

# Critical Factors of Total Logistics Cost: A Survey of Vietnam-Based Logistics Service Providers

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## Abstract

Since 1995, the integration of Vietnam into regional and global trade agreements, for example ASEAN, WTO and recent free trade agreements (FTA) with South Korea, Japan, EU has boosted the country's import export volume tremendously. The ASEAN Economic Community (AEC) formed in late 2015 creates not only opportunities but also challenges for the Vietnamese economy in general and Vietnam's logistics sector in particular enter internationally. In addition, CPTPP (CPTPP - Comprehensive and Progressive Agreement for Trans-Pacific Partnership) and EVFTA (EVFTA- EU-Vietnam Free Trade Agreement) will contribute to expanding markets and increasing exports to 11 member countries (CPTPP, also known as TPP11) as well as 27 European Union member countries (EU). Especially when joining in the global organizations, the price of goods is always a decisive factor in the issue of competition with members in the organizations and outside the organizations. Countries always want to have products with high value but competitive prices to survive and create profits with those advantages and challenges. Logistics costs are considered as one of the factors causing high product's price, especially Vietnam's leading import-export products, which contributes to reduce the competitive advantage of Vietnamese products in the international market. Therefore, there have been some previous studies to find out the factors that increase logistics costs in order to find solutions to reduce Vietnam's logistics costs, increase product value and increase competitiveness advantages. Many concerns about improving the logistics efficiency and effectiveness of these commodity chains in Vietnam recently have urged for more in-depth studies and academic researches about this topic. In this paper, we are going to conduct an empirical research about the critical factors on logistics cost by sending out surveys to Vietnam-based logistics service providers to interview. The SPSS software version 20 was used to check the suitability of six critical factors and their 41 elements and apply the dataset to build up the Analysis of Variance (ANOVA) model. Besides that, the authors also used in-depth interview method on different research subjects including: cargo owners, logistics service providers and associations for listening their difficulties related to logistics factors and finding out the causes for increasing logistics cost. Base on analyzing critical factors and opinions of enterprises, the authors want to suggest some solutions for decreasing logistics cost in Vietnam.

**Keywords:** logistics cost, critical factors, logistics service providers (LSPs), Vietnam, survey, in – depth interview

## 1. Introduction

The accession of Vietnam into WTO in 2007 has turned the economy into a new page in the global trade and services integration and development. In respect of logistics, most of the logistics service sector for foreign investors would be deregulated completely in Vietnam from 2014. This is a big opportunity for domestic logistics companies to acquire the working model and management experience of foreign ones, but, Vietnamese ones are under pressure to improve their efficiency and capability to compete with foreign logistics giants (Nguyen, 2020).

Together with the sustainable growth of international trade volume and value, the logistics service sector has been steadily emphasized its role in the economy. Since the 90's, the logistics services have been provided in Vietnam, and yet, they are taking over more vital role in the export-oriented economy policy in recent years. In 2017, Prime Minister signed the first Master plan for national logistics sector development in Decision QD 200 (Prime Minister, 2017) with a long-term vision until 2025.

The demand for more scrutiny studies on improving the logistics efficiency has increased recently, especially, due to the US-China trade war and the increase in labor cost in China, Vietnam and other ASEAN countries have been chosen as the regional plants for many multinational manufacturers (NPhuong, 2019). But, holistic researches about logistics cost of Vietnam have rarely been found. To fill the gap of the research, in this paper we will apply the survey method by collecting questionnaires from logistics services companies basing in Vietnam asking their opinions about logistics costs and their critical factors, then we estimate the Analysis of Variance (ANOVA) model from these critical factors by using SPSS software.

However, in order to increase the reliability of the research, we also conducted in-depth interviews with 2 groups of subjects: the first one were Cargo owners who use logistics services to identify logistics cost are accounting for how many percentage of the total cost of sold (Liang & Altankhuyag, 2019; Muzurura, 2019; Doghan 2019; Umobong & Agburuga, 2019; Jamaani & Alidarous 2019; Mousa, 2019) and the second subjects were logistics service providers with the purpose of finding the components of logistics cost, the reason for high logistics cost in Viet Nam.

There were a number of researches on logistics cost in Vietnam. The magazines and communication organizations used the reliable results jointly performed by ALG and World Bank in 2014. In a report of ALG (ALG, 2013), the transport cost accounts for the highest share in total logistics cost of Vietnam, for example, the transport cost of some value chains such as rice, textile and garments, machinery and electronic parts range from 58 to 75% of total cost (H. Phuong, Tuan, & Tuan, 2019). On average, Vietnam logistics cost is relatively high, about 20.8% of GDP in 2014 (ALG, 2013), (Dang & Yeo, 2018) comparing to other contries all over the world like EU (only 10%), Japan (11%) and even logistics cost of China (19%) of GDP (Figure 1)

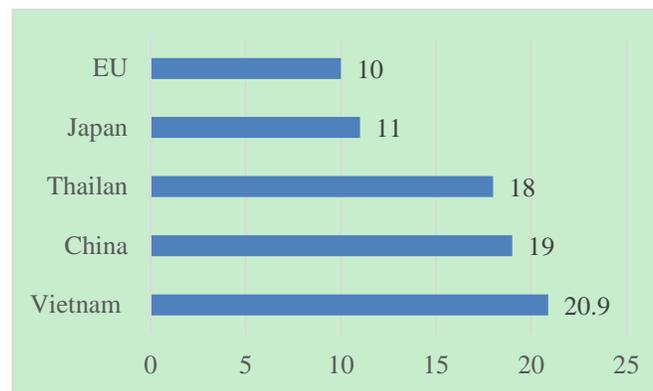


Figure 1. Logistics cost of Vietnam comparing to other countries in the world (%) (Group, 2019)

It seems that this result does not reflex the reality at this moment, because GDP of Vietnam from 2014 until now has the dramatic changes from USD 186.2 billion to USD 245.2 billion in 2018 according to data from World Bank group (Group, 2019). And not mentioned that the owners of leading consuming goods in Vietnam made many effort to reduce the logistics cost to increase their competitive advantages from 2014 to 2018 (Nguyen, 2019).

One more reason for conducting another research on logistics cost is that: according to the World Bank's survey result of Logistics Performance Index (LPI) since 2007 in more than a hundred countries, Vietnam's logistics ranking has improved significantly, i.e. 53 in 2007, 48 in 2014, and 39 in 2018 (World Economic Forum, 2018), [marking the remarkable improvement of logistics in Vietnam (Chen, Tabssum, & Nguyen, 2019).

In order to analyze logistics costs, the most common way is dividing the total logistics cost into elements, from those points the authors will find out which elements occupy the high cost ratio in order from high to low. Quandt et al. argued that logistics cost consists of customer service, splitting, packaging, inventory, warehousing, order and information handling, transport, and tax (Quandt, Beincke, Ait-Alla, & Freitag, 2017). Wang and Cheng added the definition of logistics in manufacturing which can be divided into three main stages, namely procurement, manufacturing and distribution (Wang & Cheng, 2009). In this respect, logistics cost should be calculated from supplying the raw material until delivering to customers.

Stand on another point, Engbloom et al. identified six components in total logistics cost including transport, warehousing, inventory, management, packaging for transport and indirect cost relating to logistics activities

(Engblom, Solakivi, Töyli, & Ojala, 2012). According to Daw transport and warehousing cost account for the major part of logistics cost (Daw, 2017). Depending on company size, services, economic growth, transport cost normally makes up 25-50%, then warehousing cost accounts for 15-40%, however, hidden cost is considerable part of total cost but rarely mentioned (L. Zhang, Li, & Phuong, 2019).

In 2016, Vietnam recorded the revenue of top 100 logistics companies at US\$ 8.74 billion, in which transport sector accounts for the highest share at 77%, then forwarding services, transport facilitation, warehousing at 9%, 8% and 6%, respectively (Zhang, Jiang, Hu, & Pan, 2017). Noticeably, the trucking haulage is regarded as the main backbone in transport sector (Phuong, 2019). A survey of Vietnam Logistics Association in 2018 revealed that factors causing high logistics cost are trucking cost, port surcharges, poor connectivity between ports and hinterland, and physical inspection (Phuong & Pham, 2019).

According to a research of Vietnam Logistics Association (VLA) in 2017, GDP of Vietnam increased two times from 2010 to 2016, type of key import and export goods had changed from rice, agricultural products to electronic components, furniture, and fishery products (Nguyen, 2019). From that point of view, VLA had a calculation and extrapolated the logistics costs of Vietnam at the level of 14.5% to 19.2% to GDP. And the cost element are shown in figure 2: transportation is the highest cost holding 60% in total logistics cost (Figure 2) (Vietnam Logistics Business Association, 2018).

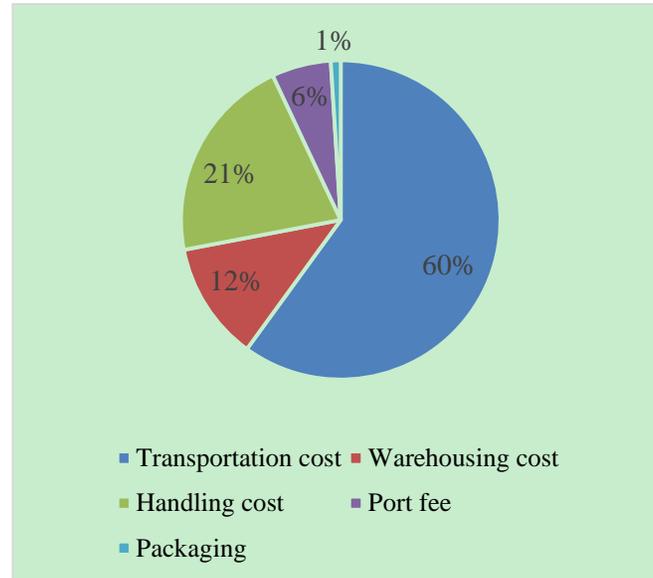


Figure 2. The ratio of elements in logistics cost of Vietnam in 2018 (Vietnam Logistics Business Association, 2018)

## 2. Research Methodology

As mentioned above, we conducted 2 methods. The first method is using questionnaires, and the second thing is in-depth interviews.

For the first one, initially, we develop five stages to conduct the research in this paper as follows:

Stage 1: Research question identification;

Stage 2: Design the questionnaire; start collecting data for the survey;

Stage 3: Data input, checking the fitness of the questionnaire;

Stage 4: Running the Analysis of Variances (ANOVA) model;

Stage 5: Analysis of findings.

For the framework study, we identify six critical factors which determine the logistics costs in Vietnam including warehousing & inventory cost, transport cost, customer service, distribution, macro-environment and other (see Figure 1). Our hypothesis is that these six critical factors (CFs) are significant to total logistics cost: including transport cost,

warehousing and inventory cost, distribution cost, customer service cost, macro environment related cost and other

There are forty-one elements explained for these CFs included in Table 2. In order to verify empirically six CFs and their elements, we develop a survey basing on many reviews of the literature and fact finding for the case of logistics companies basing in Vietnam. It has been refined several times based on the pilot study findings and on the comments and suggestion of the experts in the field. The questionnaire has been designed to capture all the critical factors which cause the high logistics cost. The respondents were asked to indicate their perception of the importance of each element on the five-point scale (*in which: 1 indicating not at all important; 2 indicating not important, 3 indicating neutral, 4 indicating important and 5 indicating very important*).

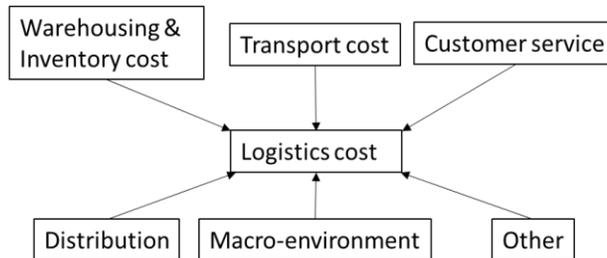


Figure 3. Critical factors of total logistics cost

Since the unit of study is the logistics cost, the target population in this paper is emphasizing the groups of logistics service providers, namely sea/ airport operators, inland terminal operators, freight forwarders, postal delivery, distribution center operators, sea/ barge carriers and trucking companies basing in Vietnam. The questionnaires were sent out and collected during July and August of 2019, and sixty-seven forms were validated for the dataset of SPSS software.

For the second method, we conducted in-depth interviews from the July to August of 2019 with 30 cargo owners enterprises who are using logistics services of 6 leading products in Vietnam consumed at the high rate not only in domestic but also in international market including: Agricultural products, fishery product, milk product, electronic components and machinery, wooden items and e-commerce products. All of the enterprises chosen have the revenue from 8.5 million USD to 40 million USD. Besides that, we also implemented in – depth interview with 30 logistics service providers (LSPs) who are providing variable services such as: port operators, shipping lines, warehouse operators, transportation operators, logistics service providers for E-commerce business, including domestic and FDI enterprises, in which there were many famous companies in the market with the high market share and big revenue.

Table 1. Number of Logistics service providers for in - depth interviews

Service types	Number of enterprises
Port: sea and airport, ICD	5
Shipping Lines	2
Cold chain logistics service providers	7
LSPs support for E-commerce	4
Integrated – logistics service providers	9
Others	3
<b>Total</b>	<b>30</b>

Source: The authors synthesized

### 3. Results Discussion

#### 3.1 Data Descriptive and Validation Check

The descriptive statistics provide an overview of CFs in Table 2 and their subsequent elements in Table 3. Hence, the mean and standard deviation of each variable are calculated to see whether the variable could be agreed by the

respondents and exist as a critical factor in the questionnaire.

More importantly, Cronbach's alpha (CA) ratios are used to validate the questionnaire and the necessity of the elements in the CFs. We also conduct the correlation check among these CFs and result shows that there is weak correlation among CFs, below 0.5.

Table 2. Critical factors of total logistics cost

Critical Factor (CF)	Mean	Std. Deviation	Cronbach's Alpha (CA)
Warehousing and inventory carrying cost	3.6551	0.521	0.715
Transport cost	3.7668	0.467	0.678
<b>Customer service</b>	3.2527	0.689	0.774
Distribution	3.5164	0.843	0.869
<b>Macro environment</b>	3.9129	0.683	0.835
Other	3.6855	0.707	0.851

CA from 0,8-1: very good, 0,7-0,8: good; 0,6 and above: can be used for survey result

Source: data composed from survey result

Except for Customer service CF, all other five CFs' mean value are higher than 3.5 over 5 point. The macro-environment CF's mean scores the highest, 3.9129, while Customer service CF's mean scores the lowest of all CFs, 3.2527. Cronbach's alphas (CAs) value range from 0.7 or higher means that this survey is reliable. In our calculation, these CAs will decrease gradually if their elements are deleted from the questionnaire. Hence, all 41 elements are vital for the model estimation.

As we find from Table 3, ten out of forty-one elements with highest mean value (see column 5 of Table 2) are unfavorable transport infrastructure, extended customs clearance procedures, cumbersome administrative procedures, high competition, bunker price, lack of transparency of import and export process, shortage of high skilled workers, renting land price, vacant land size and lack of planning for log centers, accordingly. This suggests that LSPs in Vietnam believe that issues relating to these elements should be resolved to reduce the logistics cost first.

Table 3. Descriptive statistics of 41 elements in the survey

Critical Factors (CF)	Elements	Mean	Std. Deviation	Mean Ranking
<b>Warehousing and inventory carrying cost</b>	<b>Vacant land size</b>	3.83	0.904	9
	<b>Renting land price</b>	3.85	0.949	8
	Bank interest	3.33	0.95	37
	<b>Lack of planning for logistics centers</b>	3.83	0.921	10
	Obsolete handling equipment	3.62	0.924	24
	Inappropriate warehouse management	3.7	0.803	19
	Technology application	3.76	0.929	13
<b>Transport cost</b>	Human resource allocation in peak time	3.38	0.818	34
	<b>Bunker price</b>	3.99	0.896	5
	Unclear surcharges	3.78	0.902	12
	Imbalance modal share	3.67	0.877	20
	Types and sizes of shipment	3.37	0.967	36
	Transport route	3.75	0.766	14
	<b>Unfavorable transport infrastructure</b>	4.25	0.682	1
One-way empty truck	3.73	0.914	17	

<b>Customer service</b>	Tracking and tracing	3.39	0.875	33
	Urgent order handling capability	3.41	0.841	32
	Package design, buying forms	2.88	0.969	41
	Unsuccessful order rate	3.11	1.010	39
	High return rate	3.03	1.176	40
	Underinvestment in IT system	3.58	0.993	27
<b>Distribution</b>	Unsuitable organizing methods in log center	3.3	1.03	38
	Meeting customers' special requirement	3.45	1.019	31
	Poor connectivity from logistics center	3.63	1.126	23
	Few distribution hubs	3.6	1.045	26
	Lack of IT application	3.61	0.984	25
<b>Macro environment</b>	<b>Cumbersome administrative procedures</b>	4.15	0.839	3
	<b>Extended customs clearance procedures</b>	4.22	0.85	2
	<b>Lack of transparency of import- export process</b>	3.97	0.984	6
	Ineffective National Single Window mechanism	3.67	1.050	21
	Moderate application of digital technology in management and custom procedures	3.75	0.841	15
	Unclear policies on logistics sector	3.72	0.95	18
<b>Other</b>	Small and medium size and scale of log enterprises	3.38	0.989	35
	<b>High competition</b>	4	0.911	4
	Partially split range of logistics services	3.64	0.971	22
	Rely on foreign carriers in international transport haulage	3.74	1.1	16
	Lack of coordination between LSPs and shippers	3.55	1.098	28
	Lack of contact among LSPs	3.55	1.055	29
	Shippers' old customs in international trade	3.8	1.205	11
	<b>Shortage of high skilled workers</b>	3.92	0.966	7
	High training cost	3.5	1.099	30

Source: data composed by authors from survey result

### 3.2 The Analysis of Variances (ANOVA) Model Estimation

After data validation and checking the necessity of CFs and their elements, we estimate the ANOVA model for six independent variables, CFs, and one dependent variable, logistics cost. The formulation is described as follows:

$$Y_{LC} = \beta_1 * X_{Wt} + \beta_2 * X_{Transport} + \beta_3 * X_{CS} + \beta_4 * X_{Distribution} + \beta_5 * X_{ME} + \beta_6 * X_{Other}$$

In which

$Y_{LC}$ : logistics cost

$X_{Wt}$ ,  $X_{Transport}$ ,  $X_{CS}$ ,  $X_{Distribution}$ ,  $X_{ME}$ ,  $X_{Other}$ : six independent variables stand for 6 CFs, namely, warehousing and inventory, transport, customer service, distribution, Macro-economic and other, accordingly.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ : parameters for six independent variables.

We use linear regression to estimate the ANOVA model estimation in the SPSS software, the following result is retrieved:

$$Y_{LC} = 0.059 * X_{Wt} + 0.197 * X_{Transport} + 0.223 * X_{CS} + 0.391 * X_{Distribution} + 0.205 * X_{ME} + 0.169 * X_{Other} \quad (2)$$

R-Square ratio equals 9.959 means that the ANOVA model is highly fit. Durbin Watson value is higher than 1.5 lower than 2.5 explains that there is no serial correlation. Sig F test equals 0.000 means that this model can be used to estimate total logistics costs for the case of Vietnam. Results from parameter estimation reveal that total logistics cost in Vietnam will vary the most as distribution CF change.

### 3.3 In – Depth Interview Discussion

The result after interviewing 30 cargo owners showing that the logistics cost in the total cost of the enterprises fluctuated in the range from under 2% to over 10% of total cost of good sold based on type of cargo. With agricultural products, fishery and e-commerce products: logistics cost hold 10% in total cost, mean while with milk, electric components and wooden items and furniture this rate is just only under 5%. In total logistics cost, transport cost seemed to be the highest cost component, fluctuated from 30 to 75%, however, with e – commerce products, transport cost only hold at the rate of 10% (Table 4).

Table 4. Logistics cost in total cost in Vietnam of some type of good

No.	Type of good	Logistics cost			Logistics cost in total cost
		Trans- port cost	Ware- ousing cost	Others logistics cost	
1	Agri. Product	30 – 50%	3-5%	10%	<b>10%</b>
2	Fishery	30 – 50%	10%	25-30%	<b>10%</b>
3	Milk	50%	20%	30%	<b>&lt;5%</b>
4	Electric components and machinery	70-75%	5-15%	2%	<b>4-5%</b>
5	Wooden products	60%	10-15%	< 2%	<b>2%</b>
6	E – commerce products	10%	30%	50-60%	<b>&lt;10%</b>

Source: data composed by authors from survey result

Besides that, in the data collection process, the authors also recorded some opinions from cargo owners as following:

- Transport cost: Cost for container international transportation - basic ocean freight was at reasonable rate, however local charge and surcharge were collected illogically at the high rate and disunion among shipping lines. The imbalance in the market share of modes of transport, especially with the underdevelopment of inland waterway and rail transport leading to the pressure in road transport (77.11% market share in Vietnam) more and more heavily and causing the severe traffic congestion in major cities
- Warehousing and inventory carrying cost: Land fund scarcity, high renting price, planning for Logistics centre is not reasonable and backward, poor productivity handling equipment.
- Inefficient logistics infrastructure planning: Port planning, inland depot (ICD) logistics centers, depots, truck and container car parks, industrial zones, etc. Planning work needs to be reviewed across sectors. and interregional
- One more reason for high logistics cost is “Tea money” and “specialized inspection costs”. VLA calculate roughly that “tea money” accounts for 5% in total logistics cost. While, 58% of cargo were specialized inspected 2 to 3 times

Detail of “cost for one import container” from Venice (Italy) to Cat Lai (Vietnam) pricing Ex-work (door to door) of a logistics company as followed:

Import goods: Electronic device was stuffed into one container 40 feet at a warehouse in Venice, after that this container was transported by road to Trieste, from this point container was shipped by sea transport to Singapore port and transshipped to Cat Lai port, and after that a truck carried to a warehouse in Ho Chi Minh City. This route took a duration 28 days (Table 5)

Table 5. Logistics cost for a container from Venice to Vietnam - pricing Ex work

No.	Cost elements	Cost /cont (USD)	Percentage in total cost
<b>1</b>	<b>Warehousing cost</b>	<b>800</b>	<b>13.53%</b>
	Receiving good, lashing, handling cargo at the warehouse	800	13.53%
<b>2</b>	<b>Transport cost – Distribution cost</b>	<b>4787</b>	<b>80.94%</b>
	Basis ocean freight	1750	29.59%
	ISPS surcharge	42	0.72%
	Pre-carriage to CY in Italy	2510	42.44%
	Terminal handling charge at Italy	210	3.55%
	Handling charge in Italy	30	0.51%
	Terminal Handling charge in Vietnam	175	2.69%
	Handling charge in Vietnam	30	0.51%
	Cleaning container charge	10	0.17%
	Environmental protection fee	30	0.51%
<b>3</b>	<b>Customer service charge</b>	<b>159</b>	<b>2.69%</b>
	Telex fee	25	0.42%
	Master Bill of lading releasing fee	74	1.25%
	Dilivery Order charge	40	0.68%
	Handling fee for taking care of cargo	20	0.34%
<b>4</b>	<b>Macro enviroment factors</b>	<b>168</b>	<b>2.84%</b>
	Customer clearance fee	74	1.25%
	Custom hidden fees	20	0.34%
	VGM	74	1.25%
	Total	5914	100%

Source: the authors sythernized from in-depth interview

The results from the table above pointed out that, transportation and distribution cost was the highest cost element in total logistics cost accounting for 80.94%. Followed by the warehousing cost at 13.53%. Customer service took 2.69% and macro environment factors hold 2.84%.

The authors give some suggestions in order to reduce logistics cost in Vietnam as follows:

- Priority is given to minimize transport: try to increase inland water way transport market share, especially for the route from Mekong Delta to Ho Chi Minh City and Red river Delta to Hai Phong City. The shipping lines can joint in Alliances to utilize the capacity of the parties and means of transport and sharing risks with each other.
- The Government should deploy the Decision number 1012/QĐ-TTg on Logistics Centre system development Plan in the country to 2020, orientation to 2030 to support for distributing cargo and reduce warehousing cost of the enterprise (Prime Minister, 2015).
- LSPs should apply modern technology to operate and to serve customers such as: track and trace, return good tracking, cloud logistics, AI, and specialized softwares. Besides, LSPs should resolve of customer complains well.
- LSPs should supply more value – added services for example: handling, preliminary processing of goods, in addition to packaging, labeling, container cleaning services, may provide additional services such as inspection, sampling, supervision of goods quality, authorized agents for inspection. warehousing services, weighing services, sorting goods according to customer requirements, and special services required by customers to attract more customers and take the advantages of economies of scale to reduce cost.

- In terms of macro environment factors, consider to reduce specialized examination time, apply electronic documents like: E – Delivery Order, E – Bill of lading... Reducing BOT station, reducing port fee, controlling the collection charges and surcharges of foreign shipping lines. Speeding up the development of infrastructure to keep pace with the development of Logistics services. Last but not least, the State should support to small and medium enterprises.

#### 4. Conclusion

Finally, the findings of the research on critical factors of logistics cost of Vietnam can be summarized in four points:

- All six critical factors are highly scored by respondents, particularly, the macro-economic CF, hence policy makers and authorities should push for more clarity and efficiency of the administrative, custom, import- export procedures.
- LSPs believe that the high transport cost in Vietnam is mainly caused by the unfavorable transport infrastructure (no. 1 in Mean ranking).
- The ANOVA model result also triggers that more consideration should be put into developing the distribution centers.
- Six groups of factors affecting logistics costs can be considered to reduce component costs and thereby reduce overall logistics costs. But It needs the effort from many parties, including Cargo owners, logistics service providers and the government.

In the globalization trend of logistics sector, though Vietnam logistics industry faces a lot of competition, but also takes many opportunities from the increase in trade volume and foreign direct investment capital. Reducing the total logistics cost will help Vietnam-based LSPs provide more competitive service against other ASEAN and regional competitors to global market.

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