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# Port strategy in the era of supply chain management: the case of Hong Kong

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**ABSTRACT** This article studies port strategy from a supply chain perspective considering the case of Hong Kong. Hong Kong port used to be the world's busiest container port, but is now in danger of losing its hub status due to rising competition from neighbouring lower-cost rivals. The analysis shows that Hong Kong's free port status and world-class customs clearance offer the port a sustainable and considerable advantage to shorten transit time. The port is thus a strategic fit for the shipping of high value and time-sensitive cargoes, and should pursue an agile strategy for a responsive supply chain. It is imperative for the port to strengthen its core competencies in agility by retaining a favourable position in port rotation with shipping lines and raising the efficiency of bargaining. Further reducing cost substantially would be beneficial, but might not be feasible and should not be the primary nor sole focus of policy makers and port operators.

**Keywords:** port strategy; supply chain management; supply chain strategy; maritime supply chain; port choice; Hong Kong

## 1. Introduction

Ocean shipping has been the major transportation mode of international trade [1]. Ports are the key nodes of ocean shipping and consequently, their performance and efficiency play a part in a location's global competitiveness [2]. With the growing regional competition, many ports are struggling to identify an appropriate strategic intent and core competencies in order to become an engine for economic growth [3; 4]. A customer-oriented business climate, however, demands ports to clearly define their value propositions and articulate their service offerings [5].

Supply chain management has become a prevalent business practice, as industrial competition has intensified to be no longer just between individual enterprises, but among supply chains [6]. Traditionally, ports have been studied as an isolated transportation unit. It is now essential to study ports in the context of supply chain management [4; 5; 7]. By viewing ports as an integrated element of the global supply chain, the value propositions of ports can be synergized with shipping lines, shippers and third party service providers. By creating values for the supply chains they are embedded in, ports have better opportunities to gain a competitive edge in the growing port competition [4].

Much work has been undertaken to study ports from a supply chain perspective in the areas of port/terminal integration in the supply chain [8-13], port performance measurements [14; 15], and port competition in supply chain systems [16; 17]. There are also several papers [4; 18; 19] that conceptualize the value propositions and strategic roles of ports from the viewpoint of supply chain management. However, little work has been conducted to apply these theoretical advancements to define the strategic positioning of a port in a multi-port region [20]. The seminal work of Fisher [21] proposed two distinctive supply chain strategies: physical efficiency and market responsiveness. Nevertheless, it is unclear how theories of supply chain strategy can be applied for the formulation of a port strategy.

**Table 1.** Container throughput of Hong Kong and Shenzhen ports (million TEUs)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	AAGR
Hong Kong	17.8	19.1	20.4	22.0	22.6	23.5	24.0	24.5	21.0	23.7	24.4	3.0%
Shenzhen	5.0	7.6	10.7	13.7	16.2	18.5	21.1	21.4	18.3	22.5	22.6	18.4%

Note: TEU = twenty-foot equivalent unit; AAGR = average annual growth rate

Source: compiled by authors from Marine Department [22], Cullinane *et al.*[23]

This paper aims to narrow the research gap through a case study of Hong Kong. Hong Kong port was the world's busiest container port in the 1990s and early 2000s [24]. The port is still a key vehicle now for logistics and trade operations in Hong Kong, which accounted for 25.8% of the city's gross domestic product (GDP) and 24.2% of total employment in 2007 [25]. The Hong Kong government stressed that the impact the port has on the wider economy is too great to lose [26]. Nevertheless, Hong Kong port has been losing market share rapidly to neighbouring Shenzhen port due to its cost disadvantage. As shown in Table 1, container throughput at Hong Kong port only grew at an average annual growth rate (AAGR) of 3.0% from 2001 to 2011, while that of Shenzhen port was much greater at 18.4%. Policy makers are in dire need of an effective port strategy to sustain the role of Hong Kong as a regional shipping hub.

This paper presents a case study on Hong Kong port strategy from a supply chain perspective. The case study aims to achieve two objectives. One objective is to analyze the strategic fit of Hong Kong port in regional competition for policy discussions. The other objective is to illustrate the strategic importance of transit time in maritime logistics. Shipping lines, shippers and logistics service providers all play a part in port choice which was discussed in various forums and by Magala and Sammons [20]. This paper does not attempt to argue who makes the port choice decision in regional competition. Instead, it seeks to examine the role of transit time and stimulate debates and further studies in the management of transit time in maritime supply chain. Relevant studies have focused on transportation cost [14], while industrial competition has been evolving toward time based competition [1]. For this reason, the case study considers not only transportation cost but also transit time for shipping via Hong Kong port and its major competitor Shenzhen port. After understanding the impacts of supply chain factors, it suggests an appropriate port strategy and prioritizes policy measures to support Hong Kong's port development. This study sheds light not only on Hong Kong's port strategy, but also on other ports around the world as related to their strategic positioning in the era of supply chain management.

The rest of this paper is organized as follows. The next section reviews port strategy in the context of supply chain management. The third section defines the analytical methodology. The fourth section elaborates on the geographical context and data. The fifth section presents results and discussions. The sixth section concludes the research.

## 2. Port strategy in the context of supply chain management

### 2.1. Supply chain management and strategy

The theories and practices of supply chain management have received rising attention since 1990s [6]. A key merit of supply chain management is its systems approach to integrate an activity with upstream and downstream activities [27]. For example, for a port choice decision, it considers not only services offered by port terminal operators, but also drayage services between the port and cargo origin/destination, customs clearance, liner shipping services, and value-added services provided by third party logistics firms [11; 12; 19].

Research on supply chain strategy has its root in the seminal work of Marshall L. Fisher [21]. Fisher [21] proposed the supply chain strategy of physical efficiency for functional

products with predictable demand, and market responsiveness for innovative products with unpredictable demand. Fisher's [21] typology has been very popular among industrial practitioners. It has also been affirmed by research studies [28; 29], which provided empirical evidence that optimal supply chain strategies are largely determined by product and demand characteristics.

Another perspective in supply chain strategy made the distinction between lean and agile supply chains. In general, functional products should employ a lean supply chain which is physically efficient, while it is better for innovative products to adopt an agile supply chain which is market-responsive. For the hybrid product type which consists of both functional and innovative components, a 'leagile' supply chain should be applied [30-34].

Most recently, two surveys [35; 36] investigated manufacturers' supply chain strategies. It was found that most organizations employ a hybrid strategy to pursue both cost and lead time reduction, irrespective of product type. They suggested that future supply chains are likely to have attributes of both physical efficiency and market responsiveness.

## *2.2. Port strategy and the case of Hong Kong*

In the era of supply chain management, ports should be viewed as elements in value-driven chain systems. Ports must clearly specify their value propositions and choose the right customer segmentation in order to deliver value to shippers and third party service providers [4]. In general, value is defined by three essential criteria sets – time, cost and service quality [37].

Robinson's [4; 37] conceptual paradigm on the strategic positioning of ports has been supported by industrial studies. A study on European ports called for a change of mindset from "port-to-port" to "door-to-door" [38]. It suggested that port competitiveness depends on its integration into the transport routes and the added value for clients. An industrial survey [7] found that port competitiveness is mostly influenced by the stable relationships with other actors in the supply chain. It means the attractiveness of a port can be derived not only from its location and operating efficiency, but also from its external linkages in a given supply chain.

Supply chain management brings about greater integration among stakeholders. Consequently, ports need to respond to arising strategic issues. Heaver *et al.* [39] discussed co-operation and competition amongst ports and amongst terminals within a port. The shipping industry is consolidating and few players are gaining more market power. Port authorities and terminal operators are adopting new strategies to reduce the 'footloose' nature of shipping lines. These strategies include mergers, regional and global expansion, and the development of dedicated terminals for major shipping lines. Carbone and Martino [8] discussed how ports can face the challenge of higher supply chain integration through an empirical study. They recommended a revised Lambert model for the strategic analysis.

Port choice studies are relevant to port strategy. Unfortunately, most of them have focused on how a shipper chooses a port in isolation of the chain systems in which it is embedded [20]. It has been widely acknowledged that port choice is very much influenced by time factors, for example, the frequency of shipping [40; 41]. Nevertheless, the strategic importance of lead time management for a responsive supply chain [6] has been largely ignored in port choice studies [41]. From the viewpoint of ocean carrier selection, a recent study [42] also pointed out that many shippers are negligent of shipping transit times and their variability, although they significantly affect inventory costs.

Research on Hong Kong's port strategy has been scarce. Using Porter's theory of firm competition, Wang [43] explained that Hong Kong port uses the differentiation strategy. It provides high-end services with the most comprehensive coverage of destinations, the shortest port stay time, and the highest shipping line connectivity, while also having the highest port charges. Wang's [43] explanation, while valid, did not consider external factors that are influential in the supply chain such as customs clearance and drayage services.

Recently, the role of Hong Kong's transition from a hub port city to a global supply chain management centre has been discussed [44; 45]. Competition and complementarity between Hong Kong and Shenzhen ports have been analyzed by Lam and Yap [16] through slot capacity analysis. Nevertheless, little research has been conducted to define the value propositions of Hong Kong port in the face of increasing competition from lower-cost rivals.

### 3. Methodology

In general, researchers have assumed that a shipper chooses a port of loading to minimize total transportation cost [41]. The weakness of this assumption is that it ignores the value of time. From a supply chain perspective, total logistics cost includes not only transportation cost but also the cost of holding goods in the transportation pipeline [1; 42]. Such a cost relationship is defined in the following equation:

$$TLC_{mp} = TTC_{mp} + IHC_{mp} \quad (1)$$

where  $TLC_{mp}$ ,  $TTC_{mp}$  and  $IHC_{mp}$  denote total logistics cost, total transportation cost and inventory holding cost during transport lead time respectively for the shipping through drayage service mode  $m$  via port  $p$ .

Total transportation cost is also referred to as total through cost. It consists of drayage service charges, terminal handling charges (THCs), ocean freight rate and various fees including fuel adjustment factor, documentation and declaration fees [46]. Inventory holding cost includes the interest paid for the capital invested in the goods, material handling cost, obsolescence, and the loss of sales opportunities [1]. Logistics managers need to manage the trade-off in transportation decisions. A premium transportation service, although incurring higher cost, may be justified since it shortens transit time.

Inventory holding cost during transport lead time can be calculated as follows:

$$IHC_{mp} = VAL \times \mu \times LT_{mp} / 365 \quad (2)$$

where  $IHC_{mp}$  and  $LT_{mp}$  denote inventory holding cost during transport lead time and transit time measured by days respectively for the shipping through drayage service mode  $m$  via port  $p$ ,  $VAL$  denotes cargo value, and  $\mu$  denotes annual inventory holding cost rate.

Cargo value  $VAL$  and inventory holding cost rate  $\mu$  could vary widely. This analysis chooses three commodities to represent different groups of cargo values: low-end footwear with a low value of US\$40,000 per forty-foot equivalent unit (FEU), a household appliance with a medium value of US\$100,000 per FEU, and an electronics product with a high value of US\$250,000 per FEU. Three inventory holding cost rates are given to differentiate commonly practiced supply chain strategies. Inventory holding cost rate is set as 20% for the efficient supply chain strategy, 60% for the responsive supply chain strategy usually demanded by time-sensitive products, and 40% for the hybrid supply chain strategy that balances efficiency and responsiveness [21; 47].

A unique aspect of port competition between Hong Kong and Shenzhen ports is that both ports are run by virtually the same group of terminal operators [48]. With the transfer of technical know-how in port operations, operating efficiency and service quality at Shenzhen port have been rapidly converging with Hong Kong port [46]. For this reason, the following analysis on the strategic positioning of ports assumes that port choice is determined by the total logistics cost associated with the use of these two ports and excludes the consideration of other factors [1; 42]. The case study also assumes that port choice decisions are made to maximize the interest of the whole supply chain [5], and thus does not distinguish who makes the port choice decision. In reality, port choice decisions could be made solely by shipping lines, shippers (buyers or sellers) or freight forwarders, or jointly by multiple stakeholders. There is no universal answer regarding who makes port choice decisions, because there could be a variety of very different contractual arrangements between stakeholders involved in shipping supply chains [5]. However, no matter who makes the port choice decision, the long

term trend is toward maximizing supply chain profit in order for a supply chain to stay competitive and survive in industrial competition [49].

#### 4. Geographical context and data

According to Hong Kong Port Development Council [50], about 70% of container traffic handled in Hong Kong is related to South China, primarily the Pearl River Delta (PRD) region. Major ports serving the PRD region are indicated in Figure 1. Hong Kong port has Kwai Tsing terminals for ocean trade and Tuen Mun terminal for river trade. Shenzhen port has Yantian on the east and Shekou/Chiwan on the west. Several other major ports have also been in competition with Hong Kong port. However, the main threat for Hong Kong port is the cargo diversion to Shenzhen port.



Source: adapted from Song [48]

**Figure 1.** Major ports serving the Pearl River Delta region

The PRD region is divided in the middle by the Pearl River that flows through Guangzhou. Hong Kong port is at a more favourable location for cargoes from West PRD, while Shenzhen port is more convenient for cargoes from East PRD. There is a high concentration of waterways and small feeder ports in West PRD. Cargoes from West PRD can be transported to mainline ports conveniently by barging, which incurs substantially lower cost than trucking [51]. Due to the short sailing distance from the PRD waterways, barging does not incur much longer transportation time than trucking [52].

**Table 2.** Cost comparisons of moving a 40FT container: PRD to US West Coast

Jun'2012, US\$	By truck			By barge	
	Via HKP	Via Yantian	Via Shekou / Chiwan	Via HKP	Via Shekou / Chiwan
All-in freight rate	2500	2500	2500	2500	2500
Terminal handling charges (THCs)	355	295	295	355	295
Drayage cost (from East PRD)	427	206	190	301	237
Drayage cost (from West PRD)	665	348	332	380	269
Total vs. Truck-HKP from East PRD		-281	-297		-124
Total vs. Truck-HKP from West PRD		-377	-393		-171

Note: HKP = Hong Kong port

Source: Estimates computed from data provided by industrial professionals

We present detailed analysis using a representative major trade route, which is for export from the PRD region to the West Coast of the United States (US). Shipping related cost data are given in Table 2. THCs are about US\$60 higher at Hong Kong port than Shenzhen port. Trucking to Hong Kong port is about US\$200 more expensive due to regulatory issues. Although Hong Kong is now part of China, it maintains its independent laws and customs under the unique “one-country-two-systems” political system. Trucking regulation does not allow Shenzhen drivers to conduct cargo business in Hong Kong. As a result, much more costly Hong Kong drivers must be used to complete the journey from the PRD region to Hong Kong port [53].

Data on transit time are presented in Table 3. Barges often suffer from congestion and long waiting time at Kwai Tsing terminals in Hong Kong [52]. In contrast, trucking delays are not significant. Hong Kong customs provides world-class efficiency, transparency and predictability to facilitate cargo flows [54]. After passing through the Shenzhen-Hong Kong border, a truck can drive to the port directly because of Hong Kong’s free port status. This allows the port to accept containers delivered by trucking right before sailing cut-off times, which are two days before booked vessel’s scheduled arrival for most shipping lines. For shipping via Shenzhen port, however, containers must arrive at least one day in advance for customs clearance and inspection [55]. A three to five percentage of open-box inspection is usually required at Mainland Chinese ports for anti-smuggling purposes. Chinese customs officials can issue inspection orders almost arbitrarily which sometimes causes unpredictable delays [56]. To avoid missing booked vessels, freight forwarders often require containers to arrive at the port two to three days earlier than sailing cut off times. This causes much longer port stay time at Shenzhen port than at Hong Kong port. Note that the inconsistency and lack of transparency at Mainland Chinese customs are not expected to disappear in the near future due to their deep cultural and institutional roots [53].

**Table 3.** Transit time comparisons of moving a container: PRD to US West Coast

Jun’2012	By truck			By barge	
	Via HKP	Via Yantian	Via Shekou / Chiwan	Via HKP	Via Shekou / Chiwan
Waiting at barge terminal				0.8 days	0.8 days
Drayage transportation time	0.3 days	0.1 days	0.1 days	0.3 days	0.3 days
Waiting for unloading at port				0.5 days	
Port stay time	2.9 days	5.1 days	5.1 days	2.9 days	5.1 days
Ocean transit time	Direct sailing	Direct sailing	+1 day	Direct sailing	+1 day
Total vs. Truck-HKP		+2 days	+3 days	+1.3 days	+4 days

Source: Estimates based on data from industrial professionals

Hong Kong used to be the last port of call in the region for export routes with most shipping lines [52]. In the past few years, however, many shipping lines have launched direct services from Yantian, other than making a transit via Hong Kong. As a result, ocean transit time for shipping via Hong Kong and Yantian is now comparable. Ocean transit time for shipping via Shekou/Chiwan is about one day longer as most ocean-going vessels traverse Hong Kong or Yantian before departing from the region.

It should be acknowledged that data presented above only depict a general picture of shipping via Hong Kong and Shenzhen ports. It is appropriate to use the data for a very high level strategic analysis in this case study, although individual maritime supply chains may have varying total through costs and transit times. This case study does not consider the import end of the supply chain, because its operations are usually decoupled from the export end. However, supply chain managers should be aware that much cost and lead time may be consumed to get products from the port of unloading to the shelf. In addition, a supply chain may be more fragmented than it is often supposed and its daily operations may incur unexpected costs and lead times. Nevertheless, it is still valid to claim that any saving in cost and transit time provides the potential to benefit the supply chain.

## 5. Results and discussions

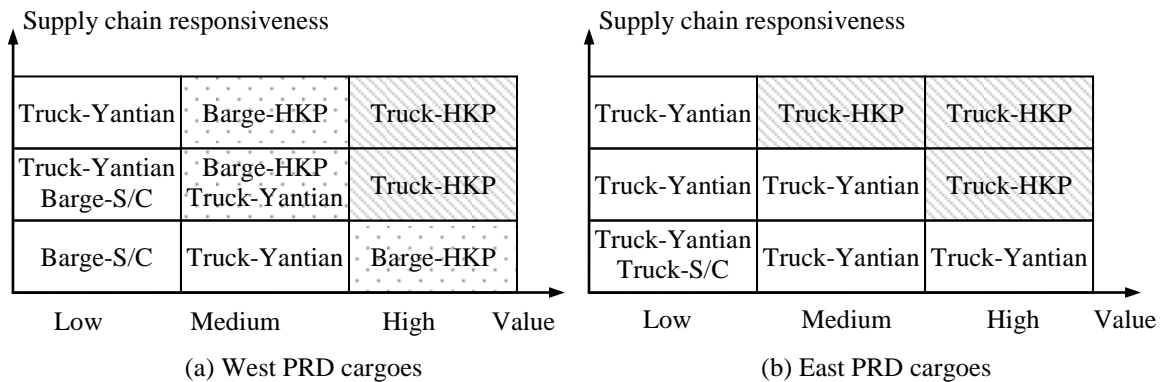
### 5.1. Current competitive positions

The value of shorter transit time is reflected in the reduced inventory holding cost during transport lead time, which can be calculated according to the equation (2). For example, the representative household appliance has a medium value of US\$100,000 per FEU, and its inventory holding cost rate is 40% per year when a hybrid supply chain strategy is employed. This leads to inventory holding cost savings of  $US\$100,000 \times 40\% \times 1/365 = US\$110$  when transit time is reduced by one day. Figure 2 categorizes the results based on cargo value and supply chain strategy as defined in Section 3. The results are in perfect agreement with the perception of industrial practitioners that a cargo with a value of US\$100,000 has a time value of US\$100-200 per day [41]. This proves the validity of the analytical methodology and results.

Supply chain strategy				
	Responsiveness	US\$66	US\$164	US\$411
	Hybrid	US\$44	US\$110	US\$274
	Efficiency	US\$22	US\$55	US\$137
		Low	Medium	High
		Value		

**Figure 2.** The value of reducing transit time by one day

Figure 3 depicts the strategic fit of ports based on total logistics cost as defined in the equation (1). Trucking to Hong Kong port possesses a competitive edge for high value cargoes that employ a responsive supply chain strategy because their time value is significant. Yantian and Shekou/Chiwan ports in Shenzhen are competitive for low value cargoes that employ an efficient supply chain strategy due to their cost advantages. Barging to Hong Kong port is a strategic fit for three types of West PRD cargoes, while trucking to Yantian port is favourable for most East PRD cargoes. This explains why Hong Kong port has continued to enjoy throughput growth for cargoes from its west while Yantian port has diverted cargoes from its east [57].



Note: HKP = Hong Kong port; S/C = Shekou/Chiwan. The same abbreviations are used in the Figs. 4 to 7.

**Figure 3.** The strategic fit of Hong Kong and Shenzhen ports

It is apparent that Hong Kong port's most appropriate market segment is high value and time-sensitive cargoes, followed by West PRD cargoes that are of medium value and semi-sensitive to time. Although shipping via Hong Kong port incurs higher transportation cost, the supply chain that the port is embedded in possesses several distinctive advantages to shorten transit time in comparison with Shenzhen port. First, port stay time is about two days



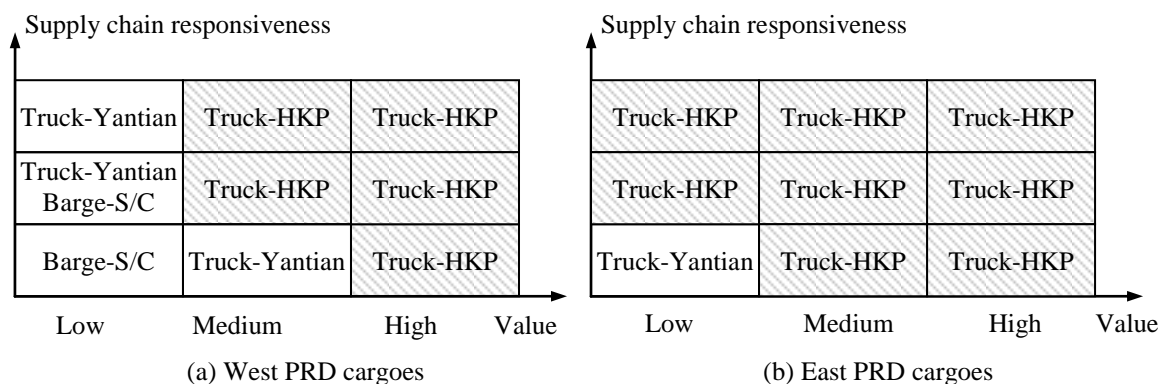
shorter for cargoes shipped via Hong Kong because of its free port status and world-class customs clearance. Second, in comparison with shipping via Shekou/Chiwan, it saves ocean transit time by about one day as many shipping lines have maintained Hong Kong as the last port of call in the region for export routes. Although Yantian has risen as a new hub, Hong Kong has kept its hub status, i.e., a dual hub port system has become evident in the region [45]. Third, Hong Kong port's geographical location is more favourable for cargoes to and from West PRD via waterways.

It should be acknowledged that the comparative advantages of ports may evolve over time. In recent years, Shenzhen port has caught up rapidly in sailing frequency for North America and Europe related trades, although Hong Kong port still has much higher connectivity for Asia and other routes [46]. This development undermines Hong Kong port's competitiveness. However, there are also changes favourable to Hong Kong port. For example, the opening of "Green Lane" in 2006 facilitates cross-border logistics between Hong Kong and mainland China. By streamlining customs procedures and enabling cargo exchanges at the border, "Green Lane" could greatly save cross-border trucking time and cost, and make Hong Kong port more attractive [45].

Besides the time factors analyzed above, there are several other factors that enhance Hong Kong port's competitiveness for the shipping of high value and time-sensitive cargoes. Hong Kong port derives advantages from well-established trading services, financial and legal systems in Hong Kong. Trading services and financial transactions are crucial for shipping activities [58]. As an international trading and financial services centre, Hong Kong has advantages over Mainland Chinese cities in shipping related financial services. The legal system of Hong Kong is also independent from that of Mainland China and it is more transparent. For this reason, a business dispute is more likely to be settled fairly and timely in Hong Kong. These advantages are especially important for high value and time-sensitive cargoes.

## 5.2. The impacts of supply chain factors

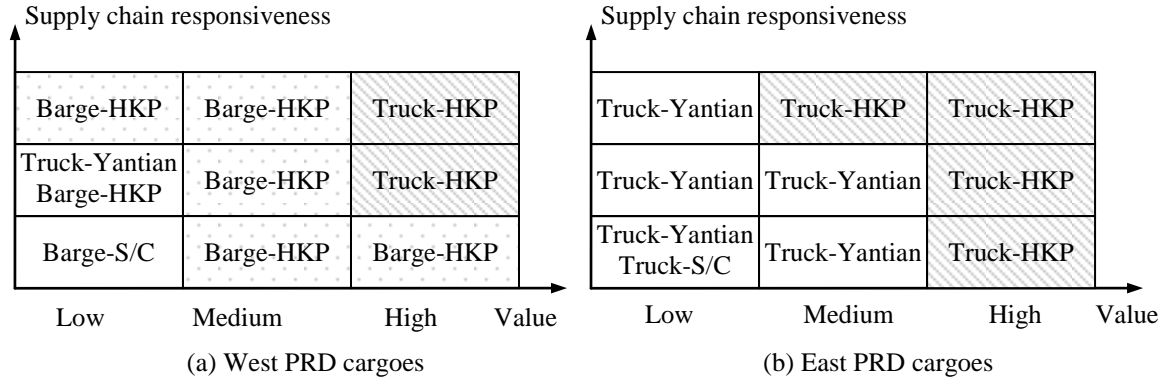
This subsection analyzes the impacts of several potential changes on the competitive position of Hong Kong port. It considers several supply chain factors including road haulage costs, THCs, the efficiency of handling barge cargoes, and port rotation of liner services. By following the example of Figure 3, the impacts of potential changes in individual factors are analyzed and presented in Figures 4 to 7.



**Figure 4.** Competitive positions of ports with Hong Kong trucking market de-regulation

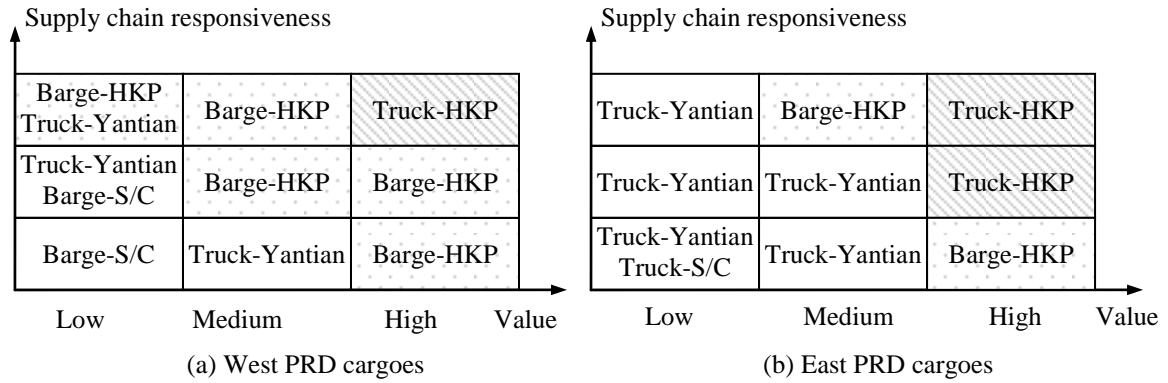
Figure 4 suggests that Hong Kong trucking market de-regulation would help Hong Kong port gain decisive advantages for most cargo types. Road haulage costs to Hong Kong port have fallen by about 40% in recent years after streamlining the border-crossing process. However, there still exists a wide cost gap in comparison with trucking to Shenzhen port. As mentioned previously, trucking to Hong Kong port is about US\$200 more expensive because Shenzhen drivers are not allowed to conduct cargo business in Hong Kong. To further reduce

road haulage costs substantially, the Hong Kong trucking market must be deregulated to give access to Mainland Chinese drivers [46].



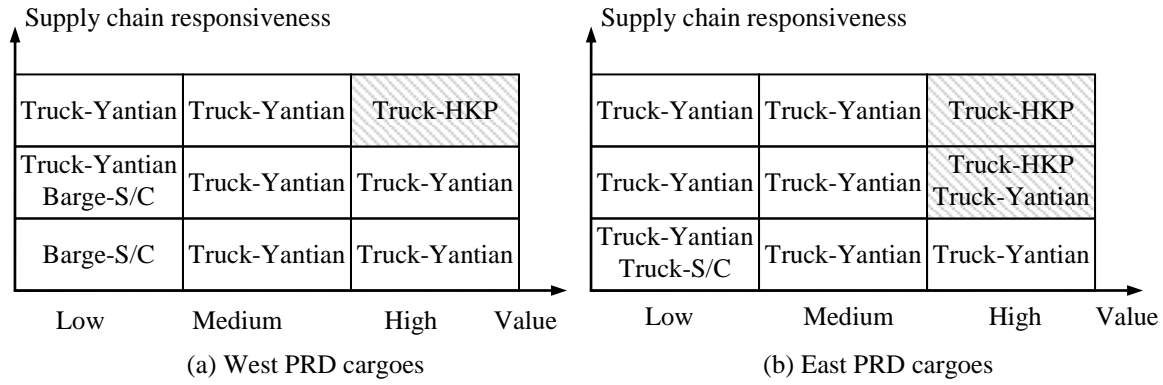
**Figure 5.** Competitive positions of ports with reduced THCs at Hong Kong port

Figure 5 shows that Hong Kong port's competitiveness would be improved moderately if its THCs could be reduced to the same level as Yantian port. Facing fierce competition from Mainland Chinese ports, Hong Kong port terminal operators have reduced container port handling tariffs by around 30% in recent years [46]. However, THCs charged by shipping lines to shippers have only fallen marginally. It is reasonable to expect shipping lines to reduce THCs more substantially because they claim that the collection of THCs is a cost recovery exercise. Nevertheless, shipping lines are unwilling to give up the profit as they are in a more powerful position than shippers in this situation. Shipping lines have their rate-setting cartels, namely, Far Eastern Freight Conference (FEFC), Intra-Asia Discussion Agreement (IADA), Asia North America Eastbound Rate Agreement (ANERA), and Transpacific Westbound Rate Agreement (TWRA). Although shippers have complained about THCs, they have not been able to pressurize shipping lines to reduce THCs [59].



**Figure 6.** Competitive positions of ports with improved efficiency of barging at Hong Kong

Figure 6 depicts the competitive positions of ports if the long waiting time at Hong Kong port could be eliminated for the unloading of barge containers. The inefficiency is mainly caused by the fragmented cargo flows whose minimal call size is only six containers in a barge. Hong Kong port could differentiate its handling charges to encourage upstream cargo consolidation in order to improve efficiency at terminals. River cargoes could also be consolidated using the River Trade Terminal at Tuen Mun, whose location is indicated in Figure 1 [52]. Another possible solution is for the Hong Kong government to grant more land for the development of barge terminals near to Kwai Tsing terminals.



**Figure 7.** Competitive positions of ports with Hong Kong port losing a favourable position in port rotation

Figure 7 illustrates that Hong Kong port will lose competitiveness to Yantian port for almost all cargo types if shipping lines stop giving Hong Kong port a favourable position in port rotation, i.e. being the last port of call for export routes and the first port of call for import routes. In this scenario, the transit time advantage of shipping via Hong Kong port will be much reduced, which would seriously undermine its current competitive advantage to enable supply chain responsiveness. If this really happens, Hong Kong would lose its hub status and the outlook of the port would become very pessimistic.

**Table 4.** The impacts of potential changes on the competitive position of Hong Kong port

Potential changes	The impacts on the strategic position of Hong Kong port
Hong Kong trucking market de-regulation	Gain decisive advantages for most cargo types
Lower THC's at Hong Kong port	A moderate improvement in port competitiveness
Raise the efficiency of handling barge cargoes at Hong Kong port	A moderate improvement in port competitiveness
Shipping lines stop giving Hong Kong port a favourable position in port rotation	Lose competitiveness to Yantian port for almost all cargo types

Table 4 summarizes key findings about the impacts of potential changes on the competitive position of Hong Kong port. Hong Kong trucking market de-regulation would be most beneficial, but will be very difficult to implement. The cost of market de-regulation would be the immediate job loss for Hong Kong truck drivers. With such a negative social impact, policy makers should be prepared for strong opposition to any such proposal. Reducing THC's at Hong Kong port would help improve the port's competitiveness. However, it should be aware that THC's are a sensitive commercial matter between shippers and shipping lines. It is difficult for port operators and policy makers to intervene directly, unless they can introduce a competitive law to stop shipping lines from fixing THC's. In contrast, raising the efficiency of barging at Hong Kong port is an internal matter and thus more feasible to accomplish. It would achieve a comparable benefit as reduced THC's. If shipping lines stop giving Hong Kong port a favourable position in port rotation, the port would lose competitiveness to Yantian port for almost all cargo types.

### 5.3. Policy implications

Comparing the impacts of the factors presented above, Hong Kong port must give the highest priority to securing its favourable position in port rotation with shipping lines to stay competitive. As mentioned previously, Shenzhen port has caught up rapidly in service quality and operating efficiency. Hong Kong port's most sustainable and considerable advantage lies not in the port itself, but in the agility resulting from Hong Kong's free port status and world-

class customs clearance. Hong Kong port should leverage this advantage to position itself as an agile port for a responsive supply chain [18].

In line with an agile port strategy, port operators should foster stable relationships with shipping lines to maintain a favourable position in port rotation and high sailing frequency. At the same time, port operators should continue to maintain/enhance operating efficiency, offer responsive services, high flexibility and expertise to stay ahead of Shenzhen port and fit agile supply chains' needs. This will also help attract shipping lines to put Hong Kong as the last port of call in the region for export routes. In addition, port operators can work with third party logistics firms to strengthen value-added services like rapid import, sorting, cargo consolidation and distribution [19]. Building agility into maritime supply chains benefits not only Hong Kong port, but also all other supply chain partners including shippers, shipping lines and third party logistics firms. For example, there was a higher portion of demand for cargo delivery via Hong Kong in 2009. During that period of global economic downturn, overseas importers and retailers tended to place only small orders and require short delivery times. Shipping via Hong Kong was preferred because of supply chain agility and flexibility [60].

The Hong Kong government should formulate proactive policies to ensure the viability of the port and sustain the city's role as a shipping hub. As mentioned previously, Hong Kong port is a key vehicle for logistics and trade operations, which accounted for 25.8% of the city's GDP and 24.2% of total employment in 2007 [25]. The impact the port has on the wider economy is thus too great to lose [26]. So far, policy discussions on Hong Kong port have been dominated by a cost reduction mind-set [46; 61]. Although cost reduction is beneficial and necessary, it should not be the primary nor sole focus in light of the fact that it might not be feasible to further reduce cost substantially. The Hong Kong government should focus on building up strengths in agility for a responsive supply chain, rather than fixing weaknesses in high costs which could never be lowered to the same level as competitors.

Following the strategic direction of supply chain agility, the Hong Kong government should further improve cross-border procedures and infrastructures as they are still a major bottleneck prolonging transport lead time. The opening of "Green Lane" in 2006 for cross-border logistics was a positive initiative. However, "Green Lane" faces several major roadblocks and its potentials have not been fully exploited to speed up cross-border cargo flows [62]. The Hong Kong government should take decisive actions to improve the utilization of "Green Lane" to minimize cross-border waiting time of container trucks. In addition, the Hong Kong government should consider granting more land for the development of barge terminals near to Kwai Tsing terminals. This will ease barge congestion and improve Hong Kong port's capability to facilitate an agile supply chain.

## **6. Conclusions**

Ports play a pivotal role in regional economy as they facilitate trade and contribute to economic growth. Traditionally, ports have been studied as an isolated transportation unit. In the era of supply chain management, ports should rethink their value propositions in the chain systems in which they are embedded. Hong Kong port used to be the world's busiest container port in 1990s and early 2000s. It now faces tremendous pressure to keep its role as a regional shipping hub due to rising competition from neighbouring lower-cost Shenzhen port. As seaport-related logistics is intertwined with trade forming a key economic pillar of Hong Kong, policy makers are in dire need of formulating an effective port strategy.

This paper identifies the critical link between port strategy and supply chain strategy. In today's business environment, a port strategy without a supply chain focus may constitute an inadequate strategy. Considering both transport cost and the value of time from a supply chain perspective, it investigates the strategic fit of Hong Kong and Shenzhen ports. Hong

Kong's free port status and world-class customs clearance offer the port a sustainable and considerable advantage to shorten transit time. Despite high costs, trucking to Hong Kong port is a strategic fit to ship high value and time-sensitive cargoes that demand supply chain responsiveness. Barging significantly reduces its cost disadvantage, and gives the port another edge for cargoes from its west. Hong Kong port should pursue an agile strategy for a responsive supply chain. Based on the value proposition, stakeholders of Hong Kong port should align port service offerings with the needs of appropriate customer segments. They can then develop a marketing strategy as a necessary sub-strategy of the port strategy, and clearly articulate their service offerings to the right customers.

Policy implications bring to light the need of a mind-set change of policy makers to support Hong Kong's port development. The appropriate focus is to build up strengths in agility, rather than to fix weaknesses in high cost that could never be lowered to the same level as rival Mainland Chinese ports. Priorities should be given to facilitate a responsive supply chain by securing a favourable position in port rotation, raising the efficiency of barging, reducing cross-border waiting time, maintaining high sailing frequency, and collaborating with third party logistics firms to strengthen value-added services. Substantial cost reduction measures, namely Hong Kong trucking market de-regulation and terminal handling charges reduction, would be beneficial but might be difficult to implement.

This case study is limited to Hong Kong port. It focuses on cost and time factors that correspond to the two dimensions of supply chain strategy, i.e., efficiency and responsiveness. It is worthwhile to apply the same supply chain perspective and analytical methodology to study other ports. As regional port competition could involve very different dynamics, it may be necessary to consider other factors such as railway connections that influence port choice decisions in future research.

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