

# A Study on improving the Performance of Transshipment Cargo System at the Port of Busan

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## ABSTRACT

This study will examine the consolidation that is occurring in the shipping industry and its effects on Busan's status as a key transshipment hub in Southeast Asia as well as what measures the port must implement to attract transshipment traffic. With this in mind heading forward, trends in transshipment cargo, problems facing the port, as well as the current status of transshipment volumes at the Port of Busan must be fully understood so that thorough research can be done into appropriate measures to stimulate growth and attract cargo traffic. In this study, We analyze the current problems and status of transshipment cargo at Busan Port and factors affecting the competitiveness of transshipment cargo at Busan New Port, Korea's key import/export gateway, have been examined. We show the Strategies to Attract Transshipment Cargo at the Busan New Port which is to become a an optimal transshipment port, a port's internal environment including the scale and location of its hinterland, facilities and tariffs as well as the external environment including global networks and logistics IT management must be carefully considered as they are all key actors affecting cargo volumes.

**Key words:** Transshipment Cargo System, Busan New Port, Performance.

## 1. INTRODUCTION

Since 2000, development at the eight largest Chinese ports of Shanghai, Shenzhen, Qingdao, Ningbo, etc. has been the focus of much attention, with these ports now handling 80% of the nation's total cargo traffic. Chinese ports are leading the global port market, and as such, exert a tremendous amount of influence over the port industry(Rim et al., 2010; Kim, 2008; Kim et al., 2008). The most important port related issue this year was the rejection of the proposed P3 network by Chinese authorities, which was to include the top three global shipping lines of Maersk, MSC, and CMA-CGM(Wang, 2014). In reaction to this failed attempt, in June of 2014, Maersk and MSC joined forces to establish the 2M alliance. Later in September, CMA-CGM, the third largest shipping

line in the world behind Maersk and MSC respectively, partnered with the Middle East's UASC and China's CSCL to form the Ocean 3 alliance. The inclusion of China's CSCL in the group is expected to lend strength to Chinese shipping routes. Likewise, the continuous growth of Chinese ports is ultimately having a substantial effect on Busan Port including the increase of China-bound transshipment cargo. As a result, this has acted as a key factor to Busan's rise to become a key transshipment port in Southeast Asia. However, with the recent expansion of infrastructure at Chinese ports and through the marketing efforts of its port authorities, the number of ships making direct sailings to China is rising. Coupled with the Chinese government's pro-port policies, Chinese port growth looks to continue heading forward while Busan Port gets relatively smaller by comparison.

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Busan Port recorded a year-over-year 5.5% increase in its handled cargo volume for a total of 12,193,000 TEU, while Ningbo Port boasted 11.3% growth over the same period for a total of 13,030,000 TEU, pushing Busan Port to 6th in global port rankings according to cargo handled (BPA, 2014). This puts Busan Port in a difficult position. This study will examine the consolidation that is occurring in the shipping industry and its effects on Busan's status as a key transshipment hub in Southeast Asia as well as what measures the port must implement to attract transshipment traffic. With this in mind heading forward, trends in transshipment cargo, problems facing the port, as well as the current status of transshipment volumes at the Port of Busan must be fully understood so that thorough research can be done into appropriate measures to stimulate growth and attract cargo traffic.

## 2. Current Status of Global Transshipment Cargo and Reorganization of Shipping Alliances

### 2.1 Current status of transshipment cargo

When looking at the 2011 global port handling volumes, the rapid economic growth in China and Southeast Asia has spurred demand resulting in Southeast Asian ports now dominating the rankings, occupying the first eight positions (Kim, 2011; Lee et al., 2011; Song, 2011). Consequently, fierce competition is taking place between ports in the region. From 2000 to 2003 Busan Port maintained the status of the world's third largest port by volume, however, from 2003 the ports of Shanghai, Shenzhen, and Ningbo-Zhoushan, overtook Busan Port, forcing it to 6th in global port rankings in 2014.

The geographic characteristics and logistics centers of new ports entering the transshipment markets are geared towards using key locations that are ideally suited to lowering operating

expenses. In addition, with labor costs accounting for a large percentage of overall operating expenses, ports that are able to minimize labor expenditures can secure a competitive advantage when vying for transshipment cargo. Clearly, ports that are located at East-West and North-South trade route intersections are positioned for rapid growth, which can be seen at ports in Africa, South America, etc., that are connecting emerging markets with buyers along the north-south routes. The current status of transshipment cargo volumes at major Asian ports is shown in Table 1 (DMR, 2013; MOF, 2014).

The top transshipment destination is Malaysia's Tanjung Pelepas Port, where transshipment cargo accounts for 95.8% of port traffic followed by Singapore Port at 84%, Shanghai Port at 22%, Northern China's Chengdu Port at 10% and the Ports of Tokyo and Yokohama at a negligible 8.8%. In terms of total TEU's handled, Singapore comes in first with 23,490,000.

Table 2 shows transshipment volumes for China-bound and Japan-bound cargo, figures on overall demand as well as trends and forecasts of Korean transshipment traffic (DMR, 2013; MOF, 2014). As we can see, transshipment cargo bound for Chinese and Japanese ports accounts for 90% of total transshipment traffic at the Port of Busan. When looking at this situation, China-bound and Japan-bound transshipment cargo accounted for as much as 30.9% of total demand, however, by 2020 this figure is expected to drop to 24.3%.

### 2.2 Reorganization of strategic shipping alliances

Although the industry can breathe a sigh of relief over the rejection of the proposed P3 Network made up of the world's largest three shipping lines, the worry over the formation of similar alliances is not over. Recently, the two leading shipping lines in the world according to deployed capacity, Maersk of Denmark and MSC of Switzerland, entered into a 10-year arrangement to form a new

Table 1. Current status of domestic transshipment cargo (unit: thousands)

Country	Port	Total Volume	Transshipment Cargo Volume	Transshipment Percentage (%)
Singapore	Singapore	27,965	23,491	84.0
China	Hong Kong	23,904	7,171	30.0
	Shanghai	26,150	5,753	22.0
	Chengdu	9,462	946	10.0
	Ningbo	9,360	936	10.0
Korea	Busan	13,261	5,809	43.8
	Gwangyang	1,737	314	18.1
Japan	Tokyo	4,124	363	8.8
	Yokohama	3,182	280	8.8
Taiwan	Kaohsiung	10,257	5,641	55.0
	Taichung	1,250	281	22.5
Malaysia	Tanjung Pelepas	5,500	5,269	95.8
Thailand	Port Klang	7,120	3,738	52.5
Sri Lanka	Colombo	3,382	2,536	75.0

Table 2. Outlook for transshipment container volumes in Northeast Asia region (unit: thousands)

Category		Actual Results					Forecast		Avg. Annual Rate of Increase (%)	
		1990	1995	2002	2006	2011	2015	2020	2002-2011	2011-2020
Current China/Japan Transshipment Demand (A)		165	498	1,376	2,012	3,262	4,817	7,903	10.1	10.3
Korea Transshipment	Total Volume	15	86	421	644	1,121	1,509	2,134	11.5	7.4
	China/Japan Current Volume (B)	14	77	379	580	1,009	1,358	1,921	11.5	7.4
	Percentage (B/A,%)	8.1	15.5	27.5	28.8	30.9	28.2	24.3	-	-

2M alliance covering the Asia - Europe and Pacific trade routes. The industry saw further consolidation with the formation of the new Ocean 3 alliance, consisting of CMA CGM, UASC and China Shipping. This new group will command a 13% market share in the Asia - N.A. trade route and 20% in the Asia - Europe route. The combined fleet strength of the Ocean 3 alliance is 159 vessels offering a total capacity of 1.5 million TEU. The scope of its operations stretches across 93 ports with 199 weekly calls to port. The alliance is paying particular attention to China and offers many direct sailings to eight different ports along the Chinese coast including six weekly calls to the Ports of Shanghai and Ningbo with plans to add

an additional four weekly calls to Yantian Port. This increase in direct sailings to China is not only continuing to put downward pressure on transshipment cargo volumes at Busan Port but also has a direct negative effect on the port's extensive feeder network. Although the Port of Busan serves as a major hub in the region, the establishment of large global alliances will force the port to continue to adjust its strategy to attract transshipment cargo.

Heading forward, fierce competition is expected between the four major alliances of GG, CKYHE, Ocean3 and 2M. Standing at the top of this group are the 2M and Ocean 3 alliances which command 60% of the market. The GG alliance includes

Hyundai M.M and Hapag Lloyd of Germany, the 6th largest shipping line in the world, as well as the 9th, 10th, 11th, and 13th ranked. The CKYHE alliance is made up of Hanjin Shipping, Evergreen of Taiwan, as well as the 5th, 14th, and 16th largest shipping lines in the world. The 2M vessel sharing agreement covers a pool of 1,070 vessels with a combined capacity of 5,180,000 TEU while the G6 offers 629 ships for a capacity of 3,260,000 TEU and CKYHE commands a fleet of 607 ships for a combined capacity of 3,010,000 TEU. Through enhanced economies of scale, these alliances will be in competition to reduce the number of routes as well as operating expenses. The domestic companies of Hanjin Shipping and Hyundai M.M., have shown improved results through reductions in expenses, however, they continue to suffer losses. In the first quarter of 2014, Hanjin recorded a loss of KRW 62.2 billion compared to KRW 99.1 billion over the same quarter last year. Hyundai M.M. also showed improved quarter-over-quarter results posting a loss of KRW 67.0 billion in the first quarter of 2014 compared to KRW 128 billion over the same period last year.

### 3. Current Problems and Status of Transshipment Cargo at Busan Port

#### 3.1 Current status of transshipment cargo at Busan Port

In 2015, for the first time in its history, transshipment cargo volume at the Port of Busan will surpass 10 million TEU. According to the Busan Port Authority (BPA), transshipment volume rose to 8,748,000 TEU in 2012 from 8,148,000 TEU the previous year, showing an increase of 7.4%. Excluding the recent financial crisis in 2008 and 2009, transshipment cargo volume at the Port of Busan has been experiencing explosive growth over the past 10 years, and in the first half of this year achieved 7% growth. If this trend continues heading forward, transshipment cargo volume will

surpass that of exports for the first time in the port's history. Although the outlook for transshipment volumes in 2014 remains positive at 9,360,000 TEU, exports are forecast to show little movement at 9,070,000 TEU in 2014 from 8,933,000 TEU in 2013, a slight increase of 1.5% year-over-year.

#### 3.2 Necessary site requirements to attract transshipment traffic to Busan New Port

Busan New Port is located 20 km southwest from the city center, and along with Jinhae Port, sits roughly halfway to Masan Port allowing it to serve as a hub for the region. When looking at site conditions of Busan New Port, the newly developed Gadeok area is one of the most important actors contributing to port growth. The area's naturally occurring favorable tidal range affords easy access to vessels and also functions as part of the New Port's hinterland. In addition, the area offers easy access by land, sea and air and also sits on the outskirts of the City of Busan, avoiding high density traffic areas and reducing traffic bottlenecks, which allows for the expedited transportation of goods from the port. The shallow surrounding waters of Gadeok also present ideal conditions for reclamation, thus making the process of securing optimal berthing depths less complicated.

Although currently, cargo volumes at Busan New Port are at less than desired levels, the port-hinterland development that has been simulated through the designation of the 31,710,000 pyoung Busan-Jinhae Free Economic Zone has significantly increased potential cargo volumes and will serve to position Busan Port as an economic gateway in Southeast Asia.

Due to Busan New Port's continuous efforts to reaffirm its position as a major logistics hub port in Asia, competition between ports has become fierce and the marketing efforts of Chinese ports have intensified. Furthermore, rising trade volumes between China and the US have sparked an in-

crease in direct sailings to the Chinese mainland which may ultimately reduce the demand of China-bound transshipment cargo. In the case of Busan New Port, if alternate measures can be found to reduce Korea's dependence on foreign markets for its economic development, the port can exploit this opportunity to increase its influence in the logistics industry.

### 3.3 Problems facing transshipment traffic at Busan Port

Factors threatening transshipment traffic at the Port of Busan do not only extend to infrastructure and service levels, but also to considerable competitive measures instituted at the domestic Ports of Gwangyang, Incheon and Pyeongtaek(Seo et al., 2012; Jo et al., 2005). In addition, as direct sailings to China increase, more shipping lines are moving their bases of operation from Korea to China. This increasing trend of direct sailings to China is the largest threat facing Busan Port, and as America-bound and Europe-bound transshipment volumes decrease, large mega ships are reducing the number of port calls made to Busan Port which directly affects transshipment volumes.

Furthermore, the two port system currently being operated between Busan Port and Gwangyang Port has been ineffective as investment in one port causes a decline in competitiveness at the other. For this reason, integration and opportunities for development between Busan North Port and the New Port must happen organically. This coupled with Busan Port's low productivity and inefficient operational systems is hurting the port's competitiveness and have been identified as reasons for the port falling behind Hong Kong, Singapore, and other major global ports.

## 4. Strategies to Attract Transshipment Cargo at the Port of Busan

Busan Port, which was battered during the crisis

in the container shipment industry, has taken steps to ensure it retains its hub port status in Southeast Asia. These measures include a transshipment cargo oriented strategy of attracting traffic while at the same time making the best use of Busan New Port's hinterland logistics base to create added value. In order to survive during periods of market instability in the shipping industry, innovative transshipment systems must be pursued as well as measures put in place to attract next generation super container liners. In doing so, Busan Port will be able to attract additional cargo volumes, which must remain the ports primary focus. Although, Busan Port has a strong reliance on containers, to ensure continued growth, it must not only continue to attract container traffic, but also a variety of cargo types including lumber, grains, chemicals, and crude oil.

### 4.1 Infrastructure

When cargo is transferred at the same terminal, it is possible to be transported using YT's without incurring any extra costs, however, goods must pass through the terminal gate and thus incur additional expenses in the form of outside trucks. Until now, ship owners have been directly involved with the transport of goods as well as problems with directing traffic flow at the port. Accordingly, terminals must identify this operational need and setup a cooperative transport center in the surrounding area to control the flow of trucks which would allow Busan Port to cut costs and provide more convenience to customers. This kind of centralized system to control truck dispatches could more efficiently manage the movement of empty containers thereby reducing the rate of vehicle traffic and transportation expenses. With this social overhead capital, an aggressive reinforcement of financial investment in port facilities will enable Busan Port to secure the requirements necessary to become the import/export port of large vessels. Through increased government funding Busan

Port can secure sufficient hinterland, related service facilities, and reduce construction times. In addition, Busan Port must secure a sufficient CFS and strengthen port functions to connect the quay area which can serve as a logistics distribution complex for multinational corporations.

ITT(Inter Terminal Transportation) centers around the use of a common dispatch center that can easily deal with problems regarding transport costs that arise between terminals. When shippers move transshipment cargo at Busan New Port they incur a considerable burden due to the freight charges issued by individual terminal operators. However, if ITT centers are established, the burden of freight charges is reduced. ITT centers increase cargo efficiency, and by reducing freight burdens, play an important role in attracting transshipment cargo to Busan Port. Since its opening in 2006, Busan Port has experienced rapid growth, and through its five terminal operators in 2013 handled 17,600,000 TEU of which 62% or 10,960,000 TEU was made up of transshipment cargo. Transshipment volumes continue to rise at Busan New Port, and in cases where transshipment cargo is moved through different terminals, each TEU receives an additional KRW 20,000 trailer charge.

Within the quay of Busan New Port, transshipment volumes yearly reach 4,500,000 TEU and encounter problems regarding time and cost. This means that although in cases where transporting cargo inside the same terminal yields no additional costs through the use of YT cranes, transport to different terminals must be done through terminal gates which will ultimately result in an additional trailer charge and require the direct involvement of shippers to resolve dispatch problems. Shippers using Inter Terminal Transportation to control dispatches at Busan Port will achieve greater convenience while also reducing costs. This type of exclusive dispatch control will also allow for a reduction in the rate of empty trailers after cargo has

been transported as well as provide further cost savings.

#### 4.2 Services

Busan Port is already a specialized container port and therefore should focus on attracting high value added cargo traffic. The port must also establish ship repair facilities, oil supply sites, and a ship component center along with promoting diversified services to be successful.

Additionally, the port should establish a customer service system targeted at collecting the opinions of users as well as resolving grievances. In addition, it should establish feeder networks, attract multinational as well as Japanese logistics firms to the city and lure the terminal operations of international companies.

Busan New Port should offer one stop service through the continuous development and application of information systems which can effectively increase berth turnover rate and productivity. Additionally, the setup of regulations and control systems, can simplify report procedures for transshipment cargo.

New service and profit incentives should be set-up to secure new business. These service incentives include agreements or contracts between operators and customers that offer bonuses for finishing tasks inside a predetermined berthing window and are based on handling time or the amount of cargo handled, while penalties are given for finishing tasks late. Profit sharing incentives are a means to encourage terminal operations and shipping lines to jointly reduce costs. In these cases, there can be different views in deciding how cost savings should be allocated and profit distribution can vary depending on which party created the savings. Therefore terminal operators and ship owners must amicably come to an agreement that stipulates the distribution of joint incentives.

## 5. CONCLUSIONS

In this study, factors affecting the competitiveness of transshipment cargo at Busan Port, Korea's key import/export gateway, have been examined. Generally, to become an optimal transshipment port, a port's internal environment including the scale and location of its hinterland, facilities and tariffs as well as the external environment including global networks and logistics IT management must be carefully considered as they are all key actors affecting cargo volumes. Below is a summary of how Busan Port can maximize its strategy to attract additional transshipment cargo in response to global strategic shipping alliances.

First, finding optimal routes for transshipment cargo being loaded or unloaded can facilitate the quick transportation of goods and after shipment occurs, control systems can track cargo in real time allowing operators to identify facility deficiencies as well as improve delays in transportation.

Second, when attracting transshipment cargo, focus must not only be given to the international competitiveness of shipping lines but also the potential benefits to shippers. Being selected as a transshipment base of operations by major shipping lines can be an important factor in reducing transshipment expenses as well as simplifying customs clearances and transshipment procedures. By offering one stop service, establishing a feeder network, providing exclusive transshipment berths, building container yards, and increasing marketing efforts, Busan Port will be able to attract additional transshipment cargo.

Third, to respond to the enlargement of global shipping alliances and their oligopolistic tendencies as well as increase container volumes, port operators, including Busan Port, must strengthen their bargaining power through combining berth operations under one provider.

Fourth, as the enlargement of vessels is expected to continue, investments in new efficient

cargo loading equipment to increase loading/unloading productivity as well as diversified policies to attract transshipment volume must be pursued to ensure the continuous creation of new sources of transshipment cargo.

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