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Integrating the Structure-Conduct-Performance framework and Logistics Performance Index to assess logistics performance determinants in developing countries: evidence from Vietnam

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Abstract. This study aims to identify the factors affecting logistics performance in developing countries by integrating the Structure-Performance-Performance (SCP) framework and the World Bank Logistics Performance Index (LPI). Based on these frameworks, a research model is developed and tested using structural equation modeling (PLS-SEM) with data collected from 197 logistics enterprises in Hau Giang Province, Vietnam. The findings reveal that the elements of the logistics system structure, including market, policy, network, technology, and environment, significantly influence logistics enterprises' reliability, operation, network, and cost, which in turn impact overall logistics performance. The study highlights the importance of developing a well-structured logistics system and fostering the capabilities of logistics enterprises to enhance logistics performance in developing countries. The results provide valuable insights for policymakers and managers in designing policies and strategies to improve logistics performance and promote economic growth.

Keywords: Market, Policy, Technology, Performance, Sustainable, Operation, logistics, Structure Conduct Performance, Logistics Performance Index.

1. Introduction

Logistics performance is a critical factor that impacts the competitiveness of a country and businesses. The market-based strategy (MBV) perspective argues that external market orientation and industry factors are the main determinants of enterprise performance. Poor performance is a barrier to trade and foreign direct investment and thus hinders economic growth. Countries with high logistics costs struggle to compete internationally. Therefore, organizations are persistently searching for more efficient and cost-effective logistics solutions that can help them gain a competitive advantage in national and international markets. Arvis et al. (2018) argue that improving logistics performance should be at the core of policies aimed at enhancing competitiveness and promoting trade integration in any country. Further contemporary challenges of logistics and supply chains refer to growth and sustainability issues such as climate and environmental aspects and the construction of new and enlarged transport corridors or networks, respectively (Gerlitz et al., 2018; Philipp, 2020).

The SCP model argues that market structure determines firm behavior, which specified performance (Bain, 1956). The SCP framework proposes a stable relationship and a causal path from structure through behavior to performance (Church and Ware, 2000). It has been used for market and industry analysis, not only in Economics but also in the fields of business management, industrial organization (IO) to increase competitiveness (Lelissa & Kuhil, 2018), supply chain integration strategies to influence firm performance (Ralstone et al., 2015); strategic network analysis (Klint & Sjöberg, 2003); marketing effectiveness in SMEs (Nuhirlalia et al., 2019). The integration of RBV and SCP also provides a common market context related to product and service innovation. The SCP model aims to identify the factors, and components that influence the performance of joint actions (Klint and Sjöberg, 2016), but cannot specify performance indicators.

Meanwhile, the Logistics Performance Index (LPI) was first developed by the World Bank in 2007. It was updated and expanded in 2010 to measure the logistics performance of countries based on certain criteria and to rank them accordingly. LPI methodological framework is used to propose logistics policies to improve the LPI scores of specific countries. The framework is a strategic tool that countries can use to benchmark and implement relevant logistics policies (Göçer et al., 2022). LPI helps to reveal a country's logistics bottlenecks and identify the needs and priorities for improvements. Therefore, it provides valuable information for businesses operating in the logistics sector.

In Viet Nam, according to research results of Vietnam Logistics Research and Development Institute, through a survey from March to April 2019 with logistics enterprises and cargo owners, shows the weaknesses of logistics today: "The biggest difficulty encountered when working with logistics service providers is that costs are not as expected, accounting for 72.2%; lack of continuous improvement, 30.6%; service quality is not as committed, 27.8%. The three primary challenges faced by logistics service providers are limited human resources, accounting for 60%; unstable freight rates, 40%; lack of experience in supply chain management, and accounting, 40%". In particular, at least the past 5 years have shown that logistics costs for seafood and fruit exports account for about 20-25%, which is quite high compared to other countries in the region (about 10-15%). Hau Giang province is located in the Southern Hau Giang River sub-region, near the airport and seaport, with many important waterways and road routes passing through. This province is also a rich source of rice and agricultural products. It has a favorable location for placing agricultural and food processing factories. It can be a connection and transit center for the Mekong Delta. The development of logistics is an opportunity for the socio-economic development of the province and the Mekong Delta.

The main objective of this study is to explore the relationship between the structure of system elements, firm performance, and logistics performance, using the integrated model of the SCP framework and the logistics index LPIs. Additionally, this research provides empirical evidence on the relationships between the elements of the logistics system structure, logistics enterprises, and logistics performance, offering insights for policymakers and managers in developing countries).

This research framework needs to (1) identify key elements in the structural system, (2) factors that create effective business operations, and (3) logistics efficiency. This method can help to complete the structural system and develop policy recommendations for Vietnam as well as other developing countries—especially in Hau Giang Province – Viet Nam. The remaining parts of the paper include Section 2 presenting the literature review and theoretical platform. Section 3 discusses the applied methodology and model development. Section 4 discusses the conclusions and proposes managerial implications.

2. Theoretical background and research model

2.1. Theoretical of SCP model and Logistics Performance Index (LPI)

According to the RBV, it tends to define these resources broadly, including assets, infrastructure, skills, and capabilities (Bharadwaj, 2000). These resources provide efficient logistics services, including developing logistics facilities and communications and providing complementary logistics activities. Logistics systems platforms coordinate suppliers, manufacturers, retailers, and logistics service providers and improve channel member performance by supplying platforms for integrating different activities across the entire supply chain (Yu et al., 2017).

The principal structure of the SCP model suggests that external structural traits of an industry have a significant impact on firms' strategic decisions. The structure is developed collectively by incumbent firms in an industry to build effective processes. The SCP model mainly consists of three core components: market structure, market performance and market outcomes, and the role of government policy. Market structure includes factors such as market concentration, product differentiation, and barriers to entry through market performance including factors such as capital, pricing policy, and market information that affect market outcomes: gross profit and gross profit margin. This analytical framework also suggests that government (local government) policies can affect market structure, performance, and outcomes which proposes that the government should play a role in developing the market (Klint & Sjöberg, 2003).

Table 1. Summary of some key studies

	Title	Theory background/Method	Results	Reference
1	Towards a comprehensive SCP model for analyzing strategic networks/alliances	SCP model: analysis and understanding of strategic networks/alliances	- Strategic networks: individual, company, network; - Society and industry-related conditions: law, Taxes, infrastructure, subsidies	Klint & Sjoberg (2003)
2	A Structure-Conduct-Performance Perspective of How Strategic Supply Chain Integration Affects Firm Performance	The SCP framework from industrial-organizational economics→Firm performance	relationship among strategic integration, firm conduct (demand responsiveness capability), and performance	Ralston et al., 2015
3	Logistics performance index-driven policy development: An application to	LPI score	6 LPI criteria: Custom, Infrastructure, ease of arranging shipments, quality of logistics services, Tracking and Tracing, Timeliness	Göçer et al., 2021

	Turkey			
4	Weighing the Key Factors to Improve Vietnam's Logistics System	Literature reviews	six factors that play roles in the system: logistics costs, logistics infrastructures, connections between logistics components, logistics services, institutional frameworks, and technology	Dang & Yeo, 2018
5	Logistics performance: Efficiency, Effectiveness, and Differentiation		Logistics performance is a second-order formative construct composed of three dimensions: (a) logistics effectiveness; (b) logistics efficiency; and (c) logistics differentiation.	Fugate et al., 2010
6	The importance of the Logistics Performance Index in international trade	Gravity model	LPI significantly improves logistics performance in international trade relations between countries. In the relationship between countries, logistics performance plays an important role.	Martí et al, 2014

(Source: Synthesis of research)

2.2. Logistics System Structure

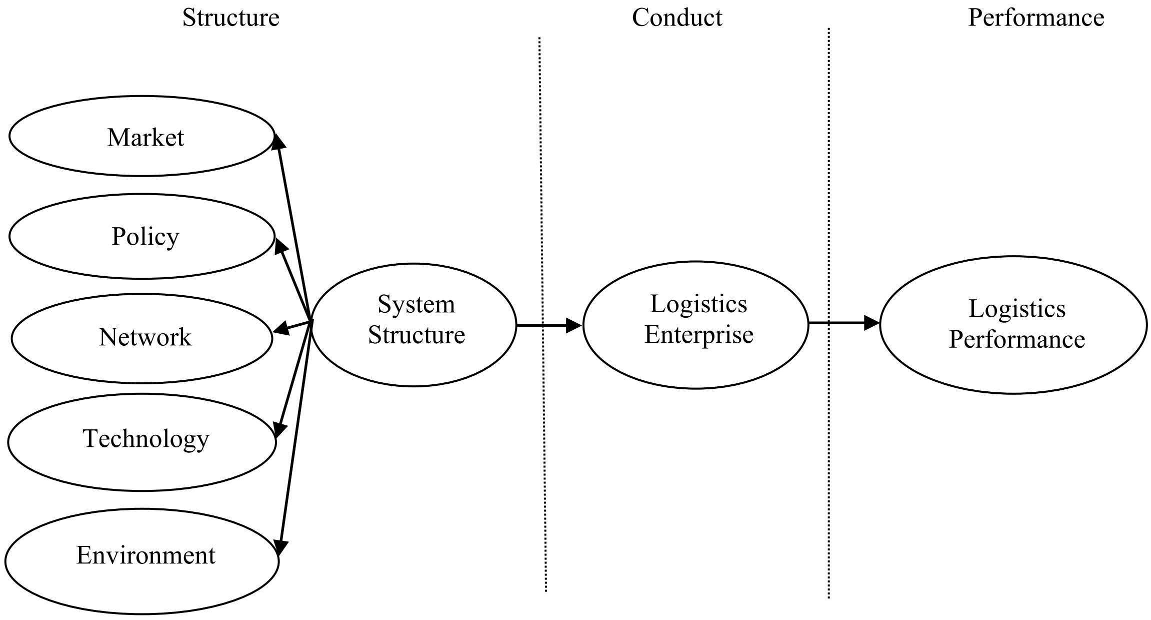
Logistics is the science and art of planning, organizing, facilitating, and controlling the flow of materials from raw material inputs to the output of products and goods to the end consumer. According to the system theory, the principle of logistics systems is associated with managing raw materials and distribution from input to the end consumer. Scientists believe that logistics provides a mechanism for developing tasks and strategies within which the structure of daily material flow management activities can be implemented. One of the characteristics of the key of logistics is that it not only pays special attention to the integration of activities but also performs their integration.

Grounded in SCP theory may take many forms Information technology use (Moldabekova, 2021; Naumenko et al., 2020); market (Klint & Sjöberg, 2003); environment (Morgan et al., 2018); policy (Douet and Cappuccilli, 2011); network and strategic alliances (Lyu et al. 2019). Aharonovitz et al. (2018) demonstrated the importance of network logistics cooperation and supplier selection on the logistics performance of shippers, carriers, and logistics service providers. Pan et al. (2019) discovered that the advancement of information technology systems has had a profound impact on the logistics industry in emerging economies, leading to increased efficiency and competitiveness in logistics services. Meersman and Voorde (2019) argued that the development and implementation of effective logistics system policies will contribute to making the supply chain more efficient. Furthermore, Lean et al. (2014) argued that improving transport network infrastructure contributes to economic development. They also stressed the importance of coordination between agencies managing different modes of transport to facilitate the implementation of multimodal transport systems.

2.3. Logistics Performance Measurement

In business, the approach that underlies performance measurement is the economic efficiency approach. The main reason is for enterprises to increase profits and continue to survive. In academic studies, the authors use various performance measures. However, some criteria used as performance measures are delivery time, consistent quality, productivity, cost of sales, production time, delivery security, service quality, flexibility, market share, customer loyalty, operations, efficiency, and compliance with standards.

In the field of logistics, Aziz et al., (2010) and Fugate et al., (2010), in their study, identified logistics performance indicators as security, reliability, on-time delivery, cost-effectiveness, and compliance



with standards. These criteria are considered essential for a business to be successful in its logistics operations.

Fig 1. Theoretical model

2.4. Relationship between the elements constituting the logistics system structure and logistics enterprise

2.4.1. Relationship between the Market and the system structure

Market structure is a concept that refers to the way a market is organized, referring to the number of sellers and buyers, barriers to entry, product differentiation, vertical entry, and product diversification. Market structure characteristics change relatively slowly and can often be considered fixed in the short run. The market structure will influence the behavior of companies in it, which together determine the performance of the market system as a whole (Nurhilalia et al, 2019). The market provides technical criteria for distributed products and services to ensure quality and continuity of supply, the larger markets, and greater dispersion of customer and supplier hence a need for global logistics. Longer and more complex supply chains require more complex logistics systems, needing more administration and making increased demands on logistics competence.

Barney (2001) states "The concept of market structure refers to how a market is organized." Market theories focus special attention on those aspects of the market that are important to the behavior of sellers and buyers, as well as to market outcomes. In the SCP model, there are three core components: market structure, market performance and market outcomes, and the role of government policy. This analytical framework also suggests that government (local government) market development policies can affect the performance of logistics enterprises and the efficiency of logistics services. From the above discussion, the following hypothesis is proposed:

H_{1a}: Market has a positive influence on system structure

2.4.2. Relationship between Policy and System Structure

Lipczynski et al. (2017), based on the SCP framework model, argue that there are three basic components: market structure, market performance, and market outcomes. According to the Asian Development Bank (2007), the logistics system is composed of (1) shippers, traders, and consignees; (2) public and private service providers; (3) regional and national institutions, policies, and rules; and (4) transport and communications infrastructure. Göçer et al. (2021) argue that combining LPI indicators will improve the measurement of policy effectiveness. Developing policies for improving the transport infrastructure and logistics for comparative advantage is a crucial issue in developing countries. Policy actions focus on infrastructure, competition, and regulation (e.g. local public transport, air transport, railways, ports), and environmental and safety principles are indicated as being important issues for further development. Thus, government policy plays a role in transmitting the direction of logistics activities to the system structure. Government policy can affect structural, behavioral, and performance variables. According to the SCP model, the role of government or regulatory intervention is to promote competition and prevent the abuse of market power. A reasonable implementation policy will help the system structure in which logistics enterprises operate efficiently in the market. Lean et al. (2014) argue that policies related to logistics performance are necessary for economic growth, especially for developing countries. Based on the above discussion, the following hypothesis is proposed:

H_{1b}: Policy has a positive effect on system structure.

2.4.3. Relationship between network connectivity and system structure

According to systems theory, the logistics industry needs a network framework. Bendoly et al. (2012) concluded that network connectivity will complement the effective coordination between internal and external resources and help the structure become complete. Based on the resource-based view (RBV) and resource complementarity theory, Pan et al. (2021) argued that the network connectivity between logistics resources and performance depends on the organization's structure, such as company size, operational experience, and human resources. Due to economic globalization, offshoring of production, increasing product complexity, and fast-changing trends, among others, logistics systems have become complex. Logistics integration is now being practiced not only within companies but also between different companies, i.e., horizontal collaboration. Logistics networks are useful for (i) perfecting the logistics structure system, (ii) making strategic decisions about how to conduct cooperation within the network, and (iii) supporting the efficient operation of the business (Ezaki et al. 2022). Based on the above discussion, the following hypothesis is proposed:

H_{1c}: Network connectivity has a positive effect on system structure

2.4.4. The relationship between technology and system structure

In the context of Industry 4.0, the level of influence of technology is an important foundation for the structure. A company's logistics network is part of a global logistics network, which is made up of a network of freight forwarders, railways, airlines, and shipping companies as well as a network of industrial enterprises, trading companies, and service providers. The global logistics network has many owners and users (Gudehus và Kotzab, 2012). The research results of Moldabekova et al. (2021) show that creating high-quality human resources (with skills to apply technology in logistics activities), sustainable use of internet services such as social networks, e-commerce... integrating digital technologies such as integrating big data, cloud computing... into logistics activities, as well as digital connections on a fixed broadband platform will support the structure to operate effectively through the transmission of connections from the system to businesses, helping businesses have sufficient operational capacity, promptly meeting the needs of the market and consumers. Barreto et al. (2017) emphasize that IoT can solve major challenges in the logistics sector, such as the issue of transparency (visibility of the supply chain) or control of integrity in the supply chain – the right product at the right time, place, quantity, and cost. With the above discussion, the following hypothesis is proposed:

H_{1d}: Modern technology has a positive influence on the system structure

2.4.5. Relationship between environment and system structure

The discussion on logistics and the environment has mainly centered around implementing more environmentally friendly technological solutions for individual firms and receiving governmental support for technology development (Aronsson & Brodin, 2006). The structural, more organizational issues, have been addressed on a societal level, where solutions concern infrastructure. There is a need to reduce the amount of transport in general. One of the main causes of environmental issues is the level of emissions in transportation and the ability to handle waste and pollution in logistics centers, river ports, and seaports.

In the macro context, actions taken by the government and legislative bodies are to build a policy framework and regulations on environmental protection towards green logistics; within the business context, actions such as applying new, energy-saving technologies; converting transportation modes from road to other modes; reduce the need for transportation. The eco-friendly logistics structure is characterized by less movement, less handling, shorter transportation distances, more direct transportation routes, and better utilization.

Green logistics (or sustainable logistics) is concerned with reducing the environmental and other negative impacts associated with the movement of supplies. Green supply chains seek to reduce negative impacts by redesigning supply sources, distribution, and reverse logistics management to eliminate inefficiencies, unnecessary freight, and packaging waste. With the above discussion, the following hypothesis is proposed:

H_{1e}: Environment has a positive influence on the system structure.

As discussed above, logistics enterprises are components in the system, affected by the elements of the system structure. On the other hand, when viewed from the perspective of the supply chain, logistics enterprises play a crucial role in this process. The central task of system planning is to develop a system that can meet performance requirements at minimum cost and within given constraints. System optimization aims to improve the static and dynamic performance or reduce the performance cost of an existing system. Therefore, a well-structured and stable system will help logistics enterprises operate effectively. Based on the above discussion, the following hypothesis is proposed:

H_2: System structure has a positive impact on logistics enterprises

2.5. Important factors of logistics enterprises

The supply chain operations model (SCOR) views supply chain operations as a series of processes and links different organizational processes in the supply chain to four components: plan, source, make, and deliver, each of which has its measurement criteria for (1) supply chain reliability; (2) responsiveness/flexibility; (3) cost; and (4) assets (Stewart, 1995). However, the SCOR model was developed with a focus on manufacturing processes. To measure SCP in this industry, companies need to combine these common performance dimensions into a balanced framework. For example, cost efficiency in service delivery may be one of the key performance metrics for a transportation logistics service provider. Another example is that delaying shipments until they can be delivered by a full truckload may reduce delivery costs and improve efficiency, but it may also result in a reduction in service provided to shippers and consignees (Lai et al., 2004). With the above discussion, the following hypothesis is proposed:

H_{3a}: Reliability has a positive relationship with logistics enterprises

H_{3b}: Cost has a positive relationship with logistics enterprises

H_{3c}: Operation has a positive relationship with logistics enterprises

H_{3d}: Network has a positive relationship with logistics enterprises

2.6. Relationship between logistics enterprises and logistics service performance

The ability of enterprises to integrate resources is the result of implementing government policies, applying market, technology, network, and environmental factors that will facilitate enterprises to provide logistics services effectively (Wang et al., 2016; Krysiński and Miller, 2017). With the information platform, IT infrastructure can create a higher level of supply chain integration, which can create significant sustainable performance (Rai et al., 2006). With the management platform, the management infrastructure can coordinate the relationship between suppliers, manufacturers, retailers, and logistics service providers. Based on the above discussion, the following hypothesis is proposed:

H_4: Logistics enterprises have a positive impact on logistics service performance.

3. Research method

3.1. Scale development

Multiple items were used for the measurement of each of the constructs, as summarized in Table I. The measurement scales were developed in accordance with Churchill's (1979) procedure for developing measures with desirable reliability and validity properties. The constructs were defined in an exacting way (Table I), based on a systematic literature review (Klint & Sjöberg, 2003). Measurement items were generated which capture the construct as defined by using two techniques: (i) Literature searches were conducted by two researchers for each construct from Akdoğan and Durak, (2016); Banomyong et al., (2008); Soliani (2018); Gocer et al., (2020); Lai et al., (2004); Dang and Yeo, (2018); Aziz et al., (2020) (Table 2) to determine how it had been defined previously and the measurement items that had been used; (ii) The experience survey technique was used, in that a panel of five expert academicians in the field of logistics (from outside the research team), and fourteen leaders and experts of Hau Giang province was consulted on the constructs and their measured items. Accordingly, essential factors in the logistics system and business operations of logistics enterprises were identified. The final scale was adjusted based on the pilot interviews to check the clarity and ease of answering the survey. The sample size was selected using the one-stage cluster method and random sampling. Therefore, the sample can represent the entire population.

3.2. Data collection

The study conducted an interview survey in the form of direct interviews with 200 representatives of logistics enterprise leaders selected and proposed by the Department of Industry and Trade of Hau Giang province from June 2023 to September 2023. Hau Giang province has 2 cities, 1 town, and 5 districts. The survey allocation for each city is 40 questionnaires. The remaining 6 administrative units, each unit conducted a survey with 20 questionnaires. As a result, 3 were invalid, 197 survey questionnaires were collected, 115 were service providers, and 84 were service companies. All of the measurement scales validated in previous studies were measured using a five-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

PLS-SEM is used in this study because (i) PLS-SEM works well with small sample sizes, models comprise many constructs and a large number of items (ii) complex models do not require normally distributed data, and (iii) applications have little available theory. The main purpose of PLS-SEM is to predict key target constructs (Hair et al. 2019). Descriptive analysis was conducted using SPSS 20, and SmartPLS 4.0 was performed to assess the measurement model and the structural model.

4. Results and discussion

4.1. Measurement model

As shown in Table 1, Cronbach's Alpha and composite reliability (CR) values of all constructs were greater than 0.70, indicating satisfactory internal reliability of the items in this study. Additionally, the average variance extracted (AVE) values ranged from 0.502 to 0.738, exceeding the threshold value of 0.5 supporting construct convergent validity (Hair et al., 2019). Discriminant validity was assessed by comparing the square root of the AVE for each construct against the inter-construct correlations. As shown in Table 2, all the diagonal values (the square roots of AVEs) exceeded the inter-construct correlations, satisfying the criterion for discriminant validity.

Table 1. Reliability, composite reliability, AVE

Variables	Measurement items	Loading	Cronbachs' alpha	CR	AVE
System structure			0.95	0.952	0.504
Market			0.874	0.88	0.529
	M1. Full logistics infrastructure	0.735			
	M2. There are a variety of goods to transport.	0.803			
	M3. Logistics centers ensure supply chain operations	0.788			
	M4. Have enough warehouse and ICD to serve the operation	0.752			
	M5. Shipping costs are still high and unreasonable.	0.699			
	M6. Has a system of logistics standards	0.684			
	M7. Have advertising and marketing activities for logistics	0.695			
	M8. Ensuring Quality Management System in Logistics Operations	0.651			
Network			0.91	0.917	0.507
	N1. The scale of logistics enterprises is still small and few.	0.687			
	N2. Competition in logistics activities complies with market mechanisms	0.732			
	N3. There is cooperation between businesses and the government in logistics activities.	0.571			
	N4. Has Logistics Center/Inland Container Depot.	0.693			
	N5. Logistics activities linked to many neighboring provinces	0.647			
	N6. Has infrastructure and information connection	0.722			
	N7. Good transport infrastructure for freight transport	0.573			
	N8. Have enough vehicles to transport goods	0.742			
	N9. Wharf, yard, fully serviced logistics activities	0.74			
	N10. Logistics knowledge is updated promptly by businesses.	0.732			
	N11. The high degree of containerization	0.858			
	N12. Has multimodal transport connections	0.798			
Policy			0.919	0.926	0.53
	P1. Documents directing and operating logistics activities are completed and timely.	0.702			
	P2. The policy to attract investment in logistics is attractive.	0.779			
	P3. There are policies to support investment in transportation systems serving logistics activities.	0.81			
	P4. There are policies to support small and medium logistics enterprises.	0.772			
	P5. Flexible price support policy for logistics activities	0.768			
	P6. There is a plan for logistics development until 2030, with a vision to 2050.	0.661			
	P7. Issue employment and salary policies for logistics activities	0.673			
	P8. Effective capital and credit support policies for logistics activities	0.627			
	P9. There is a mechanism to direct coordination activities between departments related to logistics.	0.778			
	P10. Tax and customs activities supporting export	0.675			

	P11. There is a policy to support the training of knowledge and skills for workers at logistics enterprises.	0.761			
	P12. There is a policy to attract people with logistics qualifications to serve the province.	0.705			
	Te1. Customs procedures are technologically advanced.		0.917	0.921	0.674
	Te2. Has a global positioning system by satellite (GPS)				
	Te 3. Online Status Tracking (ETracking/Tracing)				
	Te 4. Have a warehouse management system (WMS)				
	Te 5. Has a transportation management system (TMS)				
	Te 6. Has a port management system (TOS)				
Technology	Te 7. Share information about incoming and outgoing goods				
			0.875	0.886	0.727
	E1. The safe living and working environment of logistics activities	0.799			
	E2. Information and communication system ensures	0.842			
	E3. New technology applied to logistics operations	0.867			
Environment	E4. Protect the environment and avoid waste in logistics operations	0.899			
Logistics enterprise			0.974	0.975	0.502
Costs			0.919	0.921	0.714
	C1. Reduce logistics management costs	0.859			
	C2. Reduce costs associated with infrastructure to deliver services	0.898			
	C3. Reduce storage costs	0.859			
	C4. Reduce shipping costs	0.845			
	C5. Reduce unreasonable costs related to quality	0.806			
	C6. Plan and use costs effectively	0.798			
Reliability			0.924	0.926	0.622
	R1. Keep your promise to the shipper	0.691			
	R2. Solving the shipper's problem	0.771			
	R3. Perform services for shippers right the first time	0.809			
	R4. Provide the service promised to the shipper	0.828			
	R5. Keep shipper records safe	0.766			
	R6. Ensure a low product damage rate	0.807			
	R7. Ensure accurate delivery time	0.782			
	R8. Ensure Quality Management in Enterprise Logistics Operations	0.813			
	R9. Take corrective action when there are logistical issues	0.821			
Operations			0.942	0.943	0.614
	O1. Use warehouse and equipment effectively	0.727			
	O2. Fast loading and unloading time	0.729			
	O3. High rate of product delivery in good storage conditions	0.748			
	O5. Ensure on-time arrival and departure	0.816			
	O6. Perform correctly and fully according to the signed contract	0.737			
	O7. Flexible arrangement of routes and vehicle	0.757			

	loads				
	O8. Timely transmission of shipment information to sender/receiver	0.817			
	O9. Appropriate financial cycle	0.807			
	O10. Advertising and marketing activities are reasonably guaranteed.	0.784			
	O11. Partners work together to support operations	0.732			
	O12. Tax and investment incentives	0.825			
	O13. Has advantages in logistics supply/demand	0.814			
	O14. Have long-term plans for shipping routes and storage	0.823			
Collaboration			0.837	0.837	0.673
	Co1. Linked with transportation providers	0.799			
	Co2. Linked with warehouses and yards for storing goods	0.818			
	Co3. Linked with authorities to support procedures	0.867			
	Co4. Use information technology for convenient connection	0.794			
Logistics performance			0.881	0.883	0.738
	LP1. Good business results	0.829			
	LP2. Ability to scale the business	0.876			
	LP3. Contribute to local economic development	0.88			
	LP4. Good market expansion potential for local goods	0.849			

(Source: Results of research)

Table 2. Fornell-Larcker criteria

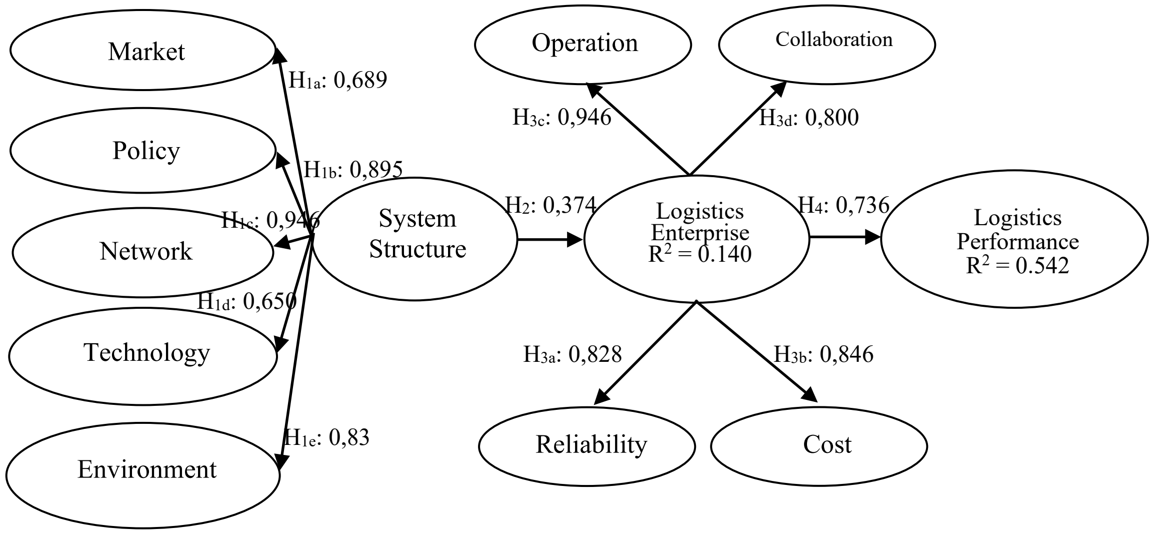
	SS	C	P	Te	LE	LP	O	Co	N	E	M	R
SS	0.71											
C	0.322	0.845										
P	0.895	0.238	0.73									
Te	0.65	0.181	0.64	0.821								
LE	0.374	0.846	0.32	0.304	0.707							
LP	0.248	0.573	0.19	0.196	0.736	0.859						
O	0.416	0.772	0.39	0.354	0.936	0.697	0.783					
Co	0.227	0.6	0.19	0.258	0.8	0.751	0.727	0.82				
N	0.946	0.339	0.76	0.625	0.374	0.234	0.392	0.226	0.71			
E	0.83	0.339	0.64	0.45	0.368	0.227	0.372	0.246	0.79	0.85		
M	0.689	0.325	0.65	0.353	0.416	0.472	0.422	0.395	0.62	0.55	0.728	
R	0.271	0.671	0.22	0.206	0.828	0.529	0.649	0.601	0.29	0.31	0.34	0.789

(Source: Results of research)

4.2. Structural model assessment

The test for the significance of path coefficients (β) was based on t-values, calculated using the bootstrap facility (with 5,000 re-sample). A hypothesis is confirmed by a positive, and significant, path coefficient between the two constructs. When the size of the resulting empirical t-value is above 1,96, it is assumed that the path coefficient is significantly different from zero at a significance level of 5% (p = 0.05; test two-tailed test). The assessment of the structural model included two parts. First, the R^2 of endogenous constructs was used to evaluate the explanatory power (Hair et al., 2019). The R^2 values of logistics enterprise, and logistics performance were 0.14; 0.542, respectively. Overall, the structural model demonstrated satisfactory explanatory power. The R^2 value of logistics performance was 0.542, meaning that 54.2% of the variance in logistics performance was explained by logistics enterprises.

The results of the hypotheses testing are summarized in Fig. 2 and Table 3.



(Source: Results of research)

Fig 2. Structural Equation Model Results

Table 3. Hypotheses Testing Results

H#	Path	Coefficient	*t* values	*p* values	Result
H_{1a}	Structure System -> Market	0.689	12.182	0.000	Supported
H_{1b}	Structure System -> Policy	0.895	35.522	0.000	Supported
H_{1c}	Structure System -> Network	0.946	50.06	0.000	Supported
H_{1d}	Structure System -> Technology	0.65	5.06	0.000	Supported
H_{1e}	Structure System -> Environment	0.83	20.213	0.000	Supported
H_2	Structure System -> Logistics enterprise	0.374	5.754	0.000	Supported
H_{3a}	Logistics enterprise -> Reliability	0.828	23.861	0.000	Supported
H_{3b}	Logistics enterprise -> Cost	0.846	24.571	0.000	Supported
H_{3c}	Logistics enterprise -> Operation	0.936	64.371	0.000	Supported
H_{3d}	Logistics enterprise -> Collaboration	0.8	23.858	0.000	Supported
H_4	Logistics enterprise -> Logistics performance	0.736	16.928	0.000	Supported

(Source: Results of research)

As expected, in the system structure variable group, the path coefficients from the system structure to the component factors are all significant at the 5% significance level (Figure 2). In addition, the bootstrap test results show that these coefficients are all different from zero. Therefore, it can be concluded that the data support hypotheses H_{1a} to H_{1e}. The test results show that the network (N) has the strongest relationship with system structure ($\beta_{N\text{-}SS}$= 0.946), followed by P ($\beta_{P\text{-}SS}$= 0.895), E ($\beta_{E\text{-}SS}$= 0.83), M ($\beta_{M\text{-}SS}$= 0.689), and Te ($\beta_{Te\text{-}SS}$= 0.65). The positive and significant relationship with strong fit statistics of the overall models demonstrates that system structure is a high-order construct that includes policy, market, network, technology, and environment. This result is consistent with the measurement research proposal of factors that play roles in the system Dang and Yeo (2018).

- Hypothesis H_2: The research results show that the path coefficient $\beta_{SS\text{-}LE}$= 0.347 and the p = 0.000 <0.05; t =5.754 (Table 3). There is a positive impact of the system structure on the logistics enterprise, which means a complete system structure will help logistics enterprises operate effectively. Hypothesis H_2 is statistically supported at the 5% significance level.

In the group conduct, the path coefficients from the logistics enterprise to the component factors are all significant at the 5% significance level (Figure 2). In addition, the bootstrap test results show that these coefficients are all different from zero. Therefore, it can be concluded that the data support hypotheses H_{3a} to H_{3d}. The test results show that the operation (O) has the strongest relationship with logistics enterprise ($\beta_{O\text{-}LE}$ = 0.936), followed by C ($\beta_{C\text{-}LE}$ = 0.846), R ($\beta_{R\text{-}LE}$ = 0.828), Co ($\beta_{Co\text{-}LE}$ = 0.8). The positive and significant relationship with strong fit statistics of the overall models demonstrates that logistics enterprise is a high-order construct that includes operation, cost, reliability, and collaboration.

- Hypothesis H_4: The research results show that the path coefficient $\beta_{SS\text{-}LP}$ = 0.736 and the p value is 0.000 (Table 3), logistics enterprise had a significantly positive relationship with overall logistics performance. Therefore, hypothesis H_4 is supported at the 5% significance level.

4.3. Robustness of the Model

Finally, according to Hair et al. (2019), a Q^2 value greater than 0.00 indicates that the research model predicts a particular dependency structure. As shown in Table 4, the Q^2 values of all constructs were high, indicating that the structural model has predictive relevance (Hair et al. 2019).

Table 4. value Q^2

	SSO	SSE	Q² (=1-SSE/SSO)
Cost	1182	588.86	0.502
Policy	2364	1358.8	0.425
Technology	1379	878.93	0.363
Logistics enterprise	7880	7198.8	0.086
Logistics performance	788	477.68	0.394
Operation	2364	1110	0.53
Network	788	452.78	0.425
Collaboration	2364	1382.7	0.415
Environment	788	436.89	0.446
Market	1576	1158.3	0.265
Reliability	1773	1026.8	0.421

(Source: Results of research)

4.4. Disscussion

The results from the H1 hypothesis group suggest that market, network, policy, technology, and environment are fundamental factors shaping the market structure for logistics development. This finding reinforces the framework model established by Klint and Sjöberg (2003) and Göçer et al. (2021), aligning with the strategic integration perspective proposed by Ralston et al. (2015). This initial discovery indicates that the SCP model framework can be adapted to different contexts, enabling each country or region to develop its own logistics system structure.

In relation to the H3 hypothesis group, businesses aiming for effective operations must focus on cost, reliability, cooperation, and management. The findings presented in Table 3 include items that were screened and tested based on the scale proposed by Dang and Yeo (2018). Logistics efficiency is a byproduct of a system structure that supports the smooth functioning of the business, which aligns with the research findings of Fugate et al. (2010) and Ralston et al. (2015).

5. Conclusions and Limitations for Future Research

This study investigates the factors affecting logistics performance in developing countries by integrating the SCP framework and the LPI. The empirical findings, based on data from 197 logistics enterprises in Hau Giang Province, Vietnam, support the hypothesized relationships between the elements of the logistics system structure, logistics enterprises' capabilities, and overall logistics performance. This study result is aligns with the suggest of Dang & Yeo (2018) for further research on logistics performance to improve Viet Nam’s logistics system.

Unlike earlier scales related to logistics performance, such as the LPI (Göçer et al., 2021) and the SCP framework for the technology industry (Ralston et al., 2015), this study employs measures of logistics efficiency, performance, and differentiation (Fugate et al., 2010) to analyze the relationship between strategic integration, behavior, and firm performance, based on LPI criteria. The measurement scales utilized in this research have been meticulously synthesized, selected, and integrated by experts from various prior studies through a thorough multi-step process. As a result, the logistics performance scale validated here presents a comprehensive solution that addresses the fragmentation and limitations of earlier measurement models.

The study underscores the necessity of creating a well-organized logistics system that integrates market dynamics, supportive policies, network connectivity, modern technology, and environmental sustainability. Additionally, improving the reliability, cost-effectiveness, operational efficiency, and collaborative networks of logistics enterprises is essential for enhancing logistics performance.

In today’s fast-changing information technology landscape, technology acts as a key driver for optimizing business structures and operations. It empowers organizations to respond swiftly and efficiently, reducing transportation costs and increasing the value of products and services for consumers both domestically and internationally. Moreover, the implementation of modern materials and equipment within this framework can help reduce environmental pollution through green logistics practices.

These findings have important implications for policymakers and managers in developing countries, as they provide guidance on designing policies and strategies to foster a conducive logistics environment and promote the competitiveness of logistics enterprises. However, the study has limitations, such as focusing on a single province in Vietnam and relying on cross-sectional data. Future research should extend the analysis to other developing countries, consider longitudinal data, and explore additional factors that may influence logistics performance, such as human resource development and institutional quality. Despite these limitations, this study makes a valuable contribution to the literature by offering a comprehensive framework for assessing logistics performance determinants in developing countries and providing empirical evidence to support the proposed relationships.

In conclusion, this study makes a notable contribution to the literature by integrating the SCP framework and the LPI to assess the factors affecting logistics performance in developing countries. With the suggested revisions and enhancements, the manuscript has the potential to provide valuable insights for researchers, policymakers, and managers interested in promoting logistics performance and economic growth in developing countries.

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