

Managing Maritime Infrastructure: Lessons from UAE and China

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1. Introduction

Ports play a significant role in the development of a country since it links the domestic economy with the rest of the world and thus help in promoting international trade. As a result, port development becomes a major issue for policy making and ongoing economic reforms and trade liberalization. It is well known fact that the port development and macro-economic development are closely related. On the one hand macro-economic development necessitates port development as part of infrastructure development. On the other hand, port development itself facilitates import-export and attracts industries to its hinterlands, which in turn create a forward and backward linkage with the rest of the economy. It is generally conceded that coastal regions have always benefited from the development of a port. However, the benefits have changed with the passage of time, due to the evolutions in industry, technology and in the general nature of trade. The transition from an intermodality system to the integration in production – distribution chain has impacted the way in which a port organizes itself. Arising from this evolution in the role of a port, the objectives and the characteristics of port have been driven to change. Having started this transition, port development is now faced with many challenges.¹

This article intends to focus on port development/management aspects, because experience has shown that port development does not always live up to expectations. The following analysis will attempt to pinpoint some of the aspects of managing maritime infrastructure by analyzing the successful port operations worldwide and particularly reviewing the port operations of Dubai in UAE and Shanghai in China, which can help to resolve some of the obstacles of port development in India.

2. Significance of Maritime (Port) Infrastructure

Port is not a single entity. It comprise of many sub industries and enterprises. These include stevedores, road and rail freight forwarders, warehouse operators, container terminal operators, container repairers, custom agents, dockworkers, ship chandlers, bankers, lawyers etc. The port infrastructure also stimulates shipping industry; ship building-repair-breaking industry, maritime equipment industry, dredging and offshore industry as well as fishing and aqua culture industry. According to Kindleberger (1996) port development is an epitome of changing economic, political and technological circumstances on various scales aided by outward orientation of an economy.²

A port grows by virtue of the trade, which it can attract. Its growth is a function of not only the technologically related supply facilities but also of the economic and political objectives of an economy that determine the demand for port services. Both classical economists like Adam Smith (1766) and the pioneers of development economics like Myrdal (1957) and Hirschman (1980) mentioned that port based development strengthen the classic sequence of specialization → division of labor → productivity → transport infrastructure → extent of market.

Most ports are multi-modal and serve as the combined gateway for several forms of transports, most typically, maritime, road, rail, often mix of bulk and containerized traffic. In addition to the main function as interface, storage and distribution points, efficient ports also functions as growth poles attracting new industries and stimulating trade. Ports offer particularly attractive locations for distribution- intensive enterprises. Apart from the obvious direct contribution to GNP growth, the indirect contribution of ports is also substantial, given the importance to the competitiveness of the country's export / import industries.³ Developing as well as developed economies are using "Growth Pole" argument to justify the development of basic port infrastructure, with the

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rationale that investments in port assets have strong direct and indirect multiplier effects on the entire national economy.

1. Francesca Moglia & Marco Sanguineri (2003),
2. Kindleberger C. P. (1996)
3. De Prabir (2006)

Ports represent a mix of public and private goods. They generate direct economic benefits (private goods) through their operations as well as additional indirect benefits (public goods) in the form of trade enhancement, second order increases in production volumes and collateral increases in trade-related services.⁴

Table: 1 Characteristics of Ports

Dimensions	Factors	Measuring Tools
Port Location	Distance to the industrial agglomeration. Distance to the main lines. Strategic location in the global network.	Referencing geographical information.
Port Infrastructure & Superstructure	Berth number, Berth depth, Crane type, Yard area.	Accommodation of latest generation ships.
Port Service	Load and discharge speed, Pick up and delivery services, Information availability, Ancillary services Provide customized service.	Referencing to International benchmarks Surveying shippers, carriers & forwarders.
Port Charges & Costs	Port charge of cargo. Port charge of ships	Referencing to International benchmarks
Carrier Service in Port Connectivity	The calling frequency. The freight rates	Referencing published data.
Hinterland Accessibility	Intermodal operation time consumed. Intermodal operation cost. Custom clearance procedure. Cargo tracing service.	Referencing to International benchmarks Surveying carriers and Lead Logistics Providers
Distribution Centre (DC)	Total area of Distribution Centre. The equipments and information system of Distribution Centre and Service scope.	Referencing statistical data Requirement of Supply Chain Management.

Source: - Song (2002) UNESCAP

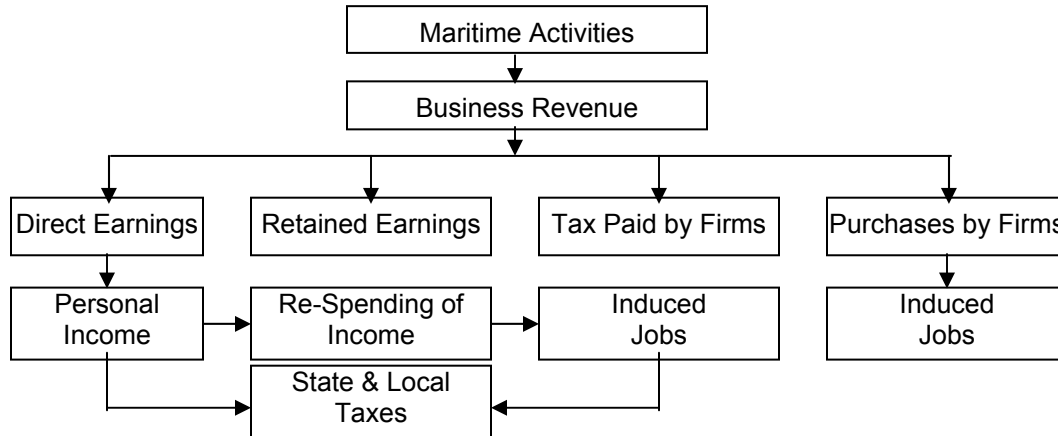
2.1. Economic Impact of Maritime Infrastructure on Economy

An efficient port raises the productivity of other factors of production (labor and capital) and profitability of the producing units thereby permitting higher levels of output, income and/or employment for most of the developing economies of world. The impact of port infrastructure on local and regional economy is direct or primary. It consists of the initial round of spending and employment generated by port related activities. A major part of direct impact arises from local port user industries. The local port user industries may be dependent on the port; in the sense that port's existence is assumed to be the major factor in the initial decision of the firm to locate near it. The secondary or the (induced / indirect) impact is generally defined as all activities in the region, which are economically dependent on the primary activities.⁵

4. World Bank Port Reforms Tool Kit (2005)
5. Chudasama K. M. (2007)

In other words these impacts consist of multiplier effect generated in regional economy by the activities included in the primary impact of the port.

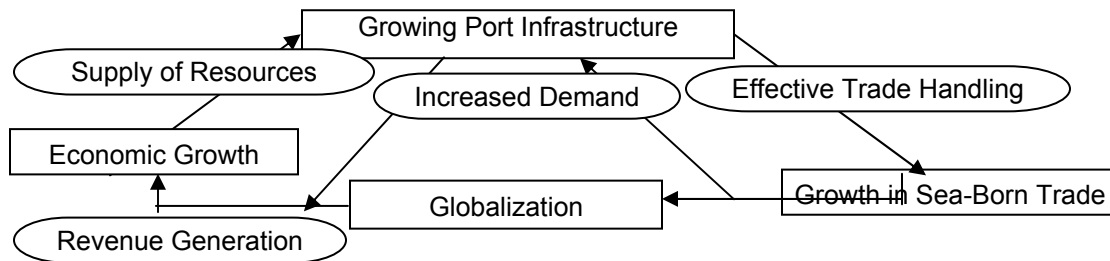
Figure 1: Flow of Economic Activities Generated by Maritime Infrastructure



3. Globalization and Developments in Maritime Sector

Globalization is a major contemporary trend that has initiated economic reforms in many countries. Haralambides (2000) described globalization as an increase in cross-boarder interdependence and more profoundly, integration, which has resulted from the greater mobility of the factors of production and of goods/services. The significant advances in transport and communications technologies have increased the speed and efficiency of transport and had decreased the communication cost (Deshmukh Atul; 2003). As key players in international transport, it necessitates the ports to adapt to the increasingly competitive environment. This confronts ports to continuously improve the operational performance to serve the rising volume of world trade.⁶

Figure 2: Development of Port Infrastructure & Possible Access to Globalization



6. UNESCAP-MPPM (2000)

Most developing countries are now well aware of the tremendous potential benefits from the opening up of their internal markets and the liberalization of their external trade and as a result the world output and volume of merchandise trade has increased tremendously. During the second half of the 20th Century, globalization and improvements in transport facilities led to a significant expansion of international trade. The growth of international trade, in turn, led to the growth in maritime services since more than 3/4th of world trade volume is carried by sea transportation through ports.

The year 2006 witnessed robust growth in the world economy and vigorous trade expansion. Global gross domestic production (GDP) growth accelerated to 3.7%, the second best performance since 2000. The strong global macro-economic situation in 2006 provided a favourable framework for the expansion of international trade. In 2006, world merchandise exports grew in real terms (i.e. at constant prices) by 8.0%, compared to 6.5% in the preceding year.⁷

Table 2: GDP and Merchandise Trade by Region, 2004-06
(Annual % change at constant prices)

	GDP			Exports			Imports		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
North America	3.9	3.2	3.4	8.0	6.0	8.5	10.5	6.5	6.5
United States	3.9	3.2	3.4	8.5	8.0	10.5	11.0	6.0	5.5
South and Central America ^a	6.9	5.2	5.2	13.0	8.0	2.0	18.5	14.0	10.5
Europe	2.4	1.8	2.8	7.0	4.0	7.5	7.0	4.0	7.0
European Union (25)	2.3	1.6	2.8	7.0	4.0	7.5	6.5	3.5	6.5
Commonwealth of Independent States (CIS)	8.0	6.7	7.5	12.0	3.5	3.0	16.0	18.0	20.0
Africa and Middle East	6.0	5.5	5.4	8.0	5.0	1.0	14.0	13.0	8.5
Asia	4.8	4.1	4.4	15.5	11.5	13.5	14.5	8.0	8.5
China	10.1	9.9	10.7	24.0	25.0	22.0	21.5	11.5	16.5
Japan ^b	2.7	1.9	2.2	13.5	5.0	10.0	6.5	2.0	2.0
India	8.0	8.5	8.3	15.5	20.5	11.5	16.0	20.5	12.0
World	3.9	3.2	3.7	10.0	6.5	8.0	11.2	7.6	8.2

^a Includes the Caribbean.

^b Trade volume data are derived from customs values deflated by standard unit values and an adjusted price index for electronic goods.

Source: World Trade 2006, Prospects For 2007, WTO (2006)

7. WTO (2006)

Asia-Pacific region grew faster than those in all other regions at 7.9% in 2006, up from 7.6% in 2005. The dynamic growth seen in the world economy in 2006 has largely been driven by developing Asia-Pacific countries. They accounted for more than 16% of world GDP in 2006 and one third of world GDP growth. The contribution of China and India with growth rates of 10.3% and 8.3% respectively in 2006 boosted these economies to emerge as world's largest economies.⁸

According to the study "Regional shipping and port development strategies" based on the Maritime Policy Planning Models (MPPM) developed by UNDP/ESCAP (2006), intra-Asian trade will continue to outperform global container growth, recording an average of 7.6% per annum over the forecast period⁹. It is estimated that approximately 330 vessels with capacities of 6,000 TEU and would be deployed on routes to and from Asia by the year 2006 and this will grow to over 470 by 2011. Approximately 130 of these would be of 10,000 TEUs or above.¹⁰

Table 3: World Fleet Size by Principal types of Vessel
(Figures in '000 of DWT)

Principal Types	2003	2004	2005
Oil Tankers	304 396	316 759	336 156
Bulk Carriers	300 131	307 661	320 584
Ore/Bulk/Oil	12 612	12 110	9 695
Ore/Bulk	287 519	295 551	310 889
General Cargo Ships	97 185	94 768	92 048
Container Ships	82 793	90 462	98 064
Other Types Of Ships	59 730	47 324	48 991
Liquid Gas Carriers	19 469	20 947	22 546
Chemical Tankers	8 027	8 004	8 290
Miscellaneous Tankers	906	947	1 001
Ferries & Passenger Ships	5 495	5 561	5 589

Other	25 833	11 865	11 565
World Total	844 235	856 974	895 843

Source: Compiled from UNCTAD (2006), Lloyd's Register-Fairplay Ltd (2006)

As key players in international transport, it necessitates the ports to adapt to the increasingly competitive environment. This confronts ports to continuously improve the operational performance to serve the rising volume of world trade.

8. Asian Development Bank (2007)

9. See Appendix Table 1

10. UNESCAP (2005)

4. The Challenges of Port Development

In terms of size, type of activities carried out and employment generation, the port industry has always had significant economic and social repercussions in the regions and urban complexes where it has been established. In this context, port expansion creates new opportunities of economic growth and employment generation, designed to benefit the areas linked to port activities. These are vitally important factors given that, up to recently, the local impact of maritime ports has decreased substantially. There is now no guarantee that the economic and employment benefits generated by a port will be restricted to the port area as was the case in the past.

Apart from the well-known effects of intermodality, information technology, automation and the substitution of capital for labour in port production, it can also contribute in reducing local impacts. It should be noticed that, today, the concepts of economic wealth and employment generated by a maritime port are perceived quite differently and in a much less tangible manner than in the past. That is because the broad spectrum of activities brought about by the ports operates with different motives generally focus on economies of scale in terms of mechanizing the operation process.¹¹

The liner shipping has undergone a major transformation in recent years and these changes have impacted strongly the port sector. This enhances the strategic nature of the role played by port terminals and other segments of the logistics chain. These segments must be efficiently organized to serve the larger players who have negotiating leverage and increasingly complex operating requirements (Sletmo, 1999; Heaver et al, 2001; Peters, 2001).

A new philosophy is emerging from these developments. The port is no longer considered in an isolated manner, like a series of infrastructures and territory, but is recognized as a complex set of functions that interact with the life of the local community and which, at the same time, is optimized within a broader port network strategy, with very solid regional roots, but open to national and international perspectives not only with regard to traffic and trade relations but, above all, in terms of organization and financial matters.

11. Francesca Moglia & Marco Sanguineri (2003)

4. Port Development World Wide ¹²

4.1. "White Elephants" in Port Development

During its early years, the container terminal of the Port of Damietta in the Arab Republic of Egypt was often cited as a "white elephant" in port development. The terminal was constructed and fully equipped in the 1970s to handle anticipated container transshipment requirements in the Eastern Mediterranean. Yet, for various reasons, the terminal was without any business for years.

Only when the shipping company Scan-Dutch decided to change its Eastern Mediterranean port of call from Cyprus to Damietta did throughput start to increase. Today, more than 20 years later, Damietta is one of the leading container ports in the region competing with terminals in Italy, and on Malta and Cyprus. During 1960s, major ports such as Rotterdam, Antwerp and Marseilles developed large industrial sites near their port facilities. These sites became centers for refineries and petro-chemical industries.

In view of the apparent success of ports becoming industrial centers, the Dutch Government created three regional ports to support the ailing economies of their respective regions. Two of these ports – Flushing and Terneuzen – developed fairly well. They are located along the River Scheldt in the vicinity of their large neighbors: Antwerp and Rotterdam. The third port was built along the River Eems near Germany in the Northern Province of Groningen.

Despite modern port facilities and large government subsidies, the Port of Eemshaven never became a success. It was too isolated and lacked an industrial hinterland. It struggled on for years to gradually develop a few niche markets. The case of Eemshaven shows that the creation of a new port, as such, does not guarantee success when there is no natural hinterland generating significant cargo flows and when the port does not attract large-scale hub traffic.

4.2. "Interaction with Port Cities"

Ports and the cities of which they are a part interact across many dimensions: economic, social, environmental and cultural. Any port reform process should take into account the linkages between port city objectives and port objectives. Transport integration – the smooth transfer of cargo and equipment from land to water-borne systems – is an essential port function; but it doesn't take place in isolation.

A seaport node within a multi-modal transport system is frequently associated with the development of an urban center and generates substantial employment, industrial activity and national and regional development. Many big cities trace their roots to the establishment of a port. This does not mean, however, that the port will be extended at the place where it was originally founded. Antwerp and Rotterdam are examples of ports that developed relatively close to the cities' central cores. Over time, however, they shifted operations away from city centers. The underlying reason was the increase in ship sizes (requiring deeper drafts and longer berths).

Another reason contributing to the weakening of links between port and city centers is the rapid mechanization and specialization of port work and the accompanying increase the operational scale and scope. This leads to increased storage space requirements and makes ports very space-intensive. Another factor is the rapid industrialization of most developed country cities. The new industries emerging after World War II required large tracts of land, preferably close to deep water, which often could not be found within the original port borders. Therefore, Maritime Industrial Development Areas (MIDAs) were located at some distance from old city centers. Technological changes and consequential port re-location have left substantial areas available for redevelopment for other purposes. Such areas are often located near city centers, since that is where the port (and city) began. Therefore, land values are potentially high, although probably depressed prior to redevelopment because of the presence of decaying port facilities.

12. World Bank (2000)

5. Port Administration Models

A number of factors influence the way ports are organized, structured, and managed including:

- The socio-economic structure of a country (e.g., market economy)
- Historical developments (e.g., former colonial structure)
- Location of the port (e.g., within an urban area, in isolated regions)
- Types of cargos handled (e.g., liquid and dry bulk, containers).

Four main categories of ports have emerged over time. They can be classified into four main models:

- Service Port
- Tool Port
- Landlord Port
- Fully Privatized Port

These models are distinguished by their characteristics such as:

- Public, private or mixed provision of service;
- Local, regional or global orientation;
- Ownership of infrastructure (including port land)
- Ownership of superstructure and equipment (in particular ship-to-shore handling equipment and warehouses)
- Status of dock labor and management.

Table 4: Basic Port Management Models

Type	Infrastructure	Superstructure	Port Labour	Other Functions
Public Service Port	Public	Public	Public	Majority Public
Tool Port	Public	Public	Private	Public/Private
Landlord Port	Public	Private	Private	Public/Private
Private Service Port	Private	Private	Private	Majority Private

Source: - World Bank (2000)

Service and tool ports mainly focus on the realization of public interests. Landlord ports have a mixed character and aim to strike a balance between public (Port Authority) and private (port industry) interests. Fully privatized ports focus on private (shareholder) interests.

Table 5: Strong and Weak Points of Port Management Models

Public Service port	
Strength	Superstructure development and cargo handling operations are the responsibility of the same organization (unity of command).
Weakness	There is no or only a limited role for the private sector in cargo handling operations There is less problem-solving capability and flexibility in case of labor problems, since the port administration also is the major employer of port labor. There is lack of internal competition, leading to inefficiency. Wasteful use of resources and under-investment as a result of government interference and dependence on government budget. Operations are not user-oriented or market-oriented Lack of innovation.
Tool Port	
Strength	Investments in port infrastructure and equipment (in particular ship/shore equipment) are decided and provided by the public sector, thus avoiding duplication of facilities.
Weakness	The Port Administration and private enterprise jointly share the cargo handling services (split operation), leading to conflicting situations. Because the private operators do not own major equipment, they tend to function as

	labor pools and do not develop into firms with strong balance sheets. This causes instability and limits future expansion of their companies. Risk of under-investment. Lack of innovation.
Landlord Port	
Strength	A single entity (the private sector) executes cargo-handling operations and owns and operates cargo-handling equipment. The terminal operators are more loyal to the port and more likely to make needed investments as a consequence of their long-term contracts. Private terminal handling companies generally are better able to cope with market requirements.
Weakness	Risk of over-capacity as a result of pressure from various private operators. Risk of misjudging the proper timing of capacity additions.
Fully Privatized Port	
Strength	Maximum flexibility with respect to investments and port operations. No direct government interference. Ownership of port land enables market oriented port development and tariff policies. In case of redevelopment, private operator probably realizes a high price for the sale of port land. The often-strategic location of port land may enable the private operator to broaden its scope of activities.
Weakness	Government may need to create a Port Regulator to control monopolistic behavior. The Government (be it national, regional or local) loses its ability to execute a long-term economic development policy with respect to the port business. In case the necessity arises to re-develop the port area, Government has to spend considerable amounts of money to buy back the port land. There is a serious risk of speculation with port land by private owners.

Source: - World Bank (2000)

5. Strategies for Managing Maritime Sector

Liberalization of trade in goods and services, new integrated transport networks and information and communication technology (ICT) developments have created unprecedented business opportunities for the trade and maritime industry. Manufacturing companies are thus taking a greater interest in managing the total supply chain from the multiple sourcing of raw material to the production and the final distribution of the finished product. Manufacturing companies are also taking steps to establish regional logistics/distribution centres, especially around port hinterlands, to improve their competitiveness by reducing inventory and raw material procurement costs, and by providing swift, customer-oriented just-in-time (JIT) services and value added logistics services. Inland distribution is becoming a very important dimension of the globalization / maritime transportation / freight distribution paradigm. Observed logistics integration and network orientation in the port and maritime industry have redefined the functional role of ports in value chains and have generated new patterns of freight distribution and new approaches to port hierarchy.

5.1. Port Hinterland Development

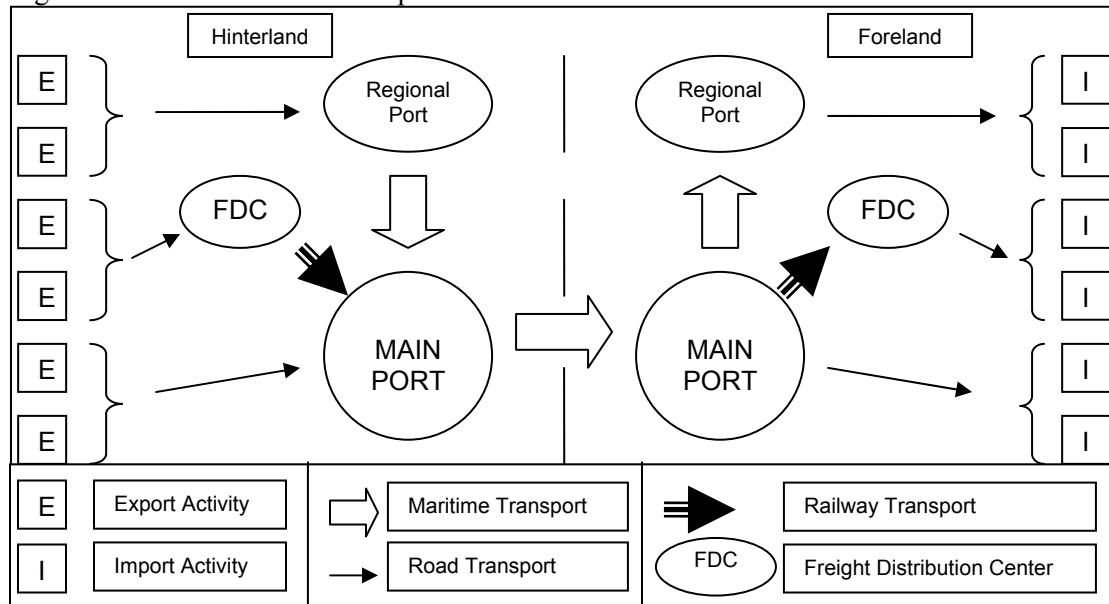
The port's hinterland is the region from which the port's customers are drawn from. It is considered as the origin and destination area of port, i.e. the inner region provided by the port (Fageda; 2005). Port hinterland is the land space over which a port sells its services and interacts with its clients. It is the market served by a port area and from where a port draws its cargo (UNESCAP; 2005). Broadly it can be said to be market reach of the port or the reach from which cargo originates, as well as the areas where cargo moving through the port is destined. Some ports will have hinterlands that extended across many states, while other ports will have smaller hinterlands.

The port hinterlands are composed of two kinds, the main hinterland and competition margin hinterland. The main hinterland is an exclusive area where port has a monopolistic position in drawing cargo. The outer region is a competition area where more than two ports compete for cargo.¹³

13. Theo E. Notteboom (2005)

A regional port (spoke port), is usually located within the port hinterland of main port and acts as an intermediate transport node. However, the development of intermodality makes the exclusive hinterland into a common hinterland where different ports share facilities.

Figure 3: Port Hinterland Development



Source: - UNESCAP, Rodrigue (2005)

The borders of a hinterland between different ports depend on the development of intermodal transport corridors and not on the exclusive market area of each port. This places the geographically separated ports in direct competition with one and therefore the hinterland is directly influenced by port based activities.

Table 6: Basic Functions of Port Hinterland

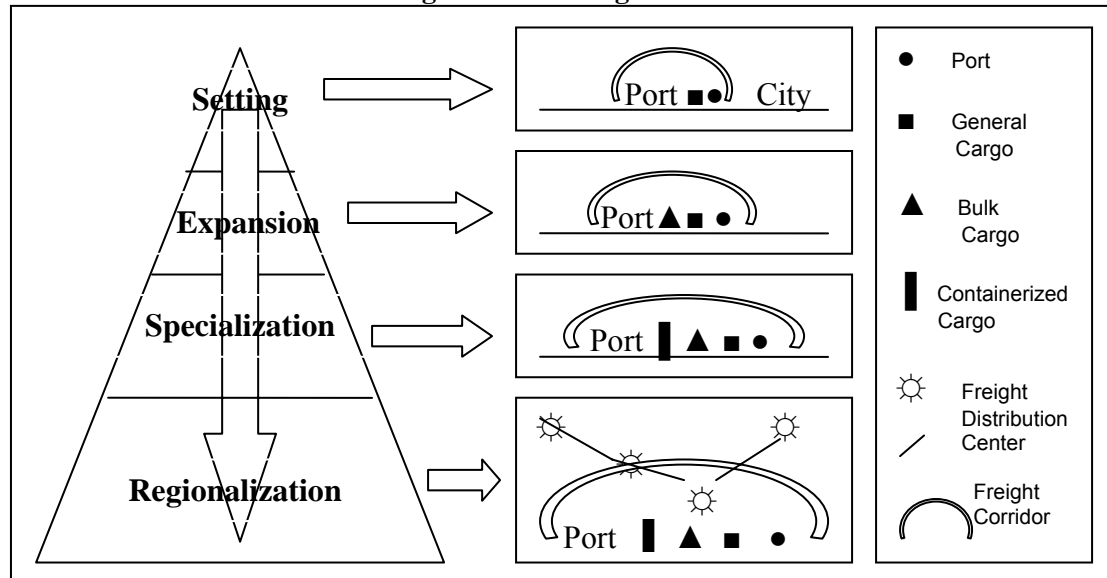
Functions	Definitions
Container Freight Stations (CFS)	A warehouse where cargo is stuffed into the un-stuffed from containers. The place for container packaging and un-packaging activities to make Full Container Load (FCL) with Loose Container Load (LCL) cargo.
Storage And Refrigeration	A place to store cargo before it is delivered to final consignee. The place for storage of cargo before it is carried to port terminals for loading.
Consolidation And Distribution	The location where cargo is consolidated and stored to be distributed to regional storage warehouse or other markets.
Value Added Services	Additional activities such as assembling, processing, labeling etc. before cargo is transported to inland areas or shipped to other countries. This is a combination of logistics and industrial activities.

Source: - UNESCAP, Arthur D. L (2003)

5.2. Port Regionalization

Port Regionalization represents a new phase in the development of port systems. In this phase, port terminal systems, Corridors and inland distribution becomes of foremost importance in port competition, favoring the emergence of and logistics poles. The transition towards the Port Regionalization phase is a gradual and market-driven process imposed on ports that mirrors the increased focus of market players on logistics integration. Port Regionalization expands the reach of the port through the market strategies and policies linking it more closely to inland freight distribution centers.

Figure 4: Port Regionalization



Source: - Theo E. Notteboom (2005)

The ‘Anyport’ model developed by Bird (1963) discussed how port infrastructures evolve in time and space. Starting from the initial port site with small lateral quays adjacent to the towns, port expansion had been observed as a product of evolving maritime technologies and improvements in cargo handling. The spatial relationships between the port and the urban center changes as docks are built further away from the central business district. In the later stages, the increased specialization of cargo handling, growing sizes of ships, increasing demand for space for cargo handling and storage, results into port activity being concentrated at regions far from the oldest facilities.¹⁴

14. Theo E. Notteboom (2005)

(A) Port Terminal Systems and Port Regionalization.

In an initial phase these terminals solely focus on accommodating transshipment flows. As the transshipment business remains a highly volatile business, offshore hubs might sooner or later show ambition to develop services that add value to the cargo instead of simply moving boxes between vessels. The terminals in the port system have their role to play within the rich blend of liner service networks. In referring to the hub/feeder restructuring, Robinson argues that a system of hub ports as main articulation points between mainline and feeder nets is being replaced by a hierarchical set of networks reflecting differing cost/efficiency levels in the market. High-order service networks will have fewer ports of call and bigger vessels than lower order networks. Increasing volumes as such can lead to an increasing segmentation in liner service networks and a hierarchy in port hubs.

(B) Corridors and Inland Terminals in Port Regionalization

The corridor is the main paradigm of inland accessibility as it is through major axes that port terminals gain access to inland distribution systems. Since loading/discharging operations form fundamental components of intermodal transportation, regionalization relies in the improvement of terminals activities along and at either side of the corridors. This involves a higher level of integration with intermodal transport systems, namely with on-dock rail transshipment facilities and the use of fluvial barges. The new function of port terminals requires the elaboration of inland terminals to accommodate new port-inland linkages. The immense pressure on the collection and distribution networks caused by changes in the hierarchy of port systems has always demanded and promoted the development of inland terminals. Various called inland container depot, inland terminal or dry port the implementation of the concept has affected trade flows, the routings between ports and hinterlands and some traditional port functions. With the expanding hinterlands, economic and logistic reasons emerged that justify the establishment of regional inland nodes that serve not only a local market, but a much broader region. Inland terminals are established as part of a new concept in freight distribution and the changing role of the ocean carrier and other market players in the entire transport journey. The development of rail hubs and barge terminal networks in the hinterland is aimed at contributing to a modal shift from road transport to rail and barge and as such enhances the regionalization phase in port and port system dynamics. Inland terminals might transfer a part of the collection and distribution function inland away from ports, thus preventing a further overcrowding of limited seaport areas.

(C) Freight Distribution Centers in Port Regionalization

The development of inland terminals is not sufficient by itself to ensure an efficient port regionalization and inland distribution. Infrastructures servicing freight are required at a location of convergence of inland freight, a function assumed by distribution centers where vast quantities of freight are processed. Manufacturers increasingly outsource logistics manipulations to their products towards distribution centers located near consumer markets. As such, a large part of the value creation in the supply chain is transferred to logistics service providers. These activities are referred to as value added logistics services (VAL) and they imply the integration of production and distribution parts of a supply chain. On top of low-end VAL activities that add little value to the goods (e.g. labeling, insertion of manuals, etc.), logistics service providers are further upgrading the functional role of their logistics centers by developing high-end VAL activities. The latter might even include postponed manufacturing activities like systems assembly, testing, software installation, etc. By doing so, logistics service providers take over an ever-larger part of the added value creation within the product chain. Freight distribution centers come to the fore as turntables for low-end and high-end VAL services and develop a strong orientation on short transit times. Logistics platforms incorporate additional functions such as back-office activities, e.g. the management of goods and information flows, inventory management, tracking and tracing of goods and the fulfillment of customs and other formalities. While setting up their logistics platforms, logistics service providers favour locations that combine a central location (i.e. proximity to the consumers market) with an intermodal gateway function. Seaports and sites along hinterland corridors typically meet these requirements.¹⁵

15. Theo E. Notteboom (2005)

5.3. Free Trade Zones

In line with global competitiveness, and to meet the demands of business, many countries have established or intend to establish special value-adding zones in port areas or within the reach of port with expectations of the economic benefits that these zones would bring. The zones are

commonly referred to as *free trade zones* (FTZ). Many countries introduced FTZs to develop their national economies by attracting foreign direct investment (FDI) into the FTZs. With limited amounts of investment funding available, most of the countries have selected this policy partly as it is easier to provide relatively well developed infrastructures in these small special areas than to establish good infrastructures throughout the whole county in a short period of time. Most of all, FTZs, whether or not they are referred to by that name, have concentrated traditionally on manufacturing for export, and many of them are located along the coast or near sea transport routes to leverage international transportation.

Special Economic Zone (SPZ) or Free Economic Zone (FEZ)

A special or free economic zone covers a large area, including residential areas and hospitals, schools and other business and supporting facilities and infrastructures. It promotes FDI by providing a good business environment with several incentives, such as a global standard level of labour regulation, allowance of repatriation and reduction of taxation for foreign investment, all of which might not be controlled under domestic regulation but under specially designed regulation appropriate to the nature of the facility.¹⁶

Export Processing Zone (EPZ)

An export processing zone can be seen as a traditional zone acting as a manufacturing/processing works for exports, and considered as outside of customs territory. Industry sectors within this type of zone are usually labour intensive and low skills industries such as producing garments, textiles, shoes, timber, plastics and electronic components using low cost labour. In general, domestic sales of products manufactured within this zone are limited.

16. UNESCAP (2005)

6. Lessons to learn from Success stories

6.1. Shanghai Port -China

The Shanghai Port Authority (SPA) and Hutchigon Whampoa Ltd. (HWL) formed a joint venture between their subsidiaries Shanghai Port Container comprehensive Development Company (SPCCDC) and Hutchison Ports Shanghai Ltd. (HPSL) to own and operate all of Shanghai's container port facilities. The contract was formalized in August 1993 when HPSL injected RMB 1 billion in cash and SPCCDC contributed RMB 1 billion in assets to the new company Shanghai Container Terminals Ltd. (SCTL). It also has preferential rights to develop container terminals at Wai Gao Qiao in Pudong and the proposed new deep water facility at Jin Shan Zui along Hanghou Bay. During its first year of operation, the joint venture handled 25 % more containers than had been channeled through Shanghai's container terminal during the preceding twelve months. Thus the Shanghai Port Authority preferred to become a joint venture partner in its own container terminals including new BOT development. This approach had several benefits. It introduced new management expertise into existing operations. It provided immediate revenue streams to the development team and it reduced the investment to be borne by the foreign partner. Finally, it ensured that the port authority would have a full (commercial) say in operations and performance.

6.1.1. About Port of Shanghai

Shanghai International Port (Group) Co., Ltd. is the exclusive operator of all the public terminals in the Port of Shanghai. Incorporated in January 2003 by reorganizing the former Shanghai Port Authority, SIPG is a large-scale business conglomerate specialized in the operation of port and related businesses. In June 2006, SIPG was turned into a share holding limited company. After listing as a whole company in October 2006, Shareholders of SIPG are: the municipal government of Shanghai with 44.23%, China Merchants International Terminals (Shanghai) Co.,

Ltd. With 26.54%, Shanghai Tongsheng Investment (Group) Corp. with 16.81%, Shanghai State-assets Operation Co. and Shanghai Dasheng Assets Co. with 0.44% respectively.(shares that cannot be sold without certain conditions).

In total, Shanghai International Port Group (SIPG) operates 125 berths on a total quay length of around 20 kilometers, among which, 82 of these berths can accommodate vessels of 10,000dwt class or above. QC. Except the container terminal, SIPG also owns public bulk, break bulk, specialized Ro/Ro terminal and cruise terminal. SIPG operates warehouses with a total area of 293,000m², storage yards with a total area of 4,721,000m², and owns 5,143 units of cargo handling equipment. In total, SIPG currently has 16 branch companies, 8 wholly-owned subsidiaries, 9 majority-owned subsidiaries, and 3 companies with equity participation.¹⁷

6.1.2. Main Business

Container Terminals	Non - Container Terminals
<p>There are three major container port areas, namely Wusongkou, Waigaoqiao and Yangshan in the Port. In the past five years, the container throughput of the Port of Shanghai increased from the 6.43 million TEUs recorded in 2001 to 21.71 million TEUs in 2006.</p> <p>Wusong Area</p> <ul style="list-style-type: none"><input type="checkbox"/> Shanghai Container Terminals Co.Ltd <p>Waigaoqiao Area</p> <ul style="list-style-type: none"><input type="checkbox"/> Shanghai Pudong International Container Terminals Limited<input type="checkbox"/> SIPG Zhendong Container Terminal Branch<input type="checkbox"/> Shanghai East Container Terminal Co., Ltd<input type="checkbox"/> Shanghai Mingdong Container Terminals Limited <p>Yangshan Deepwater Port</p> <ul style="list-style-type: none"><input type="checkbox"/> Shanghai Shengdong International Container Terminal Co., Ltd	<p>Non-container Terminals are important and indispensable to the Port of Shanghai, which sets out to serve the economic development of the Yangtze River Valley. These terminals, mainly situated on the banks of the Huangpu River, at Wusongkou, Luojing and Waigaoqiao, play the role of regional distribution centers.</p> <ul style="list-style-type: none"><input type="checkbox"/> SIPG Minsheng Controlled Company<input type="checkbox"/> SIPG Nanpu Branch<input type="checkbox"/> SIPG Gaoyang Branch<input type="checkbox"/> SIPG Coal Branch<input type="checkbox"/> SIPG Xinhua Company<input type="checkbox"/> SIPG Zhanghuabang Company<input type="checkbox"/> SIPG Jungong Road Branch<input type="checkbox"/> SIPG Baoshan Terminal Branch<input type="checkbox"/> SIPG Longwu Branch<input type="checkbox"/> SIPG Luojing Subsidiary Company<input type="checkbox"/> SIPG Passenger Transport Corporation<input type="checkbox"/> Shanghai Haitong International Automobile Terminal Co., Ltd.

17. www.sctport.com.cn (12/4/2007)

6.1.3. Shanghai Economic Zone: Supporting Shanghai Port-China

In 1990, China decided to open the Pudong New Area in Shanghai and other cities along the Yangtze River Valley. Since its founding in 1992, the Shanghai Pudong New Area has made great progress in both absorbing foreign capital and accelerating the economic development of the Yangtze River Valley. The state has extended special preferential policies to the Pudong New Zone that are not yet enjoyed by the special economic zones. For instance, in addition to the preferential policies of reducing or eliminating customs duties and income tax, common to the economic and technological development zones and certain special economic zones, the state also permits the zone to allow foreign business people to open financial institutions, and run tertiary

industries. In addition, the state has given Shanghai permission to set up a stock exchange, expand its examination and approval authority over investments and allow foreign-funded banks to engage in RMB business. The Shanghai Zhangjiang Hi-Tech Park located within Shanghai Pudong New Area was established in July of 1992 as a national level park designated for the development of new and high technology. In August of 1999 the Shanghai Municipal Government issued the Focus on Zhangjiang strategic policy to accelerate the park's development. The Focus program also increased the park's area from 17 to 25 km². The park's two leading industries are information technology and modern biotechnology and pharmaceuticals. These developments boosted foreign trade activities from Shanghai port.

6.2. Dubai Port-UAE

Dubai Ports (comprising of Dubai Ports International 'DPI' and Dubai Ports Authority, 'DPA') owns, operates and manages container terminals and ports around the world. Dubai Ports Authority, which operates Port Rashid and Jebel Ali port, the biggest man made port in the world, won two top awards for the Middle East region as the Best Seaport and the Best Container Terminal Operator at the Thirteenth Asian Freight Industry Awards for 1999. DPA facilities have a total of 102 deepwater berths, 23 container gantry cranes and four Super Post Panamax cranes, covering 10 container terminal berths. More than 100 shipping lines are served by DPA.

Mina (Port) Rashid was completed in 1972. By 1978 the number of berths was increased to 35 - including five berths large and deep enough to handle the largest container vessels. The construction of the world's largest man-made harbor at Jebel Ali was completed in 1979, Jebel Ali Port ranked alongside the Great Wall of China and the Hoover Dam as the only three man-made objects that could be seen from space. Port Rashid is situated in the city of Dubai and the port of Jebel Ali is situated 35km south west to the city of Dubai. Jebel Ali Port and Free Zone merged with Port Rashid in May 1991 to form Dubai Ports Authority which led to a dramatic increase in throughput to cross one million TEU's. In September 2005, DP World has emerged from the corporate integration between Dubai Ports Authority and DPI Terminals, to become one of the largest global port operators to date.

6.2.1. Jebel Ali Free Zone (JAFZA-Dubai): Supporting Dubai port- UAE

Jebel Ali Free Zone "Jafza" aspires to consolidate its position as the international business hub of the Middle East. The Government of Dubai has developed it as an ideal industrial, warehousing and distribution base in the Middle East. Initially encompassing 70,000 square metres of warehousing and 850,000 square metres of covered areas, Jafza took nearly three years to be developed, transforming 25 acres of desert into a secure, dynamic working environment. In 1985, Port and industrial area, eventually extending to 750 acres, with the construction of office units and warehouses to provide ready built facilities to customers were developed. In 1990, Jafza diversified into industrial center. Today's Jebel Ali Free Zone is a 135 sq.km commercial and industrial hub, which is home to 5,500 companies from over 120 countries. DP World provides Jafza clients with container handling, cool and cold stores, and storage areas. Companies can benefit from innovative services such as the Container Terminal Management System (CTMS), covering a wide range of business requirements and facilitating an integrated inter-port transfer of containers between Port Rashid and Jebel Ali; or the Container Freight Station System (CFSS), which computerizes the entire operations of the station.¹⁸

18. http://www.jafza.co.ae/jafza/content/section1/Dubai_Ports_Authorit.aspx (22/4/2007)

Table 7: Detailed Profile of Shanghai and Dubai Port Terminals

	SHANGHAI						DUBAI	
	SCT	SPICT	SPIGZCTBL	SECTCL	SMCTL	SSICTCL	JAP	PR
Establishment Year	August 1993	March 2003	July 2000	September 2002	September 2004	May 2005	1979	1972
No. of Terminals	3	1	1	1	1	2	1	1
Quay Length (Mtr)	2281	900	1,566	1,250	1,290	3,000	4,875	1,418
No. of Berths	10	3	5	6	6		71	35
Total land Area (M ²)	830,015	500,000	1,659,000	1,550,000	1,630,000		1,650,000	615,000
Container Yard (M ²)	550,000	8200						
Container Stacking Capacity (TEUs)	58,247	30,000					1,82,679	40,232
Machineries		147					11	5
Cranes	20	10	13	13	12	34	39	9
RTGs	56	36		48		120	131	39
Container Trucks	89	73					849	197
Fork lifts		11					178	77

Source: - Compiled from www.sctport.com.cn (12/4/2007), www.dpworld.com (20/4/2007)

Note: - SCT = Shanghai Container Terminals Co. Ltd, SPICT= Shanghai Pudong International Container Terminals Ltd (Waigaoqiao Phase-1)
 SPIGZCTBL = SPIG Zhendong Container Terminal Branch Ltd (Waigaoqiao Phase 2-3), SECTCL = Shanghai East Container Terminals Co. Ltd
 (Waigaoqiao Phase-4)

SMCTL = Shanghai Mingdong Container Terminals Ltd (Waigaoqiao Phase-5), SSICTCL = Shanghai Shengdong International Container Terminals Co. Ltd

JAP = Jebel Ali Port, PR = Port Rashid

RTGs = Rubber Tire Gantry Cranes, TEUs = Twenty Feet Equivalent Units

It can be observed from the above details that as far as equipments are concerned, Dubai port stand at a better position compared to Shanghai port, while in terms of coverage and operation areas, Shanghai port is a huge venture operating with number of companies simultaneously.

Table 8: Ranks, Growth in Container Throughput Handled and Growth in Vessels Handled at International Ports

SHANGHAI						DUBAI					
Year	Rank	TEUs Handled	% Growth	Vessels Handled	% Growth	Year	Rank	TEUs Handled	% Growth	Vessels Handled	% Growth
1996	11	1971300	-	5141	-	1996	10	2247024	-	9555	-
1997	10	2519592	27.81	5984	16.40	1997	9	2600102	15.71	10243	7.20
1998	9	3068421	21.78	6759	12.95	1998	10	2804104	7.85	11316	10.48
1999	6	4216000	37.40	7966	17.86	1999	11	2844634	1.45	11711	3.49
2000	5	5613000	33.14	8547	7.29	2000	11	3058866	7.53	10944	-6.55
2001	5	6334400	12.85	11293	32.13	2001	13	3501820	14.48	11293	3.19
2002	4	8620000	36.08	13527	19.78	2002	14	4194264	19.77	11777	4.29
2003	3	11281000	30.87	14654	8.33	2003	11	5151955	22.83	13232	12.35
2004	2	14557200	29.04	18210	24.27	2004	10	6428883	24.79	14035	6.07
2005	3	18084000	24.23	18943	4.03	2005	9	7619222	18.52	16010	14.07
2006	3	29720000	64.34	-	-	2006	8	8923464	17.12	-	-

Source: - Compiled from www.sctport.com.cn (12/4/2007), www.dpworld.com (20/4/2007)

7. Summary

Policy makers should develop ports, FTZs or port hinterlands with an integrated approach. Ports, port hinterlands and FTZs should be developed together with master plan including transportation facilities, IT infrastructures, and industry complexes (e.g. industrial parks, EPZs or FEZs) from the outset.

Policy makers should also put efforts into promoting the domestic logistics industry, including third party logistics providers (3PL) through deregulation, M&A, and incentives for logistics companies and the logistics outsourcing companies. A reserve of land to meet future demand for expansion should also be made.

Modal choice and smooth connectivity between nodal points are important issues to in guaranteeing a seamless flow of goods between points. Consequently the role of the port sector has expanded to include inland areas in order to integrated services. Ensuring fluent and efficient movements of goods into an out of a ports hinterland enables an increase in capacity.

The traditional FTZ and logistics FTZ maybe different in several aspects but they share one key common purpose, to attract FDI. FTZ are however not a panacea for creating nationwide economic development since they cover only relatively small amount of territory. FTZs remain one of several possible options among many policy tools for a country to adopt for its economic development.

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Appendix

Table 1: Forecast of Port Container Outputs By Economy

Economies	(Base Case)*	(Thousand TEU)	
	1999 (CIY**/ Other sources)	2006 (ESCAP MPPM)	2011 (ESCAP MPPM)
Australia	2,651	3,550	4,061
Bangladesh	392	770	1,151
Brunei Darussalam	62	188	300
Cambodia	n.a.	64	103
China	12,004	28,466	46,219
Democratic People's Republic of Korea	n.a.	161	614
Fiji	47	94	136
French Polynesia	31	137	189
Guam	123	223	284
Hong Kong, China	16,211	19,678	25,322
India	2,186	4,216	6,410
Indonesia	2,784	4,582	6,145
Islamic Republic of Iran	340	510	774
Japan***	11,503	14,307	17,087
Malaysia	3,775	8,444	14,556
Myanmar	118	182	270
New Caledonia	52	75	104
New Zealand	845	1,374	1,808
Pakistan	697	981	1,323
Papua New Guinea	138	215	291
Philippines	1,696	2,716	3,761
Republic of Korea	7,473	16,516	22,772
Russian Federation (Far East)	125	289	481
Singapore	15,945	23,393	30,940
Sri Lanka	1,704	4,447	5,372
Taiwan Province of China	9,758	13,245	16,874
Thailand	2,892	4,328	5,808
Turkey****	687	1,051	1,347
Viet Nam	653	1,185	1,701

Source: - UNESCAP (MPPM 2005)

Note: - * Domestic coastal traffic is excluded.

** *Containerization International Yearbook*

*** If annual 2 per cent economic growth, which is the official target of the Japanese economic growth from 2001 through 2010, is applied to the model, the projection for the year 2011 would be 20-21 million TEU.

**** Figure includes statistics from the ports of Mersin and Izmir only
