving financial and training help to small and medium-sized businesses (SMEs) in the country and by bringing in foreign direct investment in special economic zones, including investing in infrastructure based on what worked in South Korea and Singapore.

While the number of registered enterprises increased more than fourfold over 2013-2023, from 41,311 to 186,846, innovation adoption was low (MOIC, 2024). Likewise, the Global Innovation Index for Lao PDR shows a relatively low innovation score of 17.8 points, compared to the global average of 31.57 points. The score indicates a need for greater openness and support for the development of domestic firms to improve the firm's performance in increasing exports. Overall, there are still many challenges, and more work is needed to understand how innovation affects export performance in different ways, each with its traits that can have both positive and negative effects (Edeh et al., 2020).

Most studies in developed and highly developing countries have found a positive relationship between innovation and export performance (Sandu & Ciocanel, 2014). Motivated by increased competition, companies have prioritized investing in innovation to create differentiation, added value, increase income and corporate profits in both the short and long term (Mai et al., 2019). In the case of rapidly developing countries, they show clear proof that innovation helps improve export performance, but the impact differs based on the innovation type, the size of the company, the sector, and how well the firms can absorb know how and new information (Jitsutthiphakorn, 2021). Product innovation has pushed market entry, whereas technology adoption and process enhancements correlate more significantly with export among established exporters (Carboni, 2017).

However, some studies have found contradictory evidence in developing countries and different sample groups. In some countries, innovation plays a greater role, while in others it has a lesser impact or none (Fonchamnyo & Wujung, 2016). Not all countries can claim that innovation contributes to improved export growth. Given the varying technological contexts and levels of development, including the returns and costs (Silva et al., 2017). The differences in results for each innovation type are complex and unclear. Innovation adoption is necessary to enhance the competitiveness of firms and to encourage their contribution to economic development (Troilo, 2014; Southiseng, 2018).

Despite many papers, further research indicates that the impact of firm-level innovation on export performance in Lao PDR remains limited. Previous research usually focuses on small groups, small and medium-sized enterprises, and growth aimed at the local market, without examining the impact of innovation types on export performance (Kyophilavong, 2008; Kongmanila & Takahashi, 2009).

This research will resolve the gap in the overall preview paper by investigating the relationship between innovation activities and export performance for enterprises. Specifically, it examines how product innovation, process innovation, R&D, and foreign technology

adoption influence both the likelihood of export participation and the level of export. Using data from the World Bank Enterprise Survey (2024). By applying OLS and logit models, this study provides evidence of how effective innovation activities are in helping businesses grow their exports. The findings offer policy-relevant insights for enhancing firm competitiveness, technological upgrading, and sustainability in economic development from 2026 to 2030.

In addition, a review of related research studies published over the past decades on the subject of export performance is testimony to the importance of the issue in the literature (Cirera & Maloney, 2017; Fernández & Montalvo, 2019). However,

2. Methodology

The analysis relies on the econometric estimation method, which employs multiple regression equations. This study employs the Ordinary Least Squares (OLS) and Logit models for analysis. And the OLS model sets the total export value of the enterprise as the dependent variable. However, there are 2 groups of enterprises in the data set: the exporting group and the non-exporting group. Therefore, the logistic model was used to further study and compare the analysis of the role of innovation on the export performance.

2.1 Econometric Model Specification

This study uses a statistical method that combines two types of analysis, Ordinary Least Squares (OLS) and logistic regression (Logit), to look at how innovation affects the export success of enterprises in Laos. This dual-model approach allows for a comprehensive assessment of both

despite considerable research, the evidence about the factors affecting export performance remains largely fragmented and often contradictory. This phenomenon is especially true for the literature demonstrating that perspective diversification and innovation, which includes product innovation, process innovation, R&D investment, and foreign technology adoption, are central determinants of export performance. Thus, this study, conducted in Lao PDR, identifies a research gap in comprehending the role of various types of innovation in exports and their impacts. It also focuses on the practical implications for policymakers who aim to enhance the export-oriented growth of enterprises.

role of type innovation and export performance. Especially product innovation enables firms to develop new or higher-quality products that enhance differentiation and attractiveness in global markets, while process innovation contributes to cost reduction and efficiency improvements (OECD, 2018).

Innovation activities are also closely associated with investment in research and development (R&D) (Durmaz & Yıldız, 2020) and the acquisition of foreign technologies, which facilitate technological upgrading within firms (Cinar et al., 2021). First, the OLS model estimates the determinants of export intensity by specifying the logarithm of firm-level export value as the dependent variable.

This continuous measure captures variations in export performance among exporting firms. The OLS specification for firm i can be written as:

$$\ln Export_i = \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} npd_i + \epsilon_i \quad (1)$$

$$\ln Export_i = \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} imp_i + \epsilon_i \quad (2)$$

$$\ln Export_i = \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} rd_i + \epsilon_i \quad (3)$$

$$\ln Export_i = \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} techf_i + \epsilon_i \quad (4)$$

$$\begin{aligned}
 LnExport_i = & \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i \\
 & + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} npd_i \\
 & * imp_i + \beta_{12} npd_i * rd_i + \beta_{13} npd_i * techf_i + \beta_{14} imp_i * rd_i + \beta_{15} imp_i * techf_i \\
 & + \beta_{16} rd_i * techf_i + \epsilon_i
 \end{aligned}
 \quad (5)$$

Second, because the dataset includes both exporting and non-exporting enterprises, a Logit model is applied to examine the likelihood of export participation. The dependent variable is binary, taking a value of 1 if the firm exports and 0 otherwise. Logistic regression is appropriate for modeling dichotomous outcomes and is widely used in studies of firm export behavior (Chen et al., 2018; Jitsutthiphakorn, 2021). The Logit regression model for firm i can be written as:

$$\begin{aligned}
 Prob(Exporting = 1) \\
 = & \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i \\
 & + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} npd_i \\
 & + \epsilon_i
 \end{aligned}
 \quad (6)$$

$$\begin{aligned}
 Prob(Exporting = 1) \\
 = & \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i \\
 & + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} imp_i \\
 & + \epsilon_i
 \end{aligned}
 \quad (7)$$

$$\begin{aligned}
 Prob(Exporting = 1) \\
 = & \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i \\
 & + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} rd_i \\
 & + \epsilon_i
 \end{aligned}
 \quad (8)$$

$$\begin{aligned}
 Prob(Exporting = 1) \\
 = & \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i \\
 & + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} techf_i \\
 & + \epsilon_i
 \end{aligned}
 \quad (9)$$

$$\begin{aligned}
 Prob(Exporting = 1) \\
 = & \beta_0 + \beta_1 year_i + \beta_2 labor_i + \beta_3 exp_i + \beta_4 sex_i + \beta_5 loc_v_i + \beta_6 man_i + \beta_7 trad_i \\
 & + \beta_8 med_i + \beta_9 acf_i + \beta_{10} train_i + \beta_{11} npd_i \\
 & * imp_i + \beta_{12} npd_i * rd_i + \beta_{13} npd_i * techf_i + \beta_{14} imp_i * rd_i + \beta_{15} imp_i * techf_i \\
 & + \beta_{16} rd_i * techf_i + \epsilon_i
 \end{aligned}
 \quad (10)$$

i is number of firm and the definition of each variable in Equation (1-10) is shown in Table 1.

Equation (1-5) estimates the export performance using the OLS estimation technique by the volume of export, and Equation (6-10) is estimated using the logit estimation technique by the probability to export.

These modeling strategy enables a comparative analysis of how innovation affects both the

decision to export and the level of export performance.

The explanatory variables included in both models are derived from a systematic review of relevant theories and empirical studies. The definition, measurement, expected sign, and data source of each variable are summarized in Table 1.

Table 1: Indicators for analyzing the role of innovation on export performance of enterprises

Variables	Definition and measurement	Expected sign	Source
Lnexport	(1) Logarithm of firm export value (Lao Kip) (OLS model) (2) Export status: 1 = exporter, 0 = non-exporter (Logit model)		Jitsutthiphakorn (2021)
year	Year of establishment (years)	+	Musamali & Tarus (2013)
labor	Number of employees	+	Sisounonth and Chansomphou (2023);
exp	Manager's experience (years)	+	Musamali & Tarus (2013)
sex	Gender of manager (1 = female, 0 otherwise)	+	Sisounonth & Chansomphou, 2023
loc_v	Firm located in Vientiane Capital (1 = yes, 0 otherwise)	+	Musamali & Tarus (2013)
man	Manufacturing sector (1 = yes, 0 otherwise)	+	Sisounonth & Chansomphou, 2023
trad	Commercial sector (1 = yes, 0 otherwise)	+	Sisounonth & Chansomphou, 2023
med	Medium-sized enterprise (1 = yes, 0 otherwise)	+	Musamali & Tarus (2013)
acf	Access to finance (1 = yes, 0 otherwise)	+	Kyophilavong (2008)
train	Training provided to employees (1 = yes, 0 otherwise)	+	Kyophilavong (2008)
npd	Product innovation (new or improved products/services in the past three years) (1 = yes, 0 otherwise)	+	Carboni (2017);
imp	Process innovation (new or improved processes in the past three years) (1 = yes, 0 otherwise)	+	Kongmanila and Takahashi (2009)
rd	R&D expenditure (1 = yes, 0 otherwise)	+	(Durmaz & Yıldız, 2020); Lv et al,(2020)
techf	Use of foreign-licensed technology (1 = yes, 0 otherwise)	+	Durmaz & Yıldız, (2020)

Source: The author's work is based on theoretical frameworks and includes a review of related research on innovation and export performance.

2.2 Data Source

Based on the World Bank Enterprise Survey (2024). The final sample consists of 363 enterprises, including 145 firms located in Vientiane Capital, 113 firms in southern Laos, and 105 firms in northern Laos. Among these firms, 89 enterprises are identified as exporters, while the remaining firms operate exclusively in

the domestic market. The World Bank Enterprise Survey 2024 is a firm-level survey of a representative sample of the Lao economy's private sector. The surveys cover a broad range of topics related to the business environment and ecosystem including access to Innovation, access to finance, human capital, infrastructure, competition, and export performance.

3. Results

3.1 Innovation and Export Performance: Econometric Evidence

The results in Table 2 show that the R-squared value is 0.319-0.4303, which means the independent variables tested can explain 31.9%-43.03% of how well exports perform. The OLS estimation results can be attributed to 6 variables: Adoption of foreign technology (techf); firms that use new or improved processes and adoption of foreign licensed technology (imp*techf); number of years of establishment (years); number of workers (labor); location of the enterprise (loc_v); and enterprise in the manufacturing sector (man). Specifically, the adoption of foreign technology (techf) and the use of new or improved processes, along with the adoption of foreign licensed technology (imp*techf), positively impact export performance. Meanwhile, firms use foreign technology to produce goods and services; their exports are, on average, 4.51 times higher than those of enterprises that do not adopt it.

Additionally, firms that improve process innovation and use foreign technology have export values that are approximately 10.65 times larger than those of firms that do not, with a statistical significance of 1%. The result showed technology plays a significant role in creating differences in production and promoting exports for enterprises in Lao PDR. Furthermore, it also helps to reduce costs, increase efficiency, and promote the transfer of new technologies as a mechanism for enhancing productive efficiency, quality upgrading, and compliance with international standards and access to the global market and competitiveness. It shows that access to foreign knowledge is a key part of export.

The number of years of establishment and the number of workers have a positive impact on the export performance of Lao firms. If the number of workers increases by one person, a firm's export value will rise by 0.7%-1.1% with a statistical significance level of 1%-10%. Firm size showed a positive and significant effect on export intensity,

suggesting the presence of scale economies. Larger companies are better able to handle the fixed costs of exporting, such as certification, logistics, and market development. This lets them export more goods. with firm heterogeneity models of international trade, which predict that larger and more productive firms engage more intensively in export markets. Also, the results show that older firms perform better in exports; this means that for each extra year a firm has been around, its export value goes up by about 1.50%-1.60% because of gained experience, better connections in the market, and improved ability to operate.

The firms in the manufacturing sector (man) have a strong positive relationship with export value. This means that firms in this sector do 2.43-3.76 times better at exporting than firms in the service sector, with a statistical significance level of 10%. The results indicate that larger manufacturing firms adopting R&D and foreign technology achieve the highest export gains, whereas trade and service sectors exhibit lower adoption and weaker export outcomes. This result suggests that Lao companies mainly focus their innovation on adapting to the domestic market, not on being more competitive in exports. while process improvements may be too modest to yield measurable productivity gains. Similar outcomes have been recorded in other low-income economies, where deficient innovation systems and restricted integration into global value chains hinder the export returns to innovation. On the other hand, enterprises located in Vientiane Capital have a smaller export value compared to other regions since the majority of exporting firms are located in special economic zones along the border with specific export promotion policies. This shows that just being in one place isn't enough to help them export; they also need to be able to innovate and have access to foreign markets. Such an effect demonstrates the value of policies that support not only innovation adoption but also linkages to international buyers, export-oriented infrastructure, and business environment support.

Table 2: OLS result for the role of innovation in export performance of enterprises in Lao PDR

Variable	OLS estimation results				
	Model 1	Model 2	Model 3	Model 4	Model 5
year	-0.016 (0.020)	-0.016 (0.020)	-0.015*** (0.019)	-0.016* (0.020)	-0.005 (0.019)
labor	0.011*** (0.004)	0.011*** (0.003)	0.010 (0.004)	0.007* (0.004)	0.008** (0.003)
exp	0.031 (0.022)	0.029 (0.022)	0.026 (0.022)	0.039 (0.021)	0.024 (0.022)
sex	-0.386 (0.393)	-0.389 (0.393)	-0.381 (0.385)	-0.147 (0.373)	-0.022 (0.378)
loc_v	-0.622 (0.416)	-0.658 (0.411)	-0.699* (0.402)	-0.937* (0.373)	-0.781* (0.407)
man	0.949** (0.458)	0.910* (0.471)	0.886* (0.406)	1.024** (0.428)	1.325*** (0.478)
trad	0.588 (0.572)	0.557 (0.558)	0.600 (0.571)	0.304 (0.528)	0.482 (0.508)
acf	0.334 (0.468)	0.330 (0.467)	0.226 (0.492)	0.352 (0.454)	0.156 (0.435)
train	0.646 (0.401)	0.569 (0.373)	0.325 (0.413)	0.360 (0.358)	0.464 (0.394)
npd	-0.221 (0.403)				
imp		-0.013 (0.448)			
rd			0.897 (0.579)		
techf				1.506*** (0.546)	
npd*imp					-0.968 (0.471)
npd*rd					1.280 (1.030)
npd*techf					0.200 (0.745)
imp*rd					-2.757 (2.404)
imp*techf					2.366*** (0.828)
rd*techf					0.512 (1.574)
Constant	19.520 (0.556)	19.517 (0.553)	19.563 (0.543)	19.152 (0.538)	19.243 (0.546)

Variable	OLS estimation results				
	Model 1	Model 2	Model 3	Model 4	Model 5
R ²	0.321	0.319	0.3412	0.3931	0.4303
Prob > F	0.0003	0.0008	0.0002	0	0
Observations	89				

Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The Logit model reports marginal effects evaluated at sample means; Values in parentheses are standard error; Source. Author's estimations based on the World Bank Enterprise Survey (Lao PDR), 2024.

The results of the logit model in Table 3 can be explained by four variables: new product innovation (npd); new product innovation and the use of new or improved processes by firms (npd*imp); industrial enterprises (man); and trade enterprises (trad). Especially, the role of new product innovation on export performance is positive. The result means that firms that have introduced or improved their products and services in the last three years are about 10.63% more likely to export than firms that have not, with a statistical significance of 10%.

The results also indicate that companies that innovate their products and processes have a 17.10% higher likelihood of exporting. This finding supports the complementarity hypothesis, which states that companies become more competitive in international markets when they work on multiple innovations at once. The finding aligns with Vixathap & Phonvisay, (2019) who identified that the development of new quality products and the implementation of innovative production techniques enhance exports. Furthermore, the enhancement of production processes and the elevation of product quality are critical factors that contribute to improved export performance (Carboni, 2020; Chu & Hoang, 2022). This matches what we see in developing countries, where having unique products helps firms enter markets by making them more competitive and showing international buyers that their products are of excellent quality (Bonfiglioli et al., 2022). On average, firms in the industrial and trade sectors export less than those in the service sector, by about 17.15% to 22.41%, and this differential is statistically significant at the 1% level, because industrial and trading firms in the Lao PDR are not as competitive or innovative

(Kongmanila & Takahashi, 2009; Kyophilavong, 2011).

When firms introduce new or improved products, they may serve as a critical threshold mechanism, enabling firms to enter export markets even if it does not immediately increase export volumes. This pattern matches with developing countries, where having unique products helps companies enter markets by making them more competitive and showing international buyers that their products are of good quality (OECD, 2018).

In contrast, process innovation, R&D expenditure, and foreign technology adoption do not exhibit significant effects on export participation after controlling for other firm-level characteristics. These results indicate that while advanced technologies and formal R&D are important for scaling export intensity among existing exporters, they are not sufficient to motivate non-exporters to engage in international markets. consistent with the studies of UNCTAD , 2023 and Hoang, 2025.

Export participation seems to be more affected by factors related to the company's structure and organization, like the industry they belong to, their management skills, and how they approach the market, which aligns with recent research on differences among firms in global value chains (Owusu, 2025; Fortanier et al., 2020). Thus, the results suggest a role of innovation in the export process: product innovation serves as a gateway for market entry, whereas technology adoption and R&D are more consequential for increasing export intensity among existing exporters. This distinction has important implications for policymakers seeking to promote export-led growth in Lao PDR,

emphasizing the need for differentiated strategies targeting both export entry and expansion.

Additionally, the findings indicate that not all innovation types will contribute equally to export performance. External technology acquisition and enterprises scale emerge as key determinants of export intensity, whereas internally generated innovation activities play a more limited

role. These results show that it's important to recognize the different kinds of innovation when looking at how they affect exports, and they suggest that policies aimed at spreading technology, improving a firm's ability to learn, and helping businesses grow might be more effective for boosting exports than just focusing on encouraging local R&D.

Table 3: Logit result for the role of innovation in export performance of enterprises in Lao PDR

Variable	Logit estimation results				
	Model 6	Model 7	Model 8	Model 9	Model 10
year	0.000 (0.004)	0.000 (0.004)	0.000 (0.004)	-0.001 (0.004)	-0.001 (0.004)
labor	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
exp	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)
sex	0.061 (0.045)	0.056 (0.045)	0.054 (0.045)	0.045 (0.047)	0.044 (0.045)
loc_v	-0.043 (0.047)	-0.038 (0.047)	-0.035 (0.047)	-0.014 (0.053)	-0.023 (0.049)
man	-0.161*** (0.048)	-0.174*** (0.048)	-0.162*** (0.048)	-0.165*** (0.048)	-0.173*** (0.048)
trad	-0.223*** (0.043)	-0.219*** (0.043)	-0.215*** (0.043)	-0.211*** (0.044)	-0.216*** (0.043)
acf	-0.052 (0.053)	-0.050 (0.053)	-0.046 (0.053)	-0.047 (0.053)	-0.056 (0.053)
train	0.010 (0.047)	0.031 (0.047)	0.059 (0.048)	0.051 (0.047)	0.053 (0.048)
npd	0.101* (0.052)				
imp		0.079 (0.057)			
rd			-0.065 (0.057)		
techf				-0.066 (0.061)	
npd*imp					0.158* (0.085)
npd*rd					-0.058 (0.090)
npd*techf					-0.156

Variable	Logit estimation results				
	Model 6	Model 7	Model 8	Model 9	Model 10
					(0.079)
Imp*rd					-
Imp*techf					0.146 (0.175)
rd*techf					-0.013 (0.113)
Pseudo R ²	0.0905	0.0858	0.0837	0.0840	0.100
Prob > chi2	0.0009	0.0012	0.0011	0.0017	0.003
Pr(export)	0.2218	0.2235	0.2247	0.2245	0.219
Observations	363				

Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The Logit model reports marginal effects evaluated at sample means; Values are number of Coefficient; Values in parentheses are standard error

Source. Author’s estimations based on the World Bank Enterprise Survey (Lao PDR), 2024.

4. Discussion

Overall, the findings indicate that not all innovation channels will contribute equally to export performance. External technology acquisition and firm scale emerge as key determinants of export intensity, whereas internally generated innovation activities play a more limited role. These results show that it's important to recognize the different kinds of innovation when looking at how they affect exports, and they suggest that policies aimed at spreading technology, improving a firm's ability to learn, and helping businesses grow might be more effective for boosting exports than just focusing on encouraging local R&D.

Taken together, some innovation influences export performance among Lao enterprises through multiple pathways. Consistent with broader empirical studies, product innovation appears to be an important mechanism facilitating export market entry, while foreign technology adoption is more strongly correlated with export intensity. It is crucial to integrate both firm-level innovation activities and external technology into export strategies for technological upgrading and competitiveness capacity (Moughari & Daim, 2023). Encouraging innovation is an important way to help create

better products and drive changes that boost production capacity, showing that innovation policy needs to be multi-faceted. Policies aiming to support export participation should encourage product development and market experimentation, which can help firms overcome initial barriers to entering international markets. The policies encouraging external technology acquisition and diffusion are critical for scaling export operations and improving product quality. Research has shown that disparities in innovation capabilities significantly shape patterns of trade and technological engagement across countries (Zhang et al., 2025). In Laos, the main challenges for research and development and process innovation include not being able to learn from new information, having inadequate research facilities, and not being linked to global value chains—problems that many lower middle-income countries face (Choi & Shim, 2024). While global data shows that improving innovation systems requires combined changes in developing skills, working together with businesses and the government, and strengthening institutions for policy research that enhances absorptive capacity, it is essential for firms to benefit from foreign technology and knowledge spillovers. Case studies from ASEAN

show that differences in digital readiness and innovation skills affect how technology impacts export, indicating that investing in digital tools and training can help firms improve their ability to export advanced technology products.

5. Conclusion

This paper studies the role of innovation in the export performance of enterprises in Lao PDR, based on using firm-level data from the World Bank Enterprise Survey (2024). By employing both OLS and logit models, the analysis captures not only firms' decisions to engage in export activities but also the extent of their export involvement. Empirically, the results show a link between three types of innovation and export performance. Especially the adoption of foreign technology significantly impacts export intensity, underscoring the necessity of obtaining external knowledge and enhancing technological capabilities to stimulate export growth. Conversely, product innovation and improved process innovation significantly increase the probability of export participation, and the introduction of new or enhanced products is a vital entry strategy into international markets. While firm characteristics such as size and managerial experience also influence export performance, their effects are generally moderate. The results show that types of innovation are important in the case of Lao PDR.

In conclusion, while innovation is a crucial driver of export performance in Lao PDR, its effectiveness depends on the innovation types, firm capabilities, and the broader institutional context. Policymakers and business leaders should use targeted strategies that help start export activities and increase export intensity by improving technology and developing innovation

skills. From a practical policy perspective, Lao PDR could focus on improving the innovation ecosystem, which could include:

- Strengthening linkages between domestic firms, research institutions, and foreign partners to facilitate knowledge and technology transfer; encouraging enterprises to create new products to diversify exports is important to create product differentiation and expand opportunities for accessing foreign markets, along with promoting the transfer of new technologies to local enterprises.
- Investing in infrastructure and workforce training to improve firms' readiness for technology adoption and integration into digital trade networks and create new skills for workers and production capacity, contributing to increased production and export growth.
- Enhancing institutional capacity for innovation policy formulation and evaluation, aligned with global best practices that promote science, technology, and innovation governance, and Expanding access to export-oriented innovation support programs, especially for small and medium-sized enterprises.

Acknowledgements (Optional)

This research could not be completed without the support from Institute for Industry, Commerce, and Energy, Ministry of Industry and Commerce.

Author Declaration

We believe this manuscript is well aligned with the scope and readership of the International Journal of Special Education (IJSE). The manuscript is original, not under consideration elsewhere, and all authors have approved the submission and declare no conflict of interest.

References

- Bonfiglioli, A., Crinò, R., & Gancia, G. (2022). *International trade with heterogeneous firms: Theory and evidence*. *Oxford Research Encyclopedia of Economics and Finance*. <https://doi.org/10.1093/acrefore/9780190625979.013.707>
- Carboni, O. A. (2017). The effect of public support on investment and R&D: An empirical evaluation on European manufacturing firms. *Technological Forecasting and Social Change*, 117, 282–295. <https://doi.org/10.1016/j.techfore.2016.11.017>

- Chen, T., Chen, X., Wang, C., & Xiang, X. (2018). Export behavior and firm innovation: New method and evidence. *Economics Letters*, 170, 76–78. <https://doi.org/10.1016/j.econlet.2018.05.029>
- Choi, J., & Shim, Y. (2024). **From adoption to innovation: State-dependent technology policy in developing countries** (IMF Working Paper No. 154). International Monetary Fund. <https://doi.org/10.5089/9798400281341.001>
- Chu, L. K., & Hoang, D. P. (2022). Determinants of firm-level innovation performance: New evidences from asean manufacturing firms. *The Singapore Economic Review*, 67(03), 953–983. <https://doi.org/10.1142/S0217590821450016>
- Cinar, O., Altuntas, S., & Alan, M. A. (2021). Technology transfer and its impact on innovation and firm performance: Empirical evidence from Turkish export companies. *Kybernetes*, 50(7), 2179–2207. <https://doi.org/10.1108/K-12-2019-0828>
- Cirera, X., & Maloney, W. F. (2017). *The innovation paradox: Developing-country capabilities and the unrealized promise of technological catch-up*. World Bank. <https://doi.org/10.1596/978-1-4648-1160-9>
- Durmaz, A., & Yildiz, Ü. (2020). The impact of innovation in the process of high technology exports: An analysis on BRICS countries. *International Journal of Economics and Administrative Studies*, 28, 193–202. <https://doi.org/10.18092/ulikidince.734893>
- Edeh, J. N., Obodoechi, D. N., & Ramos-Hidalgo, E. (2020). Effects of innovation strategies on export performance: New empirical evidence from developing market firms. *Technological Forecasting and Social Change*, 158, 120167. <https://doi.org/10.1016/j.techfore.2020.120167>
- Fernández-Sastre, J., & Montalvo-Quizhpi, F. (2019). The effect of developing countries' innovation policies on firms' decisions to invest in R&D. *Technological Forecasting and Social Change*, 143, 214–223. <https://doi.org/10.1016/j.techfore.2019.02.006>
- Fonchamnyo, D. C., & Wujung, V. A. (2016). Innovation and export performance: An empirical insight on the effect of innovation on manufacturing firms in Cameroon. *Applied Economics and Finance*, 3(4), 123–133. <http://dx.doi.org/10.11114/aef.v3i4.1682>
- Fortanier, F., Miao, G., Kolk, A., & Pisani, N. (2020). Accounting for firm heterogeneity in global value chains. *Journal of International Business Studies*, 51(3), 432–453. <https://doi.org/10.1057/s41267-019-00282-0>
- Hoang, N. S. M., Trang, P. M., & Dong, V. C. (2025, April). Effects Of Innovation On Trade: New Empirical Evidence From Vietnam. In *International Conference on Emerging Challenges: Sustainable Strategies in the Data-driven Economy (ICECH 2024)* (pp. 130–151). Atlantis Press. http://dx.doi10.2991/978-94-6463-694-9_9
- Jitsutthiphakorn, U. (2021). Innovation, firm productivity, and export survival: Firm-level evidence from ASEAN developing countries. *Economic Structures*, 10, 22. <https://doi.org/10.1186/s40008-021-00251-7>
- Kongmanila, X., & Takahashi, Y. (2009). Determinants of subcontracting in the Lao garment industry. *Contemporary Management Research*, 5(3), 263–286. <https://doi.org/10.7903/cmr.2761>
- Kyophilavong, P. (2008). 'SME Development in Lao PDR', in Lim, H. (ed.), *SME in Asia and Globalization*, ERIA Research Project Report 2007-5, pp.191-215.
- Kyophilavong, P. (2011). SME development in Lao PDR. In D. T. Van (Ed.), *SME development in Asia* (pp. 196–210). Economic Research Institute for ASEAN and East Asia (ERIA).
- Lv, L., Yin, Y., & Wang, Y. (2020). The impact of R&D input on technological innovation: evidence from South Asian and Southeast Asian countries. *Discrete Dynamics in Nature and Society*, 2020(1), 6408654. <https://doi.org/10.1155/2020/6408654>
- Mai, A. N., Van Vu, H., Bui, B. X., & Tran, T. Q. (2019). The lasting effects of innovation on firm profitability: panel evidence from a transitional economy. *Economic research-Ekonomska istraživanja*, 32(1), 3411–3430. <https://doi.org/10.1080/1331677X.2019.1660199>
- MOIC (2024). Lao PDR Industry and Commerce Plan, Five Year Plan, Ministry of industry and commerce, Database Review.
- Moughari, M. M., & Daim, T. U. (2023). Developing a model of technological innovation for export development in developing countries. *Technology in Society*, 75, 102338. <https://doi.org/10.1016/j.techsoc.2023.102338>

- Musamali, M. M., & Tarus, D. K. (2013). Does firm profile influence financial access among small and medium enterprises in Kenya? *Asian Economic and Financial Review*, 3(6), 714–723.
- Nguyen, M. H., Hoang, H. T., Nguyen, D. V., & Trinh, C. H. Q. (2025). Supply chain innovation and financial performance in ASEAN manufacturing firms: The moderating role of organisational innovation. *Ho Chi Minh City Open University Journal of Science: Economics and Business Administration*, 15(1), 54–69. <https://doi.org/10.46223/HCMCOUJS.econ.en.15.1.3099.2025>
- OECD. (2018). *Oslo manual 2018: Guidelines for collecting, reporting and using data on innovation* (4th ed.). OECD Publishing. <https://doi.org/10.1787/9789264304604-en>
- OECD. (2025). *OECD science, technology and innovation outlook 2025: Driving change in a shifting landscape*. OECD Publishing. <https://doi.org/10.1787/5fe57b90-en>
- Owusu, S. (2025). Global value chains and aggregate productivity growth in developing countries: The role of intra-sectoral allocation and structural change. *Review of World Economics (Weltwirtschaftliches Archiv)*, 161(1), 89–119. <https://doi.org/10.1007/s10290-024-00550-8>
- Sandu, S., & Ciocanel, B. (2014). Impact of R&D and innovation on high-tech export. *Procedia Economics and finance*, 15, 80-90. [https://doi.org/10.1016/S2212-5671\(14\)00450-X](https://doi.org/10.1016/S2212-5671(14)00450-X)
- Silva, G. M., Styles, C., & Lages, L. F. (2017). Breakthrough innovation in international business: The impact of tech-innovation and market-innovation on performance. *International Business Review*, 26(2), 391-404. <https://doi.org/10.1016/j.ibusrev.2016.10.001>
- Sisounonth, O., & Chansomphou, V. (2023). Factors influencing innovation of SMEs in Lao PDR. *Chinese Business Review*, 22(3), 123–134. <https://doi.org/10.17265/1537-1506/2023.03.004>
- Southiseng, N., Ty, M., Walsh, J., & Anurit, P. (2008). Development of excellent entrepreneurs in small and medium enterprises in Laos and Cambodia. *GMSARN International Journal*, 2(4), 147-156.
- Troilo, M. L. (2014). Adoption Of Technological Innovation In A Developing Country: An Empirical Analysis Of Enterprises In Lao People's Democratic Republic. *Journal of Developmental Entrepreneurship*, 19(03), 1450019.
- UNCTAD. (2023). *Technology and innovation report 2023: Opening green windows*. United Nations.
- Vixatthep, S., & Phonvisay, A. (2019). Human capital, innovation and entrepreneurship in micro and small businesses in Laos. In *Innovation in developing countries: Lessons from Vietnam and Laos* (pp. 99-121). Singapore: Springer Singapore.
- World Bank. (2024). *World Bank Enterprise Survey, Lao PDR 2024* (Ref. LAO_2024_WBES_v01_M) [Data set]. World Bank Enterprise Surveys. <https://www.enterprisesurveys.org/en/data> (accessed September 5, 2025)
- Zhang, L., Pham, T. D., Li, R., & Do, T. T. (2025). Enhancing the sustainable development of the ASEAN's digital trade: The impact mechanism of innovation capability. *Sustainability*, 17(4), 1766. <https://doi.org/10.3390/su17041766>