Abstract

Over the past few decades, global trade has gone through an explosion of growth, with globalization and liberalization fuelling consumer demands. The infrastructure required to support these demands has likewise gone through radical developments and continuous improvements. The transportation industry has also been subjected to phenomenal changes, especially with the advent of containerization. This article evaluates the impact that cargo trends, resulting from containerization, have had on the development of seaport terminals in Asia, focusing on the major cargo ports in the Asia-Pacific region. Focus is given on its influence on port planning, development and management to facilitate its role as trade conduits and facilitators at the forefront in transportation and logistics.

Introduction

The sweeping forces of liberalization and globalization have significantly facilitated greater global trade, opened up economies and fueled consumer demands in an unprecedented scale. These forces, combined with the emergence of China as an economic powerhouse and the economic ascent of developing nations like India, have spurred international trade dramatically over the last few years.

In many Asian countries, these developments have resulted in the investment and development of all sorts of infrastructure to support the explosion in global trade. Better infrastructure and supporting services, in turn, have become catalysts to even greater demands for more goods to be delivered even faster and at cheaper costs between Asian nations and their trading partners.

The phenomenal growth in global trade has had a huge impact in the development of the containerized transportation industry. In the last few decades, the transportation of goods has undergone dramatic changes as a result of improved technologies in transport and communications. In Asia, container transportation has significantly changed with ever-
increasing international maritime container cargo movement, the deployment of ever-larger container ships, and the reorganization of several key Asian hub ports.

**Developments in the shipping sector and their impacts on ports**

The fate of ports and developments in the shipping sector are intertwined. Ports are trade facilitators, while shipping is an endeavor that is closely related to trade as the bulk of the world’s trade is carried via the sea. As such, developments in shipping services are sensitive to changing patterns of trade and economic activities, and have huge bearings on port development. It is therefore worthwhile to take a glance at some major shipping developments that have impacted container transportation, which in turn have influenced how ports are planned, organized and developed in Asia.

The impressive growth of economies in the Asia-Pacific region which began in the 1980s has led to the growth in trade of manufactured goods within the region and beyond. Intra-Asian links have grown dramatically over the last decade, resulting in increasing presence of global carriers in the regional waters, tremendous development of new ports and upgrading of existing ones.

Many Asian countries which have transformed their economies from agricultural-based to manufacturing-based are getting more involved in international trade. The fate of such economies is increasingly determined by the effective planning, development and operation of their seaports. The forces of liberalization and globalization and the keen competition to attract cargos have combined to pressure Asian ports to reinvent themselves from being mere static facilities to dynamic business entities. This pressure is even more relentless on seaports and cargo terminals in the region whose survival hinges upon their ability to attract cargos and lure shipping lines. Sizeable investments have been made by the owners to make their ports competitive and attractive to obtain good returns on the huge capital outlay. As Asian ports expand the scope of their roles from merely serving domestic economies to facilitating international trade, they will continue to undergo dramatic developments.

In previous decades, many carriers expanded their fleet through internal expansion. This trend changed drastically with the merger between two megaliners, P&O Containers and Nedlloyd Lines in 1996.[16] The number of long-haul operators was greatly reduced in the 1990s with a series of mergers and acquisitions (M&A). Entering into the new millennium, the 20 largest main line operators dominated almost 80% of worldwide fleet size. Most recently, the AP Moelliar-Maersk group, another coalition emerging from the M&A frenzy, offered to buy Royal P&O Nedlloyd.[2] This will further consolidate the shipping industry and potentially create a behemoth whose business model can have a significant impact on world shipping, maritime trade and port development in Asia.

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There is a notable trend in the maritime and port industry pointing towards a concentration of resources and rationalization of business processes. Such exercise has been seen in areas such as shipbuilding, crewing, ship registry and chartering. The oft-repeated mantra is to achieve economies of scale, reduce destructive competition, enhance efficiency, allocate resources efficiently, and rationalize operations and processes.

In the shipping sector, this has been evidenced in continuing mergers and formation of alliances between liners. In the ports sector, huge international consortiums are increasingly focusing on managing ports and shipyards on a global basis to achieve higher efficiency. This has resulted in the merger or dissolution of small terminal operators. More mega-hub ports are emerging to achieve economies of scale, driven by the enlargement of markets as a result of globalization and liberalization. Ports such as Singapore and Hong Kong are increasingly investing in other terminals abroad to enlarge the geographical expanse of their businesses and to better utilize their resources.

The increase in world tonnage has exerted pressure on freight rates, forcing shipping lines to seek greater levels of efficiency. The quest to attain economies of scale, especially in liner shipping, has resulted in the remarkable increase in the size and capacity of container vessels. The explosion of growth in global container throughput has acted as a catalyst for the introduction of vessels with bigger capacities and better capabilities.

Containerization has also resulted in heavier oil tanker traffic, especially along strategic sealane such as the Straits of Malacca, as local and industrial demand for oil increase. This requires improvement in the infrastructure of oil terminals at seaports and the development of new ones along the busy sealane.

Another trend emerging from containerization and the use of larger vessels is the notable increase in coastal trade. Such trade uses smaller, faster and more efficient ships to feed huge mother vessels. The vast number of vessel calls demands much more nimbleness and flexibility from feeder service providers and the ports. Such development has increased the need of port users to obtain services which are customized and individualized to suit their specific needs. Some Asian ports have rose to fulfill this demand, offering for example custom-made solutions such as free storage for transshipment containers, warehousing, priority or dedicated berthing arrangements.

All these developments in the shipping sector involving technological advances, business models and strategies, sailing scheduling and routing, and trade patterns, among others, are central to cargo trends and will continue to play a detrimental role in charting the development of ports in Asia.

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Size does matter: Can Asian ports keep up with shipping development?

As vessel size and capacity continue to rise, the challenge of keeping up the development of ports and terminal to cater to these ships have become crucial. To be competitive and attractive, ports need to be able to host larger vessels efficiently with minimum turnaround time.

This challenge has resulted in many Asian ports making heavy investments in new cranes to provide outreach to handle super-sized ships and to have enough back-up equipment to maintain a steady flow between the container yard and the quayside. Leading ports have installed cranes with tremendous outreach capable of handling huge ships [19]. Many Asian terminals have plans to invest heavily in container cranes in the future in anticipation of increasing vessel capacity and dimension.

To underline the breakneck speed in the development of containerized cargo transportation, vessels that could accommodate 20 TEU boxes once used for long haul carriage are now employed for short-sea services. Long-haul deployments are increasingly being undertaken by much larger vessels. Even bigger vessels are being built in the quest for economies of scale. China Shipping Container Lines (CSCL) boasts a fleet containing one of the world’s largest container vessels, CSCL Europe, an SX-class series vessel with a capacity of nearly 8,500 TEU capacity. Already, plans are afoot by shipping companies to introduce container vessels with capacity beyond the biggest there is now.

The pursuit for bigger capacity, a by-product of the advent of containerization, has raised questions of how big are containerships likely to be and what will be the optimum size of such vessels. Some believe that economies of scale and increasing trade volumes will relentlessly push ship capacity upwards as technologies improve. Others argue that ship capacity is already nearing optimum as operationally and technically viable.

The question remains if there are sound economic, technological and operational basis to believe that ships of these size will ever be built. The implications on port development would be immense should these mega-ships come to be. It is easy to assume that building large containerships will lead to economies of scale, but it is also possible that it could be outweighed by additional costs such as dredging, extra feeder costs, landside congestion, and handling equipment [21].

Shipping lines may change their routing with the advent of bigger vessels. They may alter operating patterns and make fewer calls at offshore hub ports. Larger feeder vessels may be used to serve container ports. Changes in trading patterns will also be detrimental to consolidation of high volume services and rationalization of port calls. All these will pose a stiff challenge to Asian port planners to develop their ports to be able to cater to these trends and to retain competitiveness in the most optimal manner.

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Asian port development in the context of cargo trends: Future challenges

One of the attractions of Asian ports, especially those situated along major trade lanes such as the Straits of Malacca, is their ability to provide adequate infrastructure and critical ancillary services such as bunkering and feeding at competitive rates. The ability of ports such as Singapore, Tanjung Pelepas and Port Klang to provide logistics services and supply chain management efficiently and reliably is a major pull factor for shipping lines to use the Straits and call at those ports. Such strengths will be continuously put to stringent test with the anticipated growth in maritime trade, increased competition to attract cargo and the advances in containerization and shipping technology.

Improvements in the design and development of ports have made bigger containership capacity possible. Technical solutions will continue to develop in tandem with the need to overcome foreseeable issues relating to bigger ships. With this in mind, Asian ports will have to plan efficiently to serve larger ships and generate economies of scale. But they, like other ports anywhere else, are subject to limitations in space, logistics, finance and technical capacities, among others. These may restrict their further development and result in eroding their attractiveness and competitiveness.

Most leading Asian container ports and terminals are able to accommodate berthing of ships up to 300-400m in overall length and feature approach channels dredged to accept ships with draught of above 15m. It can be said that the largest ports are able to handle the largest ships. Singapore Port and Hong Kong Port have facilities such as super post-Panamax quay cranes that can serve the world’s biggest megacarriers, making them among the world’s busiest and attractive ports.

However, luring ships is just not a question of providing facilities and having impressive technical features. Ports must also have the systems, manpower and skills to back up such large-scale operations to achieve productivity and minimize turnaround time. For large ships to achieve economies of scale, they must spend as little time as possible at ports. Hence, ports must be adequately equipped with resources that can ensure speedy processing of boxes and allocate enough cranes to load and unload big ships, while maintaining smooth flow of boxes between quay and yard. Ship operators will demand more efficient processing of their vessels at shorter turnaround times. Such relentless quest for speed and efficiency will require better handling systems featuring better facilities and higher productivity. Future technological advent will have to be equally accompanied by drastic changes in the way containers are handled to avoid congestion. Expansion in capacity will be inevitable, hence leading to the need for better logistics and more investments at ports.

In anticipation of bigger trade, challenges are abound for Asian ports to meet growing demands for port services. For one, they must increase storage facilities at terminals to take up more boxes. Again, leading Asian ports such as Singapore and Hong Kong lead the way, having the capacity to handle up to 50,000 TEU daily, and are poised to handle bigger volumes. But even they, not to mention smaller Asian ports, will require

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sufficient equipment and skilled labor to handle the flow of boxes between quayside and storage area. Asian ports must also upgrade their inland intermodal transport to minimize congestion and reduce container turnaround time. In doing so, they must seek balance between serving mega container vessels and idling time of equipment and labor to keep box-handling cost to a minimum.

Challenging as all these objectives already are, they cannot be achieved on their own – they depends largely on trading patterns and port calls. Such dependency could lead to developments that could spell the rise and fall of existing ports and a redefinition of their roles. For example, it is envisioned that containers from megaships will be transferred to large feeder ships, resulting in some container ports no longer being served by the huge ships. This could lead to the development of deepwater offshore container transshipment facilities, resulting in changes in the pattern of ship calls in search for such services.

The expected growth in global demand, powered by China’s economy, will continue to chart the development in containerized transportation, cargo trends and port development in the years ahead. This is underlined by Chinese estimation that its top ports will handle 140 million TEU containers by 2010, more than double the 61.5 million TEU containers they processed in 2004. This projection will need to be backed up by adequate port infrastructure to meet market demand, and in the case of Chinese ports, to ensure the competitiveness of China’s trade. As world trade continues to grow, the pressure is on for ports in Asian countries wanting to capitalize on China’s ascent as an economic superpower to meet rising demand and while minimizing congestion. Asian ports need to invest heavily in infrastructure, facilities, manpower and maintenance to enhance their competitiveness and to ride the fierce competition to capture cargo from China.

From a financial perspective, considerable challenges await Asian port planners ahead. Countries in the region with ports that cannot be further upgraded due to capacity and land constraints must build new ones to remain trade-competitive. Competition for cargos will become more intense as intra-regional trade grows, and as better ports and shipping services are provided at more competitive costs. Asian port planners will have to carry out meticulous quantitative analysis to forecast the volume of cargo that are transported and transshipped. They must thoroughly analyze cargo trends and work out viable models for ship calls must be developed to predict container cargo flow to a high degree of accuracy. Investment in a facility such as port will require huge amounts of capital. As such, meticulous evaluation will be required to justify the capital outlay.

The problem of containerized trade imbalance will also require some resolve. As global manufacturing shifts concentration to Asia where factors of production are less costly and as maritime transport becomes cheaper, the problem will be further aggravated. Huge costs are involved in shipping back empty containers to Asia from Europe and US, and as the world’s production continue to be outsourced on fewer countries, the imbalance looks set to continue and will pose a persistent challenge to the shipping and port sectors. As

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there are more containerized cargos moving out from countries with cheaper labor such as China than those coming in, Asian ports, especially the large container ports, will need to deal with the imbalance and reduce huge shipping cost as a result thereof.

Some Asian ports have undertaken ambitious expansion plans to attract more transshipment cargos and boost their revenues and earnings. However, a chicken and egg situation persists. With more cargo volume, such ports will be able to attract more main line operators to call. But without being able to attract new liners, expansion cannot be realized. This conundrum will continue to pose a keen challenge for Asian ports to overcome in the years ahead to avoid capacity crunch while remaining attractive and competitive.

**Conclusion**

There are few areas in trade and transport where changes are more pronounced than in containerized transportation. The so-called ‘container revolution’ has exerted a long-lasting impact on trade, transportation, technology, business operations, economies and the development of seaports around the world. Although the consequence of the impact may not be applicable to all the ports in the Asian region, some are notable for their magnitude and for mirroring global trends in port development. They include advent in shipping technology and practices, concentration of resources and processes, and door-to-door delivery stretching across the supply chain. These have been detrimental to the planning, organization, development, management and operation of Asian seaports.

Ports in Asia and around the world have to live with the fact that containerization will become the future of commercial shipping. As such, they must pull all the stops to keep pace with developments in containerized transportation and cargo trends. Challenges are abound for Asian port planners to plan their port development well, enhance infrastructure, keep updated with state-of-the-art technologies, increase productivity, organize operations efficiently, invest wisely and allocate resources effectively to cater to greater trade volume, bigger vessel capacity and increasingly demanding users.

If the current scenario is any indication, the next decade or so is poised to be an even busier period for maritime trade. As the world economy continues to grow, economies become more interdependent and markets are opened, global trade will increase and exert its impact on maritime activities. Ports, a crucial component of maritime transaction and a facilitator of international trade, will be expected to play an immense role amidst this challenging scenario.
It is expected that the future development of Asian ports will be marked by an increasing need to adequately support greater cargo volume and cater to ships with bigger capacity and better technology. They are expected to be more involved in logistics services, undertaken either alone or via strategic alliances with logistics operators. Mirroring a worldwide trend of ports’ evolving role, Asian ports are seen to act more as transit points of cargos within the intermodal transport network than mere recipients, processors and distributors of cargos.

Beyond cargo trends, changes in many elements will continue to chart the direction and growth of ports in Asia and beyond. These include trade flow, economic development, government policies, cargo trends, shipping, technology, and IT, among many others. In keeping with these changes and ever evolving trends, Asian ports must move in tandem with the pace in order to remain relevant, viable and competitive.