

# A DEA analysis on Container Terminals in Northern Vietnam, 2005-2014

† NGUYEN Minh Duc · KIM Sung-June\*

† Lecturer of Vietnam Maritime University & Doctoral Student of Mokpo National Maritime University  
\*Assistant Professor of Mokpo National Maritime University

**Abstract:** Sea-ports in Northern Vietnam have experienced a rapid growth of container throughput volume in recent years. To accompany with such development, huge investments also have been performed to enhance local ports capacity. It becomes a crucial task for the port authorities or the port stevedoring industry to improve the ports efficiency in order to customize national resources. In this paper, Data Envelopment Analysis (DEA) is employed to evaluate the relative efficiency of container terminals in Northern Vietnam by collecting data from terminals since 2005 up to now. The development progress of the given terminals will be presented before providing a relative comparison among those year by year. The DEA result is then analyzed and suggestions with regard to changes in local economic environment in near future are contributed.

**Key words:** Northern Vietnam, container terminals, ports efficiency, DEA

### I. Introduction

**Vietnam – a developing economy**

Figure 1. Vietnam's total and intraregional exports and imports, 1990 – 2013

Source: UNSECAP, 2014

The country's GDP has presented a gradual growth from 6.4 billion USD in 1990 to 171.4 billion USD in 2013, with the average annual growing rates of 6% (Worldbank, 2015)

Figure 2. Container throughput of ports in South East Asia from 2002-2012.

Vietnam container port throughput doubled the figure from 2002 to 2012, surpassed Malaysia and kept up with the trend of Asean economy (Maritime Insight, 2014)

### I. Introduction

- Vietnam's sea-ports are divided into 6 groups according to the ports location.
- The container seaports in Northern Vietnam concentrate in Quang Ninh province and Hai Phong city.
- Sea-ports in the Southern Vietnam are responsible for 66% of the country's total throughput while the Northern ones account for only 30%.
- Due to the global economic crisis, 2008, the growing rates of VPA's (Vietnam Ports Association) sea-ports' cargo throughput declined from 19% in 2008 to 4% in 2011, in which, containerized commodities growing rates was only 8%, compared with 18%, 2007.
- Competition is harder among rising number of container terminals in Northern Vietnam. Competitive analysis, therefore, become critical.

Figure 3. Vietnam's groups of sea-ports according to location

### II. Changing environment of ports and logistics system in Northern Vietnam

No	Terminals	Area	Time of operating	Note
1	QuangNinh	QuangNinh province	Before2005	Vinalines'
2	CICT	QuangNinh province	2012	Vinalines'
3	Hai Phong	Haiphong	Before2005	Vinalines', 2 terminals: Tan Vu and Chua Ve
4	Transvina	Haiphong	Before2005	
5	DoanXa	Haiphong	Before2005	Vinalines'
6	GreenPort	Haiphong	Before2005	
7	Dinh Vu	Haiphong	2007	Vinalines'
8	Nam Hai	Haiphong	2009	
9	Hai An	Haiphong	2011	
10	PTSC Dinh Vu	Haiphong	2011	
11	Tan Cang	Haiphong	2011	2 terminals: Tan Cang 128 and Tan Cang 189

Table 1. List of container terminals in North of Vietnam

### II. Changing environment of ports and logistics system in Northern Vietnam

To 2017, number of projects will be completed:

- ❑ Project of upgrading Haiphong's Catbi airport from a domestic to international one;
- ❑ Project of DinhVu (Haiphong) industrial and economic zone;
- ❑ Project of deep water seaport Lach Huyen, an international gateway of Northern Vietnam
- ❑ Projects of upgrading national highways connecting Haiphong to Hanoi and other parts of the country;

Figure 4. Haiphong's map

† ducnguyen@vimaru.edu.vn

\* s-junekim@daum.net

### III. Methodology

- DEA (Data Envelopment Analysis) is a quantitative method broadly applied to evaluate the relative efficiency of decision making units (DMU) by examining multiple inputs and outputs of a production process.
- In port industry, various scholars named outputs and inputs are: container throughput, number of berth, total berth length, number of crane, CY area. (Tongzon, 2001), (Park, 2010), (Young, 2012)
- In this study, DEA Output oriented CCR is employed because container terminals operate under constant return to scale and DEA-SOLVER is used to run the model.
- In this study, DEA is employed to analyze efficiency of terminals in Northern Vietnam in 2012, 2013, 2014. The data of container throughput of terminals from 2005 to 2011 is used to analyze those terminals' performance

### IV. Analysis

- The 2 terminals in QuangNinh province have very low efficiency, due to mostly the bad competition with others in Hai Phong city.
- There are only 2 out of 5 terminals under the control of Vinalines are relatively efficient, named Doan Xa and Dinh Vu. The others' low efficiency can be explained by the high number of old handling equipment.
- The most efficient container terminals in the area are small ones with one or two berths and the annual throughput less than 400,000 teus.
- All terminals in Haiphong city are in the Cam River which connects to the Gulf of Tonkin and ports which locate more closely to the river mouth are more likely to be efficient ones.
- From 2005 to 2011:
  - ❖ Containers imported and exported in the North of Vietnam through mainly terminals in Haiphong city.
  - ❖ The marketshare of Vinalines' terminals declined significantly through the given period. In 2005, the share is 86%, then decreased to 77% in 2006 and 51% in 2011. Last year, the figure even down to 34%.

### V. Discussion

#### In the aspect of Quang Ninh province:

- ➔ Transport connectivity to hinterland should be paid more attention.
- ➔ More investment in transport system, especially rail way and inland water way.
- ➔ New industrial zones locating near to ports

#### In the aspect of Haiphong city

- ➔ There are two many terminals including both general cargo and container ones on the Cam river's bank. This fact put those terminals under pressure of congestion.
- ➔ Investment in roads improvement is not enough but in all kind of transport, especially rail way and inland water way.

### IV. Analysis

No	DMU	TEU	No of		No of		C/Y	Efficiency
			Berth	Berth Length	Crane	Crane		
		Output	Input 1	Input 2	Input 3	Input 4		
1	QuangNinh	240580	3	680	8	49000	0.626743	
2	CaiLan	72295	3	594	4	151000	0.222205	
3	Haiphong	964000	10	1850	20	343565	0.598701	
4	Dinh Vu	455775	2	425	7	210000	0.953748	
5	Nam Hai	232412	3	600	8	215000	0.35717	
6	Greenport	396000	2	304	5	50550	1	
7	Transvina	104644	1	120	2	40000	0.66944	
8	Doan Xa	244014	1	220	3	65000	1	
9	PTSC	155205	1	250	4	40000	0.721695	
10	Hai An	183000	1	150	3	50000	0.936566	

Table 2. DEA result of 2012

### V. Discussion

#### In the aspect of Vinalines' terminals:

Handling equipments in Vinalines' terminals are old and low efficiency. The terminals have the advantages of low handling charge but a high number of equipments must be maintained.

- ➔ New equipments are required to improve terminals' performance. Privatization is one way to raise budgets for investment.

#### In the aspect of Haiphong terminals:

The 2 container terminals: Chua Ve and Tan Vu. The former locates deep inside the Cam river with limited depth channel and old infrastructure. The later locates closely to river mouth and some berth has just begun operation from 2009.

- ➔ Tan Vu terminal should get priority over Chua Ve terminal

Figure 5. Cam river



### VI. Conclusion

Vinalines, a national corporation, which dominated the port industry market in the area for years is losing its position and has to transform in order to survive.

Haiphong city has accounted for about 90% of container throughput of Northern Vietnam but the most efficient terminals in the area is not highly invested ones but ones with small capacity. This is not a good sign for port industry in the area and changes are critically required.

The future research should focus on benchmarking ones from both Southern part and oversea to improve the performance of major container ports in Northern Vietnam.