East Asia Ports in their Urban Context

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Acknowledgements and Disclaimer

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SECTION I: Trade, logistics and port development

Trade and logistics

High rates of globalized trade integration are putting pressure on ports in developing countries to transform their function and through the changing role, on the relationship of ports to the urban areas they serve. Increasing demand threatens to outstrip the cargo-handling capacity of existing ports, including many of those in East Asia. Filling the capacity gap, while at the same time satisfying increasing environmental and urban planning constraints, poses an enormous challenge for ports, but it is only one aspect of what is now required. Port authorities are finding that if they are to remain or become competitive, they must meet a new type of demand. It is no longer enough for them to act as a location for the transfer of freight between maritime and land transport; their logistics accessibility is increasingly a decisive factor in determining whether they are chosen as the gateway for the transport of goods to their region. The choice of port is now not just a function of geographic accessibility, the time and distance from places of production and consumption, nor even how fast, reliably, and at what price goods move these distances, but also of how visibly and flexibly the port complex can facilitate the transformation of products in response to made-to-order, just-in-time, best-priced, door-to-door requests. More and more, this logistics accessibility is crucial to the trade competitiveness of a country in the world marketplace, and, hence, is playing a pivotal role in the growth of a country's economy.

Logistics Accessibility

Logistics accessibility comprises both transport and product logistics accessibility. Transport logistics accessibility relates to the movement of cargo to, through and from a port, to integrating maritime and land modes of transport and the efficiency with which these movements are carried out. Larger units of transport, including trucks, unit trains and bulk and container ships, are producing economies of scale in the transport of goods. These economies of cost are supplemented by economies of time that result from better integrated multi-modal services, reduced holding times in inter-modal interchanges and from the expected introduction of high-speed ships that promise to deliver high-value, time-sensitive goods at a less cost than air transport, and shorter times than conventional ships. The combination of economies of scale and time, and their bundling with other logistics developments, will result in more efficient door-to-door delivery schedules, but at the same time are compelling functional changes in ports and other components of logistics chains. While the ability of ports to accommodate these larger and faster transport units and facilitate shorter door-to-door transport times determines their transport logistics accessibility, it is their expanded function that includes substantial value-adding activities, whereby goods increase in value as they move along the production chain from raw material to finished product, i.e., their product logistics accessibility, that is adding to pressures to rethink the role and location of port activities and their relationship with their urban context. Given these trends, port developers face new questions that cannot be avoided: Will they remain competitive over the long term if
they, along with their competitors, all make the enormous investments necessary to handle the increasing volumes with increasing efficiency? Who will benefit from these changes and who will fund the investments needed to bring them about? What are the alternative strategies, that while meeting the competitive challenges, at the same time address the environmental, social and urban development issues that inevitably arise from developing new infrastructure and land-intensive logistics activities?

**Ports in their urban context**

There is another global trend that is affecting port development just as profoundly as pressures to increase logistics accessibility. Communities across the world are placing greater emphasis on their 'livability' and are recognizing the link between sustainable development and the 'quality of life', and thus the need to balance the economic, environmental, and social elements in making decision-making about development, and port development in particular. Postponement in confronting and addressing quality of life issues will detract from the potential economic and social benefits of port development: where steps to address pollution, congestion, and noise consequences of port expansion are avoided, it is increasingly probable that social pressures will force delays and reconsideration of that expansion and thereby defer the benefits of increased trade.¹

In addition to these global industrial and social trends, each port has its own socio-economic environment that it must take into account in determining how to respond to them. How well it addresses and makes use of its own context will determine both its success in increasing its trade competitiveness and in integrating the port into a sustainable urban environment.² Since trends and conditions are subject to change and unpredictability, a port's tolerance of uncertainty is another crucial factor to its success. Managing uncertainty requires that port developers and operators be continuously innovative to create a sustainable competitiveness.

Ports in downtown areas face a number of conflicting issues when they consider modernization and expansion of their facilities to meet these new requirements. Of high priority is the port's role as a direct and indirect employment generator for the urban area of which it forms part, and which makes its continued presence in the city an economic asset. While the port can help facilitate growth of the urban area, it must both compete with other demands for scarce land resources and address the significant negative environmental and social impacts that it can incur. Efforts to lessen these impacts may limit the contribution that it can make to economic growth, posing a delicate balance to be struck the local and regional development authorities. In addition to issues of job generation, port impacts on urban growth can derive from:

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Problems in navigational access. The need for increased depths of access channels to accommodate larger vessels requires dredging that can be subject to an increasingly complex process for managing the disposal of dredged material that is often contaminated from historic discharges of pollutants from urban industrial activity;

- Competition for space with demands for commercial and residential land uses as well as for land to be used for open space;
- Traffic congestion deriving from port and port associated that can not only impede access to the port itself, but also contribute to more widespread congestion affecting city as well as port access;
- A constituency against the port expansion, based on concerns arising from increasing city-port tensions, particularly, land use conflicts producing direct port impacts on abutting non-port uses.

The increased depths needed in main channels, basins, berths and access ways to berths to provide for navigation of larger vessels produces larger amounts of dredged material, contaminated and uncontaminated, requiring disposal. Historically a certain synergy has been exploited with dredged material being used in the creation of land for port development and more recently in its beneficial reuse for other purposes. While these practices continue and evolve, growing environmental awareness in many places is leading to a protracted dredging approval process, both increasing costs and affecting timely implementation crucial to competitiveness. Costs to achieve the new depth requirements are already steep, and can be prohibitive, particularly when a port is not endowed with naturally deep waters, is located far upstream, or has a channel subject to rapid or regular sedimentation.

The space shortage may affect all elements of what is required to attain a competitive level of logistics accessibility. It may affect expansion capabilities for terminal facilities, and new transportation corridors to relieve the traffic impacts of urban growth, including port growth, on existing major arterials; and it may affect the ability to accommodate value-adding activities. Even when the land is available to make new port growth feasible, constituencies against port expansion, such as abutters insufficiently buffered from negative impacts of noise and truck traffic, competing real estate development interests, groups promoting public access and enjoyment of the waterfront, conservationist organizations concerned about port environmental impacts, may oppose permits for port expansion.

In this context, port expansion and access improvements are difficult to achieve and, equally important, difficult to achieve on a schedule that forestalls degradation of the port’s competitive position. Uncertainty about the future of an existing port can affect port users’ decisions about the continued use of a port as a location of their operations.
Adding to port capacity

Time-honored alternatives for creating additional port capacity may no longer be available solutions today. Alternatives that have been widely used for many years include the creation of new land through reclamation, relocation, or development of another port away from the downtown in a less developed area of the city, usually downstream, where water depths are greater, or some combination of these. Today, environmental policy may constrain the ability to fill significant amounts of water area because of the impacts on wildlife habitat and fisheries. Waterfront areas may be largely built out to full [re]development potential, precluding both further significant port expansion and release of obsolete port land for city revitalization as a benefit of this expansion. Because of this space shortage, cities and ports may compete for the use of proposed reclamation areas for their own purposes.

Developing new ports

The development of new ports outside the city, but retaining high quality access to the urban area, may be necessary to fully address the port capacity and congestion problem. Coastal rather than inland waterway locations are more likely choices because of their reduced dredging requirements. New ports outside the city promise reduced land use conflicts and their effects, including, noise impacts on residential areas, thereby avoiding calls for restricted hours of port operation and road access, and the negative impacts of such measures on port operations. Development of a new ex-urban port releases city waterfront space for high-revenue-generating uses, public access and enjoyment of the waterfront, more aesthetically pleasing uses, and from walling off or barriers for port operational safety. It brings relief to the environmental problem of degraded air quality caused by urban traffic congestion and concomitant relief to the social and economic problem of the cost of the health impacts of air pollution. New port development is not without its own environmental, economic, and social problems, however. When it replaces an existing port, previous significant infrastructure investments are lost and

Competing land uses in a downtown area

A recent study of the economic impact of the port of Fremantle in Western Australia looked into how best to use the disused bulk grain and sugar terminals. The port authority wanted to clear them to enlarge the existing container terminal, and cited the economic development impacts revealed by the study in support, mostly employment generation. Similar arguments are being used in Melbourne and Sydney, but the port authorities have learned that it is more productive to cooperate with their neighbors than try to fight them. The main development issues are the noise impacts of port operations on residential development that is making use of redeveloped port assets, and traffic generation resulting from container trucks entering the port area. The Melbourne port public relations manager recognizes that “you have to be aware of your responsibilities to the public when you occupy 500 ha in the middle of the city.”

Source: Regional Impact of Ports (April 2000)
significant new costs incurred. With the spread of industrial uses to previously undeveloped areas, there are environmental impacts on natural resources that may be depended upon by local populations for food (fish stocks), livelihoods (fishing; tourism) and flood control.\(^3\) The potential out-migration of manufacturing jobs that may follow may result in a reduction in the number, diversification, and income levels of employment opportunities in the urban area. The relief to city-port tension that it offers may be but a temporary respite as demonstrated by the historical pattern of port development. As existing ports are the raison d’être for their surrounding cities, development of a new port may similarly lead to urbanization and its consequences, including congestion, competition from high-value uses for waterfront space, and land use conflicts. Sydney, where a second port was developed in the 1970’s, now experiences community pressure aimed at minimizing the impacts of this second port.\(^4\)

The Australian Bureau of Transport Economics has been central in stimulating debate on resolving these issues.

**Making more efficient use of existing port resources**

In response to these issues, there is a growing trend among city-ports to make greater efficiency in land utilization and transportation access a priority. The pressures on city-ports and pressures for competitive logistics accessibility are producing the same outcomes: greater port and freight transportation efficiency.

Increasingly, ports in urban contexts are looking to *productivity enhancements*, and not simply the conversion of no longer used bulk facilities to container terminals, to meet expansion needs. These enhancements, by increasing terminal capacity per acre, can help reduce the need for additional waterfront terminal acreage. Every aspect of the marine terminal operation is being looked to as an opportunity to increase cargo velocity from berth occupancy to crane utilization to container dwell times to gate operations. Potential productivity enhancements include changes in terminal configuration (e.g., of the channel approaching it, apron, and yard), equipment (e.g., cranes with longer reach and faster cycle time), and operation (simultaneous vessel loading and unloading, container stacking and sorting, advances in automated gate inspection), computer simulations to evaluate choices in these, information technology to track and schedule freight transport and intra-modal ship and intermodal ship, rail, and truck transfers, and in routing cargo through a terminal, simultaneously allocating resources, both labor and equipment, and multiple terminal data-sharing to provide facility sharing and other flexibility at peak capacity periods. Information technology, so-called *info-structure*, is playing at least as important a role as infrastructure changes in increasing efficiency and creating capacity. Real-time information on the status of cargo, made possible through information technology, is crucial to the integration of port terminals in the logistic chain.

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\(^3\) According to a worldwide survey of ports, the potential environmental costs of any port development, in order of priority, includes: “…dangerous goods, water pollution, problems related to dredging operations, …air pollution, wastes, land/soil contamination, industrial plant regulations, visual contamination, stench and noise ….” (p.144, CIT)

Ports are coupling greater terminal productivity with improved inter-modal interface, including direct ship to rail and rail to ship transfers\(^5\), and shifts in transport mode maximizing the use of rail and water as alternatives to road access as part of this renewed emphasis on greater efficiency.

Barges supply about one third of the containers reaching Hong Kong from the Pearl River. Most are transported in small ships with up to 60 TEUs capacity that can serve multiple small ports with shallow access channels.

Moves to encourage the transport of containers to and from the port of Rotterdam by waterway and rail are proving successful, with inland shipping having a 36% share and railways, despite capacity constraints, having 14%. The road share, which had been as high as 66% in 1993, has fallen to 50% and is expected to fall further. Barge operators are opening services that connect to the heart of Europe, and a new combined river/rail service opened in August 2000, linking barge operations to inland ports with onward transport by rail. Even container movements within the port are handled by barges, with shuttle services operating between various terminals.

Shifts in the location of non-water-dependent activities to inland sites are also taking place, further reducing port waterfront acreage needs. Container storage is being relocated to satellite inland container terminals; distribution and logistics functions are moving in conjunction with these. (See Text Box, below, on the Port of Sydney). Land in inland locations is cheaper and more available both for port-related activities and buffering that may be needed to reduce conflicts with neighboring uses. Inland facilities can be strategically located away from residential and congested areas and in proximity to major arterials, rail lines, and industrial areas where goods are produced, further optimizing transport efficiency.

Dedicated freight corridor development is another element of the efficiency improvement trend. In the case of truck corridors, they serve to reduce delays caused by rush-hour commuter and other forms of non-freight peak traffic conditions; in the case of rail corridors, which eliminate at-grade rail crossings interrupting traffic flow, they may increase rail use and speed and reduce road congestion.

The State of California and the ports of Long Beach and Los Angeles are completing a new rail access to the port that will dramatically reduce the traffic congestion caused by the existing rail link. The cost of about US$2.4 billion can be justified if the port is to continue expanding, and if traffic congestion is significantly reduced.

Beyond the above, freight planning and technological advances in freight vehicles can be the basis for change that can make each transport mode more efficient. Improved trip planning can produce bigger and fuller freight loads. Better spatial planning can reduce transport miles. Improved vehicles can reduce fuel consumption, air pollution, and noise.

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\(^5\) As with all potential improvements, feasibility depends on specific circumstances at the port. For example, even when there is existing on-dock infrastructure, scheduling problems can impede use, such as has been found in Shanghai. One new ship-to-rail system that is being designed and tested is integral to a specific agile port system concept that, as such, encompasses design and testing of all elements essential to its feasibility, including infrastructure and ICT.
An efficient marine terminal, rail freight corridor, inland container terminal storage, and intermodal interface, key productivity enhancements, taken together, constitute the so-called “agile port system”, a new term increasingly being used as short-hand for the modern efficient port, adaptable to the highly dynamic port context, and part of a larger multi-modal transportation system. Demonstration projects are being proposed on a particular version of the agile port system to test its application on a regional basis for a total systems approach. A comprehensive transport system, capable of being managed on a systems-wide basis, creates the potential for systems-wide efficiency and rationalization. If, through a program of regional cooperation, it were applied to a broad area, cutting across provincial/state boundaries, a systems-wide rationalization would make possible a sharing and fuller use of infrastructure, replacing an unplanned redundancy in infrastructure and its avoidable environmental impacts. Increased complementarity in a transportation network instead of unchecked competition would be possible through regional cooperation. Research seems to suggest a two-way inter-relationship between these factors: that complementarities are a main feature of cooperation\(^6\), hence, identification of potential complementarities may bring about or create the incentive for cooperation.

Pacific Northwest US ports have given indication of their willingness to participate in the demonstration of an agile port system. Ports in the state of Washington have previously recognized the benefits of regional cooperation in providing regional transportation infrastructure to overcome problems of congestion, improve freight transport efficiency, and maintain the competitive position of ports on a regional basis.

Implementation of these new strategies to increase efficiency may not be enough to address the port capacity and access problem and is not without its own difficulties. While alternatives that make use of existing infrastructure, such as those that involve info-structure and structural reshaping of transportation systems, may not be costly, others, such as major infrastructure changes, are very expensive and their benefits need to be established to justify their costs. Since more intense use can produce more intense impacts, consideration must be given to how these are to be addressed.

The competitive responses of existing ports to new ports with these new strategies must be factored into the analysis of the economic viability of new port development. In the strategic assessment of alternative locations of a container hub port for Brazil, the Port of Sepetiba was identified as the preferred option because of the landside access problems of the existing major port of Santos and capacity problems of the Port Rio de Janeiro, among other considerations. Since that assessment, improvements have mitigated the constraints of these two ports. New inland container terminal and railroad development provide terminal access via rail connections to Santos and Rio de Janeiro and some “dry port” capacity to industrial growth in the interior Sao Paulo region, with complete capability planned in he next development phase; development is planned for a new private container terminal at the site of a former shipyard, a few miles outside the premises of the Port of Rio de Janeiro, that will allow contract arrangements with labor

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\(^6\) p. 141, CIT.
independent of the dock unions of the public ports, leading to lower costs and higher productivity.

Transfer of container storage and distribution centers to inland locations diverts existing and potential economic activity away from the local area, and creates facilities which can serve multiple ports, possibly introducing competition and diminishing the bargaining power of port authorities and terminal operators relative to carriers. In the context of today’s dynamic port and logistics trends, there is uncertainty about the full impacts of inland terminals.

Questions have been raised about the economic contribution of container ports to their host cities when value-added activities have been relocated off the waterfront beyond city boundaries. Some reports have asserted that they would be economically irrelevant, as highly efficient container ports, under such conditions, become not only less land-intensive, but also less labor-intensive. The argument is made that container ports may not only compete with other uses, but their development may be at the expense of other uses with demonstrated growth potential and the additional economic benefit of significant job generation, and few compatibility problems; hence the wiser economic development strategy would be to foster these uses, when urban space is scarce and valuable. The argument becomes even stronger, it is believed, when heavy industrial activity with poorer economic performance and greater negative impacts dominates a highly congested urban area. A recommended alternative scenario under a particular instance of these conditions is to also move the container port outside the urban center to a location where it could continue to play its transport role, while not compromising the cost of this transport, and while retaining transport-related service sector functions -- logistics services and management -- within the City.

This strategy, in turn, raises a number of issues that may be important to understand:

- What would be the economic impact on the city of the port's relocation on the full range of water-dependent and non-waterdependent activities interdependent with the port, and can we sufficiently assess this impact when some of these interconnections may not be sufficiently understood?

- What would be the impact of the loss of this industry cluster? On city jobs, both on the diversification of city jobs, and the income levels of job opportunities? On the availability of a labor pool with port-industry knowledge? On the waterfront's vitality --- something that may be an important factor in its attraction to tourists -- and, hence, on the tourist sector?

- Will logistics-based research and development, and other sources of industry innovations and knowledge transfer thrive to the same degree when geographically segregated from port operations? Or can functional equivalence be attained through networking that depends on other means than spatial proximity?
As public investment in infrastructure landside and waterside and other activities is usually required for ports to remain competitive, what will be the effect on this support when the port is no longer visible to city residents or experienced as integral to its economy?

**Port development planning**

Given the alternative strategies for addressing port expansion and landside access needs have pros and cons, any decision will have disadvantages that need to be grappled with. As the choice of a given alternative will have different impacts in different contexts, there is an important role for a planning process in providing for informed decision-making.

The development and protection of the port resource today requires a delicate balancing act, a greater, more multi-disciplinary knowledge base, greater coordination across a larger number of jurisdictional agencies, consensus among more expanding numbers of stakeholders, and a more advanced organizational infrastructure to meet these increased management needs.

Core port functions are water-dependent, and do not have the location options of non-water-dependent uses; these uses may require special protection to preserve waterfront areas for their location. Ports and their surrounding areas are finding that regional strategic/comprehensive port development plans can serve this role, protecting waterdependent port uses, as well as provide for shifts of non-waterdependent functions to inland locations, when desirable. They can designate and preserve waterfront space for port activity, protect prior investments, provide for its expansion, its landside access needs, and its buffering in locations proximate to inland transport systems and critical mass of import/export cargo, and provide for port area or non-waterfront space for and connections to value-adding distribution/logistics and functions.

Strategic planning is a means to provide for the full range of port requirements and a total systems approach, including:

- Physical and regulatory integration of transport networks
- Comprehensive port development strategy balancing economic, environmental, and social objectives, establishing performance standards/operational meaning for these objectives and communicating performance against these standards to the public and stakeholders
- Consistency with Integrated Coastal Zone Management policies
- Institutional framework for developing and implementing multi-disciplinary policies to address multidisciplinary issues of port development planning
- Coordinated, inclusionary process aimed at identifying a shared vision for a development/access plan
• Implementation through establishment of or consistency with land use policy/regulations that reduce land use conflicts and promote synergy between adjacent uses, and provide for the aggressive mitigation of negative impacts when prevention of these is not feasible

• Implementation of a port good neighbor policy and public education program about the role of port to promote the harmonious co-existence of the port and city

Major ports of the world have found it essential to sustaining port competitiveness to develop a strategic plan that provides policy guidance on local port-city and regional coordination to address the need for integrated solutions to economic development, land use planning, transportation infrastructure, and regulatory issues. The strategic plan can be pivotal in meeting the demands of increased logistics accessibility that requires either space at the port where it may be at a premium or at an inland location where it requires the efficient shuttle of goods between the seaport and the dry port. In the case of inland ports, the plan can address the requirements in addition to the physical link between the two locations, i.e., the regulatory arrangements, most particularly with customs that must also meet an efficiency standard. Such planning can provide for transformations of existing port-cities with largely segregated port and city uses to an integrated mix of port-city uses, as currently proposed in Rotterdam, to whole new port-cities, (or new integrated port-city areas) as is proposed in Shanghai, or development of transport corridors for off-waterfront port-related activity and industry, as being developed in Sydney and is under consideration in Sihanoukville.
Since its initial development on the Rhine delta, the Port of Rotterdam has expanded 28 miles westward towards the seacoast, releasing obsolete dockyards for City revitalization in the process. In the 1970’s, 5000 acres of new land were added through reclamation to meet the port’s capacity needs projected at that time. In the early 1990’s, the port triggered a study to evaluate the potential for adding 2500 acres to this prior reclamation effort to meet its new expansion requirements that increasing international trade was producing. After lengthy national debate and study, the Dutch cabinet decided that the reclamation project could go forward in stages, with 1850 acres to be devoted to recreational and wildlife reserve uses.

Implementation was to be governed by a planning process adhering to the principle that the additional land was to meet both the port and the city’s spatial needs. The Port and the City pledged their commitment to dual objectives on which this principle was based: to improve the economic position of the port by spatial expansion as well as to improve the ‘quality of life’ in the Rotterdam region. An important part of the planning process was the specification of the operational meaning of this second objective; operationalization was to provide the means to measure and communicate performance in achieving the objective, and decision-making in light of performance. Joint decision-making through a public participation process and involvement of key stakeholders was a critical feature of the planning process. Finding the problems of the port and the city to be inextricably linked, the planning process defined a strategy, which called for an integrated approach to the identification of issues and solutions.

The planning process deliberately broadened its scope in the issues to be addressed and its geographic coverage to enhance the prospects for identification of solutions supported by a consensus. The plan became regional, covering the greater Rotterdam area. The issues encompassed those of the port, city, and delta in their economic, spatial, and ecological aspects. According to the planning approach, the more aspects of a problem a solution addressed, the stronger the solution was considered. That new land would be used for port expansion and recreation and wildlife was emblematic of this approach. A further example is the promotion of water-borne freight transport over road transport to simultaneously address inland freight transport needs, while reducing truck traffic and noise, road congestion, air pollution, as well as the space needed for highway development. Of the port’s three distribution/logistic centers, the most recent one, and the only one to have space available, is Distripark Maasvlakte which is located on the site of the first 5000-acre reclamation area (Maasvlakte I) and is expected to expand to the second (Maasvlakte II). Today the Port is developing a new planning direction to integrate port and city uses and wants to make this integration the basis for a marketing concept.

Source: Adapted from http://www.portofrotterdam.com/UK/index.asp
Relocation of non-maritime port activities

**Sydney ports** are addressing the region’s projected capacity problem by coupling land reclamation with inland port development, a program that will keep the port in the city, while relieving city-port tensions. The Sydney Port Corporation (SPC) has proposed the expansion of its primary container facilities at Port Botany by creation of 173 acres of land and development of a 116 acre inland intermodal terminal in a manufacturing and distribution center, connected to the port by a dedicated freight rail line. The proposals were based on study findings indicating that planned capacity at Sydney and other ports in the region would be insufficient to meet forecast trade through 2025. It was found that though they would complement the region’s ability to meet trade demand, new regional ports would not substitute for expansion of container facilities at Port Botany largely because of the logistics and transport costs resulting from their distance from the manufacturing centers of western Sydney, as well as the priorities of shipping lines.

Land reclamation at Port Botany was determined the best option for meeting its objectives to sustain the following: freight transport competitiveness by expanding capacity in a location whereby inland transport costs would not suffer, Port Botany’s position as leading container facility in NSW, and city-port relations by not restricting commercial and recreational use of Botany Bay. Part of an integrated solution, the Enfield inland port, in addition to having the location advantages relative to Western Sydney and a dedicated rail link, had other transportation and community benefits. It was accessible to the existing highway network through industrial, not residential areas. Maximizing rail use, it reduced road congestion in the vicinity of the port, thereby reducing both impacts on residential areas in this city location and the cost-effectiveness of road transport, further improving inland transport costs. It complemented other intermodal road and rail terminals under construction or consideration.

The project is consistent with its long-term strategic plan to redevelop a network of inland ports with a greater reliance on rail that it views as critical to improved logistics. Decentralization of cargo marshalling, increased speed in the flow of cargo from coastal to inland port, and customs clearance at inland ports, enabled by electronic commerce, are key elements of this strategy. It has forecast economic benefits of the projects, in terms of additional gross domestic product and employment, on a regional basis to NSW, not broken down by community. Both projects are state significant ‘designated development’ subject to the NSW government approval, Environmental Assessment (EA), and close consultation with the community and stakeholders. The EAs emphasize addressing local community impacts; they will also consider best practices.

This physical solution to Sydney’s capacity problem has a complementary management solution to respond to the community’s desire for expanded urban waterfront areas. Being a good neighbor and offsetting the objectionable aspects of port activity by implementing small but effective measures are critical elements of city-port policy. Measures include providing for visual access of port activity, guided tours, open-house days to promote awareness of its operations, physical access for fishing and viewing the waterside, and buffering to provide visual and noise relief to neighbors. Its strategic plan is part of a public information program keeping the city aware of port development potentially affecting them.


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7 The SPC has found that satellite inland ports need to be located in industrial zones within 19 -25 miles of the port and optimally located with respect to distribution to points of consumption, twelve miles from the two ports being the center point of Sydney’s population.
SECTION TWO: CASE STUDIES ON EAST ASIA PORTS

In East Asia, the urban context can be especially difficult for harmonious city-port co-existence. Especially in coastal regions, where ports and industry are concentrated, many cities currently have extremely dense populations or their populations are expected to rapidly increase to crowded levels over the next few decades. Infrastructure of all types, while sometimes improving dramatically, is frequently inadequate, which in the case of transportation, is especially constraining on port-cities. Port-cities, in particular, can suffer the impacts of domination for some part of their history by heavy industrial activity without the benefit of adequate land use planning on a consistent basis. Combined, these features serve to exacerbate negative impacts. With population density, poor transportation infrastructure, and a history of inadequate planning comes traffic congestion and its consequences on pollution levels and health. Industrial activity without adequate infrastructure to mitigate its environmental impacts adds to pollution levels. At the same time the economic development context is changing, sometimes very rapidly, with the introduction of economic competition, and sometimes with the accompaniment of more local rather than centralized planning. Port facility expansion and corresponding needs to handle growing trade volumes can mean confronting particularly severe forms of the impact problems port-cities throughout the world are facing.

East Asian ports are responding with implementation strategies not unlike those taken by the rest of the world. Highlights of the strategies of a number of ports in the region are presented below, followed by more detailed briefs on these ports.

Shanghai. Navigational access, space, and congestion are problems in Shanghai. In response, the City is consolidating its container terminals in locations away from the city center and in places with improved channel depths. Two loci are at the mouth of the Yangtze River, where the navigational channel will be dredged. Construction of a major new container facility will take place on offshore islands, one existing and one to be built, where there are natural deep waters. While the new port locations are outside the historic city center, city-port integration will nonetheless be a strong feature. One facility is in the Pudong New Area, including the whole gamut of city and port functions. The new offshore Yangshan Port will be connected to the mainland by a vehicular bridge, at a location where a new port-city will be built largely on filled wetlands. Value-adding logistics activities will be incorporated, as well as recreational activities for the new residential population. This latter and other components of the planning program indicate the importance of sustainable development and quality of life issues. Recently there was announcement of a proposed change to the Yangshan Port development plan to construct a new island for port development rather than displace a local fishing community on an existing island. Environmental regulations require environmental assessment of designated projects and sophisticated management of contaminated dredged material. Inland transport access via the more environmentally friendly transport mode of inland waterways is growing rapidly, notably on the Yangtze River, one of the most viable rivers for freight transport in China.
**Hong Kong.** While Hong Kong estimates that it has sufficient container handling capacity to meet demand through nearly the end of the decade, its previously identified location for future expansion is the designated site for development of a Disney Theme Park and other existing port uses are being displaced by activities to meet the need for open space and tourist-based uses. Most existing container terminals are clustered in the Kwai Chung basin area of mainland Hong Kong, at some remove from the central city on Hong Kong Island, 8-10 kilometers away. New preliminarily identified container terminal sites are outside the Kwai Chung basin, some on offshore islands, some closer to mainland China, and most at much greater distance from the historic center. These sites will be subject to a detailed study ensuring the best options are selected in terms of their sustainable development implications. Port plan development is being coordinated with City plan development efforts, both recognizing sustainable development as important and key to the quality of life. To meet serious competitive threats from new regional ports, the port has developed a strategy setting regional transportation and logistics hub status as its goal. The strategy is twofold. Logistics parks are its centerpiece and are being sited in close proximity to container terminals, despite the competition for space. Fast-track Pearl River Delta pipelines involving road, speed boats, and rail are proposed as part of transport and logistics system to connect mainland China gateways, freight villages, inland ports, and customs, licensing and other support facilities. As with Shanghai, environmental regulations are strong; coastal and river transport modes dominate and the currently very weak rail sector mode is being strengthened.

**Singapore.** Given the space constraints of this small densely developed island nation, the limit on future land reclamation as a space solution, and environmental issues, securing land and gaining environmental approvals for port expansion will become increasingly bigger hurdles in Singapore. Nonetheless, the City and port are committed to the goal of strengthening the seaport in connection with value-adding logistics activities. Container handling capacity is expected to more than double over the next several years as a result of planned port development; distriparks have been developed as city-based uses, sited largely within or near the port, with their positive economic impacts thus not diverted to other locations. These and other implementation activities to achieve its vision to make the port an Asian-Pacific logistics hub are guided by Singapore's progressive planning and zoning intended to provide for a balance of uses, proper siting of industry, as well as buffering, to minimize conflicts. While its first three container terminals are located less than a third of a kilometer from the central business area, the newest, Pasir Panjang, is located 7 kilometers west of these at a greater distance from the city center, constructed on reclaimed land. The port has a tradition of optimizing efficiency, which serves to make maximal use of existing resources, and continues this tradition in current plans that emphasize state-of-the-art technology and a culture of innovation. A clean port is also a goal. By all accounts, Singapore's record of performance in environmental management and sustainable development is solid, particularly in addressing its main problem of marine pollution in an area of heavy marine traffic.

**Haiphong.** The Haiphong main port is located 20 miles upstream on the Cam River, where with dredging, allowable vessel weights will increase from 8,000 to 10,000 DWT;
and the majority of existing wharves are in densely developed areas, where the
constraints on expansion are comparable to those on navigational access. Port
development plans include improvements to existing resources and construction of a
major new facility. In addition to dredging, improvements are being undertaken to the
main port that will expand its size at the one wharf location where this is feasible,
enhance landside access, and increase efficiency through updated equipment purchases as
well as changes in operations approach, all of which will increase capacity. The new port
is located just south of the city center, where vessel weight limitations are 30,000 DWT
and landside access is substantially better. Falling within a trade, warehouse, and multi-
industrial use zone that is part of a broader economic zone with residential and
commercial activity, the new port is part of a mixed-use complex, albeit with segregated
sub-areas. It is in close proximity to multi-modal transport links, inland water routes, rail
and road connections to Hanoi, a soon-to-be international airport, as well as an industrial
zone, comprising part of what could be the country's first intermodal transport junction of
potential economic significance. This new port development is closer to what some
reports indicate is a powerful strategic vision for the area's future. This vision sees the
dispersal of port and industrial activity to the periphery and a multi-functional city core
with a specialization in such service sector uses as logistics, as mutually beneficial to city
and surroundings. Under the envisioned development strategy, such city-based services
would be drawn upon by the nearby Red River Delta and corridor to Hanoi and would be
used in mediating between buyers and sellers of manufactured goods and services. Since
the port has been found to pose a potential threat to the local environment and
neighboring sensitive eco-system of Halong Bay, steps are being taken to address this
issue. These include an oil contingency plan, environmental sensitivity mapping, and
documentation of and remedies for potential negative impacts on the biodiversity and
sustainability of Haiphong's tidal wetlands. Integrating the treatment of environmental
concerns in strategic development plans is recommended as a guiding planning principal
to improve the City's 'livability' and to help protect the sensitive coastal zone, other
environmentally-sensitive areas, and national heritage sites.

Sihanoukville. Steps are being taken to capitalize upon Sihanoukville's deep port,
marine/coastal eco-tourist, and fishing industry resources, while protecting them. Well-
planned port capacity expansion through investments in infrastructure and equipment to
improve efficiency, the use of three dry ports, and assessment of industrial corridor
development opportunities for off-waterfront, transportation-efficient industrial growth is
taking place in parallel with development of an integrated coastal zone management
framework with implementation measures to control land use, protect habitat, and
provide for integrated management systems.
Case Studies:

SHANGHAI

Extent of Pressures

Current Throughput/Capacity. In 1999, Shanghai handled 4.2 million TEUs, exceeding its designed handling capacity by 31%. In 2000, throughput rose to 5.6 million TEUs, exceeding capacity (which had expanded since the prior year) by 40%. Growing by 13% over the previous year, throughput in 2001 was 6.6 million TEUs. First quarter performance indicates that throughput will reach 7 million TEUs in 2002. With demand forecast to reach 10 million TEUs by 2005 and 15 million TEUs five years later, the Port has undertaken an aggressive expansion program. If implemented on schedule, its projected capacity of 20 million TEUs in 2010 will more than meet the demand forecast.

Table 1: Current Throughput, Forecast Demand, and Projected Capacity at the Port of Shanghai

<table>
<thead>
<tr>
<th>Year</th>
<th>TEUS (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throughput</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>4.22</td>
</tr>
<tr>
<td>2000</td>
<td>5.61</td>
</tr>
<tr>
<td>2001</td>
<td>6.63</td>
</tr>
<tr>
<td>2002</td>
<td>7 expected</td>
</tr>
<tr>
<td>Forecast Demand</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>10</td>
</tr>
<tr>
<td>2010</td>
<td>15</td>
</tr>
<tr>
<td>Projected Capacity</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>20</td>
</tr>
</tbody>
</table>

Source: Shanghai Port Authority, Journal of Commerce, and Shippers Today

Urban Context

Congestion. Severe congestion is a permanent feature of traffic in Shanghai, a city of an estimated 14 million people. While Shanghai, like most urban centers in China, has a relatively low motorized vehicle ownership, (40 vehicles (mostly motorcycles) per 1000 people), the low density of its roads and the narrowness of many of them is a countervailing factor exacerbating its traffic congestion problem. With an historic settlement pattern also typical of Chinese cities, Shanghai still has industry integrated with residential and other commercial uses, so there is a high proportion of trucks moving on its urban ways to serve this industry. Poor transportation infrastructure beyond the city has been a factor in sustaining the concentration of industry within the city, and

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8 Shanghai Port Authority (SPA) Director, quoted in CNA article of 3/18/02.
9 JOC
10 Shippers Today
concomitant truck traffic. Given the high population and development density of the city, there is little space for road development, without destruction of living quarters, massive population displacement, and visual intrusion. The congestion problem is likely to get worse, as motorization rates could increase to 175 of cars alone per 1000 people by 2010. Ring road development designed to offer relief is likely to induce greater traffic and to create more pressure to build more roads.
Map 1: Shanghai

Source: Adapted from http://www.hxqy.com.cn/jichang/guihua/jtqwE.htm

NEED COPYRIGHT PERMISSION OR USE ALTERNATIVE MAP
Space: Industrial restructuring and sub-urbanization  City layout has been largely determinative of spatial constraints in Shanghai. Development is concentrated in the central city and heavy industry has dominated this concentration, the former the result of the City's historical land use pattern and the latter the result of industrialization playing a leading role in the City's urbanization after 1949. Heavy industry and residential uses were thus cheek and jowl and space lacking for new and alternative uses in the central core. The City recognized the need to address the issues borne of this development pattern, preparing a general plan in 1982, the first since 1949, with a goal of rationalizing its layout. Aiming for rapid transformation of the city to an international economic, financial, trade, and navigation center, the plan called for renovation of the central city, development of a new multi-functional area -- the Pudong New Area -- adjacent to the central city across the river, and a coordinated system of central city and suburban towns and rural areas.

Table 2: Shanghai Port Development: Planned and in Progress

<table>
<thead>
<tr>
<th>Terminal/Location</th>
<th>Capacity TEU</th>
<th>Phases #/ Completion date</th>
<th>Berths #/ length (m)</th>
<th>Berth depth</th>
<th>Area m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai Container Terminal (SCT) Wusongku at Mouth of Yangtze River</td>
<td>3m Total</td>
<td>Completed</td>
<td>10/7486</td>
<td>8.25m</td>
<td></td>
</tr>
<tr>
<td>Zhang Hua Bang</td>
<td>3/783</td>
<td>13</td>
<td>303k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun Gong</td>
<td>4/658</td>
<td>11</td>
<td>304k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lu Boa Shan</td>
<td>.5m</td>
<td>3/640</td>
<td>9</td>
<td>218k</td>
<td></td>
</tr>
<tr>
<td>Waigaoqiao Pudong New Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaoqiaozui</td>
<td>&gt;4m Total⁷</td>
<td>4</td>
<td>12/8 built/ 3,700 Total</td>
<td>12.5</td>
<td>3.8m</td>
</tr>
<tr>
<td></td>
<td>1 m (Phase 1)</td>
<td>1998</td>
<td>3/900</td>
<td>.5 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.8m (Phase 2)</td>
<td>1999</td>
<td>3/900</td>
<td>1 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.4m+ (Phase 3)</td>
<td>Not fully implemented 2002 expected</td>
<td>2/700</td>
<td>.6 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.2m (Phase 4)</td>
<td></td>
<td>4/?</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Wuhaogou</td>
<td>6.5</td>
<td>30+</td>
<td>12.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yangshan New Port, Proposed Hub, 18 miles off coast, connected by 30 km long bridge -</td>
<td>15m Total</td>
<td>2022</td>
<td>50/18 km Total</td>
<td>15</td>
<td>1.7m</td>
</tr>
<tr>
<td></td>
<td>2.2m (Phase 1)</td>
<td>2005 Phase 1</td>
<td>5/1600 Total</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>28.5m</td>
<td>102</td>
<td>14m+ ¹¹</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Hutchison Port Holdings Web site, CNC (9/00), CNA (3/02), Shippers Today, Journal of Commerce 8/02)

⁷ Subsequent phases at Waigaoqiao and Yangshan
As the city has reported, the plan led to an "unprecedented shift … best borne out as follows: In order to make room for development of the industries of finance, trading, and real estate, at least a thousand factories and businesses were relocated from the downtown areas to the outskirts, shutdown, merged, or transferred to other operations. Meanwhile hundreds of downtown residents and in age-old houses moved into new residential complexes in the outskirts…"  

**Port Development.** Port Development Plans were prepared in this context. They call for consolidation of container handling operations at three centers: Shanghai Container Terminal (SCT) at Wusongku, Waigaoqiao in the Pudong New Area, both at the mouth of the Yangtze River, and Yangshan, on offshore islands. These locations are removed from the central city area and nearby extensions to it, where city plans promote commercial uses that will alter the heavy industrial orientation of the past and create a multi-functional City of global stature. They are also locations where the channel depths required of larger vessels naturally exist or can be achieved though economically feasible dredging regimes. Details on individual terminals are presented above.

**New Port.** Development of Shanghai's major new Yangshan Port is to occur on islands 20 nautical miles off the City's southeast coast at Luchao port, outside the Yangtze estuary, with connections to be made to the mainland via a six-lane, vehicular, 20-mile long bridge. This port area's distinction will be in its deep forty-nine-foot water depths, allowing it to handle 5th and 6th generation containerships, which cannot be accommodated at the other major container ports on the Yangtze River. The capacity to handle vessels of this size drove the choice of an offshore location for a new port. Prohibitively expensive capital investments in dredging and annual maintenance would have been required to make and keep the City's ports on the Yangtze accessible to the size vessels feasible at the offshore location. The expected construction start-date for Yangshan Port is 2002, with phase I completion anticipated in 2005.

While the city restructuring is intended to disperse industry and bring environmental relief in doing so, the City will maintain its historic integration of industry and other uses and city and port uses in particular, in its new layout.

The multi-functional Pudong New Area, with a financial and trade center being set up as the extension of the city center, will also encompass the Waigaoqiao port.

The City intends to build a new port-city at Luchao linked to its new Yangshan Port. Luchao is the mainland site where the bridge from the port's island location is to connect. The master plan for the new port-city features the complete integration of the offshore container terminal with mainland residential, recreational and cultural, and port-related activities. These latter include a center for logistics, port-processing, and trade, activities that encompass value-adding port functions. The 65-square kilometer site, 40 kilometers from the central city, is a floodplain that will require reclamation. The City's new transportation infrastructure is to be designed to interconnect with canals that lace

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12 Source *Industrial Restructuring*, Web site of the Information Office of Shanghai Municipality

13 DHV Projects
through the surrounding area. Construction is scheduled to begin in 2005, with completion expected in 2020.

The city recognizes that its on-going integration of industrial and non-industrial, port and city uses will require environmental management. In the Pudong New Area it has stipulated that "…only industries with little pollution can be developed in the old bases of the shipbuilding, petrochemical, building materials and metallurgical industries."\(^\text{14}\)

Shanghai is keenly aware that international metropolis status requires attention to quality of life issues, including environmental protection: in its statement of policy it has said "…construction of a transportation system will not only satisfy the needs in quantity but also meet the needs of protecting the environment. Resources should be reused and recycled, clean production should be promoted and the three wastes should be discharged properly. Green cover in the city should be strengthened and the flood-protecting capability should be reinforced. In short, we will try to build a garden city with both economic activities of high-intensity and a relaxing, beautiful and comfortable living environment…."\(^\text{15}\)

According to the document "Environmental Monitoring: A Necessity for an Emerging Economic Center in the 21\(^{\text{ST}}\) Century,"\(^\text{16}\), the need for monitoring environmental quality, publicizing results, and adopting preventative controls is being addressed by the City. The document reports the monitoring results to date, including those on air and water quality, and noise, and the measures being taken to address issues concerning pollution prevention, noise mitigation, natural resource protection, all potential issues for port industry.

Environmental regulations provide for sophisticated management of contaminated dredged material and environmental assessments of designated development projects.

Indications of the City's concern with community quality-of-life and environmental issues may be seen in its recent revamping of its plans for Yangshan Port. Initial plans proposed construction of new facilities on two existing islands, Xiaoyangshan and Dayangshan. Because development on Xiaoyangshan would require displacing and relocating more than 1,000 fishing families, the Port is now rejecting this element of the project. Its revised plan is to construct a new island just beside this existing island.\(^\text{17}\) Community issues are then also playing a significant role in port site location.

**Competitive pressure/Logistics accessibility.** Unless there is timely completion of new port capacity, Shanghai's competitive position stands to deteriorate with the potential loss of transhipment business to Pusan, Kaohsiung, and Kobe.\(^\text{18}\)

\(^{14}\) Integrating Environmental Considerations into the Economic Decision-making Process, ESCAP, Modalities for Environmental Assessment: Urban Development and Environmental Protections In Shanghai (ESCAP - Shanghai), I, D - The adjustment of Urban Development

\(^{15}\) ESCAP - Shanghai, I, F-4, Modern High Standard Infrastructure

\(^{16}\) ESCAP - Shanghai, Section VI.

\(^{17}\) JOC, 6/3/02.

\(^{18}\) Shippers' Today
Shanghai's competitive position depends not only its capacity to meet demand, but its transport and product logistics accessibility. Logistics accessibility is currently a competitive constraint. Meeting international standards for logistics accessibility will require transportation infrastructure and infrastructure improvements, water- and landside, that overcome current inadequacies. Essential improvements concern transportation infrastructure, linking the city, region, and nation, and hence national planning as well as local planning, and a huge investment program. Through studies, planning, technical assistance, and investment, great strides have been made in this area, with much more remaining to be done, as described in the following sections.

**Waterside access. Shallow Channel depths** have been a serious hindrance and are another serious relocation pressure, as has been discussed above. The newly dredged depth at the mouth of the Yangtze is 8.5 meter for a 50-kilometer long, 300 meter wide channel, a project completed in 4/01.\(^{19}\) The 1.5 meter increase in depth over the prior shallow 7 meter depth now allows for navigation of feeder container ships of 700 TEUs, 1\(^{st}\) generation container vessels of 1700 TEUs, and 30-ton vessels. At completion of the final phase of the planned dredging project, the depth of the Yangtze will increase to 12.5 meters, providing for passage of 3\(^{rd}/4^{th}\) generation container vessels, post-Panamax container vessels, and 100,00-ton vessels.

**Table 3: Shanghai Navigational Access and Dredging Program: Planned and In Progress**

<table>
<thead>
<tr>
<th>Waterway</th>
<th>Current Depth</th>
<th>Capacity</th>
<th>Proposed Depth</th>
<th>Capacity</th>
</tr>
</thead>
</table>
| **Yangtze River** | 8.5 m - completed '01 | ▪ Feeder container ships -700 TEUs  
▪ 1st generation container vessels  
▪ 30k ton vessels | 12.5 m - completion date '10  
(Review of Transport in the ESCAP Region 96-01) | ▪ 3\(^{rd}/4^{th}\) generation container vessels  
▪ post-Panamax container vessels  
▪ 100,00-ton vessels |
| **Off-shore Islands** | 15 m |  | 5\(^{th}/6^{th}\) generation -'05 completion date of phase 1 | |

*Source: Shippers Today*

**Landside Access**

**Container Movement.** A 1996 World Bank study estimates that the destination of 76% of containers arriving at China's seaports is the port-city and 92% the coastal province. Of this vast majority that stay within city limits, trucks transport 93%, inland waterways carry 4%, and rail 3%. Of the goods going beyond coastal regions, most are converted to breakbulk cargo with delivery by truck (85% of the total) or rail (15%). Port-to-door container movement is thus limited mainly to coastal port cities and their nearby coastal regions.\(^{20}\)

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\(^{19}\) International Transport Journal, 4/02  
Study findings indicate that containers are not used more for three main reasons:

- Inefficiency of transport services
- Cost is 30% greater than breakbulk
- Bureaucratic procedures

The average times for container transport per mode (see Table 4) provides evidence of the inefficiency of transport and need for improvement in all modes.

**Inland Waterways.** Shanghai has the geographic advantage of a location on the Yangtze River, one of the most viable of China’s rivers for freight transport. Extending through densely populated and industrialized areas, capable of handling coastal vessels, and providing a less congested alternative than highways, it forms the basis for a good inland port distribution network. While the volume of containers transported on the Yangtze has grown rapidly, the waterway has not been used to its fullest. World Bank sources indicate that dedicated container facilities and systematic coordination of services is lacking, and full ship size potential has not been exploited. China’s planned inland waterways improvements over the next decade emphasize inland port development of which the construction and upgrading of key ports along the Yangtze are a significant element.

**Rail.** Rail transport in China has suffered from a capacity shortage. While rail infrastructure and equipment expanded substantially between 1996-2001, rail freight traffic and haul distance remained constant as may be seen below. Capacity expansion will remain a dominant rail sector investment need for the period 2001-2010, as World Bank estimates indicate (see below).

### Table 5: China: Rail 1996-2001

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall route length</td>
<td>8.6% expansion/yr</td>
</tr>
<tr>
<td>Electrified route length</td>
<td>34% expansion</td>
</tr>
<tr>
<td>Locomotive Fleet</td>
<td>8% expansion</td>
</tr>
<tr>
<td>Fleet Wagons</td>
<td>17% expansion</td>
</tr>
<tr>
<td>Rail Freight Traffic: Net Tons</td>
<td>Constant</td>
</tr>
<tr>
<td>Rail Freight Traffic: Net-Ton Km</td>
<td>Little change</td>
</tr>
<tr>
<td>Freight Haul Distance</td>
<td>Little change</td>
</tr>
</tbody>
</table>

*Source: ESCAP*

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Table 6: China: Realizable Rail Sector Investment Needs 2001-10

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall route length</td>
<td>2,300 km new track/yr;</td>
</tr>
<tr>
<td></td>
<td>2,300 km reconstructed track/yr</td>
</tr>
<tr>
<td>Electrified route length</td>
<td>2,000+/yr</td>
</tr>
<tr>
<td>Locomotive Fleet</td>
<td>1,400 new locomotives/yr</td>
</tr>
</tbody>
</table>

Source: World Bank, 1999 (R. Carruthers, IFPCD Conference)

A 1998 review of China's rail system reports that there are problems in the links between different rail lines as well as other modes of transportation and that while intermodalism is being introduced in the eastern coastal region, it is not seen much beyond that area. The review indicates that Chinese logistics are largely based on rail service but of a type that can be very different from that of developed countries. It is said to still be a very manual system involving much handling.23

As with waterways, lack of coordination affects rail system utilization levels. Major ports are equipped with rail service -- on-dock rail is available at SCT, for example -- but use for container transport is below system capacity. The failure of authorities to manage scheduling is a key factor.24

Roads. The low density of China's road network has been a significant hindrance to inland access. There has been some expansion of the system over the past five years and massive expansion is planned for the current five years. World Bank calculations of realizable transport investment needs for 2001-2010 indicate that 45% of the total transport investment is needed to catch up on the previous under-performance in this sector as well as increasing use of the system. The majority of this investment (60%) is needed for reconstruction of the existing road network to a level that can accommodate larger and heavier trucks and their cargo loads and the increased maintenance such use will demand.

Trucking Services. According to the previously mentioned 1996 study on container use, problems with trucking services, as well as infrastructure deficiencies, are responsible for the low level of use: "The problem [the study states] is that long-haul operators are subject to added regulations (imposed by each subdivision in which they travel)."25

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23 Canadian Transportation and Logistics Web site.
24 China Container Transport Services and Trade: Framework for an Efficient Container Transport System, 10/96
Table 7: China: Realizable Road Sector Investment Needs 2001-10

<table>
<thead>
<tr>
<th>Need</th>
<th>Investment Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion of interurban expressway network</td>
<td>6% of total road investment 2001-2010</td>
</tr>
<tr>
<td>Reconstruction of capacity of existing network to handle larger trucks with high gross weights and axle loads</td>
<td>60% of total road investment 2001-2010</td>
</tr>
<tr>
<td>Increased road maintenance and rehabilitation in response to heavier demands of trucks</td>
<td>30% of total road investment 2001-2010</td>
</tr>
<tr>
<td>Rural roads</td>
<td>4% of total road investment 2001-2010</td>
</tr>
<tr>
<td>Inland province road upgrading and reconstruction</td>
<td>67% of total upgrading and reconstruction budget</td>
</tr>
</tbody>
</table>

Source: World Bank, 1999 (R. Carruthers, IFPCD Conference)

Table 8: China: Roads 1994-1999

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>New road constructed - concentrated in development of long distance arterial road system in extremities of the country</td>
<td>&gt;230,000 km, 3.9% expansion 94-99</td>
</tr>
<tr>
<td>Road vehicle fleets</td>
<td>12.1% average annual growth 92-97</td>
</tr>
<tr>
<td>Motorization rate</td>
<td>2.2 car ownership/1000 people (Carruthers), 4.7% growth, 97-99</td>
</tr>
</tbody>
</table>

Source: ESCAP

Inland Clearance Depots (ICDS)/Port Corridors. Based largely on the findings of the container use study, the State Economic Trade Commission (STEC), with World Bank support, has undertaken a Container Transport Project that aims to establish a pilot network of nine to ten Inland Container Terminals on two transport corridors, one of which extends from Shanghai to Zhengiang province south of the City. The project encompasses the financing of a number of pivotal elements at each ICD to ensure viability; these include storage areas, container-handling equipment, a fleet of container trucks, an EDI information management system and adequate road and rail access to the terminals. To further ensure viability, other measures are being implemented that are intended to simplify documentation, facilitate administrative procedures, and promote competition through open multi-user terminal access.26

Impact of Transport Sector Projects in Progress and Proposed. With the completion of projects planned for the next ten years, it is predicted that, barring disruptions to economic growth, improved domestic investment, foreign direct investment, and political stability, there will be remarkable enhancements to the transport sector. This will produce positive impacts on ports that will redound to the benefit of the city. As a representative of the World Bank has reported:“…international freight handling in ports

26 World Bank, (R. Carruthers, IFPCD Conference, 1999, and AJOT, 6/02)
will rapidly reduce and inland container terminals will handle approximately half of all
TEU movements.27 The effect will be to reduce the dwell time of containers at marine
terminals, an outcome that will allow for more intense utilization of terminal space,
increasing the need for waterfront terminal expansion to increase capacity.

These transport sector improvements will help to reduce truck transport through
promoting greater use of rail and inland waterways. Such transport shift will help in
relieving the impact of increasing truck traffic congestion, and concomitant increases to
pollution, and noise. Making inland industrial growth more economically feasible, the
improvements will expand the locational options of industry, reducing long-standing
trends concentrating industry within the city.

Shanghai’s choice of a location outside the central city for its port capacity expansion
projects contributes to the reduction of these and similar pressures. It makes possible
transport routes that bypass the city and helps mitigate what could be additional impacts
on the city of meeting landside access needs. It provides for room for expansion to
respond to capacity demands that cannot be met through greater efficiency alone.

27 World Bank, (R. Carruthers, IFPCD Conference, 1999)
Hong Kong's current and planned port development is sufficient to meet capacity needs until nearly the end of the decade. Current container throughput (year 2001 data) at container terminals, river trade terminals, midstream operations, and public cargo working areas is 19.6 million TEUs for the total of ocean-going and river trade. Current quay length is 6,000 meters at Kwai Chung, location of its 8 existing container terminals, and Stonecutters, 7,750 meters at public working cargo areas, and 3,000 meters at its one river trade terminal at Tuen Mun, built in 1999; supply of back-up land is 3,310,000 square meters. Completion of the construction of six berths by 2004 at a new container terminal on Tsing Yi Island will bring the total number of berths to 25, the number of container terminals to 9, and capacity nearly reaching forecast demand of 31.1 million TEUS for 2011. Current and planned supply of back-up land will carry the Port through same time period. According to projections made in 2000-2001, demand for container handling capacity will rise to 40.6 million TEUS in 2020, more than doubling over the next twenty years. The "way forward" to meet this 2020 projected capacity need, according to the Port's current statement in its Port Development Strategy Review 2001 (PDSR), is to identify container terminal sites outside the Kwai Chung basin and to incorporate river trade facilities in future container terminal development. The Port touts its innovative use of mid-stream operations, which increase cargo-handling capacity without requiring land.\(^\text{28}\)

Hong Kong has begun the preliminary planning necessary to meet its currently projected 2020 port development needs, a process its expects to be contentious. It notes the growing importance of quality of life issues and growing public concern over large-scale reclamation projects and environmental impacts. The impact of strong competition for use of the waterfront for public access and enjoyment has already been felt. A Disney Theme Park has replaced its planned development for two container terminals on North Lantau Island. The government has informed operators at some public cargo working areas that their areas will be affected by plans and projects developed to address the need for open space and tourism and other uses. In response, the Port is exploring how to improve productivity in the Kwai Chung Container basin and has recommended establishment of a task force to pursue this objective. It is anticipating that in the long term back-up land would be located on the mainland. The existing facilities of Kwai Chang basin are located on the mainland of Hong Kong eight to ten kilometers from the central city on Hong Kong Island. While the central city is known for its high building and population density and congestion, Hong Kong is described as "...a well-ordered city...[where] the landscape takes central place...[a city]...focused on trade, intelligence, industry, and nature, with a huge well-ordered dynamism."\(^\text{29}\) It is also described "...as an exemplar of modern urban planning...yet...[having] certain heretical characteristics...[violating]...many of the taboos of modern planning." Among these is adjacency or the proximity of people and structures: "...its adjacency condition is akin to that which existed in medieval cities."\(^\text{30}\) In this urban context, its preliminary search to identify sites for future container terminals has resulted in the identification of four sites,
some on offshore islands, some closer to Mainland China, and most at much greater distance from the historic center. Compatibility with surrounding uses and environmental acceptability were key criteria used to derive a short list of potential sites. The port seeks to ensure that the best port development options are identified in terms of their sustainable development implications and will require a detailed follow-up study of these sites. Sustainable development is a priority on its list of long-term strategic development issues, and the Port has explicitly stated that future port development strategy would need to be based on the principles of sustainable development, noting that it is the key to a good quality of life. It also indicates that the current Port Development Strategy Review is to be coordinated with the development Hong Kong 2030 Planning Vision and Strategy (HK2030) that is currently underway.\(^{31}\)

Objectives of the HK2030\(^{32}\) falling under the overarching goal of sustainable development are potentially conflicting and will require a delicate balancing act, as many port-cities have experienced. The other elements of the Port's strategy, described below, reveal just how difficult this balancing may be.

Beyond meeting its capacity needs, the Port has another objective: to strengthen its competitive position vis-a-vis regional ports. That the majority of Hong Kong's industrial activity has relocated to the Pearl River Delta (PRD), 80% of Hong Kong's cargo comes from the PRD region, and container ports in this region were growing by 30%, compared to a 10% growth rate for Hong Kong, underscores the significance of the objective. A study undertaken to achieve this objective reveals the vision in its title: *Competitive Strategy and Master Plan for Hong Kong as the Preferred International and Regional Transportation and Logistics Hub 2001*. To expeditiously address issues concerning Hong Kong's logistics accessibility, the study identifies the following target projects for implementation in an initial accelerated three-year phase, beginning with the plan's completion:

- **Creation of Value-added Logistics Parks.** The first park is to be located at the airport with subsequent parks to be developed at Tsing Yi and Tuen Mun. Interestingly, these latter were two of the four short-listed sites for container terminal development all of which were evaluated for their size and development potential, including their ability to accommodate logistics parks as well as other development, a preferred feature; the sites scored poor and fair respectively on this criterion. The Parks are to be connected by dedicated rail and road corridors to the location of future high-speed boats (see below) as well as the airport.

- **Establishment of Fast Track Pipelines for:**

  - **PRD Road connecting Mainland China gateways, freight villages and inland ports together with facilities for customs, licensing, and other support needs (focus Eastern PRD).**

\(^{31}\) Port Development Strategy Review 2001, Executive Summary, 9/01.

\(^{32}\) Identified in Newsletter Issue No. 2 2001 posted on the Web site established for the planning process.
• PRD High Speed Boat - for time sensitive freight transport within the Western PRD and also including the means to meet facility and operation requirements concerning customs, etc.

• Establishment of an Inland Logistics Rail Pipeline involving the rail feeder being developed to the mainland and in conjunction with the development of a freight village at Pinghu and again with facilities for customs, licensing, and other support needs.

Given the proposed location of its logistics parks, Hong Kong, it appears, is choosing to site these facilities with their associated access needs within its boundaries on the waterfront in close proximity to its terminals, despite the competition for waterfront space.
Map 2: Hong Kong

Source: Executive Summary, Port Development Strategy Review 2001, 9/01
According to the Environmental Protection Department, Hong Kong, like other urban areas of China, is besieged with environmental problems concerning air, water, and noise pollution to which port development can contribute. Environmental reports indicate measures are being put in place that will help achieve sustainable development objectives. China has ratified four of the five annexes of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). Strategic environmental assessments are required for designated projects and there is a sophisticated environmental management program for contaminated dredged material.\textsuperscript{33}

One of the HK2030 objectives is to provide a framework to develop a safe, efficient, economically viable and \textit{environmentally friendly} transport system. In 2000, modal shares for freight transport were approximately 60\% for seaborne, 20\% for river, 18\% for road, 2\% for air, and 0\% for rail. River and road shares have been growing significantly over the past decade. As described above, strengthening the intermodal links of the port is being pursued to enhance the Port's competitive position. The PDSR sees strengthening the rail link, in particular, as a way to increase opportunity by gaining deeper inland access to sources of cargo north of the PRD. While not pursing this tactic to reduce environmental impacts, it would be the effect. The PDSR supports a proposed rail line, which the Koolong-Canton Railway Corporation is assessing for economic viability; steps have been taken to reserve the alignment for the rail.

\textsuperscript{33} State of the Environment in Asia and the Pacific 2000 and Managing Environmental Issues in Port Development and Operation: Compliance and Cost Considerations, S. Clarke, Port Technology International.
SINGAPORE

Total container throughput for the Port of Singapore increased from 15.1 to 17.1 million TEUS between 1998 and 2000, dropped to 15.6 million TEUS in 2001, and given the trends thus far this year, appears to be increasing again. Capacity is expected to more than double over the next several years with the completion of planned port development.34

The Port has four container terminals, Brani, Keppel, Pasir Panjang, and Tanjong Pagar, all privately-operated by the Port of Singapore Authority Corporation (PSA). These terminals have a total of 21 main berths and 16 feeder berths and cover an area of 3,390,000 square meters. Pasir Panjang, which currently has six berths that are in full operation, will have a total of 49 berths and 36 million TEUS of handling capacity upon completion of its four phases of development in 2009; draft is 15 meters. There are six Free Trade Zones within the port area and four major Distriparks with over 500,000 square meters of storage space near the port.35

The Port of Singapore is facing increasing competition from emerging regional ports of Tanjung Pelepas (TJP) in Malaysia and Leam Chabang in Thailand. TJP will get a boost from recently occurring events and additional expected actions. In the spring of 2002 a new rail link opened connecting TJP to the national rail network that extends to Thailand, effectively extending its hinterlands to this country. This is to be followed by the planned opening in 2004 of a smoother 250-mile double-tracked line from just south of Kuala Lumpur to near the border of Thailand, as well as further equipment upgrades and other steps that will improve rail efficiency. Most Thailand container transport currently moves via Singapore; with the rail opening, this is expected to change, as rail transport via the Malay peninsula will take half the time of sea transport. Ultimately this rail stretch will be part of 3,400-mile trans-Asian rail network that is expected to be completed in several years. In addition to the anticipated loss of traffic resulting from this rail opening, a major shipping line is to relocate its operations from Singapore to TJP later this same summer, the second such move by a major carrier.36

Development of Pasir Panjang, a mega-terminal, which PSA describes as its most advanced, is emblematic of the Port and port operator's strategy. Both champion high productivity and efficiency. Evidence of this emphasis by the Maritime and Port Authority (MPA) can be seen in its recent master planning effort that aims at a port that is more innovative, adds more value, and moves faster than its competitors in achieving these ends. A key proposal of the resulting Port Improvement Plan calls for the Port to assess the latest technological developments to improve management and efficiency of its operations. The PSA has similarly displayed this emphasis in its investments in state-of-the-art technology at its terminals and its stress on its role in providing global, integrated logistics services.37

35 Maritime and Port Authority and Port of Singapore Authority Corporation Web sites.
36 Journal of Commerce, 4-5/02.
37 Maritime and Port Authority and Port of Singapore Authority Corporation Web sites.
Beyond improving competitiveness, higher productivity and efficiency reduces terminal acreage needs. This is a particularly important benefit in Singapore, an island nation with a small land area and dense population, where, according to the City's Concept Plan 2001, the scarcity of land is the main planning challenge. Reclamation has been a widely used solution to this dilemma to date, creating 6,000,000 square meters of new space. The Concept Plan points out, however, that this option has a limited future because of Singapore's proximity to neighboring countries.

**Map 3: Port of Singapore Container Terminals**

![Map of Port of Singapore Container Terminals](http://www.singaporemaritimeportal.com/layoutcontainerBig.htm)

Competition for space by port and non-port uses is thus inevitably an issue. The Concept Plan promotes a range of uses: housing, recreation, infrastructure, commercial uses, and those that reinforce the identity of the City. The City's Economic Development Board (EDB), which has a vision to make Singapore an Asian-Pacific logistics hub, promotes elements of the City's Concept Plan and Port Improvement Plan: it is committed to strengthening the seaport, airport, and petrochemical industries, in connection with value-adding logistics activities. Another government priority is tourism; the attraction of Singapore to tourists is believed to require protection of the tropical environment as well as activities enjoyed by tourists. While some of these land use objectives are compatible, others are potentially in conflict and must be balanced. The Concept Plan is said to be successful in achieving this balance; reports indicate that stringent planning through both the Concept Plan and Singapore's progressive Green Plan, as well as zoning and development guidelines, provide for optimal land usage, proper siting of industry, and buffering.

The first three container terminals developed in Singapore are clustered in a location about ten minutes' drive from the central business district, financial districts, and city area; one of these terminals is located on an island opposite the others and connected to

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39 Preliminary Assessment of Singapore's Environmental Law, Alan Tan, National University Of Singapore, 1998
the main island by a bridge; just beyond is a second resort island, dedicated to major recreational functions. Pasir Panjang, its newest terminal, is located 7 kilometers west of the other three at a greater distance from the CBD, along a major road, and is integrated operationally with the other terminals. It is being constructed on reclaimed sandfill, using a technology that is aimed at minimizing the impact of an earthquake.

Industrial areas and activity within these areas are substantial in Singapore, and continue to be promoted by its EDB as well as the MPB, in particular, as mentioned above. The Concept Plan 2001 shows most large industrial areas on the coast or with access to it. The Free Trade Zones, which are within the port area, contain two million square meters of storage space. Of Singapore's four Distriparks, all operated by PSA, three are located at its container terminals, one each at Keppel, Tanjong Pagar and Pasir Panjang. Keppel Distripark, the most advanced technologically, is described by PSA as an ultra-modern cargo distribution complex with key activities including cargo consolidation and de-consolidation, storage and regional distribution, logistics management, cargo sampling, surveying and remarking as well as re-packing of containers. Pasir Panjang includes a vehicle processing and central distribution center for the export of paper and pulp products. Planned projects include setting up a major chemical logistics hub on Jurong Island, which hosts 55 petroleum and chemical companies. Singapore, which, given its small island-nation status, has limited options for relocating industry within its borders, is siting port-related uses on its waterfront. Landside access that is necessary for this industry is available through Singapore's extensive network of expressways; such access issues play a minor role for the port, in general, as it is primarily a transhipment hub.

The Port Improvement Plan identifies the promotion of Singapore not only as an efficient port, but also as a safer, cleaner, and cost-effective port, as a primary guiding principle. The reduced need for terminal acreage notwithstanding, increased efficiency, in bringing increased trade traffic, is potentially in conflict with its environmental objectives. The PSA appears responsive to these concerns in seeking development work on environmentally friendly equipment in addition to its other acquisitions for the Pasir Panjang terminal. The difficult task of balancing economic and environmental elements of sustainability falls to the MPA. With responsibility for enforcement of environmental regulations, the MPA must determine whether any proposed terminal construction complies with marine and environmental standards.

The main environmental problem is the prevention of marine pollution in an area of heavy marine traffic. By all accounts, Singapore's record of performance in environmental management and sustainable development is solid. It is described as taking the appropriate measures to avoid or minimize the risk of an oil spill, including prevention, monitoring, and mitigation measures. The products of a study commissioned in 1996 concerning oil pollution, include an oil spill combat and damage

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40 US Department of Commerce, 699
41 Port of Singapore Authority Corporation Web site.
42 Singapore Economic Development Board Web site.
assessment plan, as well as management and decision support tools.\textsuperscript{45} It has ratified three of the five annexes of the International Convention for the Prevention of Pollution from Ships, (MARPOL 73/78).\textsuperscript{46} Finally, it is part of a Mallaca Straits Demonstration project of the Partnership in Environmental Management for the Seas of East Asia (PEMSEA) on the use of risk assessment and management in effectively managing marine pollution.\textsuperscript{47}

In summary, space and environmental issues make obtaining land for development and complying with the environmental regulatory framework hurdles for port capacity expansion in Singapore. With port-related, value-added activities promoted as city-based uses and development of them occurring within or near the port, the positive economic impact of these activities is not diverted. Given a limit on land reclamation in the future, and highly dynamic trends in the port industry, the cost vs. benefits of these land use policies could shift, leading to policy change.

\begin{footnotesize}
\begin{enumerate}
\item Coastal Zone and Environmental Resource Management Project, Singapore Case Study, CZERMP Singapore Web site.
\item Managing Environmental Issues in Port Development and Operation: Compliance and Cost Considerations, Shelley Clarke, Port Technology International.
\item PEMSEA Web site.
\end{enumerate}
\end{footnotesize}
HAIPHONG

Extent of pressures

**Current Throughput/Capacity.** While data varies with the source, container throughput at 230,000 TEUs is reported to have doubled between 1995 and 2000 at the main Port of Haiphong, including the old port terminals and Chu Ve Port.\(^48\) The Haiphong government in 2000 projected the total cargo throughput for these terminals for that year to be 7 million tons and total cargo capacity to increase to 12 million tons in 2010.\(^49\) Government officials indicate that with the rehabilitation of Chu Ve, its container capacity will reach 500,000 TEUs. Completion of the new Dinh Vu Port, located near the main port and within the Dinh Vu Industrial Park, will reportedly bring an additional 12 million tons of capacity on-line.\(^50\) At the deepwater Cai Lan Port, 50 kilometers northeast of Haiphong, capacity is projected to rise to 18-25 million tons of mostly containers with its expansion done in 2010.\(^51\) These expansion figures would indicate a total 2010 capacity for Haiphong and Cai Lan combined of 42-49 million tons. The aggregate demand forecast in 1999 by the World Bank for 2010 for the northern ports of Vietnam is approximately 19 million tons.\(^52\) Under the government endorsed 10-year plan of the Vietnam Port Association, the goal for handling capacity in the northern ports, a group comprised of 24 ports under its reorganization, is 21-24 million tons in 2003, and 60-70 million in 2010.\(^53\)

<table>
<thead>
<tr>
<th>Table 9: Haiphong and Area Port Throughput and Projected Capacity</th>
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<tbody>
<tr>
<td><strong>Port</strong></td>
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<tr>
<td>------------------------</td>
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<tr>
<td><strong>Throughput</strong></td>
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<tr>
<td>Haiphong Port</td>
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<tr>
<td><strong>Projected Capacity</strong></td>
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<tr>
<td>Haiphong Port</td>
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<tr>
<td>Dinh Vu Port</td>
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<tr>
<td>Cai Lan Port*</td>
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</tbody>
</table>


\(^{49}\) Haiphong government Web site, socio-economic indicators, 2000. If the World Bank's high containerization ratios for Vietnam were applied, the container handling capacity for 2010 would be 360,000 TEUs. Vietnam Moving Forward -- Achievements and Challenges in the Transport Sector, World Bank, 1999.

\(^{50}\) A CNC news report of 5/98 states that the first phase of this three-phase project was completed in '97 and that the remaining phases were expected to be done by 1999. A review of port status in 2000 on the Haiphong government Web site refers to this port as one to be built. Note that the target of the City's 1994 Master Plan for 2000 was 6-7 m tons and for 2010 10-20 m tons. (Nigel, 1998).

\(^{51}\) Vietnam Marine Transport -- Its Current Issues and Future Development Directions, D. Nguyen and M. Le [date]


\(^{53}\) BBC/VNA, '02.
Capacity is a function of not only port acreage, but also handling facilities and other operational factors, which are a problem in Vietnam's ports. While unlike most of the ports in Vietnam, Haiphong has modernized equipment, it has operational deficiencies consistent with the country norm, for example, not meeting international standards for operator container lifts on and off per hour.\textsuperscript{54} Capacity has expanded in Haiphong with equipment updates acquired over the past few years and stands to increase with improvements in operational approach. The government's 10-year plan calls for raising facility standards to that of other countries in the region.

**Urban Context**

**Congestion.** Currently, with motorization rates low, Haiphong has neither a problem in congestion nor air quality, though these are potential future problems. While the City’s rate of natural population increase barely reaches replacement level, this will change in the future if the economic growth occurs that is predicted. Labor demands will dictate a rapid increase to avoid stagnation of the economy that would result without it. The World Bank has reported signs that Vietnam’s urban growth will accelerate through rural to urban migration and projects that between 1990 and 2020, the country’s urban population will increase by a factor of two, to reach 45\% of the population total. With infrastructure unlikely to keep up, congestion is a probable outcome, as well as deterioration in air quality from vehicular pollution.\textsuperscript{55} A case study on Haiphong cites these as threats and something it would be wise for the City to address in its planning efforts.\textsuperscript{56}

**City Development/Space.** A series of reports on Haiphong, undertaken in the late 1990s, have analyzed its development conditions and recommended a strategic vision for consideration by the government. The reports find that between 1970 and 1990 Haiphong’s development was dominated by heavy industry, but that this has changed. Recent trends show a rapid rise in export-led light manufacturing, which by the mid-nineties employed a quarter of the city’s workforce. This, according to the reports, represents an unrecognized shift in the economy’s structure that should be fostered. Their findings indicate that Haiphong’s future depends on promoting a multi-functional economy, including a light manufacturing exports sector and a service sector, to complement its implicit strategy in support of industrial parks and export processing zones, a strategy consistent with the interests of the central government. The vision is based on trends found in developed and developing countries -- that the experience of cities everywhere is one of the relocation of industry to the urban periphery. The vision also reflects the trends found when economic competition is introduced, viz., that most heavy industry tends to close, with survivors also relocating to the outskirts, a pattern reinforcing the larger industrial relocation trend. As these reports indicate, the relocation

\textsuperscript{56} LED Case Studies -- Haiphong, Vietnam, World Bank.
of port industry is part of this larger trend. The strategy recommended in these reports is that Haiphong follow these trends.

Map 4: Haiphong, Vietnam

The reports also find that, in light of the economic changes that have taken place in Haiphong, it is probable that the port no longer plays a decisive role in the city’s economy. They argue that it will play even less of a role as the port modernizes and its labor force declines and port-related activities move inland, and along with this port-dependent industry, moves which they promote. This is believed good policy for port-cities in general, and for Haiphong, in particular. They cite the reasons applicable in the case of Haiphong:

**Spatial Limitations.** Two of three sets of the Port's wharves are located in densely developed areas in which land, already cleared to meet spatial needs, is inadequate for significant expansion.

**Vessel Weight Limitations.** A third set of wharves, which have expansion and improved road access potential (this latter with the completion of new routes bypassing the city and connecting to the wharves), have a vessel weight limitation of 10 DWT on its navigation channel, even with dredging.

The reports see the potential for a mutually beneficial relationship between former port and non-port industrial inner city sites opened to service sector uses and dispersed port and manufacturing sites. The suggestion is that the city will become an increasingly specialized service center drawn upon by the nearby Red River Delta and the corridor to the north to Hanoi. The vision, in particular, is one of the city transforming to a logistics and management center, “…initiating and mediating between distant suppliers and buyers of manufactured goods and of traded services between foreign and domestic markets.”

The reports also see the potential significance to the Haiphong economy of the proximity of multi-modal transport connections -- the city’s Cat Bi airport, upgraded to an international airport, southern container ports, the Dinh Vu Industrial Zone, inland water routes, and rail and road connections to Hanoi -- in that these could comprise Vietnam’s first intermodal transport junction.

**Port Development.** The foregoing planning recommendations notwithstanding, investments have been made to rehabilitate the main Port of Haiphong and improve and enhance its facilities. In the period 2000-2010, Chua Ve, part of the main port cluster, is to undergo additional expansion, including the construction of more berths, beyond the current area of 600,000 square meters (the reported size of the total working area in 2000) and berth length of 2700 meters. Planned dredging of the channel will increase the vessel weight accommodated from 8,000 to 10,000 DWT. Five kilometers south of the central city, the Dinh Vu Port has been developed within the Dinh Vu Industrial Zone. While close to the city, the port is on a peninsula, which gives it geographical separation. Its area of 1,450,000 square meters is more than twice the size of the main port. Channel depths allow passage of ships of 30,000 DWT. Handling capacity at

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### Table 10: Haiphong and Area Port Development: Planned and in Progress

<table>
<thead>
<tr>
<th>Terminal/Location</th>
<th>Capacity</th>
<th>Phase/#/date</th>
<th>Berths #/length (m)</th>
<th>Berth Depth (m)</th>
<th>Vessel/Weight k DWT</th>
<th>Area m²/Stacking Capacity TEU</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Haiphong Port Cluster</strong></td>
<td>200k TEUS - '98 total; 12m tons, total projected for '10</td>
<td></td>
<td>-/2,705</td>
<td>7.5</td>
<td>8; 10-planned, completion date not known</td>
<td>600k m²</td>
<td></td>
</tr>
<tr>
<td><strong>Main Port Berths</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>One, Two, and Three</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Chua Ve</strong></td>
<td>500k TEUS Planned</td>
<td>'95-'98</td>
<td>3/150m each - completed '98</td>
<td></td>
<td>Located within 750k-square meter Chua Ve Industrial Zone</td>
<td>3 gantry cranes, 2 in-stalled in '98</td>
<td></td>
</tr>
<tr>
<td><strong>Dinh Vu</strong></td>
<td>12m tons - upon project completion in '99</td>
<td>'00-'10 additional expansion, more berths</td>
<td>-/3,400</td>
<td>30</td>
<td>1.45m square meters</td>
<td>9.82 m - total of industrial zone</td>
<td></td>
</tr>
<tr>
<td><strong>Cai Lan</strong></td>
<td>18-25m tons, mostly containers, projected for 2010</td>
<td>Container terminal completed '00</td>
<td></td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>42-49m tons</strong></td>
<td><strong>6,700+</strong></td>
<td></td>
<td></td>
<td><strong>2000k +</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Haiphong government Web site, socio-economic indicators, 2000 and Dinh VU Economic Zone Web site

A million tons is equal to that projected for the main port in 2010. Under the government-endorsed 10-year plan of the Vietnam Ports Association, which reorganizes the country’s
port system and establishes funding priorities, significant investment is to be made in the Port of Haiphong, including financing for its dredging.\(^{58}\)

The improvement program for the Port of Haiphong addresses the need for enhanced landside access. National Road No 5, one of the most important in the country, has been extended to connect to Chu Ve. This road links with National Road No 1 that runs to the northern provinces and via Hanoi to Ho Chi Minh City and the southern provinces. Planned upgrading of national Road No 10 will improve connections between the Port and the industrial area of Quang Ninh. Rail access between the Port and the southern provinces of China that are undergoing rapid economic expansion will increase in efficiency with the revitalization of the Haiphong-Hanoi-Lao Cai railway.

Port development thus includes improvements to the main port in the central city, encompassing expansion, enhanced landside and waterside access, facilities and operational approach, as well as development of a new port further south of the central city with the substantially better land and waterside access its location affords.

The Chua Ve Industrial Zone, which includes the port, is a 750,000 square meter site that will host warehousing facilities and some light industrial uses. The 9,820,000 million square meter Vinh Vu Industrial Zone will be the location of various industries and a trade center in addition to marine terminal and warehouse functions.\(^ {59}\) The broader economic zone in which this industrial site is situated includes a 250,000 square meter area for residential and commercial activity. Thus this new zone with a location slightly removed from the central city will include mixed uses, albeit in segregated sub-areas.

**Constraints**

With the old Port remaining in the central city twenty miles upstream on the Cam River, significant spatial and navigational access constraints will remain, as noted previously. Improved transportation connections are providing alternatives to the use of local roads and together with improved equipment and operations are providing for improved efficiency, and thereby increased capacity and more intense utilization of existing resources.

While port development at Dinh Vu in Haiphong is providing for more capacity in a location with deeper water, Cai Lan Port, located 50 kilometers northeast in neighboring Quang Ninh province, is undergoing expansion and has deeper water, accommodating vessels of 50,000 DWT, and will be a competitor.

Environmental issues have been identified. Haiphong Port is reported to be the source of marine pollution threatening the local environment and neighboring sensitive eco-systems in Halong Bay.\(^ {60}\) Development of Dinh Vu Port involves land reclamation and other activity that will have environmental impacts.

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\(^{58}\) Haiphong government Web site, socio-economic indicators, 2000 and Dinh VU Economic Zone Web site.  
\(^{59}\) Haiphong government Web site et al.  
\(^{60}\) Trimar, private sector consulting firm.
Steps are being taken in light of these potential environmental threats and impacts. A plan has been developed by a private consultant to address the marine pollution of Haiphong. It includes an Oil Contingency Plan covering the port and its approaches as well as an environment sensitivity map. Another project, supported by the Vietnam Economic and Environmental Management Program (VEEM), will document the threats to the biodiversity and sustainability of Haiphong’s tidal wetlands and recommend solutions. To protect the sensitive coastal zone, national heritage sites, and other environmentally-sensitive areas, a number of studies recommend adoption of what is a guiding principle of good environmental planning, i.e., the integration of the treatment of environmental concerns in strategic development plans. The Case Study on the Local Economic Development of Haiphong identifies this as a means to improve the City's “Livability”.

**Competitive pressure/Logistics accessibility.** Issues of Haiphong’s product and logistics accessibility as affected by the problems of Vietnam’s transport sectors are covered in depth in another document in this series. Suffice it to say here that all sectors are in need of improvement and international development banks and overseas development agencies are assisting the Vietnamese government in making the necessary changes.

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61 VEEM: Study on Biodiversity Protection of Tidal Wetlands in Haiphong Area, supported under the Natural Resources Component of the VEEM project being funded by CIDA and the International Development Research Centre, Ottawa, Canada (IDRC). [http://www.idrc.ca/cbnrm/program/Project_List/number21.htm](http://www.idrc.ca/cbnrm/program/Project_List/number21.htm)
SIHANOUKVILLE

Extent of pressures

**Current Throughput/Capacity.** Total throughput for dry cargo at Sihanoukville Port increased 48% to 636,000 tons between 1991 and 1995 and increased 16% to 1.3 million tons between 1995 and 2000. As a result of its 1996 rehabilitation and additional planned and funded improvements scheduled for completion in 2003, capacity shortage does not appear an immediate problem. With throughput expected to double by 2007, however, capacity increases through updated handling equipment, further expansion, and berth and basin dredging may eventually be necessary. Even without capacity problems, competitive pressures may compel efficiency enhancements. A comparison of throughput trends in Sihanoukville and Phnom Penh between 1990 and 2000 indicates that Sihanoukville has emerged as the main port of the country.²

**Urban Context**

**Development.** Sihanoukville is a provincial city with an extensive coastline of sandy, relatively pristine and undeveloped beaches. The Port area sits adjacent to these beaches and a marine national park. The City's downtown area, situated off the waterfront, is some 3 kilometers from the Port. With the country's only deep-water port and the resources for a marine/coastal eco-tourism, Sihanoukville has been identified as one of three economic development areas in Cambodia. Capitalizing on the assets behind this selection, the City's development strategy focuses on tourism, port expansion, and industry. Tourism development is expected to be an economic driver leading to development of a commercial center and is already producing rapid growth in the surrounding area. It is anticipated that the port, as a hub for the expansion of maritime transport, will attract additional industry. An industrial zone has been established that includes petrochemical production and food-processing based on local fisheries and other elements. With new investment in these areas, the hope of the development strategy, there will be increased urbanization of Sihanoukville, with growing economic opportunities creating the incentive for migration from rural areas.

Urbanization will put pressure on the City. Infrastructure, in general, is inadequate to meet the needs of the current population level. While one of the major and premier roads of the country connects to the Port, it is congested, and the road network within the rest of the City, like the rest of the country, is sparse. The three economic development

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sectors being promoted are potentially in conflict and have the potential to cause adverse impacts on the environment. These impacts would threaten the fragile coastal resources on which tourism and some key industrial activity is based.63

Map 5: Sihanoukville, Cambodia

Source: Port Authority of Sihanoukville - http://www.pas.gov.kh/location.htm

Port Development. With the completion of planned improvements in 2003, the existing berth length of 930 meters will significantly increase; 11 existing berths are to be expanded and a new quay of 400 meters and an additional four berths are to be constructed. Waterfront covered and uncovered storage areas of 96 square meters will increase by 580 cubic meters through land reclamation. Additionally, basin depths will

63 Vann Monyneath, The Status of Cambodia's Coastal and Marine Environment- Emerging Policies and Management Strategies.
increase to 8.5-9 meters and container handling equipment improved. The Port is already served by three dry ports, one port-operated that is located on the outskirts of Phnom-Penh and that is 190 square meters in area, and two that are privately-operated, one at the airport, and another north of the city. Details of port development are presented in the Table below. The information on projected demand and capacity seems to indicate port development capacity planning to be carried out well.
### Table 12: Sihanoukville Port Development: Planned and in Progress

<table>
<thead>
<tr>
<th>Terminal/Location</th>
<th>Phase/#/date</th>
<th>Berths -#/length (m)</th>
<th>Berth Depth (m)</th>
<th>Area/Stacking Capacity TEU</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Old Quay</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>-/580</td>
<td>Jetty - 290 m,</td>
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<td></td>
<td></td>
<td>accessible on both</td>
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<td></td>
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<td>sides</td>
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<td></td>
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<td>7.5-8.5</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>12k m² - Warehousing;</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>35k - general cargo storage</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>7 mobile cranes</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(80 ton max); 5 super</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>stackers (45 ton max)</td>
<td></td>
</tr>
<tr>
<td><strong>New Quay</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>-/350</td>
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<td></td>
<td>10</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>24k m² - Warehousing;</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>25k m² container yard</td>
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<tr>
<td><strong>Dry Port/Port-operated</strong></td>
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<tr>
<td><strong>Planned</strong>, including road, power, lighting of Port area</td>
<td></td>
<td>New 400 m quay for general cargo; enlargement of 11 berths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Container terminal</strong></td>
<td>Phase 1</td>
<td>1/240</td>
<td>8.5-9 Basin</td>
<td>580k m³ - Land reclamation; container yard</td>
<td>2 Gantry cranes (50 ton)</td>
</tr>
<tr>
<td></td>
<td>Phase 2</td>
<td>3/450</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>&gt;2,520</td>
<td>&gt;280k m²</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Cambodia Country Framework Report for Private Provision of Infrastructure, 3/02.*

A feasibility study is currently underway to assess industrial growth opportunities of a Phnom Penh-Sihanoukville corridor (along National roads 3 and 4) developed in close relationship with the Sihanoukville Export Processing Zone. As with the dry port development, such corridor development would provide for off-waterfront growth of industrial activity with direct access to major transport connections.

The potential environmental impacts of port development, its transportation infrastructure needs, and associated industrial growth on sensitive coastal and other resources has been recognized in Cambodia. One report indicates that there is a lack of policy, guidelines, planning, enforcement, information, participation, and capacity, which will make development conflicts and their environmental impacts obvious. Discussion is taking place in some quarters of the promotion of eco-tourism over industrial development to take advantage of the lack of infrastructure and protect environmental and cultural resources from further degradation. An Integrated Coastal Zone Management (ICZM) framework is emerging to address these issues, responding to the need for both planning.

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64 Xinhua News Agency, 10/01.
and policy development and capacity building. Sihanoukville is getting assistance as an ICZM Demonstration Project of the Regional Program for Building Partnerships in Environmental Management and Protection in the Seas of East Asia (PEMSEA). PEMSEA-assisted workshops, including various stakeholders, took place last fall. They led to the articulation of a common vision on the future development of Sihanoukville: "...a beautiful, clean, and safe place to live in, with an international modern port, attractive marine/coastal eco-tourism, restored and preserved cultural values, preserved marine/coastal biodiversity and unique habitat, sustainable fisheries and viable local economy." Parallel assistance has been provided on the development of strategy and implementation measures concerning zoning controls, habitat protection, and integrated management systems. With an international port as a key element of its vision, the fleshed out strategy and implementation program will need to ensure that conflicts between this and other development are prevented or mitigated; this notwithstanding, the issue of providing for sustainable tourism seems to be generating the most interest.

**Competitive pressure/Logistics accessibility.**

**Roads.** While roads are the only transport sector with a national network in Cambodia, their geographic coverage is inadequate, and their condition and maintenance poor, with only a third being usable by motor vehicles. Traffic on them is rising and contributing to their poor condition as deterioration from use is occurring at a faster pace than repairs. The volumes they carry are double that of rail and sea.

The road transport industry in the country is relatively competitive and freight costs for container transport on its best highway, Highway 4, are lower than standard rates for an OECD country, though costs are higher and conditions worse on other roads. Highway 4 links Sihanoukville with the country's capital, Phnom Penh, and underwent recent massive reconstruction, but is now congested.

Road sector investment needs for the period 2001-2003 represent 74% of all transport sectors needs. Financing is available to meet 41% of estimated cost. Funding from donors, by agreement, will cover the improvement of 110 kilometers of priority national roads and bridges connecting provincial areas with the Port to promote economic development in rural areas.

**Rail.** Rail freight transport, though increasing generally between 1993 and 1999, has limited relevance to the transport of goods in Cambodia. Two domestic rail routes are available between Sihanoukville and Phnom Penh; while they have freight rates for their use lower than road rates for this itinerary, their poor condition constrains speed and capacity.

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65 PEMSEA.org news archive, 9/01.
While rail investment needs for the rail sector have been estimated at $108 million for the period 2001-2033, no sources of funding have been identified to meet these needs.

**Multimodalism**  According an ESCAP review of multimodal transport in its region, Cambodia met none of the five criteria concerning electronic data interchange and electronic commerce applications.

**Port Charges.**  For lack of competition, port charges are said to be the highest in the region. One negative impact of this concerns the use of the Port's cranes. To avoid the high charges of using tem, port users are employing vessels with on-board cranes, despite the increase in operating cost this means.
SECTION THREE: STRATEGY INDICATIONS

There are two principal strategy indications: Ports must sustain their competitiveness. At the same time, they must be good urban neighbors. Of these two, sustaining competitiveness must be the priority. Without sustaining its competitiveness, a port puts its future at risk, and along with it, the wherewithal to be the good neighbor, its commitment to this good neighbor policy objective notwithstanding. As a leading port has succinctly put it: a port must do well to do good.

This section, in reporting on strategy indications, has relied on the tracking and synthesizing of information on current trends in both international competitive standards, as well as effective implementation strategies to improve performance in meeting these standards, given the local socio-economic environment. These standards and implementation strategies are identified below.

These strategy indications are subject to change, as the environment in which ports operate is highly dynamic. Changes in trends call for concomitant changes in strategies. Ports must be ever alert to this volatility in trends and its implications; such vigilance must be a permanent element of their operations. While ports must keep an eye to the long term in defining their strategic direction, they must be prepared to make ongoing timely adjustments to this direction, as changing circumstances dictate.

Current trends indicate key standards for sustaining competitiveness and being a good neighbor. For sustaining competitiveness, these standards are:

- **logistics accessibility**, or efficiency in the integrated logistics of the transport and production of goods to meet consumer needs, an increasingly more decisive factor in both the choice of port as regional gateway and the attraction of value-adding activities critical to revenue and employment generation
- the **sustainability of development**, economically, environmentally, and socially, a standard intimately connected to quality-of-life issues
- a **knowledge-based culture**, providing the port the capacity to address the needs and make the best use of its local context and to manage the range of uncertainties, local and global, which are a constant

For being a good neighbor, these standards are:

- **Coordination of multi-jurisdictional interests and integration** of multiple disciplines, e.g., transportation, land use, economic, and environmental planning
- **Inclusive** planning processes
- **Communication** to all stakeholders
In the selection of strategies articulated below, priority has been given to those that meet the criteria of strategic significance to and cost-effectiveness in sustaining competitiveness and being a good neighbor.

**Sustaining Competitiveness**

- **Deciding overall strategic direction.** A port must decide its competitive strategy, based on a rigorous competitive analysis, giving particular attention to those strategy choices that represent significant commitments that will constrain later ones.

- **Making optimal use of existing port resources** through economically justifiable, environmentally enhancing improvements to logistics accessibility, when an alternatives assessment considering economic, environmental, and social impacts indicates that, on balance, continued use as a port resource is recommended. Exploring the potential opportunities of integrating port and city uses, as a way of making optimal use of existing port resources should be considered.

- Implementation of **competitive strategies** (environmentally friendly improvements to logistics accessibility and others) that do not require costly changes in infrastructure or formulation of a phased-development plan to gradually implement infrastructure changes, when re-location of the port is not an option and available funding is limited. Making optimal use of information and communications technology (ICT) or 'info-structure' can be a cost-effective strategy.

- Evaluation of the economic, environmental, and social benefits to be gained from **regional cooperation** -- vs. unchecked competition -- in allowing for management, efficiency, and rationalization of integrated transport and product logistics on a total systems-wide basis.

- Evaluation of existing and potential **complementarities** with other regional ports to identify and create the incentive for regional cooperation with beneficial effects.

- **Maintenance of channel depths sufficient for competitive status.** Especially when becoming or retaining hub or 'mainport' status is the objective, a port will need adequate depths, maintainable within an acceptable dredging budget, to provide for adequate navigational access to at least those container facilities key to meeting the full range of competitive requirements. Usually, locations with these depths have been available within city bounds, though frequently outside downtown areas. Generally, ports consolidate pivotal container terminals on sites further downstream, close to, if not at, a river's mouth, or offshore on reclaimed land forming an extension of the mainland or connected by bridge, or on existing coastal islands, expandable through reclamation. When the future portends regulatory compliance issues barring, delaying, or making too expensive the provision of adequate depths, then the port will need to adjust its strategic plan to this reality. These compliance issues potentially include the significant environmental impacts of dredging, disposal of dredged material, or reclamation, as well as limits on reclamation for other reasons.
Adequate depth will depend on the size vessel to be accommodated, which will depend on the port's strategic objective. It is important in choosing a strategic objective that consideration be given to the economics of increasing ship size on the shipping industry and port industry revenues.

- **Maintenance of space sufficient for competitive status.** Strategic planning to address spatial needs in existing port areas should entail determining whether, on balance, it would be more advantageous to reduce waterfront acreage needs and increase transport efficiency by strategically locating non-maritime activities inland. Strategic location considerations include proximity to major transport links and industrial activity and relief from development pressures, making land cheaper and more available to accommodate spatial needs -- both for port-related activities and buffering from existing or potential neighboring uses with which there could be a conflict. The relocation decision should be informed by an assessment of the impacts on the existing and alternative locations on direct and indirect employment generation in the long term. The analysis should consider the extent to which:

  - The dispersal of port-related industrial and other activities with high traffic impacts but economic promise for the future would have value in its own right and would create job opportunities in areas where they are needed, while at the same time potentially opening up urban space for activity also with strong positive and enduring direct and indirect employment impact, but less traffic impact.

  - Such dispersal, if encompassing non-water dependent, port-related, value-added logistics activities, would lead to a net negative impact on employment in the existing location, while potentially sowing the seeds of future port decline in a critical area of its competitiveness by a geographic separation of activities that would thereby inhibit necessary innovation and growth in other forms of its knowledge infrastructure.

- **Maintenance of inland access sufficient for competitive status.** There is a large menu of transportation infrastructure options for how ports can make improvements to inland access essential to its competitive status. These run the gamut from local improvements -- by-pass and port-connector roads, on- or near-dock rail, dedicated rail shuttles or truck haul roads providing links between port and inland terminals and major transportation routes -- to regional and national improvements that enhance a country's global logistics network. They also encompass geographically cross-cutting improvements that emphasize modal shifts away from road transport to such alternatives as inland waterway transport, that in relieving congestion, increase efficiency and reduce pollution. Equally important are alternatives, which do not include major infrastructure changes or when they do, serve to significantly enhance their benefits, that have been mentioned above. Info-structure improvements that enhance the flow of information necessary to the flow and parallel processing of goods, regional cooperation, and better freight and spatial planning to ensure among
other things, fuller loads per trip and reduced mileage, are on this list, and are all means by which a systems-wide transportation approach can be taken with systems-wide efficiencies gained - making possible, as noted above, a sharing and fuller use of infrastructure, increasing the complementarity of the transport network and reducing its redundancy. In making these decisions about these options, ports need to coordinate with local and national government levels and the various sectors -- transportation, spatial planning and environmental -- of these government levels with a jurisdictional interest in these decisions. The overall strategic direction the port has selected needs to guide these decisions. These decisions also need to be informed by analyses identifying strategic missing links and key bottlenecks to be overcome in the transportation network needed to implement the strategic plan. These findings need to be integrated with the findings of the analysis of the economic, environmental, and social impacts of choices. Such information should provide the economic justification for choices. It should further provide the basis for a prioritization of investments in options that will optimally enhance inland access in light of the trade-offs to be made when environmental and social, as well economic impacts are taken into account.

- **Maintenance of product logistics accessibility and value-added activities sufficient for competitive status.** In defining its overall strategic direction, a port will identify its competitive goals in terms of the maximization of the tonnage vs. value of goods and position in the hierarchy of ports with regard to both transport and product logistics accessibility. If a port's strategic objective is dominance by value-adding activities, including, most particularly, the key logistics and distribution functions, trends indicate that a number of key factors must be in place, in addition to demand. Ports must develop a comprehensive, cohesive program for these activities that will differ in their spatial arrangement from traditional port activities in ways that go beyond the alternatives of waterfront vs. inland location. To provide for the necessary cohesion, the program of activities will need to be guided by the port's overall strategic plan and this plan will need to meet certain requirements; while defining the port's role in the global transport/production network, the plan will need to be fully integrated with broader such plans of the surrounding urban area, leading to implementation actions that are comparably integrated. To provide the supportive environment for these activities, ports must also move towards a knowledge-based culture, a culture in which information and knowledge, knowledge transfer, networks, education, innovation, and a context promoting innovation and experimental activities play a greater role. As with the strategic planning process, this transformation must involve more than the port and encompass the surrounding urban area. Ports must be prepared to establish the different organization and management framework requisite to both the strategic shift to increased product logistics accessibility and dominance by value-added activities and the concomitant different spatial arrangement of the network of these activities. Organizationally, ports may vary in the particulars in what will be most conducive to success organizationally, except that this organizational aspect, too, will need to be more integrated in the lifeblood and fabric of the surrounding urban area.
• When appropriate, identification of a new port location to overcome economic, environmental, and social constraints on existing port resources, while retaining high quality access to the urban area to be served:

A port development **plan should provide for long term needs to avoid repetition of past urban-based pressures and constraints.** As with any port development plan, the port development planning process should encompass the pro-active integration of environmental and social issues with economic issues. Guidance is available on the implementation of a model port development planning process that involves the integration these issues and the range of multi-disciplinary issues in the context of a planning process specific to port development. Guidance is also available on the next generation of environmental assessment procedures, the so-called, strategic environmental assessment, which focuses on the pro-active treatment specifically of environmental and social issues in any type of development planning process. As part of such planning process, site selection criteria should give due weight to quality of life and sustainable development issues, particularly the issue of consistency with ICZM and other such policies to restore, enhance, and prevent further degradation of coastal and environmental resources.

• **Management of uncertainty.** Because, as we have noted, uncertainty about the future is a constant, strategic planning and port development planning processes should take this into account through the advanced planning tools that are available for this purpose. The importance of this not only to port competitiveness, but also to being a good neighbor (discussed below), can be seen in recent examples: Rotterdam is modifying its port plans because proposed land reclamation must now meet both port and city spatial needs, reducing the amount available for port purposes. Hong Kong is identifying new port development sites -- meeting both capacity needs and sustainable development standards -- to replace previously selected sites now developed to satisfy City recreational needs. Shanghai currently plans to create a new island for offshore port development, rather than use a previously selected existing island that was found objectionable when social impacts were assessed in greater depth.

**Being a Good Neighbor**

Being a good neighbor can very effectively be addressed through port development planning that identifies this as an objective. The following should be incorporated in the port development planning process to attain this objective:

• **Coordination between the port, city, and region** to ensure integrated planning with regard to land use, comprehensive economic development, transportation, and the environment.

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69 Report on the preparatory seminar for Africa, Richards Bay (South Africa) AIWP, 3/00, Stuart Heather Clark.
• **Preservation of port space, avoidance of use conflicts, promotion of synergy.** As a target of city-port land use coordination, establishment of better land use policies designed to designate and preserve port expansion space, where feasible, and reduce use conflicts and promote synergy within and between port and surrounding areas. Urban design guidelines directed at the better integration of port and city uses can be an important element of these policies. Land use policy should reflect city-port coordination on economic development planning, which can be used to determine the potential for economic synergies within and between port and city uses.

• **Formal institution of good neighbor policies.** These frequently encompass the promotion of such objectives as: providing greater public access -- physical and visual -- to the waterfront both to industrial port areas (in ways that do not jeopardize safety) or port property dedicated to park space; and educating the public about the role of the port and its contribution to the region.

• Implementation of an **inclusionary port planning process**, one that provides for strong public participation programs and the involvement of key stakeholders. These should apply to discrete port development projects as well as comprehensive efforts to determine an overall development program for a sustainable future port. As noted above, the comprehensive process should be structured to build a consensus amongst all organizations with jurisdiction/interest (national, regional, city, port, et al.) first on a vision and objectives and then on a development program for achieving that vision. Key to this process is reaching agreement on criteria for formulating and assessing alternative development programs. This calls for clarification of the various objectives of the port, economic, environmental, and social/community, the performance standards for these different objectives, and the decision-making process for resolving conflicts between them. For example, the Port of Rotterdam has recently identified “improvement of the quality of the living environment “ of the Rotterdam region as one of its two main objectives, has specified the operational meaning of this objective, and further how this and the other objective of creating space for the port are both to be achieved. (See Box in Section One, above) The Port of Seattle in its Harbor Development Strategy 21 is another good example in its identification of a Triple Bottom Line measuring performance in terms of three categories -- economic benefits, environmental and community benefits, and financial performance -- as its basis for the choices and tradeoffs it must make.\(^{70}\)

• **Communication on Port Performance, Economic, Environmental, and Social.** Communication to the constituencies to which the port is accountable -- stakeholders and public -- of port performance in attaining agreed upon standards. Such report cards provide the basis for tracking port progress and putting in place necessary measures to improve performance, when necessary. It is important that these report cards indicate not just economic performance in terms of cargo volumes, as has more traditionally been done, but that it extends to the three key elements of sustainable development, economic, environmental, and social. Release of information on the

\(^{70}\) hds21@portseattle.org; also, Rafferty, L., City-Port of Seattle: A Performance Report Card, to be published, 2002.
full range of performance indicators can help a port in achieving optimal performance through stimulating self-regulation, rather than relying on external regulations alone to attain this objective. A World Bank Web site that provides assistance in assessing performance is available. Additional resources on performance standards should be looked to, particularly those developed by organizations based in the region in which the port is located.

Evidence is accumulating that for ports in an urban context, sustaining competitiveness in some instances may depend on being a good neighbor. Being a good neighbor is a way to overcome community objections that can prevent or significantly delay development critical to a port's future. A port's good neighbor policies directed most particularly at promoting sustainable port development, but in other important ways as well, can appreciably enhance the quality of life of an urban area, which is increasingly playing a role in decisions about investments in these areas, investment required to sustain port competitiveness.

Sustaining port competitiveness while being a good neighbor will depend on how well a port makes use of its differences in conditions to achieve these objectives. Port development strategies that improve competitiveness while generating jobs, thus enhancing the economic quality of life, make ports particularly good neighbors in the eyes of most communities. Not only port strategies, but also city strategies for economic development and land use can have an impact on port-related job generation (as well as non-port related employment). Some of the world's leading port-cities are exploring how the port and city can contribute to each other in promoting job generation amongst other benefits, how city and port uses can mutually sustain competitiveness and be good neighbors to each other.

71 /wbln0018.worldbank.org/twu/gfp.nsf
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