
The Impact of Supporting Industries on Attracting Foreign Direct Investment: A Case Study in Vinh Phuc Province, Vietnam

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Abstract: Summary: This study focuses on explaining the theoretical basis of the impact of supporting industries (SI) on attracting foreign direct investment (FDI); assessing the state of the impact of SI on FDI attraction into Vietnam in general and Vinh Phuc province in particular. Quantitative analysis results show that, in the field of SI in Vietnam, import suppliers are dominating domestic suppliers, the factor that most affects FDI enterprises' satisfaction level is labor, especially hard-work and progressiveness, followed by quality and attitude of discipline compliance of labor resources. The domestic SI still face difficulties in approaching customers, quality assurance, with outdated technology, lack of high-tech manpower, poor innovative research capabilities... In the coming time, to contribute to FDI attraction into Vietnam, to become a supplier for FDI enterprises, domestic enterprises working in supporting industries (SI enterprises) need to increase the rate of capital investment on technology, improve the quality of human resources, and promote information exchange with FDI enterprises.

Keywords: Enterprise, FDI attraction, Vinh Phuc province, Vietnam industries.

INTRODUCTION

Research subject

FDI, which has a strong impact on the economy, is an important research topic in many countries, especially in developing countries, and more and more research is needed in Vietnam. After more than 30 years of Doi Moi when the open door policy was implemented, FDI inflows into Vietnam have created many "bright spots" in economic growth. While still having some negative impacts, FDI has contributed to capital investment supplementation, export boost, technology transfer, job creation, revenue generation for the government budget, and economic recovery after the long-lasting macroeconomic instability. Nowadays, as Vietnam is entering an era of intensive integration, the demand for FDI attraction is increasing, due to the reduction of official development assistance (ODA), high public debt, and difficulty to accept commercial loans ... To boost FDI attraction, it is important to support investment incentive policies, because their effectiveness is decreasing. One of these supports is the development of SI, which is considered an important factor in attracting FDI (Dunning, Narural, 2000).

On the other hand, Vinh Phuc Province has identified foreign investment as one of the most important factors for economic development, so it has focused on attracting FDI since its re-establishment. Geographical advantages, effective investment attraction policies, and high provincial competitiveness index (PCI) (which is often at the top of the country) have helped Vinh Phuc become one of the most successful provinces in attracting FDI. As of December 31, 2018, the province had accumulated 365 FDI projects with a total registered capital of US 4,527 billion and had been very successful in attracting large-scale FDI projects. As a result, from a small-sized, small-population, purely agricultural province, after 22 years of re-establishment, in 2018, Vinh Phuc had had a gross regional domestic product (GRDP) per capita of USD 3,757 - ranking 9th among 63 provinces, approximately the figures of Hanoi and higher than Danang. This is due to the contribution of the FDI sector, proving that the province is an "attractive destination" in the eyes of foreign investors. Therefore, the study of the influence of SI to attract foreign direct investment into Vietnam through the case of Vinh Phuc province is of practical and theoretical significance. Beside, relating to macro impacts, Huy, D.T.N et al (2020) said Fluctuation of stock price in commercial banks in developing countries such as Vietnam will reflect the business health of bank system and the whole economy. Good business management requires us to consider the impacts of multi macro factors on stock price, and it contributes to promoting business plan, financial risk management and economic policies for economic growth and stabilizing macroeconomic factors.

The objective of this study is to explain the theoretical basis of the impact of supporting industry on FDI attraction; assess the state of the impact of SI to attract FDI into Vietnam in general and Vinh Phuc province in particular; propose solutions to the development of supporting industry to attract FDI into Vietnam in the near future. Those are also the three main research questions, for research subjects being Vietnamese enterprises in supporting industries, with the scope of the study being Vinh Phuc province, from 2005 to 2016.

2. A summary of studies on SI, FDI and the impact of SI on FDI attraction

Three main contents of this study, SI, FDI and the impact of SI on FDI attraction, are all "hot" topics, attracting the attention of many researchers, especially in East Asian countries. The studies of supporting industry have mainly focused on theoretical issues, from the concept, role, form, structure, to the influence of the state on SI. The term "SI" first appeared in 1985 in Japan's Ministry of International Trade and Industry (MITI)'s White Paper on economic cooperation, referring to small and medium-sized enterprises (SMEs) specializing in manufacturing and supplying components, accessories, and spare parts, creating the industrial infrastructure for the country. Now, although the term SI is widely used, especially in developing countries, it has not yet been uniformly understood, there are still many different definitions ...

The role of supporting industries was first studied by Porter (1990) when supporting industries were considered as one of the four factors in the Diamond model, the driving force for development and the determinant of national competitiveness. They can coordinate or divide activities within the industrial value chain, make complementary products or transfer skills from one industry to another. After that, it was mentioned in many other studies, with many new highlights, such as JICA (1995), which went into the relationship, the cohesion in production, and the requirements and conditions for promotion. Ratana (1999) pointed out the relationship between small and medium-sized enterprises (SMEs) and SI, emphasizing that SI consist mainly of SMEs ... Thomas Brandt (2012) emphasized: to develop SI, it is essential to maintain competitive advantages through skills, expertise, experience, and placing them in the value chain. K. Ohno (2005) generalized the supporting industry groups and their role to ensure the process of industrialization to take place in a "healthy and smooth" way ... Studies by Goh Ban Lee (1998), Asian productivity Organisation (2002) highlighted the role of the Government in the development of SI. Japan Bank for International Co-operation (JBIC, 2004) systematized the supporting industry groups; Ohno & Fujimoto (2006) and the University of Tokyo research group theorized about business structure based on SI ...

Studies on FDI are numerous, typically are theories explaining the factors that influence FDI attraction, such as the theory of internationalization (Coase, 1937), the theory of comparative advantage (Hymer, 1960), the theory of product life cycle (Vernon, 1966), eclectic theory - OLI (Dunning 1973, 1993, 2001, 2006) ... In reality, eclectic theory is most commonly used, because it has inherited all the advantages of other theories, converging principles to explain the shift of FDI into a country. Based on that foundation, many studies went into specific factors such as market size (Beven & Estrin, 2000; Pravakar Sahoo, 2006; Pravin Jadhav 2012); national risks (Beven & Estrin, 2000); labor costs (Pravakar Sahoo, 2006); trade openness (Pravin Jadhav, 2012; political stability (Mohamed Amal et al., 2010), infrastructure (Pravakar Sahoo, 2006) ...

Regarding the impact of FDI on receiving countries, Mori's study (2005) showed that it will be positive, contributing to improving national welfare, if domestic supporting industries are developed and can meet investors' requirements. Studies of Ohno (2007 & 2008) showed that FDI plays a leading role and dominates SI in the early stages of industrialization; but to be more successful, a dynamic private sector is needed, and industrial human resources are the most important throughout factor ... Studying the development of supporting industries in relation to FDI attraction, Mori J & Ohno K (2004) both agreed that the strategy to develop domestic supporting industries should be built based on a full understanding of the needs of multinational corporations (MNCs). Ryuichiro, Inoue (1999) pointed out the need to adjust Thailand's supporting industry development strategy after the Asian economic crisis in 1997, to promote cooperation and build a complete SI system. Peter (2011) affirmed that the comprehensive development of SI has created favorable conditions for investors and at the same time promoted the Thai economy to grow stably and sustainably.

The role of SI in attracting FDI has been increasingly focused on, according to the Japan Bank for International Cooperation (JBIC, 2004). China and Thailand have maintained the first two positions since 2000, thanks to both competitive SI and high local procurement ratio. Prema-Chandea Athukorala (2002) pointed out that to attract FDI inflows effectively, it is necessary to develop the manufacturing industry as the key. Pham Truong Hoang (2005) argued that SI are not only important in attracting FDI but are also the main basis of investment decision of foreign companies. Unlike a few decades ago, nowadays, the competition to attract FDI has led to a race on incentive policies, leading to their weakening influence (Narula and Dunning, 2000), so the development of SI is becoming more and more important...

In Vietnam, there have been many studies on SI, on theoretical studies we have: Tran Van Tho (2006), Nguyen Thi Xuan Thuy (2007), who gave definitions to SI, both affirmed the importance of SI development and considered SI as a breakthrough for domestic industrial development which helped to attract FDI, especially in Vietnam's advantageous fields; Le Thanh Y (2007) emphasized that localization is the key to attract FDI; in

order to increase FDI attraction, it is necessary to have policies to develop SI and improve the localization rate; Hoang Van Viet (2012) showed that: SI is a determinant of operational efficiency, development ability and competitiveness of enterprises, industries, regions, and countries; Truong Thi Chi Binh (2010) and Ha Thi Huong Lan (2014) and Nguyen Van Trinh (2012), though approaching from different perspectives, all affirmed: SI is an important factor contributing to FDI attraction and dominates economic development in general; Nguyen Thi Xuan Thuy (2007) and Nguyen Ngoc Son (2012), both confirmed the role of SI in attracting FDI, emphasizing that Vietnam needs to learn from the experience of other countries, focus on the localization rate, promote foreign investment in SI, promote industrial linkages, and participate in global production chains; Hoang Van Chau (2010), Le Xuan Sang et al (2011), Nguyen Thi Xuan Thuy (2011), Vo Thanh Thu and Nguyen Dong Phong (2014) all analyzed theoretical and practical basis of SI and proposed policy solutions to develop SI in Vietnam ...

On the other hand, there have been many studies on the state of SI development in Vietnam, according to Ichikawa (2004), Vietnam's SI have been developing thanks to the increase in FDI inflows, reformed State-owned enterprises, and the emergence of private enterprise. To emphasize: in order to attract FDI to develop SI, Vietnam needs to have an open and free business environment, abolish rigid regulations and frameworks, improve labor quality, improve infrastructure, and apply preferential tax policies. Do Manh Hong (2004) emphasized that to promote sustainable economic development, it is necessary to create conditions to attract FDI, in which, SI must be one step ahead. Thi Minh Hieu Vuong, Kenji Yokoyama (2011) studied 23 attributes qualitatively, including the development of SI in the receiving countries which over 1,500 Japanese enterprises considered attractive. It showed that Vietnam should maintain political stability, low cost and skilled labor, profit opportunities, companies' expansion strategy support, and low production costs ...

Regarding development orientation, with the viewpoint that SI development needs to meet the needs of FDI enterprises, SI enterprise development center - Institute of Industrial Strategy and Policy Research - Ministry of Industry and Trade (2015) analyzed the criteria that need to be satisfied to become a supplier of multinational corporations (MNC). Vu Chi Loc (2010), Luu Tien Dung et al. (2014) analyzed the factors affecting the development of SI in the process of international integration, emphasizing the role of MNC in SI. Truong Ba Thanh & Nguyen Ngoc Anh (2014) and Tran Quang Hau (2015) based on survey data from FDI enterprises to analyze factors affecting FDI attraction and showed that local advantages and international environment affect FDI inflows to provinces. In contrast, Pham Thu Huong (2013), Hoang Mai Van Anh (2014), and Nguyen Thi Phuong Nhung (2014) pointed out the role of FDI in the development of SI, and at the same time analyzing the factors that affect FDI attraction for the development of SI. Gereffi and Korzeniewicz (1994), Henderson (1998), Gereffi (1999), Morris and Kaplinsky (2001), Schmitz (2004) also analyzed global value chains associated with the formation of production linkages and provided directions and solutions to increase FDI attraction for SI development in Vietnam.

Thus, SI and the impact of SI on FDI attraction, which thereby affects economic development is an urgent and practical topic. Although there have been much research on this topic, there are still limitations, such as: (i) Some just mentioned but didn't analyze the impacts of SI on FDI attraction, many research questions have not been answered, especially when referring to Vietnamese practices. (ii) The studies mainly used qualitative methods, whose nature is to explore the factors, not quantitative methods using a combination of models for practical analysis. (iii) There have not been clear results, have not created an impact to support the development of SI to attract FDI in Vietnam today - and these are the gaps that need researching...

3. The theoretical basis of SI, FDI and the impact of SI on FDI attraction

3.1. General concept of SI

From the original concept in the "White Paper on Economic Cooperation 1985", until 1987, MITI officially defined the supporting industries as industries that provide what are needed such as raw materials, components, and goods for assembling industries (Truong Thi Chi Binh, 2010). Over time, along with the development of production forces, the understanding of SI has also become more and more profound and specific, up to now, there exist many concepts about SI, in which the definitions of the US Department of Energy (2004) and Thai Bureau of Supporting Industries Development (1999) are highly appreciated. European countries do not use the term "supporting industries", but often refer to this field as "supplier industries"...

In Vietnam, according to Tran Van Tho (2006) with an approach from economic theory: "SI is a concept of all industrial products that support the production of main final products. In particular, they include components, accessories, parts, packaging products, paint, dyeing materials, etc. and also intermediate products and primary materials." Based on the Vietnamese context, Nguyen Thi Xuan Thuy (VDF, 2007) proposed: "SI is a group of industrial activities providing intermediate inputs (including components, parts, and tools for their production) for assembly and processing industries". According to Decree No. 111/2015/ND-CP, dated November 3, 2015, of the Government on the development of supporting industries, the supporting industries are understood as "industries that produce raw materials, ingredients, components, and spare parts to support the final product manufacturing". Basically, these three concepts are similar to those of Japan, Thailand and many other

countries, but have not yet emphasized the role of SI in production value chains. Therefore, "Supporting industries include all industries that produce raw materials, components and spare parts providing inputs for industries producing final products."

Thus, SI is a historical category, with constant movement and change, presents in every country and usually develops in 5 stages, which are (i) Early, newly formed, (ii) Low development when SI products have increased, but their quality has not increased, (iii) Developed to meet the needs of manufacturers of final products, (iv) Highly developed, able to meet both cost and quality standards, and (v) Completely developed. On the other hand, with their attributes, SI have 6 main characteristics: being a part of the value chain; including many supply layers; having a variety of technology; requiring large amounts of capital and high-quality labor resources; having a wide market and covering a large range of industrial production; and attracting a large number of businesses to join, especially SMEs.

There are three groups of criteria to evaluate the development of SI, including (1) Group of development criteria, including industrial production value, number of manufacturing enterprises in the field, and size of SI enterprises. (2) Group of development criteria on quality, including technology level of SI enterprises, quality standards, relationships with customers and suppliers, and supply capability of the industry. (3) Group of structural criteria, including the structure of SI's products in the value chain and the structure of the industry - so that SI development is both an important solution to attract FDI and an opportunity for countries to develop and promote the process of industrialization and modernization of the economy.

3.2. General concept about FDI

There are three concepts of FDI being used at the same time. According to the International Monetary Fund (IMF, 1993), "FDI is the type of international investment in which an economic entity belongs to an economy acquires long-term benefits from an economic entity in another economy". To ensure the sustainability of FDI, according to the IMF, FDI investors need to hold a minimum of 10% of the shares or voting rights in enterprises. According to the Organization for Economic Co-operation and Development (OECD, 1996): "FDI is a form of investment to gain long-term benefits made by an investor of a country (direct investor) to an economic entity in another country (an enterprise with direct investment). Like IMF, according to OECD, direct investors need to hold 10% or more of common stock or voting rights to establish long-term relationships and influence business management. Besides, the investors have the right to: establish or expand a business or branch under its authority, take over the whole business, and join a new business. According to the United Nations Conference on Trade and Development (UNCTAD, 2012): "FDI is a long-term investment linked to the benefits and long-term control of an investor in a country (direct investor) into a company in another country." UNCTAD does not use the minimum rate of stocks to classify FDI, but base on the objectives of the investment, the classification is based on each country's practices...

Depending on the approach, many characteristics of FDI can be identified, including specific characteristics of FDI affecting industrial development such as (i) The goal of FDI is to find cheap input costs, in order to maximize profits, (ii) FDI is often accompanied by technology transfer to the host country, and (iii) FDI enterprises always have the intention to transfer prices. FDI activities have impacts on both the capital exporting countries (Home countries) and the capital importing countries (Host countries), but FDI have a more diverse impact on the capital-receiving countries. FDI contributes to capital supply, promotes economic growth, encourages technology transfer, develops human resources and creates jobs, helps expand markets and boosts exports, and promotes economy restructuring... However, besides the positive effects, FDI also causes many negative effects on receiving countries, such as environmental pollution and depleting resources. FDI can cause an imbalance in the international payment balance and in economic development among regions. It can also hinder the development of domestic enterprises, and risk economic excessive dependence. Therefore, although FDI plays an important role, and receiving countries should take measures to promote FDI attraction, but they should be selective to limit negative impacts ...

3.3. The impact of SI on FDI attraction

The impact of SI on FDI attraction is mentioned in many theories, such as: The theory of competitive advantage, the theory of Investment Development Path - IDP. However, this study will mainly base on the Eclectic Theory or OLI model, because it inherits all the advantages of previous studies on FDI. According to Dunning, FDI is effectively implemented when all three of the following conditions are satisfied: (1) Ownership advantages (O): including advantages such as proprietary technology, economies of scale, management skills, prestige ... (2) Location advantages (L), including advantages at the location which receiving investment such as resources, development level of infrastructure, policies of the government, cost of inputs (labor costs, transportation costs, component costs, spare parts ...), tax incentives ... (3) Internalization advantages (I), including reducing contract signing cost, reducing control and performance costs, avoiding information shortage leading to high costs for companies, avoiding the cost of copyrights and patents, etc.

According to this theory, for FDI inflows, the "pushing" factors originate from O and I, while L creates "pulling" factors, but the effects are not constant but change over time, space, and development level. SI with its representatives, SMEs, will promote the development of industrial infrastructure, provide necessary spare parts and components for the assembly process, create "pulling" factors for FDI. The OLI model explains the phenomenon of FDI in a static state, while IDP theory considers the phenomenon of FDI in a dynamic state with the change of these advantages in each development step. The combination of this theory and the OLI model is best suited to explain the process of FDI attraction.

Regarding the effect of SI to FDI attraction, it has been proved both theoretically and practically because the development of SI is the key to FDI attraction into developing countries. Underdeveloped SI will make FDI enterprises dependent on imported components and spare parts, increasing input costs, risking lagging progress, and low goods quality ... They also have difficulty in managing supply chain, making the investment environment less attractive, because the cost of components is much higher than the cost of labor. In fact, both FDI enterprises and domestic enterprises are involved in SI, so the localization of production needs to start from attracting component suppliers, then gradually improving their capability. It is important to make the relationship between SI and FDI a two-way relationship, SI do not necessarily have to develop first to attract FDI, but in many cases, FDI goes ahead to invest in the development of SI.

This study only focuses on the impact of SI on FDI attraction, specifically focusing only on the impact of SI on: (i) FDI scale, expressed in quality (Quality), Cost and Delivery, (ii) The quality of FDI is reflected in the ability to contribute FDI to the trade balance surplus, the level of technology spillover to domestic enterprises and the degree of impact on the development of domestic enterprises through the link between FDI enterprises and domestic enterprises, (iii) Structure of FDI inflows by regions and by industries. In countries with developed SI, FDI tends to flow into assembly industries using high technology. In the countries without developed SI, FDI tends to flow into SI, then continues to flow into assembly industries...

4. Empirical research in Vinh Phuc province

4.1. Data system and data collection methods

To examine the impact of SI on FDI attraction, the study conducted surveys based on the questionnaires, conducted by: (i) In-depth interviews with Department-level managers of SI enterprise and FDI enterprise sector, and officials who regularly advise FDI enterprises and SI enterprises in specialized departments. (ii) Conducting surveys and distributing questionnaires to FDI enterprises and SI enterprises; consulting expert, conducting in-depth interviews of two enterprises and researchers. The main difference in this study was that it conducted surveys and analyzed from both sides: FDI enterprises and SI enterprises, instead of just looking at the internal resources of SI enterprises or just evaluating from FDI enterprises' perspective as in previous studies... Primary data sources were collected through in-person surveys at the enterprises, exchanging documents via email to supplement, and direct phone calls when problems arose or there were problems in the research process.

Table 1: Distributing - collecting questionnaire for the study

	Questionnaire			
	Distributed	Collected	Valid	Invalid
Manufacturing FDI enterprises	200	162	155	7
SI enterprises currently providing products for FDI enterprises	130	125	125	0
Domestic SI enterprises only providing products for domestic manufacturing enterprises	60	54	50	4

Source: Author's summary and calculation

Secondary data is purchased directly from the General Statistics Office; from the investigation on SI enterprises of the Supporting industry enterprise development center, the Institute for Industrial Strategy and Policy (Ministry of Industry and Trade); and from the project "Encouraging the development of supporting industry in Vinh Phuc province to 2025" of Vinh Phuc People's Committee. The analysis was divided into two parts: (i) Analysis of the FDI enterprises group to obtain the assessment of the FDI enterprises on the ability of the SI enterprises in Vietnam to meet their requirements. A set of 28 observed variables measured by a 5-point Likert scale (1 - very dissatisfied; 2 - dissatisfied; 3 - normal; 4 - satisfied and 5 - very satisfied) was extracted from the questionnaires of manufacturing FDI enterprises. This study then conducted an exploratory factor analysis

(EFA) to collapse the 25 observed variables into representative factors considered most important by FDI enterprises. (ii) Analysis of the SI enterprises group, with the aim of evaluating internal resources as well as the current situation of SI enterprises in Vietnam. The study then conducted a statistical analysis of the frequency of the indicators in the questionnaire, to review the current status as well as the potential of SI enterprises group. The study then used the Logit model to assess the impact of internal factors of SI enterprises on the ability to attract FDI, through assessing the probability of purely domestic direct investment, not FDI-based SI enterprises (DDI) becoming a supplier for FDI enterprises.

SPSS and Eviews softwares are used to perform quantitative analysis.

4.2. Analyze the results based on FDI enterprises survey

4.2.1. Assessments of manufacturing FDI enterprises on the raw materials, components, and spare parts provided by domestic suppliers and by import suppliers

Currently, FDI enterprises in Vinh Phuc province are using two sources of raw materials, components and spare parts. Firstly, from domestic suppliers (made in Vietnam, by both FDI enterprises and DDI), secondly, from import (from countries other than Vietnam). To have an assessment of the two above-mentioned sources, the study conducted interviews with FDI enterprises based on criteria that they always required suppliers to meet, including: Quality (Q), Cost (C), Delivery Time (D), Environment (E), Finance (F), Technology (T), Responsibility and long-term Collaboration (R), Labor resources (L) (According to SIDEDEC's SI assessment criteria, Ministry of Industry and Trade, 2015). In each factor, the FDI enterprises evaluated further according to the detailed internal factors. The combined results assessed the satisfaction of FDI enterprises on each factor between the two supplier sources. As a result, the statistics frequency shows that: there is no significant difference between domestic and import sources in 3 groups of criteria, which are product quality of suppliers, suppliers' finance, and labor resources. In the remaining 5 out of 8 groups of criteria, import suppliers dominate and receive great satisfaction from the manufacturing enterprises compared with domestic suppliers ...

4.2.2. Analysis of factors affecting the satisfaction level of FDI enterprises

This study conducted an analysis on factors based on the evaluation of FDI enterprises, only with domestic suppliers (including domestic SI enterprises and domestic FDI SI enterprises in Vietnam). The goal is to use the EFA method to evaluate eight factors of domestic suppliers, thereby considering which factors really affect and have the strongest influence on FDI attraction today. First, the author conducted Cronbach's Alpha test in turn for each of the mentioned factors, which would be evaluated as acceptable and effective when the Cronbach's Alpha coefficient is greater than 0.6, and the corrected item-total correlation is greater than 0.3, and get the following result.

Table 2: Summary of variables and criteria of Cronbach's Alpha Analysis

No.	Criterion	Cronbach's Alpha	Significant observed variable		Eliminated observed variable	
			Number of variables	Name of variable	Number of variables	Name of variable
1	Quality (Q)	0.845	3	(Q1) Technology and production process (Q2) Equipment and production methods (Q4) Preventive remedies	1	(Q3) Production and quality management system
2	Cost (C)	0.834	4	(C1) Cost competitiveness (C2) Cost structure (C3) Cost transparency (C4) Flexibility	0	
3	Delivery time (D)	0.669	3	(D1) Supply chain management capability (D2) Packing-	0	

		Cronbach's	Significant observed variable		Eliminated variable	observed
				logistics department (D3) Production and delivery plan management		
4	Environment (E)	0.432 (Loại)				
5	Finance (F)	0.368 (Loại)				
6	Technology (T)	0.752	3	(T1) Innovative design capability (T2) Copyright registration (T3) Facilities for research and development	0	
7	Responsibility and long-term cooperation (R)	0.812	4	(R2) Quick response (R3) Make decisions in due course (R4) Supply data management (R5) Long-term cooperation	1	(R1) Management board's qualification
8	Labor (L)	0.872	3	(L1) Quality of labor resources (L2) Attitude of discipline compliance (L3) Hard-work and progressiveness	0	

Source: Summary and calculation by author

Except for 2 criteria of Environment and Finance; all other criteria have Cronbach's Alpha coefficient greater than 0.6, showing the criteria that the author included in the analysis were significant. Two criteria of Environment and Finance were excluded, due to domestic SI enterprises have: (i) Low compliance with environmental rules, ISO certificates in Vietnam do not ensure reliability, (ii) General situation in enterprises is that at present, financial statements have not yet met the requirements of transparency and clarity. Then, the study continued to conduct exploratory factor analysis (EFA) for the remaining 6 criteria and the 20 observed variables to assess the satisfaction of the FDI enterprises explained by them, and got the following results.

Table 3: Results of exploratory factor analysis

Observed variable	Main factor					
	L	Q	C	R	T	D
L3	0.920					
L1	0.832					
L2	0.754					
Q4		0.915				
Q1		0.870				
Q2		0.713				

Observed variable	Main factor					
	L	Q	C	R	T	D
C3			0.934			
C4			0.912			
C1			0.713			
C2			0.657			
R5				0.903		
R2				0.846		
R4				0.732		
R3				0.619		
T1					0.875	
T3					0.671	
T2					0.550	
D1						0.913
D3						0.786
D2						0.67
KMO	0.787					
P-value (Barlett's test)	0.000					
Eigenvalue	7.872	2.847	1.625	1.246	1.134	1.073
Explained variance (%)	74.23					

Source: Summary and calculation by author

Thus, all 6 criteria explained the satisfaction level of the FDI enterprises when evaluating SI enterprises in Vietnam. They explained 74.23% of the attitude of FDI enterprises when evaluating domestic suppliers, in which the main factor that leads to satisfaction is labor resources. The strongest impact is L3 (Hard-work and progressive), then the quality of labor resources (L1) and the attitude of discipline compliance of workers (L2). Quality is the second most important factor, followed by other factors: Cost, Responsibility and long-term cooperation, Technology and Delivery time.

4.3. Analyze the results based on the survey of SI enterprises

4.3.1. Assess the status of two groups of enterprises - FDI SI enterprises and DDI SI enterprises

In addition to summarizing and analyzing results from frequency statistics based on the questionnaire, this research is also based on the Logit model to assess the possibility of Vietnamese SI enterprises becoming a supplier for manufacturing FDI enterprises. In addition to the data from 125 SI enterprises which were suppliers to the FDI enterprises, the authors also conducted interviews and collected data of the other SI enterprises which were suppliers to domestic manufacturing enterprises. Based on the questions in the survey questionnaire of SI enterprises, the author summarized the information collected in two groups: (1) the group of SI enterprises which were also FDI enterprises and (2) the group of SI enterprises which are purely domestic direct investment (DDI).

Frequency statistics show that: (i) FDI enterprises are much more proactive and autonomous in production than DDI enterprises, the proportion of products designed by themselves, purchased by themselves and labeled their own brands accounts for 65% and 3% respectively. (ii) Most of the equipment used by the domestic SI enterprises is imported, while the FDI enterprises balance between imported equipment and equipment manufactured by their own country. (iii) FDI enterprises mainly use automatic and semi-automatic equipment (accounting for 90%), DDI enterprises still mainly use manual equipment (more than 50%). (iv) There is not much difference between the two groups of SI enterprises in using modern management methods, except that FDI enterprises are compulsory to use them, while DDI enterprises have not had such requirements. (v) The possibility of DDI enterprises being able to find FDI customers through direct exchange is relatively low (12%) compared to 57% of the FDI enterprises. (vi) Domestic SI enterprises are facing more difficulties than FDI enterprises, especially in terms of technology, identifying customers' quality standards, highly qualified human resources shortage... (vii) FDI enterprises need support in administrative procedures, market access, tax incentives and space for lease (78%, 68%, 83%, and 80%, respectively); and DDI enterprises wish to receive support in technology (80%), administrative procedures (60%), tax incentives (80%) and human resource training (60%). (viii) Most SI enterprises (over 70%) highly appreciate human resources in terms of hard-work

and attitude of discipline compliance, while the educational and professional level of the labor force has not been highly appreciated in industrial zones.

4.3.2. Assess the impact of internal factors of SI enterprises on the ability to become a supplier of manufacturing DNFDI

In addition to the assessment from both sides of FDI enterprises and SI enterprises, the study on the impact of the internal factors of SI enterprises is also based on the Logit model, the dependent variable has only two states that are: equal to 1 (if the SI enterprise is currently a supplier of a FDI manufacturing enterprise) and equal to 0 (if the SI enterprise is currently not a supplier of a FDI manufacturing enterprise). The objective is: determine how the probability that a dependent variable will receive a value of 1 (P_i) (i.e. the probability that the SI enterprise is currently a supplier of a FDI manufacturing enterprise) will change when the independent variables change.

4.3.2.1. Theoretical framework of the Logit model

Logit model (Maddala, 1984) p_i is determined by:

$$p_i = \frac{e^{\beta_0 + \beta_1 X_{1i}}}{1 + e^{\beta_0 + \beta_1 X_{1i}}} = \frac{e^{X_i \beta}}{1 + e^{X_i \beta}} = \frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)} \quad (4.1)$$

$X = (1, X_1)$; $X_i = (1, X_{1i})$; $\beta' = (\beta_0, \beta_1)$.

In this model, p_i is not a linear function of the independent variables.

Equation (4.1) is called the logistic distribution function, If $X \beta$ receives values from $-\infty$ to ∞ , then p takes a value from 0 to 1. p_i is nonlinear with X and the parameters β , which means it is not possible to apply OLS directly to the estimation, but we need to use the maximum likelihood estimation to estimate β .

Because Y only has one of the values 0 and 1, Y follows a binomial distribution, so the likelihood function with the sample size n is the following:

$$L = \prod_{i=1}^n p_i^{Y_i} (1 - p_i)^{1 - Y_i}$$

$$L = \prod_{i=1}^n \left(\frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)} \right)^{Y_i} \left(\frac{1}{1 + \exp(X_i \beta)} \right)^{1 - Y_i}$$

$$= \frac{\exp(\beta' \sum_{i=1}^n X_i Y_i)}{\prod_{i=1}^n (1 + \exp(X_i \beta))} \quad (4.2)$$

Let $t^* = \sum_{i=1}^n X_i Y_i$, t^* be a two-dimensional vector (the number of dimensions is equal to the number of regression coefficients). We need to find the maximum likelihood estimation of β :

$$\ln(L) = \beta' t^* - \sum_{i=1}^n \ln(1 + \exp(X_i \beta))$$

$$\partial \ln(L) / \partial \beta = g(\beta) = - \sum_{i=1}^n \frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)} X_i + t^* = 0 \quad (4.3)$$

$$g(\hat{\beta}) = - \sum_{i=1}^n \frac{\exp(X_i \hat{\beta})}{1 + \exp(X_i \hat{\beta})} X_i + t^*$$

The equation is nonlinear for β , so the Newton-Raphson method is used to solve this system of equations.

$H(\beta) = E(\partial^2 \ln(L) / \partial \beta \partial \beta') = E(\partial g(\beta) / \partial \beta)$

$$= - \sum_{i=1}^n \left(\frac{(1 + \exp(X_i \beta)) \exp(X_i \beta) X_i - (\exp(X_i \beta))^2 X_i}{(1 + \exp(X_i \beta))^2} \right) X_i$$

$$= - \sum_{i=1}^n \frac{\exp(X_i \beta)_i}{(1 + \exp(X_i \beta))^2} X_i X_i'$$

$H(\hat{\beta})$ is called the information matrix. If $\hat{\beta}$ is the root of $g(\beta)$ and we use Taylor expansions at $\hat{\beta}$, then

$$g(\hat{\beta}) = \frac{\partial Ln(L)}{\partial \beta} + \frac{\partial^2 Ln(L)}{\partial \beta \partial \beta'} (\hat{\beta} - \beta)$$

$$\frac{\partial^2 Ln(L)}{\partial \beta \partial \beta'}$$

If $\frac{\partial^2 Ln(L)}{\partial \beta \partial \beta'}$ is a non-singular matrix, then

$$(\hat{\beta} - \beta) = - \left[\frac{\partial^2 Ln(L)}{\partial \beta \partial \beta'} \right]^{-1} g(\beta) = - [H(\hat{\beta})]^{-1} g(\hat{\beta})$$

We have the following iteration: Starting with some initial value of β , such as β_0 , we calculate $S(\beta_0)$ and $I(\beta_0)$, then find new β with the following formula :

$$\beta = \beta_0 - [H(\beta_0)]^{-1} g(\beta_0)$$

The above iteration process will be performed until convergence. Since $H(\beta)$ is a positive definite quadratic form, the above process will give a maximum likelihood estimation. Corresponding to $\hat{\beta}$, we have $[H(\hat{\beta})]^{-1}$ being the covariance matrix of $\hat{\beta}$. Use this matrix to test hypotheses and perform other statistical speculations.

After estimating $\hat{\beta}$, we can calculate the estimated probability $p_i = P(Y=1 | X_i)$,

$$\hat{p}_i = \frac{\exp(X_i \hat{\beta})}{1 + \exp(X_i \hat{\beta})}$$

Combined with (4.3) we have: $\sum \hat{p}_i X_i = \sum Y_i X_i$. This equation is used to retest the \hat{p}_i . So in the Logit model, we do not study the direct effect of the independent variable X_k on Y but consider the influence of X_k on the probability that Y will receive a value of 1 or expected value of Y .

The effects of X_k on p_i are presented as follows:

$$\frac{\partial}{\partial X_k} p_i = \frac{\exp(X_i \hat{\beta})}{(1 + \exp(X_i \hat{\beta}))^2} \beta_k = p_i(1-p_i)\beta_k$$

4.3.2.2. Model results

The variables included in the model are listed in Table 3.19 below

Table 4: Description of variables included in the model

Name of the variable	Notation	Definition of the variable	Expectation
Dependent variable	Y	Binary variable, equal to 1 if the SI enterprise is a supplier of the FDI enterprise, equal to 0 if the SI enterprise is not a provider of the FDI manufacturing enterprise	
The rate of capital invested on technology	CT	Capital invested on technology / owner's equity	(+)
The rate of high quality labor resources	AL	Number of employees graduated from university or vocational schools / total number of employees of an enterprise	(+)
Return on total assets	ROA	Profit after tax / Total assets	(+)

Information asymmetry	AI	Binary variable, equal to 1 if the SI enterprise thinks there is an information asymmetry between the SI enterprise and the FDI manufacturing enterprise, and equal to 0 otherwise	(-)
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Source: Summary and calculation by author

Because the logit model is nonlinear for independent variables and the dependent variable Y only receives one of the values 0 and 1, it is not possible to apply the ordinary least squares method (OLS) directly to estimate the coefficients of the model, so the author used the maximum likelihood method to estimate the coefficients β_i of the model, and the results are summarized below.

Table 5: Results of Logit model's estimation

Independent variable	Regression coefficient (β_i)	Standard errors	Wald statistic	P-value
Block Coefficient	-30.740*	7.349	17.498	0.000
The rate of capital invested on technology	1.150*	0.362	10.076	0.002
The rate of high quality labor resources	0.531***	0.224	2.115	0.073
Return on total assets	0.019***	0.016	2.007	0.096
Information asymmetry	-2.210*	3.451	7.122	0.001
2-log likelihood	113.206			
Cox & Snell R ²	0.525			
Nagelkerker R ²	0.657			
Homer & Lemeshow Test	Chi-square	10.18	Sig.	0.0023

Source: Summary and calculation by author

*: Variable has statistical significance at 1% level

**: Variable has statistical significance at 5% level

***: Variable has statistical significance at 10% level

The Wald tests and the Homer & Lemeshow tests both show that the model is valid and the coefficients of the independent variables are statistically significant. The ROA variable and the rate of high quality labor resources variable are significant at 10% level, the other two variables being the rate of capital invested on technology (CT) and information asymmetry (AI) are significant at the level of 1%; and the sign of each coefficient is completely in accordance with the expectation.

Regarding the magnitude of the coefficients, we find that the slope coefficient of the variable CT (the rate of capital invested on technology) has the greatest value (1.150), showing that to become a supplier for FDI enterprises in the future, SI enterprises will need to invest more to improve technology and improve production techniques to meet the increasingly high requirements of FDI enterprises. The least impact on the probability of becoming a supplier for a FDI manufacturing enterprise is the ROA variable, showing that: profitability indicators are not necessarily an important factor in the supplier selection process of manufacturers. The qualitative variable AI (information asymmetry) receiving a negative value and being a significant variable indicates that if there exists an information asymmetry between SI enterprises and FDI manufacturing enterprises, the SI enterprises' probability of becoming a supplier of FDI manufacturing enterprises will decrease.

To better understand the impact of internal factors on the probability of becoming a supplier for FDI manufacturing enterprises, the author analyzed the marginal effects of each variable on the probability of becoming a supplier for FDI manufacturing enterprises under the assumption that the initial probability $P_0 = 10\%$ (ie initial probability $P(Y=1) = 10\%$).

For the variable the rate of capital invested on technology (CT) with $\beta_1 = 1.150$, $P_0 = 10\%$ and $e^{\beta_1} = 9.855$, we calculate:

$$P_1 = P_0 \cdot e^{\beta_1} / [1 - P_0(1 - e^{\beta_1})] = 0.260 = 26\%$$

Which shows that if the initial probability of becoming a supplier of FDI manufacturing enterprises of a SI enterprise is 10%, if the SI enterprise increases the rate of capital invested on technology by 1%, then the probability of becoming a supplier of FDI manufacturing enterprises will increase by 16%, ceteris paribus.

Similarly for the remaining variables, respectively we receive the same conclusion: When the other factors are constant, if the rate of high quality labor resources of an SI enterprise increases by 1%, then its probability of

becoming a supplier for FDI manufacturing enterprises will increase by 5.89%. If ROA increases by 1% and other factors remain constant, this probability will increase by 1.7% compared to the initial figure.

Regarding the qualitative variable Information asymmetry (AI), after calculating using the above formula we get the probability $P_1 = 0.0108 = 1.08\%$. It shows that when other factors are constant, the SI enterprises which receive symmetrical and effective information about FDI manufacturing enterprises will have the probability of becoming a supplier of FDI manufacturing enterprises 8.92% higher than that of the SI enterprises which receive asymmetrical information. This once again shows that supporting SI enterprises in market access and linking businesses in the production chain is important in Vietnam's current FDI attraction policy.

CONCLUSION

From the quantitative research results on the impact of SI to FDI attraction, the following conclusions can be drawn: According to the assessment of FDI enterprises on domestic suppliers and import suppliers, it shows that: (i) The quality of raw materials or labor operating in the field of SI is not much different, but in terms of the price, delivery time, manufacturing environment, technology, responsibility capacity, the import suppliers overwhelmingly outperform domestic suppliers. (ii) In all 6 criteria: quality, price, delivery time, technology, responsibility and long-term cooperation, labor is significant to explain the satisfaction level of FDI enterprises when evaluating Vietnam's SI enterprises. Currently, the labor criterion has the biggest impact on the satisfaction level of FDI enterprises; in labor, the most impactful is hard-work and progressiveness, then quality and attitude of discipline compliance. (iii) Compared to FDI SI enterprises, DDI SI enterprises have more difficulties in approaching customers, quality assurance, with outdated technology, lack of high-tech manpower, poor innovative research capabilities ... (iv) To become a supplier of FDI enterprises, SI enterprises need to increase the rate of capital investment on technology, improve the quality of human resources, and enhance information exchange between the SI enterprises and FDI enterprises. The most important factor helping to improve SI enterprises' probability to become a supplier of FDI enterprises is the rate of capital investment on technology, so SI enterprises need to focus on technology innovation investment, because profitability is not an important factor when choosing a supplier.

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