Vietnam Transportation Logistics Feasibility Study

(USTDA Activity Number 2007-31012B)

Final Report

August 2009

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This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U.S. Government.

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Glossary of Acronyms

3PL	Third Party Logistics Provider
ADB	Asian Development Bank
AFAS	ASEAN Framework Agreement on Services
AFTA	ASEAN Free Trade Area
AGS	Automated Gate System
AIA	ASEAN Investment Area
ASEAN	Association of South East Asian Nations
ASIA	ASEAN Investment Area
ASP	Application Service Provider
B2B	Business to Business
BIZA	Ba Ria-Vung Tau Industrial Zones Authority
BTA	Bilateral Trade Agreement
CAGR	Compound Annual Growth Rate
CCTV	Closed Circuit Television
CEPT	Common Effective Preferential Tariff
CFS	Container Freight Station
CHE	Container handling equipment
CMCT	Cai Mep Container Terminal
CMIT	Cai Mep International Terminal
CSI	Container Security Initiative
CTPAT	Customs-Trade Partnership Against Terrorism
DGPS	Differential Global Positioning System
DIZA	Dong Nai Industrial Zones Authority
dwt	Deadweight tons
EDI	Electronic Data Interchange
EIU	Economist Intelligence Unit
EPZ	Export Processing Zone
ETA	Expected time of arrival
EUROSTAT	Statistical Office of the European Union
Ex-Im Bank	Export-Import Bank of the United States
FCL	Full Container Load
FDI	Foreign Direct Investment
ft	Foot
FTA	Free Trade Agreement
G&A	General and Administrative
GDP	Gross Domestic Product
GMS	Greater Mekong Subregion
GOS	Gate Operating System
GPS	Global Positioning System
HCMC	Ho Chi Minh City
HEPZA	Ho Chi Minh Export Processing and Industrial Zones Authority
ICD	Inland Container or Clearance Depot
ICE	Immigration and Customs Enforcement

IMF	International Monetary Fund
IP	Industrial Park
ISPS	International Ship and Port Security
IT	Information Technology
IZ	Industrial Zone
JV	Joint Venture
kg	Kilogram
km	Kilometer
KPI	Key Performance Indicator
LCL	Less-than Container Load
m	Meter
MDU	Mobile Data Unit
MOL	Mitsui OSK Lines
MT	Metric Tons
MTO	Marine terminal operators
n/a	Not available
NVOCC	Non-vessel operating common carrier
OCR	Optical Character Recognition
OPIC	Overseas Private Investment Corporation
PCS	Port Community System
PCU	Passenger car unit
PNTR	Permanent Normal Trade Relations
PPP	Purchasing Power Parity
RDBMS	Relational Database Management System
RDT	Remote Data Terminal
RF	Radio Frequency
RFID	Radio Frequency Identification
RTLS	Real-Time Location System
SITV	Saigon International Terminal Vietnam
SKRL	Singapore-Kunming Rail Link
SOWATCO	Southern Waterborne Company
SPCT	Saigon Premium Container Terminal
SPPSA	Saigon Port-PSA Container Terminal
sq. km	Square Kilometer
SSIT	Saigon Port-SSA International Container Terminal
SSL	Secure Socket Layer
Tanamexco	Tay Nam Import-Export Trading and Producing Company
TANIZA	Tay Ninh Industrial Zones Authority
TCIT	Tang Cang Cai Mep International Terminal
TEU	Twenty Foot Equivalent Unit
TOS	Terminal Operating System
TIFA	Trade and Investment Framework Agreement
TRIPS	Trade-Related Aspects of Intellectual Property Rights
TSA	Transportation Security Administration
TSP	Terminal Security Plan

TWIC	Transportation Worker Identification Credential
UN	United Nations
U.S.	United States
US$	United States Dollar
USCBP	Unites States Customs and Border Protection
USDHS	United States Department of Homeland Security
USTDA	United States Trade and Development Agency
VEC	Vietnam Expressway Corporation
VICT	Vietnam International Container Terminal
Vinalines	Vietnam National Shipping Lines
VOIP	Voice Over Internet Protocol
VSA	Vietnam Seaports Association
WIM	Weigh-in-Motion
WLAN	Wireless Local Area Network
WTO	World Trade Organization
YTD	Year to date

Executive Summary

Study Background

The U.S. Trade and Development Agency (USTDA) provided grant support to Vietnam National Shipping Lines (Vinalines) to conduct the "Vietnam Transportation Logistics Feasibility Study". The objectives of the study are to profile the existing processes, information systems and infrastructure for handling import and export containerized cargo, and to make recommendations for future improvements to reduce the costs and improve the security of containerized trade. Vinalines contracted with SSA Marine to conduct the study. A U.S. company, SSA Marine is a leading independent marine terminal operator with terminal operations in North America, Panama, Mexico, Chile, Costa Rica and New Zealand. In Vietnam, SSA Marine is participating in development of new container terminals at Cai Mep to serve the HCMC region and at Cai Lan in Northern Vietnam.

As stated in USTDA's terms of reference for the study, the Host Country has seen an increase in sea-going cargo-based trade of more than 20 percent annually; HCMC accounts for 60 percent of the Host Country's maritime cargo movement. To keep pace, the Grantee seeks to identify an appropriate logistics system to reduce trade costs and improve trade security for their operations. The purpose of the study is to recommend appropriate telecommunications, information technology (IT) and software systems needed to improve cargo movement in and around ports and container terminals in the growing Ho Chi Minh City (HCMC). The study provides an assessment of the current state of container logistics for international cargo around HCMC, projects the anticipated trade growth for the next five, ten and fifteen years, identifies area for improvement and streamlining, defines improvements for the next five, ten and fifteen years, and identifies areas for U.S. involvement in the implementation of the project.

The Report is structured by task:

- Task 1: Review of Host Country's Container and Trade Trends
- Task 2: Review of Current and Future Infrastructure Plans
- Task 3: Survey of Companies Involved in Container Movement and Trade
- Task 4: Export and Import Cargo Process Maps
- Task 5: Technology Requirements and Solutions
- Task 6: Interim Presentation
- Task 7: Development of Implementation Plan and Cost Estimates
- Task 8: Development Impact Assessment

Principal Recommendation

The evaluation of the HCMC region logistics system for handling containers, along with a review of the region's container trade, identified several technology gaps that require addressing in order to improve the efficiency and security of the region's logistics system. The technology gaps center on the absence of IT systems to track and monitor the movement of containers between the container terminals and the various inland points, such as industrial zones, storage depots, and inland container (clearance) depots (ICD).

The study team identified a variety of IT solutions to improve the logistics system and the central recommendation is the establishment of a **Port Community System** (PCS). The PCS provides information services to the community outside of the port or individual container terminals in order to improve the overall efficiency of the logistics community as well as to offer improved security throughout the entire logistics chain. In addition, the PCS addresses many of the IT challenges encountered today, complements investments in physical infrastructure, and supports medium to long term trade growth. The PCS has several components that would be phased in over a five-year time horizon; elements include container enquiry functions, gate scheduling, trucker validation, online payment of fees, functions for ICDs, and barge operation features.

For PCS to succeed, there must be a relatively neutral Champion (or sponsor) who would be able to encourage the logistics community (terminals, trucking companies, ICDs, etc.) to participate. In the case of the HCMC region, it is recommended that an influential state-related body be identified as the Champion. The Champion should be well-respected with the appropriate commercial and government relations to pursue the PCS strategy.

Implementation and operation of PCS would be undertaken by a joint venture (JV) between a local Vietnamese company and an established PCS technology provider. The study team recommends the joint venture use an Application Service Provider (ASP) business model to establish and operate the PCS. This business model is a competitive cost solution by outsourcing the IT operation to a proven PCS solution provider with immediate access to PCS technology that can be modified to the local HCMC region environment.

The total 5-year cost to implement and operate PCS is projected to be US$1.29 million. This cost includes annual IT expenses (hardware and software system lease, PCS software licensing, and support services) and general and administrative (G&A) expenses. The cost may be funded from a variety of sources including internal resources of the study sponsor, a joint venture partner, multilateral and foreign government agencies, and on-going transaction fees.

The PCS supports the more efficient and secure movement of containers between the marine terminals and inland points by providing a neutral resource for the exchange of information on containers. The individual container terminal operating companies are responsible for selecting and managing IT technologies within their respective container terminals.

The principal recommendation is described in Sections 5 and 7 of the report. The remainder of the Executive Summary summarizes key findings on the structure of the HCMC logistics system and the recommendations proposed by the study team.

Task 1: Review of Host Country's Container and Trade Trends

The region under study is primarily centered on HCMC and the five neighboring provinces of Ba Ria Vung Tau, Dong Nai, Binh Duong, Tay Ninh and Long An. This region is the location of existing and planned urban and industrial centers that generate or will generate significant container cargo for the local container terminal system. Other geographic regions of interest are the provinces of the Mekong River Delta, to the southwest of HCMC, and Cambodia.

Population Trends

Based on a review of population trends, the HCMC container terminal system is projected to offer access to a direct market of 37.9 million people by 2020 and 41.1 million people by 2030. Extending the hinterland to incorporate transit access to Cambodia boosts the projected hinterland population to 56 million in 2020 and 61.9 million in 2030. Finally, the HCMC terminal system is centrally located in the Association of South East Asian Nations (ASEAN) region, which is projected to have a population of 708 million by 2030, placing the region third after India and China in terms of total population.

Economic Trends

Vietnam's real gross domestic product (GDP) growth is projected to increase by 3.2 percent in 2009 and 4.1 percent in 2010 based on a forecast from the Economist Intelligence Unit (EIU), compared to an estimated growth rate of 6.1 percent in 2008. The Vietnamese government's official growth target for 2009 is currently 6.5 percent. Supported by recovery of World economic growth, Vietnam's annual growth rate is projected to revert to between 5 and 7 percent in the period 2011 to 2015. The long term projection beyond 2015 is for annual growth of 4 to 5 percent. GDP and GDP per capita are projected to steadily increase over the approximately 20-year forecast horizon. Central elements of the short to medium term outlook (2009 to 2013) for Vietnam are for the economy's growth to slow sharply in 2009 due to the downturn in the global economy and weakness in major export markets. Further strengthening of

economic and trading links (with the United States (U.S.), European Union (EU), China, Japan and other Asian countries) will provide upside to exports and growth post-2010.

Foreign Direct Investment and Business Environment

Foreign Direct Investment (FDI) has played an important role in supporting the expansion of manufacturing activity in Vietnam. The EIU reports that FDI surged to US$6.7 billion in 2007 (the General Statistics Office of Vietnam reported $6.8 billion of foreign investment in 2007) and an estimated US$7.6 billion in 2008 (news reports are of up to $10 billion in 2008), partially driven by Vietnam's accession to the World Trade Organization (WTO) in early 2007 and its position as a competitive manufacturing center compared to other locations in Asia. The sharp downturn in world economic growth and new worldwide constraints on availability of credit is projected by the EIU to cause a sharp downturn in FDI flows in 2009 to US$2.2 billion. FDI is projected to start a gradual recovery in 2010 and return to the 2007-2008 level by 2013. The reduction in FDI activity is projected to have a negative impact on the growth rate of the export sector over the short to medium term, and thus Vietnam's export trade. However, Vietnam's continued development of closer trading ties with the U.S., EU and Japan, as well as liberalization of barriers to trade under WTO, are anticipated to provide support for increased FDI activity in the future.

International Trade Agreements

As part of its economic development over the past decade, Vietnam has entered into or commenced negotiations on several different trade liberalization agreements. These agreements have driven expansion of the international trade component of Vietnam's economy, attracted FDI and supported economic development. Such agreements are anticipated to contribute to further development of Vietnam's economy and international trade. Major agreements are: accession to WTO; ASEAN Free Trade Area (AFTA); U.S.-Vietnam Bilateral Trade Agreement (BTA); Japan-Vietnam Free Trade Agreement (FTA); and a potential EU-Vietnam FTA.

International Trade Profile

Vietnam has experienced continuous growth of exports and imports over the past decade driven by economic liberalization, trade agreements, foreign investment and global economic growth. The total value of trade in all goods, as reported by the General Statistics Office of Vietnam, reached US$111 billion in 2007, more than five times the value of trade a decade earlier. Trade growth remained strong in 2008 in the first three quarters of 2008, with a slowdown evident in the final months of the year. Vietnam's export trade is heavily focused on major consumption markets in the U.S., EU, Japan and Australia, which together accounted for 60 percent of Vietnamese exports in 2006 (measured by value). ASEAN and China are also important export markets, together receiving 25 percent of Vietnamese exports in 2006. ASEAN is the largest source for imports with a 28 percent share in 2006 (measured by value) followed by China, which held a 16 percent share in 2006. Further economic integration in the ASEAN region and with other Asian countries is projected to accelerate the long term expansion of trade between Vietnam and its Asian neighbors.

U.S.-Vietnam Trade

After implementation of the U.S.-Vietnam BTA, total bilateral merchandise trade accelerated from US$1.5 billion in 2001 to $12.5 billion in 2007, a 6-year compound annual growth rate (CAGR) of 42 percent. U.S. imports from Vietnam reached over $10 billion in 2007, and recorded a 6-year CAGR of 47 percent. Although smaller in value, U.S. exports to Vietnam expanded at a 6-year CAGR of 27 percent to reach $1.9 billion in 2007. The expansion of bilateral merchandise trade continued in the first ten months of 2008; total trade of $13.1 billion exceeded the total for calendar year 2007.

The trend in containerized tonnage since 2003 was developed based on statistics from U.S. Customs. Total containerized tonnage increased from 0.94 million MT in 2003 to 2.67 million MT in 2007, a 4-year CAGR of 30 percent. Trade expansion remained strong in 2008, with containerized tonnage of seaborne trade in the first ten months exceeding the same period in 2007. However, the 2008 performance masks a slowdown in trade growth during the course of the year.

European Union-Vietnam Trade

The total value of trade accelerated rapidly after 2005 and reached 7.9 billion euro (US$10.8 billion) in 2007, with imports valued at 5.9 billion euro (4.3 billion). Similarly, the total volume of seaborne trade increased from 2.2 million metric tons in 2002 to 4 million tons in 2007, a 5-year CAGR of 13 percent with most of the growth occurring in 2006 and 2007. Imports dominate seaborne trade and accounted for 78 percent of total seaborne tonnage in 2007. Trade expansion continued in 2008, with both the value and tonnage of seaborne trade in the first ten months exceeding the same period in 2007. However, the 2008 performance masks a slowdown in trade growth during the course of the year and shifted towards negative growth due to the deterioration in the economic climate.

Japan-Vietnam Trade

The total value of trade increased from 400 billion yen (US$3.1 billion) in 1998 to 1,400 billion yen (US$11.9 billion) in 2007, with most of the trade expansion occurring over the last five years. Bilateral trade has been driven by significant investments by Japanese companies in manufacturing in Vietnam, the export of components from Japan to Vietnam and the shipment of finished goods from Vietnam to Japan.

Container Traffic

Vietnam's port container traffic expanded rapidly over the past 10 to 15 years driven by economic growth, foreign investment, and trade integration with the global economy. Total port container throughput (loaded imports, loaded exports and empty containers) increased from under 1 million twenty foot equivalent units (TEU) in 1998 to 5.4 million TEU in 2008; a CAGR of 20 percent.

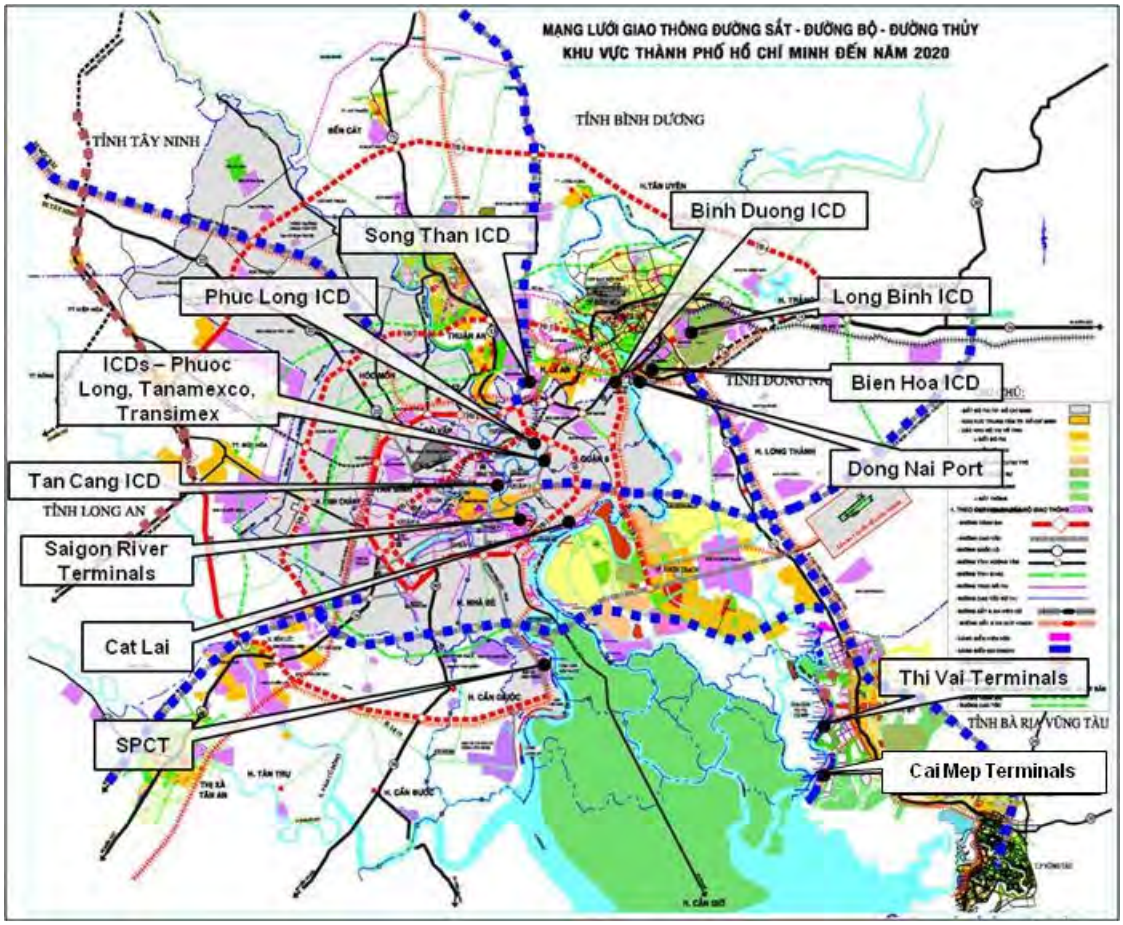
Southern Vietnam, centered on HCMC, accounts for the majority of Vietnam's container traffic (74 percent in 2007). This reflects the relatively more established economy of the HCMC region, which has been a major location for foreign direct investment in Vietnam. Total port traffic in South Vietnam increased from 0.7 million TEU in 1998 to 3.8 million TEU in 2008.

South Vietnam's container traffic expanded by 10 percent in 2008 as the slowing world economy dampened growth in the final months of the year. The immediate outlook (2009 and 2010) is for single digit growth due to weakness in the World economy. However, the medium to long term expansion of Vietnam's economy, partly driven by foreign direct investment and Vietnam's competiveness as a manufacturing location, is expected to support continued expansion of container traffic. Investment will be required in new transportation infrastructure (ports, roads, etc.) to support the trade growth. The opening of new deep draft container terminals in the HCMC region is expected to create new market opportunities for terminal operators and their shipping line customers, including the handling of additional Cambodian transit cargo and the potential to handle regional transshipment cargo. These market opportunities are projected to generate container traffic growth in addition to the organic growth derived from the long-term development of Vietnam's economy and international trade. See Sections 2.1.5 and 2.1.6 of the report for specific details about the new deep draft container terminals.

Task 2: Review of Current and Future Infrastructure Plans

The review of current and future infrastructure addresses those infrastructure elements that support container traffic in the HCMC region: container terminals, inland container (or clearance) depots (ICDs), industrial production zones, transportation companies, barge system, highways and container rail. The review was based on interviews with companies and organizations that participate in each of the above sectors, a review of government and other studies that address transportation infrastructure, and the project team's experience of the Vietnam port sector. The location of the container terminals and ICDs, set against the long term master plan for regional highway improvements is shown below.

Location Map of HCMC ICDs and Container Terminals



Source: HCMC Department of Transportation

Container Terminal Capacity

The HCMC region is projected to have a significant increase in container terminal capacity over the next decade due to development of the new terminals in the Cai Mep/Thi Vai area and the construction of new capacity along the Soi Rap River. The expansion of capacity is required to absorb projected long term growth of container traffic in the region.

Container Terminal Operating Systems

Cat Lai and Vietnam International Container Terminal (VICT), the current dedicated container terminals in HCMC, have industry standard systems in place for terminal operations. Terminal operating systems (TOS) used are:

- Cat Lai – TOPX provided by Realtime Business Solutions, an Australian company.
- VICT – SPARCS provided by Navis, a U.S. company.

Both terminals are using their systems for terminal operations management including planning of ship loading and discharge with shipping lines. They use electronic data interchange (EDI) to communicate with the shipping lines. However, the terminals do not have EDI connectivity with other elements of the container logistics system – customs, ICDs, barge operators, and trucking companies – which have limited or no information technology (IT) capabilities. Communication with these parties is by e-mail and fax.

Inland Container (or clearance) Depots (ICD)

The ICD is a key component of the container logistics system in the HCMC region. The ICD provides the following major functions:

- Receipt of import containers by barge or truck from the container terminals or mid-stream operations
- Shipment of export containers by barge or truck to the container terminals or mid-stream operations
- Container storage
- Bonded warehousing
- Container Freight Station
- Customs clearance
- Delivery and receipt of loaded and empty containers by truck
- Receipt of local truck cargo and direct load to containers
- Deconsolidation of containerized cargo and distribution by local truck.
- Local truck receipt and distribution of deconsolidated cargo

ICDs generate revenue primarily from lift-on/lift-off charges, storage, and container freight station (CFS) services. Some ICDs may also operate empty container depots where revenues are generated from storage, repair and maintenance, and pre-trip inspections of refrigerated containers. The ICDs have basic operating systems and do not conduct EDI with container terminals and customers. The major ICDs are shown below:

ICD	Status	River Location	Total Estimated Area (Hectares)	Estimated Annual Throughput (TEU)
Bien Hoa	Operating	Dry ICD with river access 5km away on Dong Nai River	18	Not available
Binh Duong	Operating	Dong Nai River	Not available	72,000 in 2007
Phuc Long	Operating	Saigon River	16	252,000 in 2008
Phuoc Long	Operating	Saigon River	44	470,000 in 2007
Long Binh	Under Development	Dry ICD	80 (phase 1)	Not applicable
Song Than	Operating	Dry ICD	50	Not available
Tan Cang	Operating	Saigon River	72	Not available
Tanamexco	Operating	Saigon River	12.5	365,000 in 2007
Transimex	Operating	Saigon River	9	280,000 in 2007
Dong Nai	Proposed	Dong Nai River	18.7	Not applicable

Industrial Production Zones

The development of industrial production zones (IZ) has been central to the expansion of Vietnam's international trade. Industrial production zones take two forms – industrial parks (IP) and export processing zones (EPZ). The HCMC region has 121 industrial production zones active or in the planning stage.

The industrial production zones are important generators of containerized cargo, notably from the manufacturing plants of foreign companies, and they drive imports of materials for processing and exports of finished goods. Dong Nai and Binh Duong provinces are expected to remain leading generators of containerized cargo; these provinces accessible to the new deep-draft terminals by Highway 51 (noting that traffic congestion may be a concern) and by barge. Within Dong Nai province, further development of the Nhon Trach district and the new international airport (Long Thanh district) will be positive for the Cai Mep/Thi Vai terminals. Development of new zones in Ba Ria-Vung Tau province will support the adjacent Cai Mep/Thi Vai terminals. Expansion of industrial production zones in Long

An province, southwest of HCMC is expected to favor the existing Saigon River terminals, and the new terminal on the Soi Rap River. The long term modernization of the region's highway system (discussed in Section 2.6) will improve access to current and planned IP/EPZs. Projects such as a new Highway 51 and new ring roads around HCMC would provide better connections between Cai Mep/Thi Vai and the industrial zones.

Transportation Companies

The trucking industry is very competitive and highly fragmented, although there are a number of large trucking companies. The level of foreign participation in the business is limited but is likely to expand under WTO liberalization. Foreign companies are allowed to acquire a 49 percent interest in trucking companies, the majority stake held by a Vietnamese joint venture partner. In January 2010, three years after WTO membership, foreign companies can hold a maximum of 51 percent of a trucking company.

Companies commented on the problem with road congestion in the HCMC area and its negative impact on the number of round trips a truck can perform per day. They also observed that the situation had deteriorated over the last number of years due to the growth of traffic in the region and the slow pace of improvements to the region's road infrastructure.

Trucking companies apply limited IT to conduct their business, its application mostly at the larger operators. A number of companies are testing or have installed Global Positioning Systems (GPS) to better manage their trucking fleets and drivers. GPS is seen as potentially good for security, in particular for shipments of higher-value products. In some cases, companies have reported post-installation difficulties with both software and hardware. The booking and delivery process is normally by fax or e-mail, while the gate process at container terminals is manual. Security is limited with drivers showing their identification at the terminal gates, but the terminal does not maintain a list of drivers.

Barge System

Barges and barge services for containers are normally provided by independent companies under contract to container terminals, shipping lines and ICD operators. The industry is fragmented with numerous small companies as well as some larger operators – Falcon Shipping, Southern Waterborne Company (SOWATCO), Phu My Transport, Saigon Newport, Gemadept and PIP.

Barges come in a variety of sizes ranging from 10 TEU to 100 TEU, and include self-propelled barges with capacity of 36 TEU and 74 TEU, and flat-deck barges with capacity of 36 TEU, 74 TEU and 100 TEU. Barge service is normally provided 24 hours per day at the container terminals and ICDs. Barges are loaded and discharged using either shoreside gantry cranes or stick cranes, the type of equipment used varying from facility to facility.

Container terminal operators, shipping lines and barge operators are evaluating the requirements for barging to and from the terminals under development at Cai Mep/Thi Vai. Some barges are already being built in preparation for the opening of the new terminals. Self-propelled barges are preferred with capacity up to 100 TEU.

Highways

The highway system in the HCMC region is congested and requires significant investment to major and secondary highways, as well as the local road system. During the interview phase of this study, respondents stated that the present condition of highways was one of the main challenges for the existing terminal networks and new terminals. Full implementation of the master plan for regional highway improvements is projected to have an impact on how containers flow through the HCMC region and will improve access to both existing and new container terminals and ICDs. However, the impacts will most likely occur in the medium to long term due to the complexity of many projects – the need for funding, land acquisition and so forth. The following are viewed as important long term impacts:

- Completion of the second ring road, including the Phu My Bridge, will improve road distances and access to the existing container terminals, ICDs and industrial parks. In addition, the second ring road will provide improved access to the Hiep Phuoc terminals on the Soi Rap River.

- Completion of Vietnam Expressway Corporation's (VEC's) HCMC-Long Thanh-Dau Giay toll road will improve access to the Dong Nai area, both for the existing container terminals and for the Cai Mep/Thi Vai terminals.

- Construction of VEC's Ben Luc- Nhon Trach-Highway 51 project would create enhanced access to cargo centers south of HCMC for the Cai Mep/Thi Vai container terminals. This project would also improve access to the Hiep Phuoc terminals.

- Construction of a new Highway 51, with connections to VEC's two projects and the regional ring roads, would greatly improve truck access to the Cai Mep/Thi Vai terminals.

- Construction of third and fourth ring roads would generally provide improved access to cargo centers to the north, west and south of HCMC.

- While the highway projects are expected to improve access to container terminals, they will also incur additional costs for trucking companies in the form of tolls. The impact on tolls may influence the decision to use truck versus barge, or the decision to move freight through one container terminal over another.

In addition to the regional highway improvements, the proposed Greater Mekong Sub-region (GMS) Southern Corridor would provide improved transportation connections between the HCMC region, Cambodia and Thailand. Long term development of the 1,032km Southern Corridor will create a highway connection running from Vung Tau, and the deep-draft container terminal at Cai Mep and Thi Vai, through the HCMC region to Cambodia and onwards to Bangkok. Assuming completion by 2020, the Southern Corridor would be expected to create new opportunities for international transit traffic through container terminals in the HCMC region.

Container Rail

The successful long term development of rail infrastructure in Vietnam, both upgrades to the existing rail network and development of a new rail link to Cambodia, would be expected to create opportunities for the introduction of intermodal rail service and the supporting infrastructure (intermodal rail yards, etc.). Potential future intermodal rail corridors include connections between the HCMC region and Cambodia, and Central Vietnam. In the project team's view, these opportunities are of a long term nature but should be considered in planning the introduction of new technologies to support the container logistics system in the HCMC region. The future success of intermodal rail service will be driven by a variety of factors including:

- Access to funding for rail network improvements.
- Development of supporting infrastructure for intermodal rail cargo.
- Location of ICDs near projected rail routes.
- Collaboration between rail authorities and operators in Vietnam and Cambodia.
- Ability to coordinate intermodal rail services with other rail corridor uses (for example, passenger trains).
- Ability to offer in-bond rail shipments to/from destinations in Cambodia and Vietnam.
- Competitive freight rates with trucking and barge services.

Task 3: Survey of Companies Involved in Container Movement and Trade

The project team conducted interviews with companies involved in the HCMC container trade in order to understand the current process for moving containers around the region, identify areas of strength and weakness, growth prospects, regulatory requirements, and future plans for trade expansion. The types of interviewees included freight

forwarders, government agencies, ICD operators, barge operators, shippers, shipping lines, terminal operators, trucking companies, and others. The interview results were used as input to the other tasks of the study, while some responses were grouped by subject matter.

HCMC Terminals and Infrastructure

Interviewees generally acknowledged that the current transportation infrastructure around HCMC would not be capable of handling projected volumes over the next five to ten years. Shippers see the need for comparable infrastructure performance with countries such as China and Indonesia, if Vietnam is to realize its potential as a future international trade leader. Establishing deep-water, high capacity terminals near HCMC was considered to be a key element that would support future trade growth in Vietnam.

Interviewees expressed concern over the inland transportation system that is currently being used to access terminals at HCMC. The main reason cited is that the terminals are too close to the population areas, and few roads are dedicated to express traffic. In addition to improved roads, several respondents suggested that a barge system between key existing river terminals, and inland factory areas that are accessible by river should be included in any new port development, because barging is an efficient way of circumnavigating HCMC traffic delays, and is less expensive than building roads or railroads.

Cai Mep and Thi Vai Terminals

The Cai Mep and Thi Vai terminals were unanimously acknowledged to be welcome additions to the infrastructure of the HCMC region. The key benefit was viewed to be the ability of these terminals to handle larger, direct services vessels. Infrastructure connecting the port to inland facilities was viewed to be equally important. A connecting highway from HCMC and other key industrial areas was considered to be an essential component of a port development.

Ocean Carrier Service

In the interviews with container shipping lines, those operating in the European, U.S. and intra-Asia trades, there was an overall consensus that the long-haul Europe and U.S. trades would be better served out of the new deep-draft container terminals at Cai Mep/Thi Vai. The new terminals will allow the shipping lines to deploy larger ships in direct calls at these new terminals and secure associated economies of scale. Shippers moving cargo to the U.S. and European market are also interested in and recognize the benefits of direct calls for their shipments – reduced transit times and improved service reliability.

Differences of opinion arose over to what extent the intra-Asia trade would migrate to the new container terminals. The existing terminals – Cat Lai, VICT and other Saigon River terminals – and the new container terminal on the Soi Rap River can accommodate the smaller vessels operating in the intra-Asia trade. Intra-Asia operators also observed that the intra-Asia trades were unlikely to experience increases in ship sizes that would exceed the draft capabilities of these container terminals. A few respondents observed that the situation may evolve in a similar manner to the experience of Bangkok and Laem Chabang in Thailand, where the shallower draft port in Bangkok maintained a strong presence in the intra-Asia market after the opening of Laem Chabang. The extent to which intra-Asia cargo migrates to Cai Mep/Thi Vai will also be influenced by the major shipping lines; whether or not they want to consolidate all their cargo at a single terminal servicing larger ships and the smaller intra-Asia vessels.

Some respondents also commented on the opportunity to conduct transshipment at Cai Mep/Thi Vai. For example, they noted that the Thailand-U.S. trade may be an attractive business for transshipment at the new terminals. Similarly, the Cambodia market (both as transit and transshipment) was given as another opportunity for the new terminals.

Trade Growth

Survey responses indicate that trade to and from Vietnam will continue to grow, and HCMC ports will need to expand to meet future demand. Port congestion issues are viewed as being a barrier of future growth in Vietnam. The

timeline to develop a new port and infrastructure was considered to be a critical issue. Implications of prolonged infrastructure issues in Vietnam may be that manufacturers will soon begin to look elsewhere for sourcing options, especially on lower end apparel.

Task 4: Export and Import Cargo Process Maps

The project team documented the process flows for full container load (FCL) exports, less-than-container load (LCL) exports, FCL imports and LCL imports. Highlights of the process flows are presented below.

Full Container Load Exports

Full container load (FCL) refers to a container that is fully used by a single shipper. The major alternatives in the process relate to the location of container stuffing, use of an ICD as an intermediary point, transport mode between the ICD and container terminal, or use of mid-stream operations to load the container ship. The options are:

- The container is stuffed at the factory/IP/EPZ, drayed to the container terminal for loading to ship.
- The container is stuffed at the factory/IP/EPZ, drayed to the ICD and then transferred by road or barge to the container terminal, or moved by barge to the mid-stream ship loading operations.
- Cargo is delivered to the container terminal by local truck, stuffed in the container, and loaded to ship.
- Cargo is delivered to the ICD by local truck, stuffed in the container, and then transferred to a container terminal or to mid-stream ship loading operations.

The FCL export process described above is also expected to apply to the new Cai Mep/Thi Vai container terminals. The decision to deliver to these terminals by truck or barge will be influenced by the origin point of the cargo, freight rates, and other factors such as traffic conditions on access roads to the terminals.

As the process relates to customs, the decision to conduct physical inspections will be based on a risk assessment of the shipper and cargo. Physical inspections take place at the point of cargo loading into the container – the IP/EPZ, ICD or container terminal. Additional customs control will occur related to receipt of the container at the terminal or ICD, and clearance of the container to ship.

While individual entities have operating systems and there is EDI between some parties, the overall IT system is fragmented and requires improvement. Container terminals have industry-standard terminal operating systems (TOS) and use EDI with their shipping line customers. Communication and data exchange with ICDs, barge operators and trucking companies is by e-mail and fax. ICDs have limited TOS capabilities and use e-mail/fax to communicate with the container terminals, shipping lines, trucking companies, and barge operators.

Less-than-Container Load Exports

Less-than-container load (LCL) refers to the use of a single container to ship the cargo of more than one shipper. The cargo is received and consolidated into the container at a container freight station, which can be located on a container terminal, an ICD or another location. Once the cargo has been consolidated into the container, the process is the same as that described earlier for an FCL export container. As with FCL export containers, the customs physical inspection, if required, takes place at the location where cargo is loaded into the container.

Full Container Load Imports

The process for FCL import containers is the reverse flow as that described for FCL export containers. After discharge from the ship, the containers either:

- Move directly from the container terminal by truck to an inland point for unloading and distribution to final destination,
- Move by truck or barge to an ICD where the container is unloaded, or
- Move by barge from the mid-stream vessel discharge operations to the ICD.

The customs process is also similar with any physical inspection taking place at the container terminal or ICD.

Less-than-Container Load Imports
The basic process for LCL import is same from ship to container terminal or to ICD as encountered by FCL import cargo, the difference occurring at the deconsolidation facility and distribution to multiple destinations by local truck.

Mekong Delta Rice Exports
Vietnam is a major producer and exporter of rice and the Mekong Delta accounted for 52 percent of the country's rice production in 2007. The marketing channel for rice comprises numerous local intermediaries, who purchase rice from the farms, and finally the large wholesalers in HCMC that sell into the domestic and international markets. Rice is mostly exported in bulk but a small quantity is shipped in containers. The decision to containerize rice is driven by several different factors such as the requirements of the specific overseas markets and importers, smaller volume shipments, higher quality rice, and the cost of shipment in containers compared to shipment by bulk vessel. Rice for export in containers moves through the following main steps:

- Shipment of 50-kg bagged rice from the Mekong Delta, in small bulk barges of up to 200 dwt in size, to a container terminal or ICD in the HCMC region.
- Discharge of the bagged rice at the container terminal or ICD.
- Stuffing of the rice into 20-ft containers at the container terminal or ICD.
- Once stuffed, the container moves through the same hand-offs described earlier for FCL exports.

Mekong Delta Refrigerated Cargo
The Mekong Delta is Vietnam's principal production center for farmed aquatic products, notably farmed shrimp. The export process for seafood from the Mekong Delta involves several different transport modes depending on the location of container stuffing, which can take place in the Mekong Delta, at a cold store or at the container terminal. The refrigerated containers are provided by the shipping lines. The main steps are:

- Stuffing of the refrigerated container at the processing plant in the Mekong Delta and transfer by river barge or truck to the container terminal in HCMC. The barges have on-board diesel generators to power the refrigerated containers. Mekong Delta barge service (for all types of containers) is provided multiple times per week depending on the cargo volume.
- Stuffing of cargo into reefer trucks for transfer to HCMC where:
    - The product enters cold storage and is then stuffed into a reefer container at the cold store; or
    - The product is moved directly to the container terminal for stuffing to refrigerated container.

Cambodia Transit Cargo
The HCMC region acts as a gateway for transit cargo moving to and from Cambodia. From Cambodia, export containers are loaded onto barges, which then move to the container terminals in HCMC. Import containers move intact from the HCMC container terminals via barge to Cambodia. Alternatively, import containers are unstuffed at bonded warehouses and cargo is then moved to Cambodia by truck. Barge operators provide weekly service between HCMC and Cambodia.

Customs and Security Processes
The project team conducted meetings with local customs offices to discuss the current customs clearance process and future changes to the process. In addition, the customs clearance process was discussed during the interviews with container shipping lines, shippers and other companies. The local customs offices in the HCMC region report to the General Department of Customs, which is part of Vietnam's Ministry of Finance. The local customs office maintains sub-offices at the container terminals and ICDs, and will also send inspection teams to designated industrial parks and export processing zones, or other locations requested by the shipper or consignee.

The new container terminals at Cai Mep and Thi Vai fall under the jurisdiction of the Ba Ria-Vung Tau Customs Office. The office is expected to initially have a customs team to provide customs clearance services at the first terminal that comes on stream. A new customs branch (or sub-office) will then be considered based on the need to support further new terminals and the volume of cargo moving through the terminals. Ba Ria-Vung Tau Customs Office will undertake inspections and clearance of containers with a declared destination or origin within its jurisdiction. For containers moving by barge between HCMC and the Cai Mep/Thi Vai terminals, customs inspection will take place at the declared place of receipt for outbound and the final destination for inbound.

Remote Declaration and E-Customs

Vietnamese Customs currently operates a remote declaration system via the internet that allows shippers or their agents to enter declaration information through the customs web site, while also submitting hard copies of documentation to customs. The share of cargo processed using remote declaration varies across the country; the national average reported as 60 percent with some districts achieving 100 percent usage. While remote declaration provides some level of "automation" it still falls short of a complete E-Customs system that would improve the efficiency of the customs clearance process. An E-Customs system is currently in development phase and is projected to be implemented over the next two to three years, the date of implementation varying by customs district.

E-Customs is being developed under the Customs Modernization Project for Vietnam, a project sponsored by the World Bank. The project has several objectives:

1. Introducing modern customs systems and procedures based on internationally agreed standards and best practice;
2. Improving the organizational structure and strengthening the human, financial and physical resource capacity of the Customs Department; and
3. Introducing appropriate information and communication technology to improve effectiveness, increase transparency, and lower transaction costs.

E-Customs has been undergoing testing at customs districts in the HCMC region with varying levels of progress. The HCMC Customs Office is still in the testing phase and is likely to go live with E-Customs post-2010, while Ba Ria-Vung Tau Customs Office expects to implement E-Customs by the end of 2009.

Task 5: Technology Requirements and Solutions

Task 5 provides a review of technology requirements and solutions to support container traffic in the HCMC region. The following provides a summary of the major recommendations.

Information Technology – Next 5 years

- Terminal Operating System (TOS) at every marine terminal
- Computerize every ICD
- Develop a Port Community System (PCS)
    - Trucker Registration
    - Online Payment of Fees
    - Scheduling
    - Virtual Container Depot

Information Technology – Next 10 to 15 years

Given that technologies for logistics and terminal operations in particular are very dynamic, it is somewhat difficult to project what the port's technology needs might be ten to fifteen years into the future. Furthermore, recommendations made now for long-term needs would involve the most advanced, cutting-edge (and therefore expensive) technologies currently available; however, by the time of implementation, recommended technologies may have

come down significantly in price or even become obsolete. In any event, an analysis and justification – based on volume, cost of ownership, return on investment, etc. – for proceeding with long-term recommendations should be undertaken at time of implementation. Recommendations include:

- Optical Character Recognition (OCR) Systems at the Gate
- E-Customs in Place
- Modern Rail Facility
- Traffic Monitoring System for the HCMC region

Cargo Security – Next 5 Years

- Password Protection and Encryption
- Driver Verification

Cargo Security – Next 10 to 15 years

- Electronic Seals
- GPS enabled devices
- Tagging of Containers

Port Security – Next 5, 10, 15 years

Port Security mainly deals with alerting the U.S. authorities of dangerous (terrorism related) cargo ahead of time so that they could be stopped from reaching the U.S. shores. Since the U.S. is an important export market for, and potentially a significant recipient of future transshipment cargo as well, some technologies arising out if this need would be of concern to the logistics community in HCMC area.

As most of these technologies are relatively new, expensive and they depend on the co-operation of many parties across and within borders, it is difficult to assume that any one of the initiatives could be adopted and implemented completely within a short time horizon of 5 years. They are most likely to be implemented to some extent within the next 5 years but most likely to be completely implemented over the next 15-year horizon.

U.S. Cargo Security Requirements

The container logistics system and Vietnamese customs are currently not in a position to meet the requirements of and participate in the U.S. Container Security Initiative (CSI), which is a program intended to help increase security for containerized cargo shipped to the United States from around the world. CSI addresses the threat to border security and global trade posed by the potential for terrorist use of a maritime container to deliver a weapon. CSI proposes a security regime to ensure all containers that pose a potential risk for terrorism are identified and inspected at foreign ports before they are placed on vessels destined for the United States. To be eligible for participation in CSI a port must meet the minimum standards:

- The Customs Administration must be able to inspect cargo originating, transiting, exiting, or being transshipped through a country. Non-intrusive inspection (NII) equipment (including equipment with gamma or X-ray imaging capabilities) and radiation detection equipment must be available and utilized for conducting such inspections. This equipment is necessary in order to meet the objective of quickly screening containers without disrupting the flow of legitimate trade.
- The seaport must have regular, direct, and substantial container traffic to ports in the United States.
- Commit to establishing a risk management system to identify potentially high-risk containers, and automating that system. This system should include a mechanism for validating threat assessments and targeting decisions and identifying best practices.
- Commit to sharing critical data, intelligence, and risk management information with the United States Customs and Border Protection (USCBP) in order to do collaborative targeting, and developing an automated mechanism for these exchanges.

- Conduct a thorough port assessment to ascertain vulnerable links in a port's infrastructure and commit to resolving those vulnerabilities.
- Commit to maintaining integrity programs to prevent lapses in employee integrity and to identify and combat breaches in integrity.

Task 6: Interim Presentation

The project team provided an Interim Presentation to senior management of Vinalines in late March 2009. The presentation covered the main research activities undertaken by the project team during Tasks 1 to 5 of the study, the major findings and conclusions of these tasks, and a review of next steps to complete the logistics study. Comments received from Vinalines were addressed in the final study report.

Task 7: Development of Implementation Plan and Cost Estimates

Implementation Strategy for PCS

The project team recommends the following overall implementation strategy for PCS:

- An influential state-related body is identified as the Champion. The Champion should be well-respected with the appropriate commercial and government relations to pursue implementation of the PCS over the proposed 5-year period.
- A private sector company (or companies) experienced in putting a PCS in place be identified as a partner.
- Once the Champion and private partner (or partners) has been identified, they should form a local joint venture (JV) in Vietnam to implement and operate the PCS. While the Champion provides the support, the JV would execute the entire PCS project.
- The PCS product identified must have proven capabilities, be web-based, scalable, and can easily be localized to Vietnam, which includes translation to Vietnamese and incorporation of local rules and regulations.
- A six phase implementation plan undertaken over five years to address: Container Enquiry Functions; Gate Scheduling; Trucker Validation; Online Payment of Fees; ICD Functions; and Barge Operations Features.

The Study Team recommends use of an Application Service Provider (ASP) business model the initial 5-year period because this provides the lowest implementation and operating costs, uses proven technology from an external PCS vendor, and allows the JV to concentrate resources on ensuring the PCS is successfully adopted by the container logistics community in the HCMC region. The projected total 5-year cost to develop and start-up the PCS is US$1.29 million under the ASP Model.

The technologies recommended for the 10 to 15-year time horizon (for example, GPS) are likely to be purchased and installed by the user community instead of the JV operator of the PCS. The adoption of some of these technologies may occur earlier than projected in this study due to Government mandated requirements.

Additional medium to long term costs incurred by the JV are projected to be driven by the need to alter the PCS business model, to adopt new technologies that may emerge in the future, and to pursue future PCS opportunities in other regions of the country. Areas where the JV may plan for future long-term additional costs relate to:

- A shift from the ASP Model to the Own and Operate Model. This model would only be considered if the JV has substantial business needs that would benefit from an in-house IT operation.

- Newly developed hardware and software technologies that support upgrading the underlying PCS portal and functions. However, such costs may be directly borne by the PCS vendor (under the recommended ASP business model) and the JV would most likely incur incremental annual leasing and licensing costs.

- Application of the PCS model to other region's of Vietnam. The Study Team is recommending that the project sponsor (with the recommended support of USTDA) consider studying the use of PCS in other regions of Vietnam. The application of a PCS in these regions may require additional resources from the JV.

- Extension of the PCS model to accommodate growth of regional transit cargo (both truck and rail) and/or future rail intermodal rail services. Again, the JV would likely incur incremental management and development costs to support PCS expansion.

Project Financing

The 5-year cost of implementing the PCS is a projected US$1.29 million under the recommended ASP Model. The total cost is viewed as reasonable given the expected benefits offered by the PCS, which would help improve the efficiency and security of the HCMC container logistics system. The project could be funded through a blend of internal resources, external financial support, and subsequently transaction fees. This section describes several funding options that should be explored by the Champion and its joint venture partner as part of their business strategy for implementation of PCS. Potential external sources include multilateral agencies (for example, the World Bank and the Asian Development Bank) and U.S. government agencies (for example, the Ex-Im Bank and Overseas Private Investment Corporation (OPIC)).

Task 8: Development Impact Assessment

Projected Development Impacts

The PCS and other technologies recommended in this Study are projected to have a variety of benefits for container logistics in the HCMC region and for Vietnam as a whole. Development impacts were addressed under the following

- Infrastructure
    - Allow the region's container logistics system to more efficiently and securely handle current and projected container traffic.
- Market-Orientated Reform
    - The Study Team did not find any specific market-oriented reforms required to implement and operate the PCS. The study team believes an important factor in successful implementation of the PCS will be protection of intellectual property and data. Therefore, the proposed JV must adopt and apply intellectual property and data protection procedures consistent with Vietnamese law and international agreements.
- Human Capacity Building
    - The greatest employment impact from the PCS will be through the improved efficiency of the container logistics system, which would allow Vietnamese companies (including foreign operated entities) to be more competitive in the international market and would facilitate further development of the export sector in the HCMC region.
- Technology Transfer and Productivity Enhancement
    - The recommendations on technology presented in this Study involve the introduction of IT systems and practices not currently used in the HCMC region for container handling or only used in limited circumstances.
- Other Impacts or Benefits
    - The successful introduction of PCS and other technologies to the HCMC region will provide the foundation for applying these technologies to other port systems in Vietnam.

Recommendations on Other Regions
The Study Team recommends:

- The Grantee, with USTDA support, evaluates the feasibility of applying the PCS and other technologies to the port logistics system in North Vietnam.

- The Grantee, with USTDA support, assesses the feasibility of applying the PCS and other technologies to the port logistics system in Central Vietnam.

- The Grantee, with USTDA support, investigates how PCS and other technologies can be used to foster regional integration by improving major transit corridors, for example through North Vietnam into Southwest China.

Assessment of Impacts: 6-Year Time Frame
The Study Team recommends that the assessment of impacts be performed by monitoring the PCS implementation strategy, notably the initial 5-year plan. The monitoring program centers on regular contact with:

- Vinalines (the Grantee),
- The JV entity established to implement the PCS, and
- The Study Contractor

Vinalines and the JV can provide selected key performance indicators (KPIs) on PCS activities to gauge impacts of the project. KPIs could be provided on PCS membership (for example, type and number of users) and PCS performance (for example, number of transactions processed through PCS). The KPIs will allow USTDA to evaluate projected impacts. For example, a high level of membership and usage would indicate the logistics community views the PCS as a success and providing efficiencies, thus indirectly confirming some of the projected impacts described earlier.

1 Review of Host Country's Container and Trade Trends

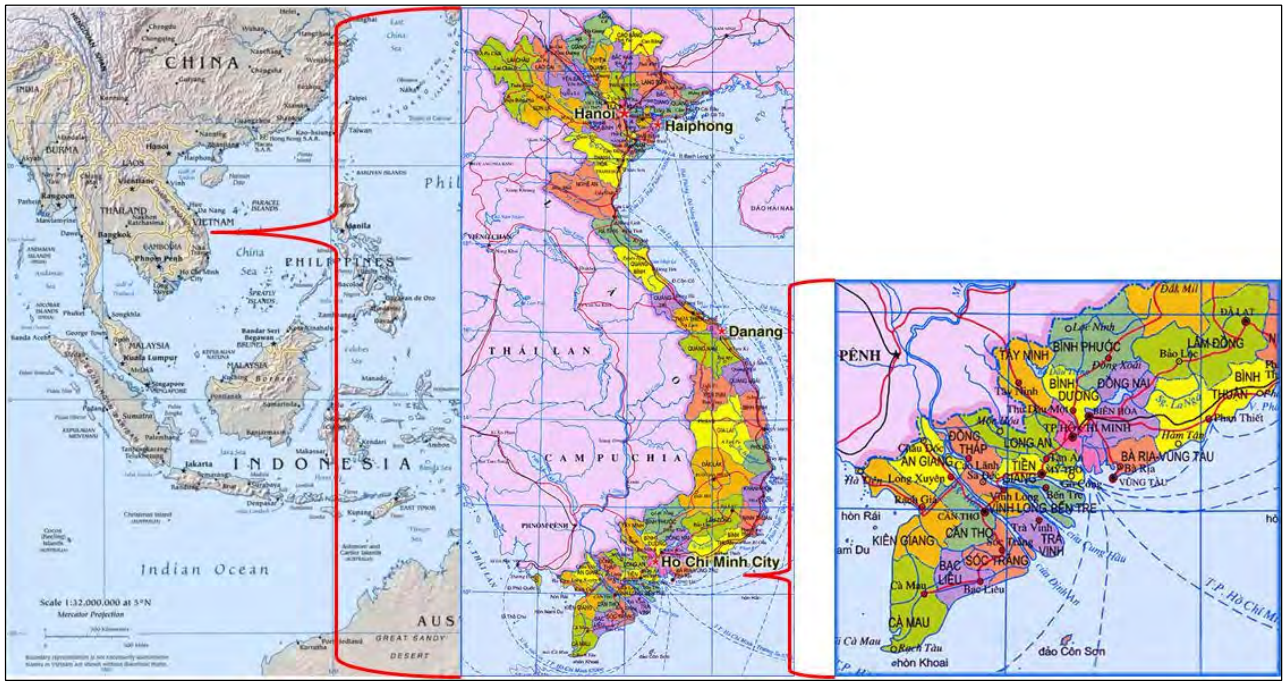
Task 1 provides a discussion of current and projected trends in Vietnam's container trade. The analysis includes import and export trends, commodity types, labor costs, institutional reform, foreign direct investment, and international trade agreements. Regional and global trends that are projected to impact Vietnam are also discussed in Task 1. The results are used by the project team to determine how development of the container trade may impact the current container logistics system in the Ho Chi Minh City Region (HCMC) and to identify areas for future improvement. The discussion is divided into the following topics: Vietnam and HCMC Region; Population trends; Economic trends; Foreign Direct Investment; Trade Agreements; International Trade; and Container Traffic.

1.1 Vietnam and HCMC Region

Located in Southeast Asia, Vietnam (Figure 1-1) is bordered to the north by China and to the west by Laos and Cambodia. The country has three broad geographic regions – North Vietnam, Central Vietnam and South Vietnam. North Vietnam is centered on the capital Hanoi and comprises mountainous terrain and lowlands of the Red River Delta and coastal plains. Central Vietnam comprises a narrow coastal plain and mountains, and is centered on the city of Danang. South Vietnam covers the lower third of the country and includes the fertile Mekong River system. The main urban center of the South, and the focus of this study, is the HCMC region.

The region under study is primarily centered on HCMC and the five neighboring provinces of Ba Ria Vung Tau, Dong Nai, Binh Duong, Tay Ninh and Long An. This region is the location of existing and planned urban and industrial centers that generate or will generate significant container cargo for the local container terminal system. Other geographic regions of interest are the provinces of the Mekong River Delta, to the southwest of HCMC, and Cambodia.

Figure 1-1: Map of Vietnam and Southern Region

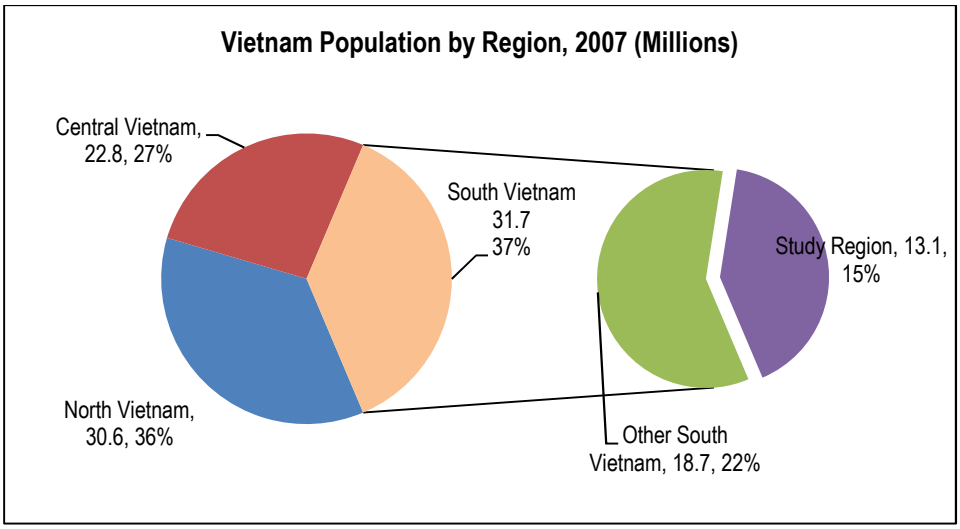


Source: Vietnam Embassy web site

1.2 Demographic Trends

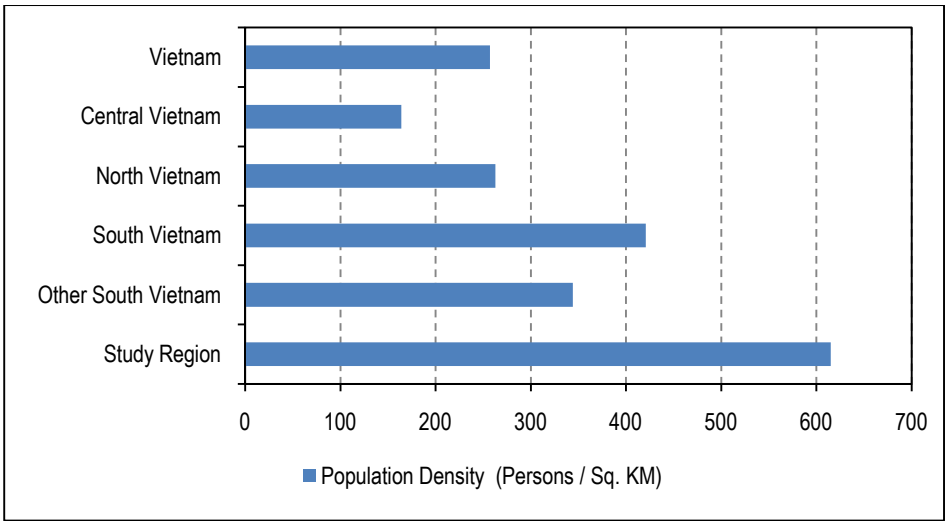
Vietnam had a 2007 population of 85.1 million[1] with 31.7 million or 37 percent located in South Vietnam (Figure 1-2). The country has a high population density (Figure 1-3), which reaches its greatest in South Vietnam (421 persons per square km). The primary study region (HCMC and five neighboring provinces) had a total population of 13.1 million in 2007, 15 percent of the national total and 41 percent of Southern Vietnam. Population density in the study region is 615 persons per square km, and climbs to 3,024 persons per square km in HCMC (second in the country after Hanoi).

Figure 1-2: Vietnam Population by Region, 2007



Source: General Statistics Office of Vietnam

Figure 1-3: Vietnam Population Density by Region, 2007



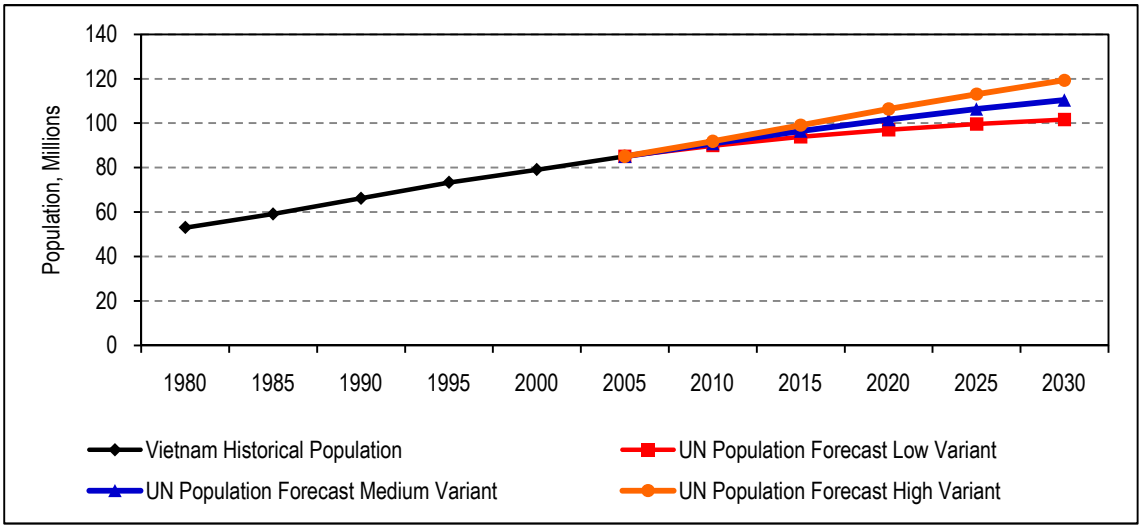
Source: General Statistics Office of Vietnam

The population of Vietnam is projected to grow at an average annual rate of approximately one percent per year in the period to 2030, based on population projections prepared by the United Nations (UN) Population Division. Under

[1] United Nations Population Division estimates the population of Vietnam was 87.1 million in 2007 under its 2006 Revision Population Database, 2 million higher than the statistics released by the General Statistics Office of Vietnam.

the UN's medium variant (most likely) forecast, Vietnam's population climbs to 102 million in 2020 and 110 million in 2030 (Figure 1-4). Assuming an even distribution of population growth by region, the population of South Vietnam would reach 38 million in 2020 and 41 million in 2030. Similarly, the population of the primary study region would be 15.5 million in 2020 and 16.9 million in 2030.

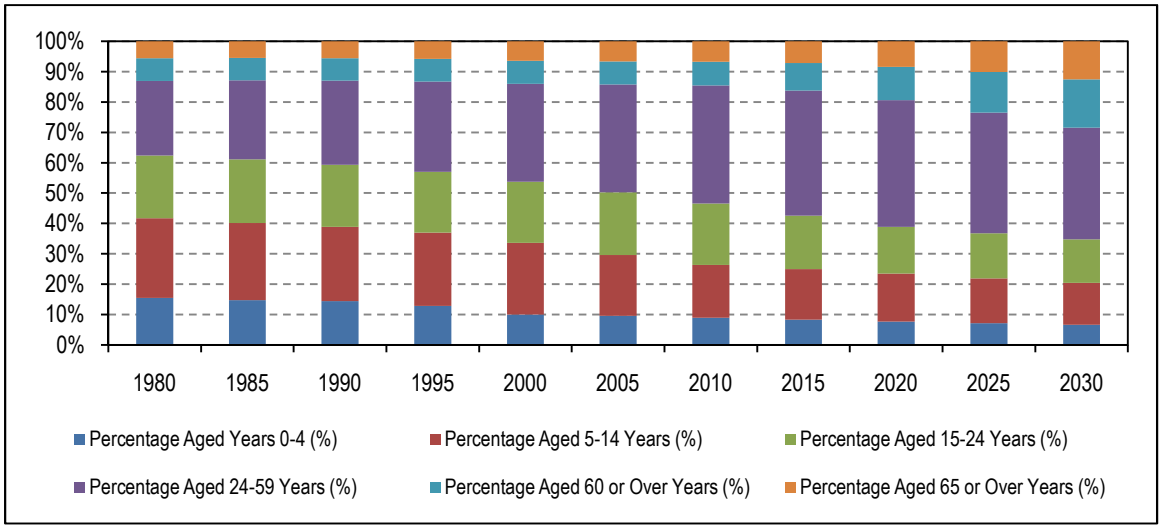
Figure 1-4: UN Population Projection for Vietnam



Source: United Nations Population Division

The projected age structure of Vietnam's population is shown in Figure 1-5. The outlook is for continued expansion of the main working age population (aged 24 to 59 years) from 35.6 percent of the total population in 2010 to 41.7 percent in 2020, which is projected to support a larger labor force, higher economic growth and an expansion of domestic consumption. This age group is then projected to decline to 36.8 percent of the total population in 2030, with a corresponding expansion of the 60 years and plus population to 28.4 percent from 19.4 percent in 2020.

Figure 1-5: UN Population Projection for Vietnam – Age Structure

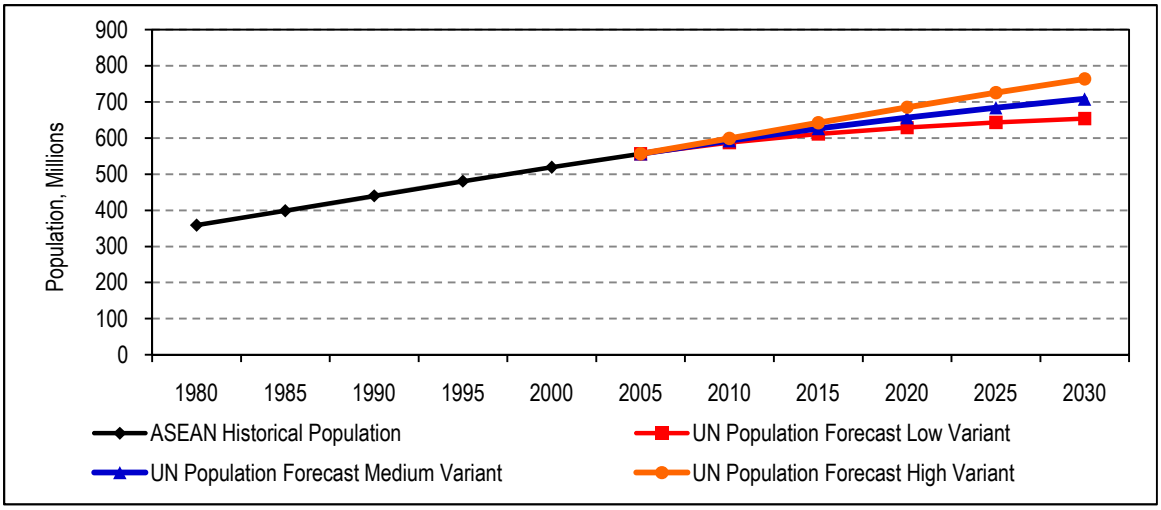


Source: United Nations Population Division

Vietnam is one of the ten members of the Association of Southeast Asian Nations (ASEAN), which has primary aims to accelerate economic growth, social progress and cultural development in the region, and to promote regional

peace and stability. Other member countries are Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, and Thailand. ASEAN had an estimated population of 571 million in 2007 according to the UN Population Division. The population of ASEAN is projected to reach 657 million in 2020 and 708 million in 2030 under the UN's medium variant (most likely) forecast (Figure 1-6).

Figure 1-6: UN Population Projection for ASEAN



Source: United Nations Population Division

Cambodia, a member of ASEAN and bordering the study region, had an estimated population of 14.4 million in 2007. The country's population is projected to grow to 18.1 million in 2020 and 20.8 million in 2020. Population growth is also projected for China and India, the world's first and second most populous countries. Under the UN's medium variant (most likely) forecast, China's population is projected to climb from an estimated in 2007 to 1.33 billion in 2007 to 1.42 billion in 2020 and 1.46 billion in 2030; while India's population is projected to increase from an estimated 1.17 billion in 2007 to 1.38 billion in 2020 and 1.51 billion in 2030.

Based on the above review, the population falling within the hinterland of the HCMC container terminals is summarized in Table 1-1. The HCMC terminal system is projected to offer access to a direct market (study region plus other South Vietnam) of 37.9 million people by 2020 and 41.1 million people by 2030. Extending the hinterland to incorporate transit access to Cambodia boosts the projected hinterland population to 56 million in 2020 and 61.9 million in 2030. Finally, the HCMC terminal system is centrally located in the ASEAN region, which is projected to have a population of 708 million by 2030, placing the region third after India and China in terms of total population.

Table 1-1: Projected Population within Hinterland of HCMC Container Terminals

Population (Millions)	2007e	2010	2020	2030
Direct Hinterland				
Study Region [1]	13.0	13.9	15.6	16.9
Other South Vietnam	18.7	19.9	22.3	24.2
Total Direct Hinterland	**31.8**	**33.8**	**37.9**	**41.1**
Cambodia	14.4	15.2	18.1	20.8
Total Direct and Transit Hinterland	**46.2**	**49.0**	**56.0**	**61.9**
ASEAN Region [2]	571.4	592.9	656.8	708.3

(1) HCMC and neighboring provinces of Ba Ria Vung Tau, Dong Nai, Binh Duong, Tay Ninh and Long An.
(2) Includes total population of Vietnam and Cambodia

Source: General Statistics Office of Vietnam and UN Population Division (Medium Variant forecast)

1.3 Economic Trends

The discussion of economic trends in Vietnam and the region is based on two primary data sources: the International Monetary Fund's (IMF) comprehensive "World Economic Outlook" published in October 2007 with an update for major economies released in November 2008, and Vietnam specific forecasts released by the Economist Intelligence Unit (EIU). These two primary sources are supplemented with information from the General Statistics Office of Vietnam, Asian Development Bank (ADB), the World Bank and other publications.

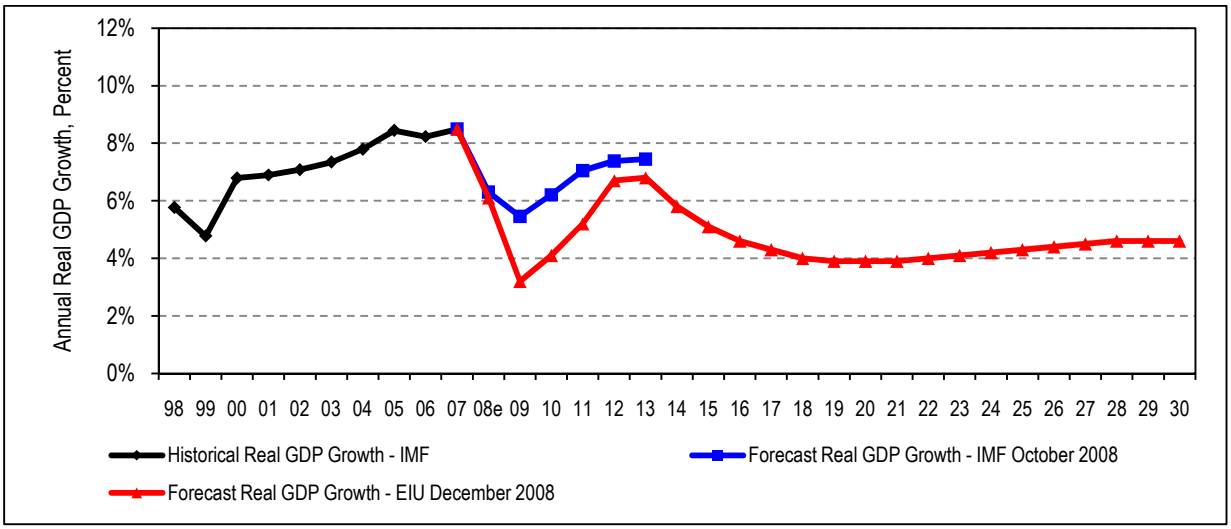
1.3.1 Vietnam

Vietnam experienced strong economic growth in the decade up to 2007, recording an average annual growth rate of 7.2 percent for real gross domestic product (GDP). As shown in Figure 1-7, annual growth peaked in 2007 when real GDP expanded by 8.5 percent. The strong performance was driven by the following major factors:

- Economic liberalization within Vietnam, which supported local consumption and development of exports.
- Foreign direct investment in the export sector.
- Trade agreements and membership of the World Trade Organization (WTO), which stimulated international trade flows.
- Global economic growth, which supported the export sector.

The short to medium term outlook for economic growth has been recently downgraded by major economic forecasting agencies due to the deterioration in growth prospects for the World economy. Vietnam's real GDP growth is projected to increase by 3.2 percent in 2009 and 4.1 percent in 2010 (based on the EIU forecast), compared to an estimated growth rate of 6.1 percent in 2008. The Vietnamese government's official growth target for 2009 is currently 6.5 percent. Supported by recovery of World economic growth, Vietnam's annual growth rate is projected to revert to between 5 and 7 percent in the period 2011 to 2015. The long term projection beyond 2015 is for annual growth of 4 to 5 percent (key long term economic indicators are presented in Table 1-2). GDP and GDP per capita are projected to steadily increase over the approximately 20-year forecast horizon.

Figure 1-7: Vietnam - Historical and Projected Real GDP Growth, 1998 to 2030



Source: IMF and EIU

Central elements of the short to medium term outlook (2009 to 2013) for Vietnam are for the economy's growth to slow in 2009 due to the downturn in the global economy and weakness in major export markets. Annual growth is now forecast to be significantly lower than projected earlier in 2008 (reference the comparison of the latest EIU forecast with the IMF forecast of October 2008 in Figure 1-7). Rising disposable income per capita is expected to

support growth in domestic demand for consumer goods. Vietnam's imports and exports are projected to grow more slowly in 2009 compared to 2008 due to the weak global environment, and slower domestic growth.

Further strengthening of economic and trading links (with the U.S., European Union (EU), China, Japan and other Asian countries) will provide upside to exports and growth post-2010. Membership of WTO is expected to improve the operating environment for business, assist reform of state-owned enterprises, and support expansion of international trade. Consumer price inflation is projected to ease over the next five years, while the Dong will depreciate slowly in nominal terms. Wages for unskilled labor are projected to remain low and the country is expected to face challenges in supplying sufficient skilled labor. Economic growth is projected to remain driven by the industrial sector, although growth of the sector will slow considerably in the 2009-2010 period. Foreign direct investment (FDI) is projected to slow over the next one to two years.

Table 1-2: Vietnam – Historical and Projected Economic Indicators

Year	Real GDP (US$ Billions)	Annual Change in Real GDP	Real GDP per Capita (US$)	GDP Per Head (US$ PPP)	Dong (VND) Per US Dollar	Lending Interest Rate	Annual Change in Consume r Prices	Annual Change in Unit Labor Costs	Population (Millions)
1998	$32.9	5.8%	-	$1,230	13,268	14.4%	7.3%	-8.5%	
1999	$34.5	4.8%	-	$1,290	13,943	12.7%	4.1%	-1.5%	
2000	$36.9	6.8%	$466	$1,390	14,168	10.6%	-1.7%	-5.6%	79.09
2001	$39.4	6.9%	-	$1,510	14,725	9.4%	-0.4%	-6.2%	
2002	$42.2	7.1%	-	$1,630	15,280	9.1%	3.8%	-2.5%	
2003	$45.3	7.3%	-	$1,760	15,510	9.5%	3.2%	-1.0%	
2004	$48.8	7.8%	-	$1,930	15,746	9.7%	7.8%	3.1%	
2005	$52.9	8.4%	$622	$2,130	15,859	11.0%	8.3%	3.8%	85.03
2006	$57.3	8.2%	-	$2,360	15,994	11.2%	7.4%	4.7%	
2007	$62.1	8.5%	-	$2,600	16,096	11.2%	8.9%	3.8%	
2008	$65.9	6.1%	-	$2,830	16,801	16.1%	22.4%	7.3%	-
2009	$68.1	3.2%	-	$2,950	17,856	12.6%	6.3%	2.6%	-
2010	$70.9	4.1%	-	$3,070	18,123	10.0%	3.6%	2.0%	90.85
2011	$74.6	5.2%	-	$3,270	17,659	10.4%	6.0%	7.5%	-
2012	$79.6	6.7%	-	$3,530	17,042	10.8%	7.1%	8.1%	-
2013	$85.0	6.8%	-	$3,840	16,441	10.8%	7.6%	8.9%	-
2014	$89.9	5.8%	-	$4,090	16,822	-	6.5%	-	-
2015	$94.5	5.1%	$980	$4,340	17,332	-	6.4%	-	96.47
2016	$98.9	4.6%	-	$4,580	17,946	-	6.4%	-	-
2017	$103.1	4.3%	-	$4,810	18,639	-	6.4%	-	-
2018	$107.2	4.0%	-	$5,060	19,390	-	6.4%	-	-
2019	$111.4	3.9%	-	$5,310	20,178	-	6.4%	-	-
2020	$115.8	3.9%	$1,139	$5,590	20,986	-	6.5%	-	101.66
2021	$120.3	3.9%	-	$5,880	21,785	-	6.4%	-	-
2022	$125.0	4.0%	-	$6,200	22,558	-	6.4%	-	-
2023	$130.1	4.1%	-	$6,550	23,293	-	6.4%	-	-
2024	$135.5	4.2%	-	$6,940	23,978	-	6.4%	-	-
2025	$141.3	4.3%	$1,329	$7,370	24,606	-	6.4%	-	106.36
2026	$147.5	4.4%	-	$7,850	25,171	-	6.5%	-	-
2027	$154.2	4.5%	-	$8,380	25,670	-	6.6%	-	-
2028	$161.2	4.6%	-	$8,970	26,106	-	6.6%	-	-
2029	$168.6	4.6%	-	$9,630	26,483	-	6.7%	-	-
2030	$176.4	4.6%	$1,598	$10,350	26,809	-	6.7%	-	110.43

Source: EIU, IMF and United Nations Population Division

1.3.2 ASEAN and Major Economies

The short to medium term economic projections for ASEAN and major economies are presented in Table 1-3. The general outlook is for lower GDP growth rates in 2009 and 2010, followed by a recovery to stronger growth post-2010. A principal concern is any further deterioration in the world's major economies – U.S., European Union and Japan – could result in slower projected growth for Vietnam and ASEAN countries than presented in Table 1-3. From Vietnam's perspective, the global picture is not healthy for its exports in 2009 and possibly 2010. Vietnam's three major export markets – U.S., Japan and the European Union – are projected to have negative growth in 2009 and slightly positive growth in 2010. The post-2010 outlook is more positive as growth rates recover and accelerate in the major economies and elsewhere in Asia.

Table 1-3: Historical and Projected Real GDP Growth, 2003 to 2013

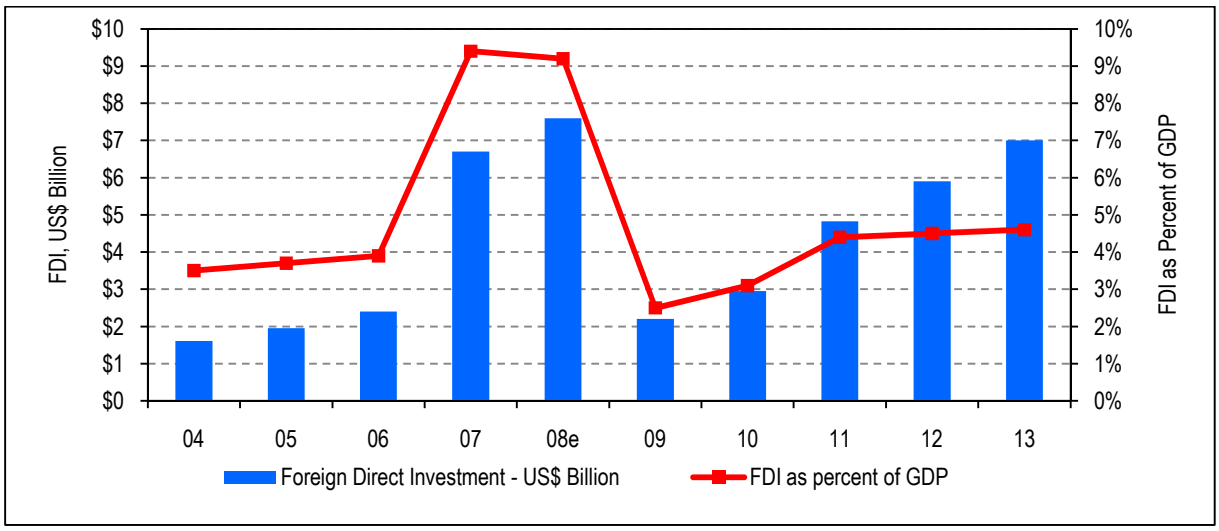
Percent Change in Real GDP	2003	2004	2005	2006	2007	2008e	2009	2010	2011	2012	2013
Vietnam	7.3%	7.8%	8.4%	8.2%	8.5%	6.1%	3.2%	4.1%	5.2%	6.7%	6.8%
ASEAN											
Brunei	2.9%	0.5%	0.4%	4.4%	0.6%	-0.5%	2.8%	2.9%	n/a	n/a	n/a
Cambodia	8.5%	10.3%	13.3%	10.8%	10.2%	5.0%	3.0%	3.6%	n/a	n/a	n/a
Indonesia	4.8%	5.0%	5.7%	5.5%	6.3%	6.2%	2.0%	2.7%	4.8%	5.6%	5.9%
Laos	6.1%	6.4%	7.1%	8.1%	7.9%	7.5%	5.0%	6.0%	n/a	n/a	n/a
Malaysia	5.8%	6.8%	5.3%	5.8%	6.3%	5.1%	1.5%	2.6%	4.5%	4.8%	5.6%
Myanmar	13.8%	13.6%	13.6%	12.7%	5.5%	0.9%	0.3%	3.4%	n/a	n/a	n/a
Philippines	4.9%	6.4%	5.0%	5.4%	7.2%	4.2%	1.8%	3.2%	4.7%	5.3%	5.5%
Singapore	3.5%	9.0%	7.3%	8.2%	7.7%	2.2%	-2.2%	1.3%	4.3%	5.6%	6.4%
Thailand	7.1%	6.3%	4.5%	5.1%	4.8%	4.0%	1.9%	2.8%	4.7%	5.2%	4.9%
Major Asia											
China	10.0%	10.1%	10.4%	11.6%	11.9%	9.6%	7.5%	7.5%	8.2%	8.5%	8.1%
Japan	1.4%	2.7%	1.9%	2.4%	2.1%	0.3%	-0.5%	0.7%	1.0%	1.2%	1.2%
S Korea	3.5%	6.2%	4.2%	4.9%	5.7%	4.2%	-1.7%	0.6%	4.5%	4.3%	4.4%
Taiwan	3.1%	4.7%	4.2%	5.1%	5.0%	2.3%	-2.9%	1.6%	3.9%	4.9%	5.4%
India	6.9%	7.9%	9.1%	9.8%	9.3%	6.2%	6.1%	7.1%	7.9%	8.2%	8.0%
Other											
USA	2.5%	3.6%	2.9%	2.8%	2.0%	1.4%	-0.4%	0.8%	2.0%	2.3%	2.5%
EU-27	1.5%	2.7%	2.2%	3.3%	3.1%	1.3%	-0.3%	0.8%	1.6%	2.2%	2.3%
World	3.6%	4.9%	4.5%	5.1%	5.0%	2.4%	0.9%	2.0%	2.9%	3.2%	3.2%

Source: EIU and IMF

1.4 Foreign Direct Investment and Business Environment

Foreign Direct Investment (FDI) has played an important role in supporting the expansion of manufacturing activity in Vietnam. The investment has been directed at the export sector and centered on the country's designated export processing zones and industrial parks. EIU reports that FDI (Figure 1-8) surged to US$6.7 billion in 2007 (the General Statistics Office of Vietnam reported $6.8 billion of foreign investment in 2007) and an estimated US$7.6 billion in 2008 (news reports are of up to $10 billion in 2008), partially driven by Vietnam's accession to WTO in early 2007 and its position as a competitive manufacturing center compared to other locations in Asia. The sharp downturn in world economic growth and new worldwide constraints on availability of credit is projected by the EIU to cause a sharp downturn in FDI flows in 2009 to US$2.2 billion. FDI is projected to start a gradual recovery in 2010 and return to the 2007-2008 level by 2013. The reduction in FDI activity is projected to have a negative impact on the growth rate of the export sector over the short to medium term, and thus Vietnam's export trade. However, Vietnam's continued development of closer trading ties with the U.S., EU and Japan, as well as liberalization of barriers to trade under WTO, are anticipated to provide support for increased FDI activity in the future.

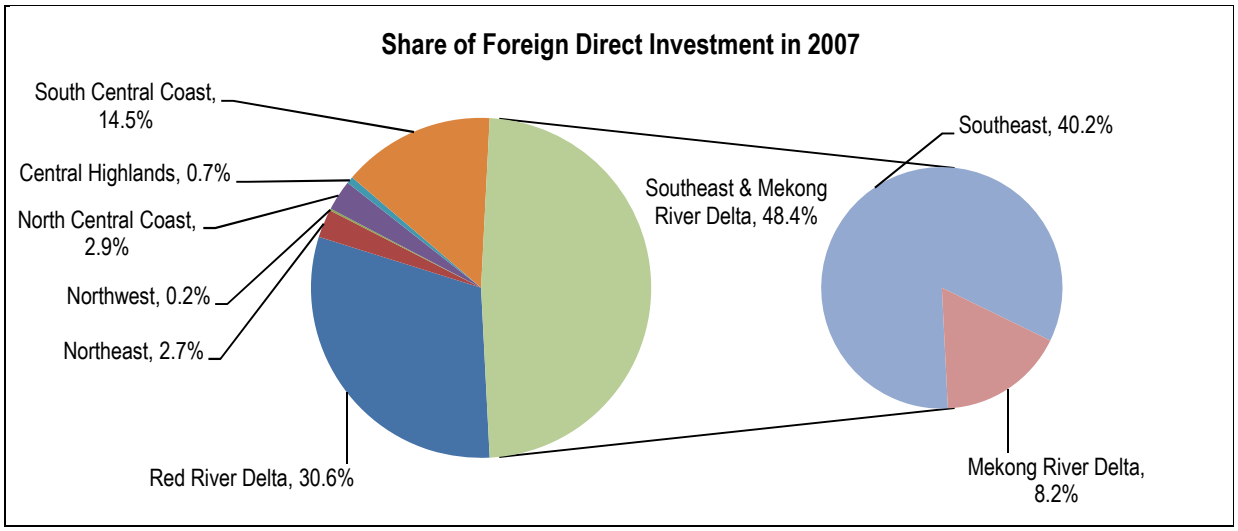
Figure 1-8: Vietnam – Trends in Foreign Direct Investment



Source: EIU

In 2007, the Southeast and Mekong River Delta regions accounted for nearly 50 percent of FDI in Vietnam (Figure 1-9). The Southeast was the largest single recipient of FDI with a 40.2 percent share, while the Mekong River Delta received 8.2 percent. The Southeast's large share of FDI has supported economic and trade growth in the region, including the expansion of containerized trade through the region's container terminals.

Figure 1-9: Foreign Direct Investment by Region

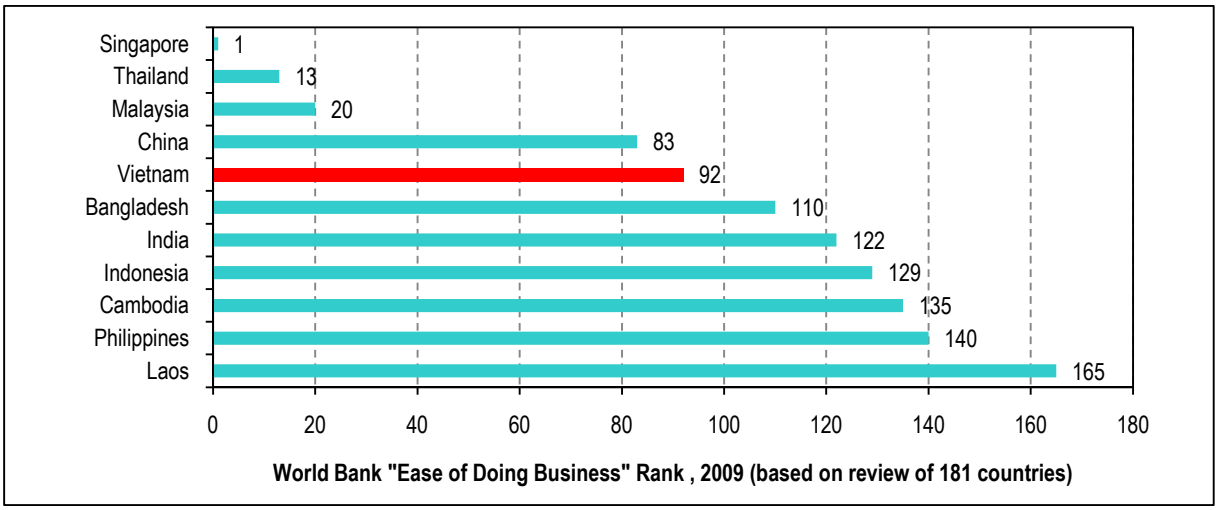


Source: General Statistics Office of Vietnam

While Vietnam has been successful in attracting increased FDI, the country still faces several challenges that could inhibit its ability to maximize future investment potential. The World Bank's annual report "Doing Business" study evaluates a countries regulatory environment for business. Each country is ranked based on an assessment of the following aspects of doing business: starting a business, dealing with construction permits, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and closing a business. A higher ranking indicates a country has a regulatory environment that is more conducive to business operations. The most recent report covers the period from April 2007 to June 2008. The overall rankings for

Vietnam, other ASEAN countries, China and India are presented in Figure 1-10. Vietnam achieved a ranking of 92 out of the 181 countries covered by the survey. Vietnam performed better than several other ASEAN members – Bangladesh, India, Indonesia, Cambodia, Philippines and Laos – and also performed better than India. In addition, Vietnam's regulatory environment was not significantly poorer than China (ranked 83). However, Vietnam's business environment is weaker than Malaysia and Thailand, which both ranked in the top twenty of the survey.

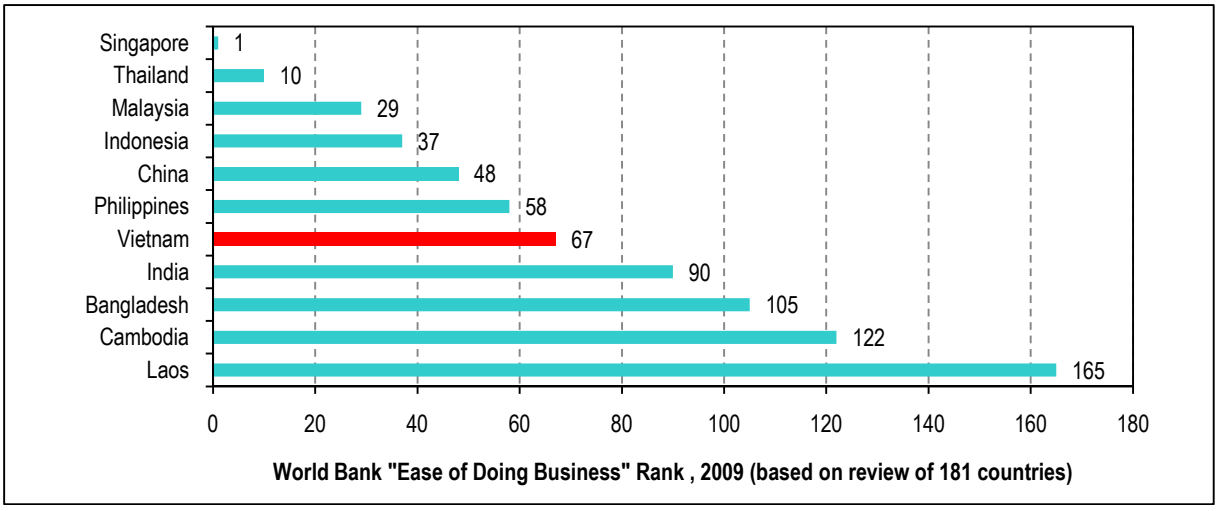
Figure 1-10: World Bank "Ease of Doing Business" – Overall Rank



Source: World Bank "Doing Business 2009" report

One of the ten components used to construct the overall rankings is "trading across borders", which focuses on the ease with which business can import and export goods based on an assessment of documentation requirements, time and cost. Vietnam's performance is mixed as shown by the rankings in Figure 1-11. While Vietnam performs better than its overall ranking (67 versus 92) its international trade process is less efficient than many of its major competitors within ASEAN. Accession to WTO and implementation of trade liberalization measures over the next few years are likely to improve Vietnam's performance. In addition, any future improvements to customs processes and technologies would also be expected to improve "trading across borders" performance.

Figure 1-11: World Bank "Ease of Doing Business" – Ranking for "Trading Across Borders" Element



Source: World Bank "Doing Business 2009" report

1.5 International Trade Agreements

As part of its economic development over the past decade, Vietnam has entered into or commenced negotiations on several different trade liberalization agreements. These agreements have driven expansion of the international trade component of Vietnam's economy, attracted foreign direct investment and supported economic development. Such agreements are anticipated to contribute to further development of Vietnam's economy and international trade. The following discussion reviews major international trade agreements, already in place or under discussion.

1.5.1 World Trade Organization

The General Council of the WTO approved Vietnam's accession package in November 2006, after a roughly decade long negotiation process, and Vietnam officially became the WTO's 150th member in January 2007. Under its accession agreement, Vietnam gains increased access to foreign markets, and in return gradually reduces high tariffs on imports and subsidies for state-owned companies. WTO membership provides increased foreign market access for Vietnam's exports in major sectors (electronics, food, footwear and garments) and improves the country's competitiveness against higher cost competitors in the region, such as Thailand. The accession package also addresses liberalization of the services sector of the Vietnamese economy, including easing market access to the maritime and transportation sectors of the economy. Market access measures related to selected maritime and transportation services are summarized in Table 1-4. The liberalization of foreign access to these services (for example, storage/warehouse services) is anticipated to draw increased foreign investment and accelerate development of technologies and services offered to both importers and exporters.

Table 1-4: WTO Market Access for Selected Maritime and Transportation Services

Sub-Sector	**WTO Limitations on Market Access** *(Note: accession occurred in January 2007)*
Maritime Auxiliary Services	
Customs Clearance Services	None, except that upon accession joint ventures with foreign capital contribution not exceeding 51% can be established. After 5 years (*January 2012*), joint ventures can be established with no foreign ownership limitation.
Container Station and Depot Services	Commercial Presence - None, except that upon accession joint ventures with foreign capital contribution not exceeding 51% can be established. Seven years (*January 2014*) upon accession, none.
Internal Waterways Transport	
Freight Transport	Upon accession, foreign service suppliers are permitted to provide services only through the establishment of joint ventures with Vietnamese partners in which the capital contribution of foreign side not exceeding 49% of total legal capital.
Rail Transport Services	
Freight transportation	Unbound except: Foreign suppliers are permitted to provide freight transport services through the establishment of joint ventures with Vietnamese partners in which the capital contribution of foreign side not exceeding 49% of the total legal capital.
Road Transport Services	
Freight transportation	Upon accession, foreign service suppliers are permitted to provide passenger and freight transport services through business cooperation contracts or joint-ventures with the capital contribution of foreign side not exceeding 49%. After 3 years (*January 2010*) from the date of accession, subject to the needs of the market, joint-ventures with foreign capital contribution not exceeding 51% may be established to provide freight transport services.
Services Auxiliary to all Modes of Transport	
Storage and warehouse services	None, except that upon accession joint ventures with foreign capital contribution not exceeding 51% can be established. Seven years (*January 2014*) after accession, none.

Source: WTO - Working Party on the Accession of Vietnam "Schedule of Specific Commitments in Services"

1.5.2 ASEAN

The Association of Southeast Asian Nations (ASEAN) was established in 1967 by the five original Member Countries – Indonesia, Malaysia, Philippines, Singapore, and Thailand. Brunei Darussalam joined in 1984, Vietnam in 1995,

Laos and Myanmar in 1997, and Cambodia in 1999. Primary aims of ASEAN are to accelerate economic growth, social progress and cultural development in the region, and to promote regional peace and stability.

An important component of ASEAN is the establishment of the ASEAN Economic Community as outlined in the ASEAN Vision 2020. Elements include the gradual liberalization of the movement of goods, services, investment and capital amongst member countries, and the establishment of a single market and production base. The long term goal of a free trade area will build upon ASEAN's existing economic initiatives including the ASEAN Free Trade Area (AFTA), ASEAN Framework Agreement on Services (AFAS) and ASEAN Investment Area (AIA). Other important long term integration measures include development of a trans-ASEAN transportation network consisting of major highways and railroads, linking major ports and urban centers.

The AFTA was launched in 1992 and incorporates the elimination of tariff and non-tariff barriers among member countries. The Common Effective Preferential Tariff (CEPT) Agreement for AFTA requires that tariff rates levied on a wide range of products traded within the region are reduced to zero to five percent. Quantitative restrictions and other non-tariff barriers are to be eliminated. As of January 2006, tariffs on 99 percent of the products on the inclusion list of the ASEAN-6 (Brunei, Indonesia, Malaysia, Philippines, Singapore, and Thailand) had been reduced to no more than 5 percent, while more than 60 percent of these products had zero tariffs. The average tariff for ASEAN-6 had been reduced from more than 12 percent when AFTA was introduced to 2 percent. The other members (Cambodia, Laos, Myanmar and Vietnam) saw about 81 percent of the products on their inclusion list lowered to the 0-5 percent range. The target year for full liberalization of trade within ASEAN, creating an integrated market ranked third after China and India when measured by total population, is 2015 for the six original member countries and 2018 for the other members (including Vietnam).

1.5.3 U.S.-Vietnam Bilateral Trade Agreement

The United State and Vietnam started the process of establishing full bilateral relations in the early 1990s, normalizing political relations in 1994 and signing a Bilateral Trade Agreement (BTA) in 2001. The BTA required Vietnam to open market access for U.S. goods and services, and transition to a market-based international trading system. This agreement was followed by the signing of a Trade and Investment Framework Agreement (TIFA) in 2006, as part of Vietnam's WTO accession process, and the passing by U.S. Congress of Permanent Normal Trade Relations (PNTR) in late 2006. This decade long political and trade liberalization process provided increased opportunities for trade between Vietnam and the U.S.; the total value of bilateral merchandise trade expanded from US$1.5 billion in 2001 (when the BTA was signed) to US$12.5 billion in 2007 according to official U.S. trade statistics.

1.5.4 Japan-Vietnam Free Trade Agreement

In December 2008, Vietnam and Japan signed a free trade agreement (FTA) separate from the one negotiated between Japan and ASEAN. The Japan-Vietnam FTA has an objective of cutting tariffs on 92 percent of the goods traded between the two countries over a 10-year period. Vietnam will obtain duty-free access to the Japanese market for shrimp, durian, okra and other agricultural and marine products, while Japan will secure duty free access for auto parts, steel and electronic goods for assembly in Vietnam. Bilateral trade was valued at an estimated US$12 billion in 2007 based on Japanese trade statistics. The agreement is subject to ratification by authorities in Vietnam and Japan, and is expected to come into effect during 2009.

1.5.5 European Union-Vietnam

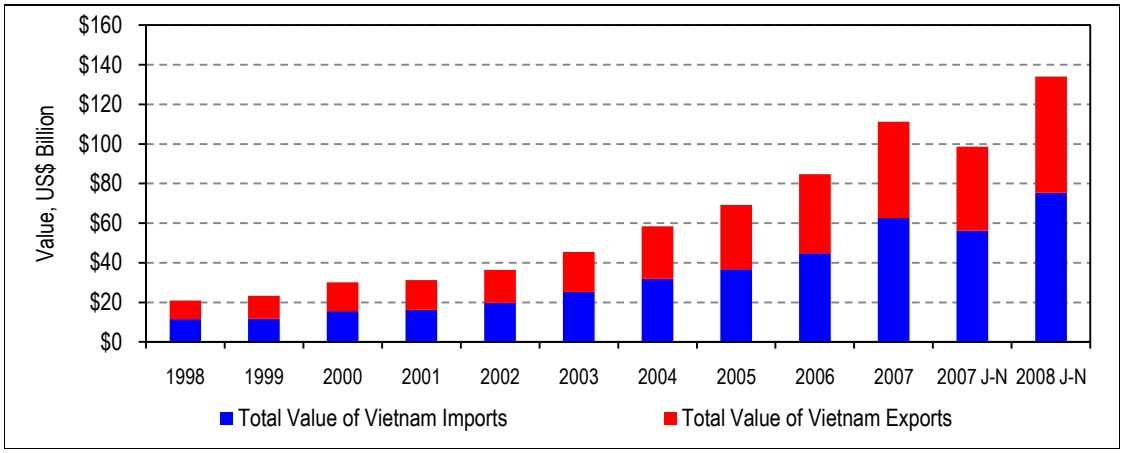
In 2007, the EU and ASEAN agreed to commence negotiations on a bilateral trade agreement between the two regional groups. Negotiations have moved forward slowly and it is now possible the EU may pursue free trade agreements with individual members of ASEAN, including Vietnam, that are interested in accelerating implementation of FTAs. If the EU and Vietnam negotiate and successfully implement a bilateral FTA, this would create new export opportunities for Vietnam. Many sectors, notably apparel and footwear sectors, would obtain reduced or zero import duties on exports to the EU. EUROSTAT reports that total EU-Vietnam seaborne trade was valued at 7.9 billion euro in 2007 (US$10.8 billion) compared to 4.4 billion euro in 2002 (US$4.2 billion).

1.6 International Trade Profile

1.6.1 Total Trade

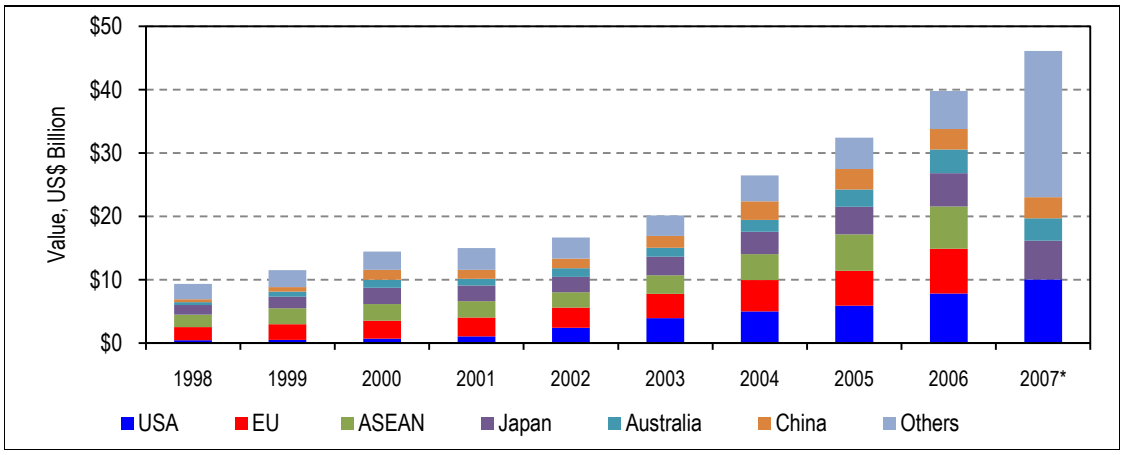
Vietnam has experienced continuous growth of exports and imports over the past decade (Figure 1-12) driven by economic liberalization, trade agreements, foreign investment and global economic growth. The total value of trade in all goods, as reported by the General Statistics Office of Vietnam, reached US$111 billion in 2007[2], more than five times the value of trade a decade earlier. Trade growth remained strong in 2008 in the first three quarters of 2008, with a slowdown evident in the final months of the year. Vietnam's export trade (Figure 1-13) is heavily focused on major consumption markets in the U.S., European Union, Japan and Australia, which together accounted for 60 percent of Vietnamese exports in 2006 (measured by value). ASEAN and China are also important export markets, together receiving 25 percent of Vietnamese exports in 2006.

Figure 1-12: Trend in Total Value of Vietnam Trade in Goods



Source: General Statistics Office of Vietnam

Figure 1-13: Trend in Total Value of Vietnam Exports by Destination



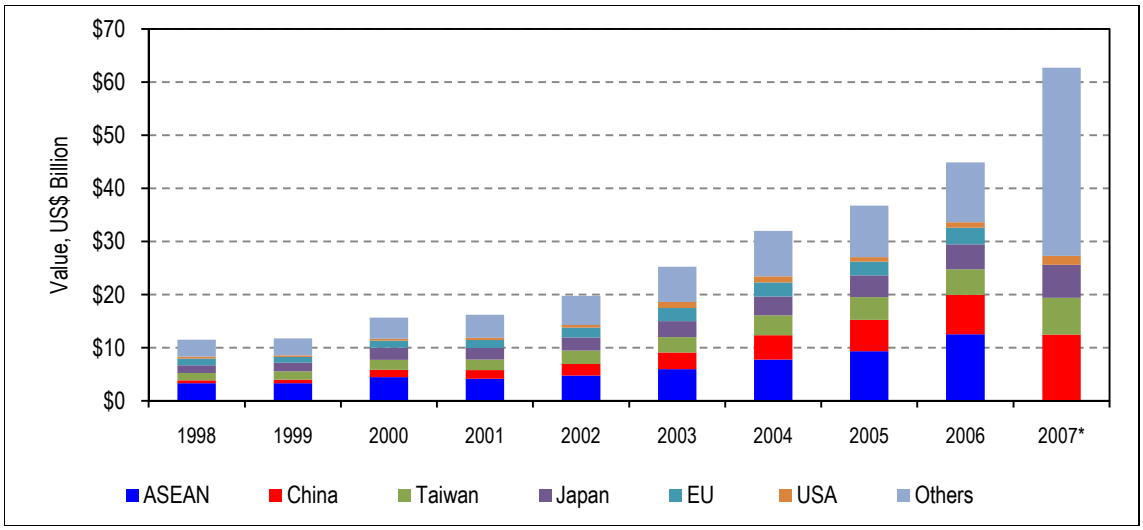
* The General Statistics Office has not yet released a full profile of exports by country for 2007.

Source: General Statistics Office of Vietnam

[2] The trade value data quoted in this section covers all goods, including petroleum and bulk commodities.

ASEAN is the largest source for imports with a 28 percent share in 2006 (measured by value) followed by China, which held a 16 percent share in 2006 (Figure 1-14). Further economic integration in the ASEAN region and with other Asian countries is projected to accelerate the long term expansion of trade between Vietnam and its Asian neighbors.

Figure 1-14: Trend in Total Value of Vietnam Imports by Origin



* The General Statistics Office has not yet released a full profile of imports by country for 2007.

Source: General Statistics Office of Vietnam

Profiles of selected export and import commodities are provided in Table 1-5 and Table 1-6, based on data obtained from the General Statistics Office of Vietnam. Exports are heavily focused on apparel, footwear, fishery products, wooden products, electronics and commodities (for example, rice, coffee and rubber). Imports have a heavy concentration of intermediary products, which are processed into finished goods for export.

Table 1-5: Selected Export Commodities

Commodity	Unit	1998	2003	2004	2005	2006	2007
Fishery products	US$ Million	$858	$2,200	$2,408	$2,733	$3,358	$3,763
Including:							
Frozen shrimps	US$ Million	$432	$944	$1,085	$1,266	$1,263	n/a
Frozen fish	US$ Million	$70	$334	$492	$609	$1,083	n/a
Frozen cuttle fish	US$ Million	$61	$136	$63	$74	$93	n/a
Textile, sewing products	US$ Million	$1,450	$3,609	$4,430	$4,772	$5,855	$7,750
Footwear	US$ Million	$1,031	$2,261	$2,691	$3,039	$3,596	$3,994
Wood and wooden products	US$ Million	n/a	$609	$1,102	$1,561	$1,943	$2,404
Electronic parts, computer and their parts	US$ Million	n/a	$855	$1,062	$1,427	$1,808	$2,154
Electrical wire and cable	US$ Million	n/a	$292	$390	$518	$706	$883
Articles of plastic	US$ Million	n/a	$170	$239	$358	$452	$711
Rucksacks, bag, pockets, wallets(*)	US$ Million	n/a	$243	$382	$471	$502	$634
Pottery and glassware	US$ Million	$55	$136	$155	$255	$274	$331
Fresh and processed vegetables & fruit	US$ Million	$53	$152	$178	$236	$259	$306
Rattan, bamboo and rush products	US$ Million	$37	$141	$172	$157	$214	$221
Bicycles and parts of bicycle	US$ Million	n/a	$155	$235	$158	$111	$81
Vegetable oils and fats	US$ Million	n/a	$22	$36	$14	$15	$48
Dairy produce	US$ Million	n/a	$67	$34	$85	$90	$35
Sugars	US$ Million	n/a	$11	$1	$0	$2	$5
Fine art products	US$ Million	$13	$60	$91	$90	$120	n/a
Embroidery products	US$ Million	$35	$61	$92	$78	$98	n/a
Meat and meat preparations	US$ Million	12	21	40	36	26	n/a
Foodstuff processed from starch and cereals	US$ Million	n/a	$83	$101	$130	$151	n/a
Rice	000 MT	3,730	3,810	4,063	5,255	4,642	4,558
Coffee	000 MT	382	749	976	913	981	1,229
Rubber	000 MT	191	432	513	554	704	715
Shelled cashew nut	000 MT	26	82	105	109	128	153
Tea	000 MT	33	59	104	92	110	115
Pepper	000 MT	15	74	111	110	115	83
Shelled ground nut	000 MT	87	82	46	55	14	37
Cinnamon	000 MT	1	5	8	8	14	15

Source: General Statistics Office of Vietnam

Table 1-6: Selected Import Commodities

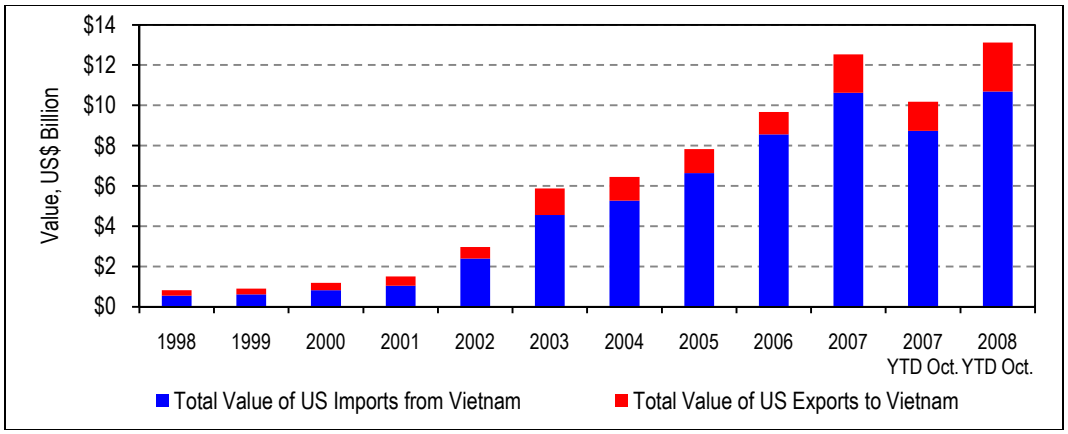
Commodity	Unit	1998	2003	2004	2005	2006	2007
Textile fabrics	US$ Million	$593	$1,805	$2,067	$2,474	$2,947	$3,957
Plastic in primary form	US$ Million	$349	$829	$1,252	$1,517	$1,886	$2,507
Electronic parts (including television parts), computers and their parts	US$ Million	n/a	$1,014	$1,350	$1,639	$1,870	$2,958
Auxiliary materials for sewing	US$ Million	n/a	$1,265	$1,444	$1,439	$1,124	n/a
Machinery, apparatus and parts for telecommunication	US$ Million	n/a	$303	$378	$598	$946	n/a
Auxiliary materials for footwear	US$ Million	n/a	$769	$809	$843	$828	$2,152
Motorcycles (including unassembled)	US$ Million	$384	$329	$452	$541	$557	$725
Paper	US$ Million	n/a	$293	$367	$411	$498	$600
Machinery, apparatus and parts for textile, garment	US$ Million	n/a	$402	$378	$447	$482	n/a
Motorcycles Unassembled	US$ Million	n/a	$291	$413	$476	$481	$580
Fibers, spun	US$ Million	n/a	$318	$384	$400	$439	n/a
Dairy produce	US$ Million	$79	$171	$201	$279	$303	$462
Machinery, apparatus and parts for construction	US$ Million	n/a	$280	$255	$256	$291	n/a
Vegetables oils and fats	US$ Million	n/a	$166	$244	$192	$257	$485
Wheat	US$ Million	n/a	$126	$163	$201	$226	$343
Cotton	US$ Million	$68	$105	$192	$170	$222	$267
Machinery, apparatus and parts for plastic industry	US$ Million	n/a	$128	$132	$165	$216	n/a
Fibers, not spun	US$ Million	$244	$159	$191	$213	$214	$741

Source: General Statistics Office of Vietnam

1.6.2 U.S.-Vietnam Trade

After implementation of the U.S.-Vietnam BTA, total bilateral merchandise trade accelerated from US$1.5 billion in 2001 to US$12.5 billion in 2007[3] (Figure 1-15), a 6-year CAGR of 42 percent. U.S. imports from Vietnam reached over US$10 billion in 2007, and recorded a 6-year CAGR of 47 percent. Although smaller in value, U.S. exports to Vietnam expanded at a 6-year CAGR of 27 percent to reach US$1.9 billion in 2007. The expansion of bilateral merchandise trade continued in the first ten months of 2008; total trade of US$13.1 billion exceeded the total for calendar year 2007.

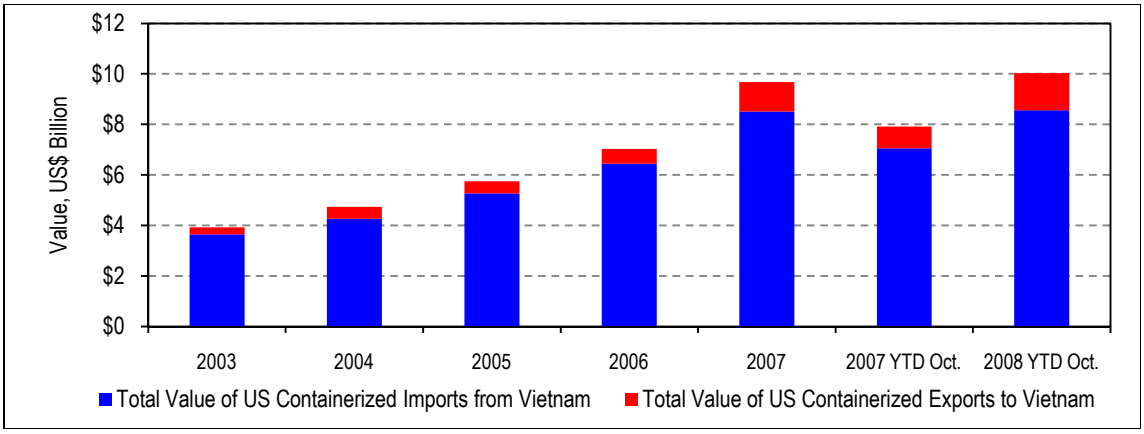
Figure 1-15: Trend in Total Value of U.S.-Vietnam Merchandise Trade



Source: www.usatradeonline.gov

U.S.-Vietnam containerized trade was US$3.9 billion in 2003 and had expanded to US$9.7 billion in 2007 (Figure 1-16), a 4-year CAGR of 25 percent. Containerized trade accounted for approximately 77 percent (measured by value) of total U.S.-Vietnam merchandise trade in 2007. U.S. containerized imports from Vietnam expanded from US$3.6 billion in 2003 to US$8.5 in 2007 (a 4-year CAGR of 24 percent), while U.S. containerized exports to Vietnam climbed from US$0.3 in 2003 to US$1.2 in 2007 (a 4-year CAGR of 43 percent). As of end-October 2008, U.S. containerized trade with Vietnam, measured by value, had exceeded the total for calendar year 2007.

Figure 1-16: Trend in Total Value of U.S.-Vietnam Containerized Trade

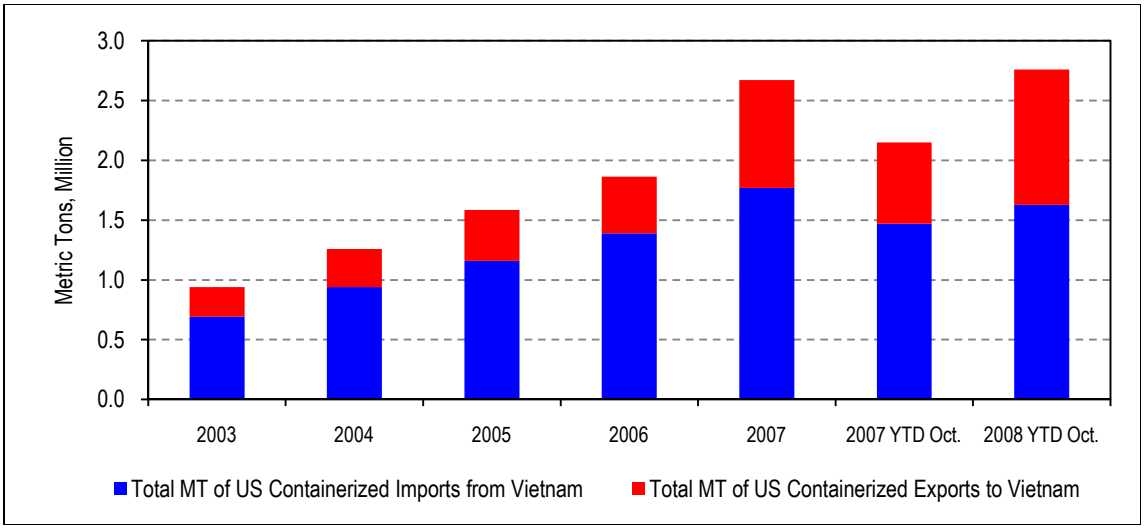


Source: www.usatradeonline.gov

[3] Trade data quoted in this Section is based on U.S. Customs statistics and may differ from the trade data reported by the General Statistics Office of Vietnam. The data on US-Vietnam containerized trade was obtained from www.usatradeonline.gov and is based on U.S. Customs statistics.

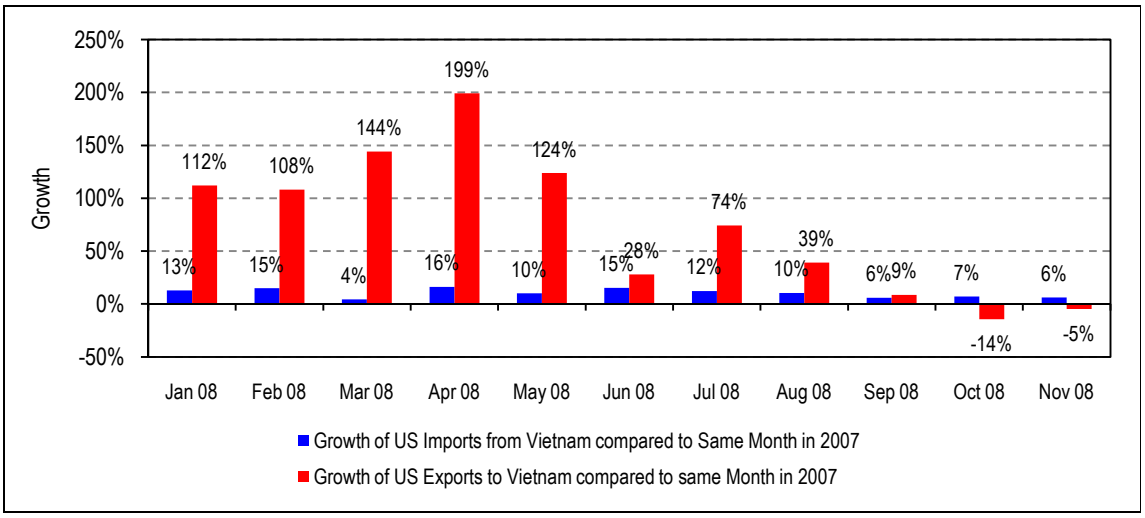
The trend in containerized tonnage since 2003 is shown in Figure 1-17, based on statistics from U.S. Customs. Total containerized tonnage increased from 0.94 million MT in 2003 to 2.67 million MT in 2007, a 4-year CAGR of 30 percent. Trade expansion remained strong in 2008, with containerized tonnage of seaborne trade in the first ten months exceeding the same period in 2007. However, the 2008 performance masks a slowdown in trade growth during the course of the year (Figure 1-18).

Figure 1-17: Trend in Total Metric Tons of U.S.-Vietnam Containerized Trade



Source: www.usatradeonline.gov

Figure 1-18: Month-over-Month Growth of U.S.-Vietnam Containerized Trade



Source: www.usatradeonline.gov

A profile of major commodities in U.S.-Vietnam containerized trade is provided in Table 1-7 and Table 1-8. The largest five import commodity groups (as designated by harmonized code and measured by metric tons) are furniture and related articles, coffee and related products, apparel and footwear. Together, they accounted for 62 percent of containerized cargo tonnage imported by the U.S. from Vietnam in 2007 and 60 percent in the first ten months of 2008. The major export commodity groups are iron and steel, food industry products, meat products, plastics and cotton; they accounted for 52 percent of export tonnage in 2007 and 60 percent in the first ten months of 2008.

Table 1-7: Major Commodities in U.S.-Vietnam Containerized Import Trade

Commodity Group (Million Metric Tons)	2003	2004	2005	2006	2007	YTD Oct 2007	YTD Oct 2008	2003 Share	2007 Share
Furniture; Bedding Etc; Lamps Nesoi Etc; Prefab Bd	0.08	0.08	0.31	0.41	0.54	0.44	0.48	11.34%	30.45%
Coffee, Tea, Mate & Spices	0.12	0.12	0.20	0.19	0.21	0.18	0.14	18.01%	11.75%
Apparel Articles And Accessories, Not Knit Etc.	0.09	0.09	0.10	0.11	0.14	0.11	0.13	13.24%	7.79%
Apparel Articles And Accessories, Knit Or Crochet	0.08	0.08	0.07	0.08	0.13	0.12	0.14	12.06%	7.49%
Footwear, Gaiters Etc. And Parts Thereof	0.03	0.03	0.05	0.07	0.08	0.07	0.08	3.72%	4.41%
Plastics And Articles Thereof	0.01	0.01	0.03	0.04	0.08	0.06	0.07	0.77%	4.31%
Fish, Crustaceans & Aquatic Invertebrates	0.08	0.08	0.07	0.07	0.07	0.06	0.07	11.78%	4.07%
Ceramic Products	0.04	0.04	0.05	0.06	0.06	0.03	0.04	5.06%	3.28%
Soap Etc; Waxes, Polish Etc; Candles; Dental Preps	0.00	0.00	0.01	0.03	0.05	0.02	0.04	0.03%	2.89%
Edible Fruit & Nuts; Citrus Fruit Or Melon Peel	0.03	0.03	0.04	0.04	0.05	0.05	0.04	4.24%	2.75%
Total Top-10 Import Commodity Groups	**0.56**	**0.56**	**0.93**	**1.10**	**1.40**	**1.14**	**1.24**	**80.24%**	**79.20%**
Others	0.14	0.20	0.22	0.29	0.37	0.33	0.39	19.76%	20.80%
Total Containerized Imports	**0.69**	**0.76**	**1.16**	**1.39**	**1.77**	**1.47**	**1.63**	**100.0%**	**100.0%**

Source: www.usatradeonline.gov

Table 1-8: Major Commodities in U.S.-Vietnam Containerized Export Trade

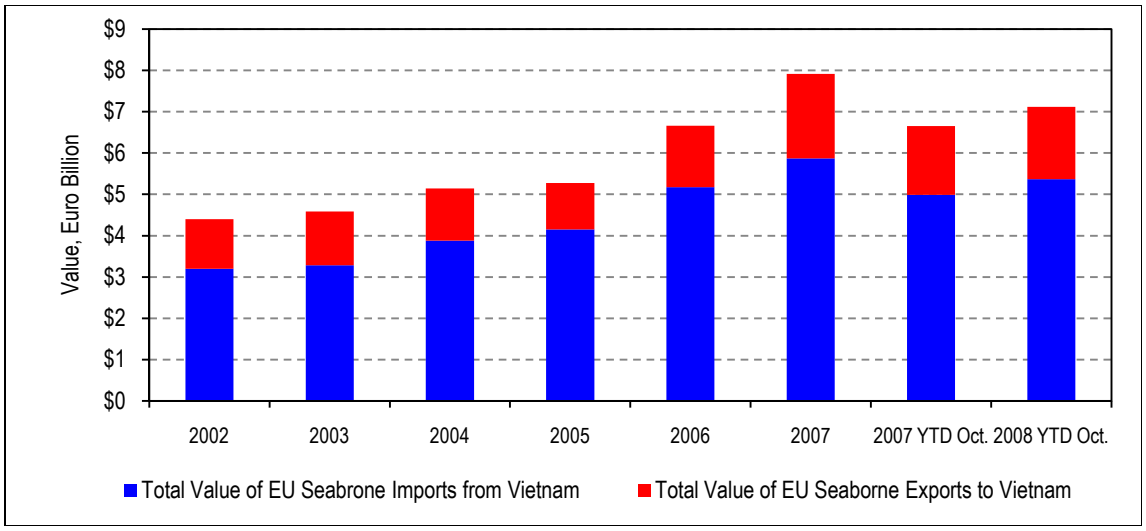
Commodity Group (Million Metric Tons)	2003	2004	2005	2006	2007	YTD Oct 2007	YTD Oct 2008	2003 Share	2007 Share
Iron And Steel	0.01	0.02	0.03	0.06	0.17	0.12	0.20	3.68%	19.22%
Food Industry Residues & Waste; Prep Animal Feed	0.03	0.02	0.04	0.03	0.08	0.06	0.19	13.45%	8.90%
Meat And Edible Meat Offal	0.00	0.01	0.01	0.01	0.04	0.02	0.11	0.01%	4.38%
Plastics And Articles Thereof	0.04	0.06	0.09	0.07	0.11	0.09	0.09	16.59%	12.37%
Cotton, Including Yarn And Woven Fabric Thereof	0.03	0.04	0.04	0.04	0.06	0.05	0.08	12.11%	6.92%
Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc	0.00	0.00	0.00	0.00	0.05	0.04	0.08	0.11%	5.13%
Wood And Articles Of Wood; Wood Charcoal	0.02	0.02	0.03	0.06	0.07	0.05	0.05	8.52%	7.43%
Cereals	0.00	0.00	0.00	0.03	0.07	0.05	0.04	0.09%	7.61%
Vehicles, Except Railway Or Tramway, And Parts Etc	0.00	0.01	0.01	0.01	0.03	0.02	0.03	1.34%	2.84%
Wood Pulp Etc; Recovd (waste & Scrap) ppr & pprbd	0.03	0.02	0.04	0.03	0.03	0.02	0.03	12.88%	2.99%
Total Top-10 Export Commodity Groups	**0.17**	**0.22**	**0.29**	**0.33**	**0.70**	**0.53**	**0.92**	**68.79%**	**77.79%**
Others	0.08	0.10	0.13	0.14	0.20	0.15	0.21	31.21%	22.21%
Total Containerized Exports	**0.25**	**0.32**	**0.43**	**0.47**	**0.90**	**0.68**	**1.13**	**100.0%**	**100.0%**

Source: www.ustradeonline.gov

1.6.3 European Union-Vietnam Trade

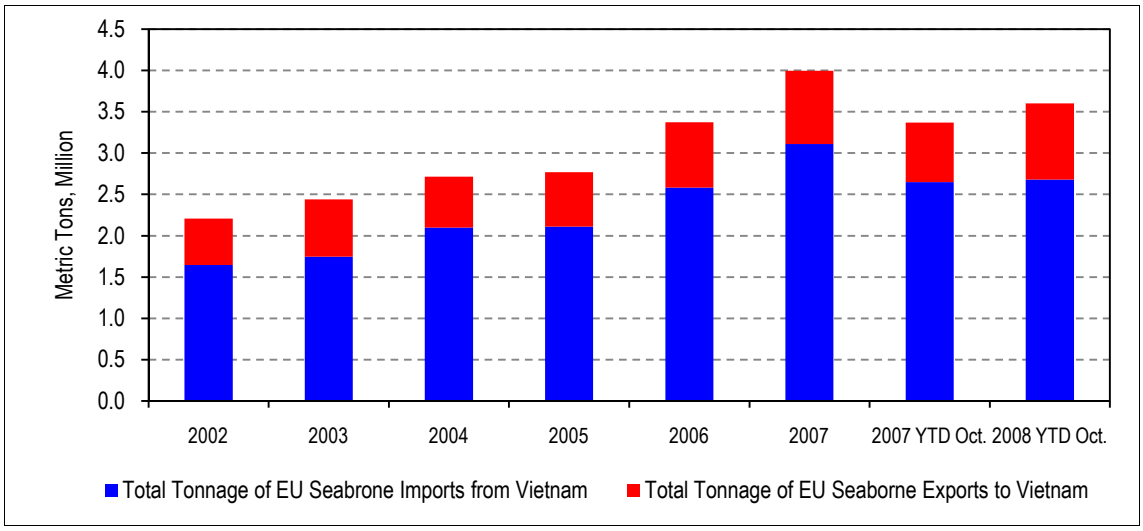
The recent trend in the value of EU-Vietnam seaborne trade[4] (containerized and non-containerized) is presented in Figure 1-19. The total value accelerated rapidly after 2005 and reached 7.9 billion euro in 2007 (US$10.8 billion), with imports valued at 5.9 billion euro (US$4.3 billion). Similarly, the total volume of seaborne trade (Figure 1-20) increased from 2.2 million metric tons in 2002 to 4 million tons in 2007, a 5-year CAGR of 13 percent with most of the growth occurring in 2006 and 2007. Imports dominate seaborne trade and accounted for 78 percent of total seaborne tonnage in 2007.

Figure 1-19: Trend in Total Value of EU-Vietnam Seaborne Trade



Source: Eurostat

Figure 1-20: Trend in Total Tonnage of EU-Vietnam Seaborne Trade



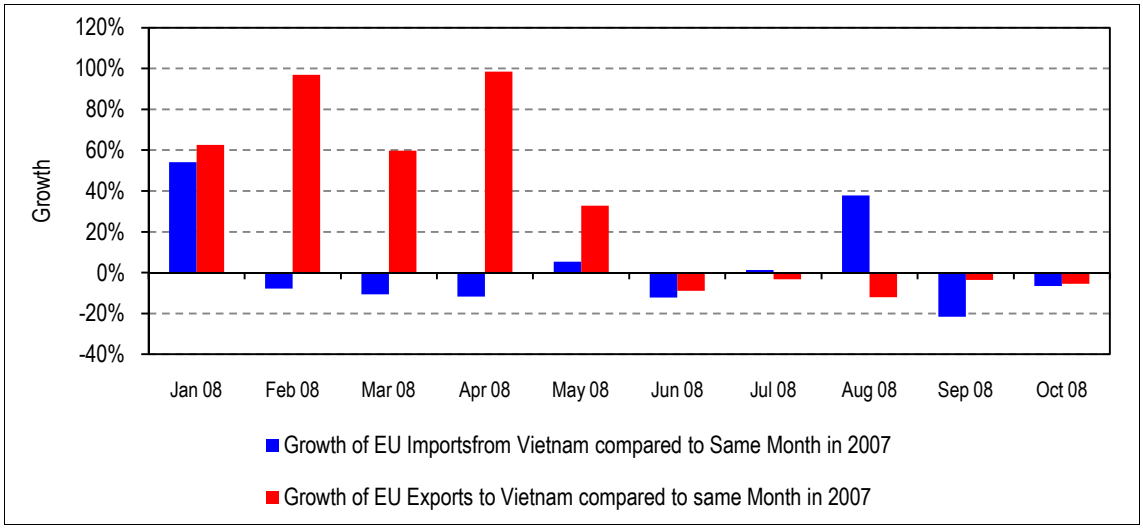
Source: Eurostat

Trade expansion continued in 2008, with both the value and tonnage of seaborne trade in the first ten months exceeding the same period in 2007. However, the 2008 performance masks a slowdown in trade growth during the

[4] Trade data quoted in this Section is based on official statistics released by Eurostat and may differ from the trade data reported by the General Statistics Office of Vietnam.

course of the year. As shown in Figure 1-21, the growth of trade slowed and shifted towards negative growth due to the deterioration in the economic climate.

Figure 1-21: Month-over-Month Growth of Tonnage in EU-Vietnam Seaborne Trade



Source: Eurostat

A profile of major commodities in EU-Vietnam seaborne trade (containerized and non-containerized) is provided in Table 1-9 and Table 1-10. The top three import commodity groups (coffee, furniture and ceramics) accounted for 46 percent of total imports (measured in MT) in 2007. The top three export commodity groups (wood products, fertilizers, and iron and steel) accounted for 34 percent of export tonnage in 2007. Although a breakout is not available from Eurostat, the top ten import and export commodities are believed to be largely containerized; based on the commodity descriptions, commodity volumes and values, as well as the containerized commodity profile of the U.S.-Vietnam trade.

Table 1-9: Major Commodities in EU-Vietnam Seaborne Import Trade

Commodity Group (Million Metric Tons)	2003	2004	2005	2006	2007	YTD Oct 2007	YTD Oct 2008	2003 Share	2007 Share
Coffee, Tea, Mat+ And Spices	0.34	0.47	0.44	0.52	0.59	0.52	0.43	25.7%	24.4%
Furniture; Bedding, Mattresses, Mattress Supports, Cushions And Similar Stuffed Furnishings; Lamps And Lighting Fittings, Not Elsewhere Specified Or Included	0.14	0.21	0.22	0.25	0.31	0.26	0.28	10.7%	12.6%
Ceramic Products	0.18	0.20	0.21	0.21	0.23	0.20	0.18	13.7%	9.3%
Articles Of Stone, Plaster, Cement, Asbestos, Mica Or Similar Materials	0.08	0.11	0.14	0.17	0.22	0.19	0.19	5.9%	9.1%
Fish And Crustaceans, Molluscs And Other Aquatic Invertebrates	0.03	0.05	0.08	0.16	0.22	0.18	0.24	2.5%	9.1%
Footwear, Gaiters And The Like; Parts Of Such Articles	0.14	0.16	0.14	0.14	0.14	0.12	0.12	10.7%	5.6%
Plastics And Articles Thereof	0.01	0.01	0.03	0.07	0.09	0.08	0.10	0.9%	3.9%
Rubber And Articles Thereof	0.07	0.07	0.07	0.08	0.08	0.07	0.06	5.0%	3.3%
Articles Of Apparel And Clothing Accessories, Not Knitted Or Crocheted	0.02	0.02	0.03	0.04	0.06	0.05	0.05	1.4%	2.3%
Articles Of Apparel And Clothing Accessories, Knitted Or Crocheted	0.01	0.01	0.02	0.03	0.04	0.03	0.03	0.9%	1.6%
Total Top-10 Import Commodity Groups	**1.03**	**1.31**	**1.37**	**1.66**	**1.98**	**1.70**	**1.67**	**77.6%**	**81.3%**
Others	0.30	0.32	0.39	0.35	0.45	0.95	1.01	22.4%	18.7%
Total Imports	**1.33**	**1.63**	**1.77**	**2.01**	**2.43**	**2.65**	**2.68**	**100.0%**	**100.0%**

Source: Eurostat

Table 1-10: Major Commodities in EU-Vietnam Seaborne Export Trade

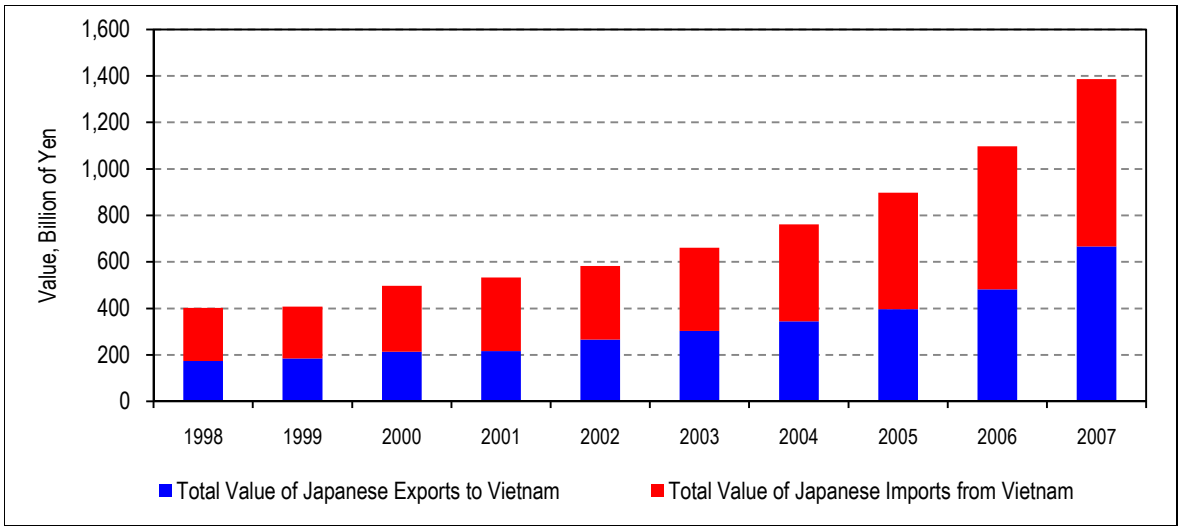
Commodity Group (Million Metric Tons)	2003	2004	2005	2006	2007	YTD Oct 2007	YTD Oct 2008	2003 Share	2007 Share
Wood And Articles Of Wood; Wood Charcoal	0.05	0.08	0.07	0.09	0.11	0.10	0.05	7.3%	13.3%
Fertilizers	0.03	0.01	0.01	0.06	0.11	0.09	0.06	4.2%	12.5%
Iron And Steel	0.17	0.08	0.10	0.07	0.07	0.05	0.18	25.1%	8.2%
Boilers, Machinery And Mechanical Appliances; Parts Thereof	0.05	0.04	0.03	0.04	0.06	0.05	0.05	7.1%	7.0%
Pulp Of Wood Or Of Other Fibrous Cellulosic Material; Recovered (Waste And Scrap) Paper Or Paperboard	0.01	0.02	0.04	0.05	0.05	0.04	0.07	1.5%	5.9%
Plastics And Articles Thereof	0.02	0.03	0.03	0.03	0.04	0.04	0.04	3.1%	5.1%
Products Of The Milling Industry; Malt; Starches; Inulin; Wheat Gluten	0.06	0.05	0.06	0.06	0.04	0.03	0.05	8.5%	4.4%
Residues And Waste From The Food Industries; Prepared Animal Fodder	0.00	0.01	0.03	0.08	0.03	0.02	0.04	0.6%	3.5%
Miscellaneous Chemical Products	0.02	0.03	0.03	0.02	0.03	0.02	0.02	3.1%	3.1%
Paper And Paperboard; Articles Of Paper Pulp, Of Paper Or Of Paperboard	0.03	0.03	0.02	0.03	0.03	0.02	0.03	4.5%	3.1%
Total Top-10 Commodity Groups	**0.44**	**0.38**	**0.40**	**0.52**	**0.56**	**0.46**	**0.59**	**65.1%**	**66.0%**
Others	0.24	0.23	0.25	0.25	0.29	0.24	0.30	34.9%	34.0%
Total Exports	**0.68**	**0.61**	**0.65**	**0.77**	**0.86**	**0.70**	**0.89**	**100.0%**	**100.0%**

Source: Eurostat

1.6.4 Japan-Vietnam Trade

The long term trend in trade (containerized and non-containerized) between Japan and Vietnam[5] is presented in Figure 1-22. The total value of trade increased from 400 billion yen (US$3.1 billion) in 1998 to 1,400 billion yen (US$11.9 billion) in 2007, with most of the trade expansion occurring over the last five years. Bilateral trade has been driven by significant investments by Japanese companies in manufacturing in Vietnam, the export of components from Japan to Vietnam and the shipment of finished goods from Vietnam to Japan.

Figure 1-22: Trend in Total Value of Japan-Vietnam Trade



Source: "Trade Statistics of Japan" Ministry of Finance, Japan

[5] Trade data quoted in this section is based on official statistics from Japanese Customs and may differ from the trade data reported by the General Statistics Office of Vietnam.

1.7 Container Traffic

1.7.1 Container Traffic

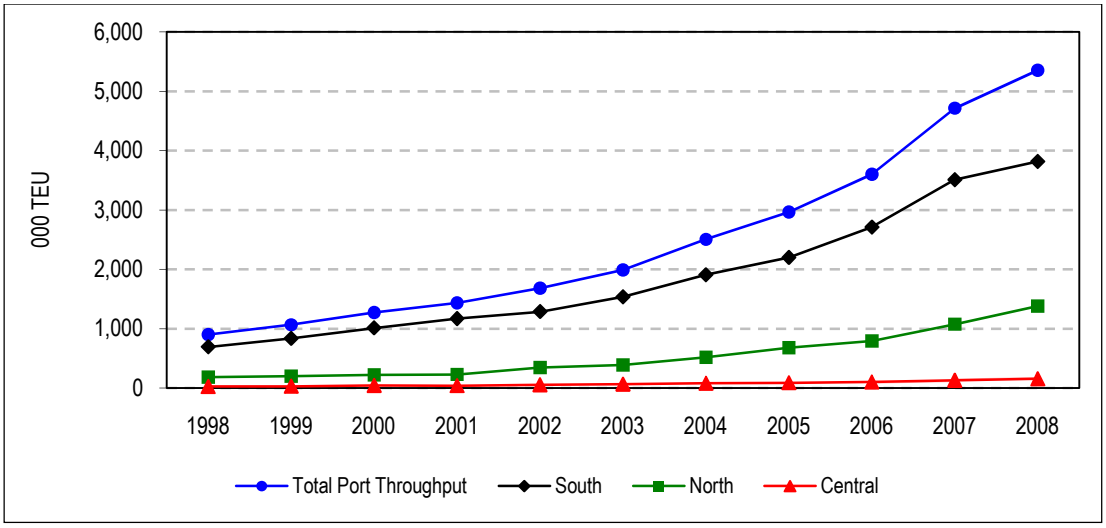
Vietnam's port container traffic expanded rapidly over the past 10 to 15 years driven by economic growth, foreign investment, and trade integration with the global economy. Total port container throughput (loaded imports, loaded exports and empty containers) increased from under 1 million twenty foot equivalent units (TEU) in 1998 to 5.4 million TEU in 2008 (Figure 1-23), a CAGR of 20 percent.

Southern Vietnam, centered on HCMC, accounts for the majority of Vietnam's container traffic (71 percent in 2008). This reflects the relatively more established economy of the HCMC region, which has been a major location for foreign direct investment in Vietnam. Total port traffic in South Vietnam increased from 0.7 million TEU in 1998 to 3.8 million TEU in 2008.

The distribution of container traffic in South Vietnam by container terminal is presented in Table 1-11. The two largest terminals are Saigon Newport Cat Lai and Vietnam International Container Terminal (VICT), which together accounted for 67 percent of South Vietnam's container traffic in 2008. Saigon Port had the third largest container activity in 2008 followed by the mid-stream activities (vessel to/from barge) conducted by Gemadept.

South Vietnam's container traffic expanded by 10 percent in 2008 as the slowing world economy dampened growth in the final months of the year. The immediate outlook (2009 and 2010) is for single digit growth due to weakness in the World economy. However, the medium to long term expansion of Vietnam's economy, partly driven by foreign direct investment and Vietnam's competiveness as a manufacturing location, is expected to support continued expansion of container traffic. Investment will be required in new transportation infrastructure (ports, roads, etc.) to support the trade growth. The opening of new deep draft container terminals in the HCMC region is expected to create new market opportunities for terminal operators and their shipping line customers, including the handling of additional Cambodian transit cargo and the potential to handle regional transshipment cargo. These market opportunities are projected to generate container traffic growth in addition to the organic growth derived from the long-term development of Vietnam's economy and international trade.

Figure 1-23: Development of Vietnam Port Container Traffic



Source Vietnam Seaports Organization

Table 1-11: Vietnam Port Container Traffic

000 TEU	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
SOUTH											
Cat Lai	413	421	412	403	475	700	880	1,056	1,400	1,850	2,018
VICT	0	45	123	204	264	298	348	377	446	572	536
Saigon Port	140	172	237	269	285	240	300	285	221	350	510
Mid-Stream	85	102	124	143	158	189	234	270	400	450	500
Ben Nghe	54	94	110	130	78	89	129	164	191	218	189
Bong Sen	0	0	0	12	17	9	0	21	18	24	24
Total HCMC Region	**693**	**834**	**1,006**	**1,162**	**1,277**	**1,524**	**1,891**	**2,172**	**2,675**	**3,414**	**3,778**
Can Tho	0	1	4	6	9	11	16	18	17	21	11
My Thoi	0	0	0	0	0	0	1	8	18	25	31
Tra Noc-Can Tho	0	0	0	0	0	0	0	1	1	1	1
Other South	**0**	**1**	**4**	**6**	**9**	**11**	**17**	**27**	**36**	**46**	**41**
Total North	184	201	221	229	345	388	516	680	791	1,076	1,380
Total Central	25	29	43	39	54	64	80	87	101	129	155
Total Vietnam	**901**	**1,065**	**1,274**	**1,436**	**1,684**	**1,988**	**2,505**	**2,966**	**3,603**	**4,715**	**5,354**
Region Shares											
South	77%	78%	79%	81%	76%	77%	76%	74%	75%	74%	71%
North	20%	19%	17%	16%	20%	20%	21%	23%	22%	23%	26%
Central	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%

Source: Vietnam Seaports Association

1.7.2 Container Traffic Structure

In the absence of an available statistical breakdown of container traffic, interviewees were asked to provide estimates on the distribution of port container traffic by imports and exports, and by markets. The general estimates presented Table 1-12 were developed based on the interview responses. The import profile is heavily weighted towards Asia due to the large amount of imports of intermediary goods for processing, while the export profile is more weighted towards consumption markets in USA and Europe.

Table 1-12: Estimated Structure of Container Traffic

Estimates	Imports	Exports
Estimated Share of Total Container Traffic	52%	48%
Estimated Distribution by Laden / Empty	75% / 25%	95% / 5%
Estimated Distribution by Market:		
USA	10%	30%
Europe	5%	30%
Asia Regional & Other	85%	40%

Source: Interviews

1.7.3 Current Shipping Line Services

A list of current shipping line services calling at HCMC is provided in Table 1-13. The services are a mixture of intra-Asia services, feeder services for major transshipment ports (Singapore, Hong Kong and Kaohsiung) and coastal

services. Services are operated by major container shipping lines, regional carriers, specialist feeder service operators, and domestic shipping lines. The largest ship size calling at HCMC is 1,900 TEU, while 39 ships are under 1,000 TEU in size and 79 ships are between 1,000 TEU and 2,000 TEU in size. Many of the shipping likes make two or three terminals calls at the terminals in HCMC.

The principal recent change to shipping line services, and a development expected to spread to other major Vietnam trade lanes in the future, is the introduction of direct service between HCMC and the U.S. West Coast. In June 2009, MOL, APL and Hanjin introduced direct service calls at two new deep-draft terminals that opened in the Cai Mep/Thi Vai port complex (see Section 2.1 for discussion of container terminal developments) and the shipping lines are deploying, in some cases, ships of up to 6,500 TEU. These new terminals and direct services offer importers and exporters faster transit times between Vietnam and the U.S. West Coast and more efficient operations for the ocean carriers. These new direct shipping services to the United States are an important development for Vietnam due to the fact that the United States is the second largest market for Vietnam's exports. In addition, the new terminal infrastructure is expected to create new market opportunities for the terminal operators and their shipping line customers, including increased handling of Cambodian transit cargo and transshipment of regional cargo.

Table 1-13: List of Container Services Calling at HCMC

Service	Number of Vessels	Service Frequency	Service	Number of Vessels	Service Frequency
APL – SVS	1	52	K-LINE/NEW ECON LINE - ASECO-X2	3	52
APL/HANJIN - SVX	2	52	K-LINE/WAN HAI - JCV	3	52
APL/MOL - VCX	2	52	KMTC - KTC	3	52
BIEN DONG - COASTAL	2	104	MCC TRANSPORT - SKM	2	52
BIEN DONG - VS2	2	52	MCC TRANSPORT - SVN 1	1	52
BIEN DONG/MOL - TVS	2	52	MCC TRANSPORT - SVN 2	1	52
BIEN DONG/MOL - VSS	2	52	MCC TRANSPORT - SVN 3	2	52
CHIPOLBROK	4	48	MCC TRANSPORT - SVN 4	1	52
CNC LINE/OOCL - VIET	2	52	MOL/RCL/SITC - CBC/RBJ	3	52
CNC LINE/STX/YANG MING - CTS	3	52	MSC - MEKONG EXPRESS	1	52
COSCO - STV	3	52	MSC - SAIGON EXPRESS	1	52
CSCL - CVT	2	52	RCL - RBS	2	52
EVERGREEN - VSS	1	52	RCL - RHS	1	52
EVERGREEN/OOCL/YANG MING - THX	3	52	RCL/SAMUDERA/TSK - TCX	3	52
GEMADEPT	1	52	SINOKOR/TS LINES - KJ2/CKI	3	52
GEMADEPT/K-LINE	1	52	SITC - CJV1	2	52
GEMARTRANS/HUB LINE - 1	2	104	TASMAN ORIENT - E ASIA	4	26
GEMARTRANS/HUB LINE - 2	2	52	THORESEN - B	3	26
GOLD STAR - CVX	3	52	TS LINES - JTV	3	52
GOLD STAR/CSAV NORASIA - VTX	4	52	TSK - TWX	4	52
HANJIN - NHS	3	52	VIETNAM LINE	1	17
HANJIN/SINOKOR/STX - NTS	3	52	VINALINES	1	156
HEUNG-A/MOL - BHS	3	52	VOSCO	1	12
HYUNDAI - FTS	4	52	WAN HAI - JSV	3	52
K-LINE/HANJIN - JABCO-1	3	52	WAN HAI - KVS	3	52

Source: MDS Transmodal Containership Database, January 2009

1.7.4 Domestic Container Service

Domestic container shipping service between HCMC and Haiphong (for Hanoi) is primarily provided by three shipping lines – Vinalines, Bien Dong Line and Gemadept. Vessel sizes and volumes are modest; however service frequency is high with multiple calls per week. Gemadept also provides container service between HCMC and Can Tho, in the Mekong Delta. During interviews, shippers stated that coastal container shipping service is a viable alternative to truck transport between HCMC and Haiphong, offering rates that are as much as 50 percent lower than truck rates. Truck transportation is impeded by traffic congestion and weight limitations on the road system.

Future expansion of domestic coastal service is expected given the projected improvements in container terminal infrastructure in the South and North, the distances involved in domestic transportation (848 nautical miles) that are suitable for shipping services, and congestion on the north-south land transportation corridors. Inefficiencies with the port logistics system (for example, congested roads near terminals) could hamper the development of coastal shipping services. Another opportunity for coastal shipping, linked to the new deepwater terminals at Cai Mep/Thi Vai, is the integration of domestic service with the handling of international feeder cargo between HCMC and smaller ports in Vietnam. Domestic container services can also benefit from the technologies proposed in this study to improve the container logistics system in the HCMC region.

Bien Dong Line

Bien Dong Line is a state-owned enterprise that operates nine small container ships up to around 1,000 TEU in capacity. Service is provided in domestic and intra-Asia trades. In the domestic market, the company provides service approximately three to four times per week between HCMC and Haiphong in the North; the advertised transit time is three days. The company reports that it captures as much as 40 percent of the domestic container cargo moving between the two ports.

Gemadept

Gemadept is a publicly listed company with a diverse range of business activities that include port operations, container shipping service, shipping and forwarding agency, logistics, project cargo transport and real estate. Gemadept operates the following domestic container shipping services:

- HCMC to Haiphong, one to two times per week with a 3-day transit.
- HCMC to Can Tho (in the Mekong Delta), one to two times per week with a 1-day transit.

The HCMC-Haiphong service is operated with small container ships with capacity of 500 to 700 TEU. Service to Can Tho is provided with self-propelled river vessels of up 75 TEU. River vessels are also used by Gemadept to provide service between HCMC and Phnom Penh in Cambodia (see Section 1.7.5). In HCMC, the services call at Gemadept's mid-stream operations and Phuoc Long ICD (see Section 2.2.5 of the report). Public reports indicate that Gemadept accounts for approximately 35 percent of the domestic container trade.

Vinalines

Vinalines operates a fleet of eight container ships, ranging in size from 580 TEU to 1,020 TEU. The ships are deployed in domestic services and international feeder services. In the domestic market, Vinalines operates three 594 TEU ships linking HCMC with Haiphong.

Other Services

There are also other operators that offer coastal container service, but with limited capacity using non-container ships.

1.7.5 Cambodia Transit Market

A small and growing volume of transit cargo moves by river between HCMC and Phnom Penh in Cambodia. Phnom Penh Autonomous Port (PPAP)[6] reported handling approximately 50,000 TEU in 2008 compared to 45,000 TEU in 2007 and 7,600 TEU in 2003. The growth of trade was driven by expansion of the Cambodian exports and increased frequency of river service. The distance between HCMC and Phnom Penh is approximately 330km, a two-day transit by river vessels of up to 75 TEU in capacity.

For Cambodian containerized export cargo, shipment from Phnom Penh via transshipment at HCMC to major Asian ports (for example, Hong Kong) is estimated to offer a saving of 10 to 15 percent[7] compared to shipment from Phnom Penh through Sihanoukville, Cambodia's main container seaport. The development of new deepwater terminals in HCMC is expected to offer additional opportunities for handling Cambodian transit cargo; for example, Cambodian exports shipped to the U.S. West Coast. With launch of the first direct service between HCMC and the U.S. West Coast in June 2009, shipping lines are promoting the new deployment's ability to service Phnom Penh via HCMC as a faster, more reliable, lower cost option for the growing Cambodia market[8].

The river route and facilities are expected to gradually improve in the future due to national and regional investments. PPAP has proposed development of a new dedicated container terminal on a 12-hectare site with a planned operational date of 2013. Strategic development of the Mekong River Basin is coordinated through the Mekong River Commission (MRC), which was established in 1995 by an agreement between the governments of Cambodia, Laos, Thailand and Vietnam. One function of the MRC is to improve navigation on the Mekong River by introducing modern navigational aids and channel maintenance programs.

In Task 5 of this report, recommendations are made on new technologies that could be used to improve the efficiency of the HCMC container logistics system. River services connecting to Phnom Penh and the container terminal in Phnom Penh could eventually be integrated into these technologies, to improve the efficiency and security of moving Cambodian transit cargo between HCMC and Phnom Penh.

[6] http://www.ppap.com.kh

[7] The savings estimate is based on data cited in "Integrated Waterborne Transport Planning on the Mekong River System in Cambodia", The International Forum on Integrated Water Resources Management of the Mekong River Basin, November 2005. Although somewhat dated, the information provides an indication of the potential savings available to Phnom Penh region container cargo by using service via HCMC.

[8] MOL press release April 14, 2009

2 Review of Current and Future Infrastructure Plans

The review of current and future infrastructure addresses those infrastructure elements that support container traffic in the HCMC region:

- Container terminals
- Inland container (or clearance) depots
- Industrial production zones
- Transportation companies
- Barge system
- Highways
- Container rail

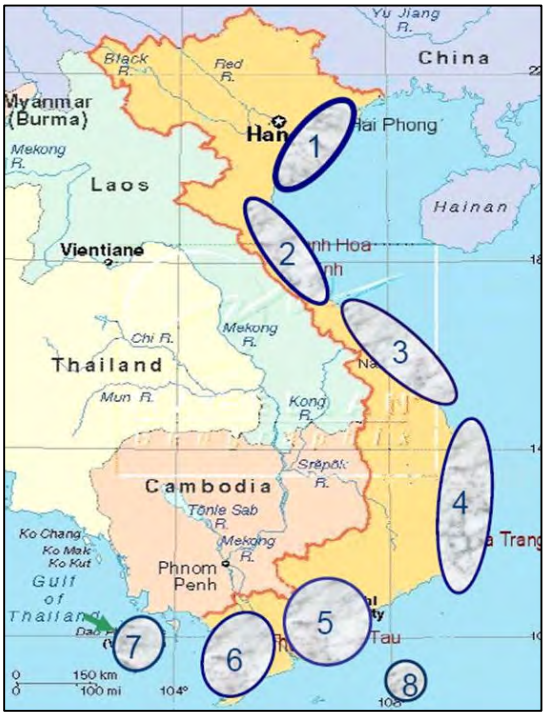
The review is based on interviews with companies and organizations that participate in each of the above sectors, a review of government and other studies that address transportation infrastructure, and the project team's experience of the Vietnam port sector.

2.1 Container Terminal Assessment

2.1.1 Port Master Plan

The strategy for port development in the HCMC region is being guided by the Vietnamese Government's Master Plan for port development. The Master Plan identifies eight port groups for development (Figure 2-1) including the HCMC region (Group 5). These port groups are the focus of long term planning and development, including opportunities for investment by the private sector and for foreign investment.

Figure 2-1: Master Plan for Port Development

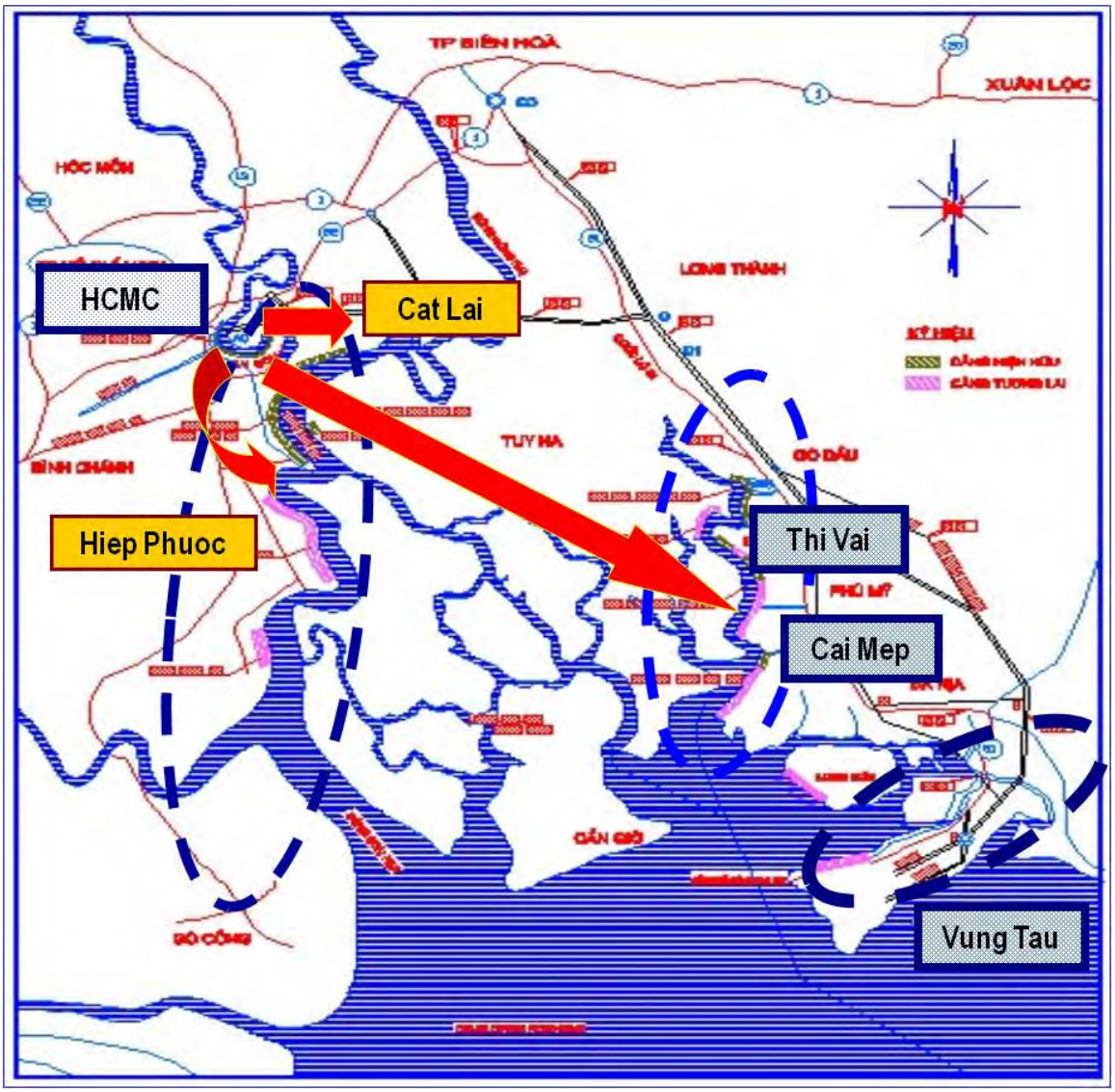


Source: Vinamarine

The principal Master Plan objectives for container terminals in the HCMC region (Group 5) are (Figure 2-2):

- Relocate the container terminals on the Saigon River to alternative locations in the HCMC region.
- Develop a new container terminal at Cat Lai, Dong Nai River (completed).
- Develop a new container terminal at Hiep Phuoc, Soi Rap River (under development).
- Develop new container terminal capacity at Cai Mep / Thi Vai River system (under development).
- Develop new general cargo terminals on the Dong Nai River and Soi Rap River.

Figure 2-2: Relocation of HCMC Saigon River Terminals



Source: HCMC Department of Transportation

2.1.2 Saigon River Terminals

Four terminals provide container handling services along the Saigon River:

- Vietnam International Container Terminal (VICT)
- Saigon Port
- Ben Nghe
- Bong Sen (Lotus Port)

The location of the four terminals is illustrated in Figure 2-3 and terminal profiles are provided in Table 2-1.

Figure 2-3: Location Map of Saigon River Terminals

Source: TranSystems and Google Earth

Table 2-1: Profile of Saigon River Terminals

Terminal	VICT	Saigon Port	Ben Nghe	Bong Sen (Lotus Port)
Terminal Type	Container	Container / General Cargo	Container / General Cargo	Container / General Cargo
Throughput in 2008 (TEU)	536,176	510,496	188,815	24,252
Estimated Capacity (TEU)	900,000*	550,000**	250,000***	25,000****
Number of Berths	4	4	4	1
Berth Length	678m	713m	816m	275m
Maximum Draft at Berth	10m	11m	9.5m to 13.0m	12.5m

* Estimate based on news reports.

** Estimate based on peak throughput in 2008. Container handling primarily at the four berths of Tan Thuan Terminal; Saigon Port also has 15 general cargo berths at the Nha Rong and Khanh Hoi terminals.

*** Estimate based on peak throughput of 218,000 TEU in 2007.

**** Estimate based on peak throughput of 24,000 TEU in 2008.

Source: Terminal Web Sites and Vietnam Seaports Association

VICT started operations in late 1998 and is the second largest container terminal in the HCMC region (after Cat Lai) with a total throughput of 572,000 TEU in 2007 and 536,000 TEU in 2008. VICT's principal advantage is its central location in HCMC; however, this location also presents the terminal with challenges including shallow river draft and traffic congestion. The completion of the Phu My Bridge across the Saigon River is expected to improve access to VICT by diverting some truck traffic away from the city center. However, the new bridge will also provide other terminals with improved highway access to the west and south of HCMC, increasing competition for cargo generated by these areas.

With the opening of the deep-draft terminals at Cai Mep/Thi Vai, VICT is expected to concentrate on handling regional cargo moving on smaller container ships. VICT will face increased competition for this regional cargo from SPCT, the new container terminal on the Soi Rap River due to open in 2009 and also from expansion at Cat Lai container terminal (Dong Nai River). While the country's Port Master Plan indicates that VICT would be relocated by 2020, the joint venture operating company has a terminal concession that extends beyond 2020.

Saigon Port operates general cargo and container berths along the Saigon River, and handled 350,000 TEU in 2007 and 510,000 TEU in 2008. Containers are primarily handled at Saigon Port's Tan Thuan terminal. Under the original Master Plan for port development, Saigon Port's Tan Thuan terminal was due to relocate before 2020 and its general cargo berths (Nah Rong and Khanh Hoi) before 2010. However, the actual schedule will be influenced by market conditions and construction schedules for new facilities. Saigon Port is planning a new general cargo terminal in the Hiep Phuc area on the Soi Rap River, and is involved in the development of deep-draft container terminals in the Cai Mep/Thi Vai area.

Ben Nghe is a general cargo terminal that handles containers. Total container throughput was 218,000 TEU in 2007 and 188,000 TEU in 2008. Under the Master Plan for port development, this terminal is scheduled for closure before 2020, and its operations transferred to a proposed new terminal on the Dong Nai River.

Bong Sen (Lotus Port) is a small facility that handled 24,000 TEU in 2007 and in 2008. Under the Master Plan for port development, the terminal is scheduled for closure before 2020.

The development of new deep draft container terminals in the Cai Mep/Thi Vai area is expected to generate barge traffic between these locations and the HCMC area. The existing Saigon River terminals could partly function as ICDs for the new deep draft container terminals.

2.1.3 Dong Nai River Terminals

Container handling capacity along the Dong Nai River is provided by:

- Cat Lai Container Terminal
- Mid-Stream container handling (vessel to/from barge)

The location of Cat Lai is illustrated in Figure 2-4 and a profile provided in Table 2-2. The Dong Nai River is also the location for the planned Phu Huu general cargo terminal, the proposed new location for the Ben Nghe terminal on the Saigon River.

Figure 2-4: Location Map of Dong Nai River Terminals

Source: TranSystems and Google Earth

Table 2-2: Profile of Dong Nai River Terminals

Terminal	Cat Lai Container Terminal	Mid-Stream Operations
Throughput in 2008 (TEU)	2.01 million	500,000
Estimated Capacity (TEU)	2.25 million*	Variable
Number of Berths	6	5 buoys
Berth Length	973m	n/a
Maximum Draft at Berth	12m	n/a

* Estimate by TranSystems

Source: Terminal Web Sites and Vietnam Seaports Association

Cat Lai Terminal is the largest container terminal in the HCMC region and it handled 1.85 million TEU in 2007 and 2.01 million TEU in 2008. Operated by Saigon Newport Company, the terminal is undergoing expansion and a seventh berth plus additional container yard area will be completed in 2009. The terminal has 11.7 hectares of land currently used as a petroleum storage facility, which is expected to be converted to additional container yard in the future (possibly by 2012). A challenge for the terminal is its 7km access road, which needs improvement. Saigon Newport is also the operator and developer of ICDs, a new deep-water terminal at Cai Mep, and operates barges. Under a new business initiative, Saigon Newport has recently started its own company to provide pilotage services to container shipping lines.

Mid-stream container operations (illustrated in Figure 2-5) are provided by Gemadept close to the confluence of the Dong Nai and Saigon Rivers. The company operates five pairs of buoys for vessel mooring and four floating cranes for handling containers. The company also owns a fleet of small barges ranging in capacity from 16 TEU to 72 TEU. Approximately 90 percent of the mid-stream containers are transferred by barge to and from Gemadept's Phuoc Long ICD. Transit time from the mid-steam buoys to Phuoc Long ICD is reported to be three hours for self-propelled vessels and five hours for towed barges. The other 10 percent of mid-stream container traffic is transferred by barge to and from other ICDs in the area, including Binh Duong ICD. Mid-stream handling provides additional capacity for container traffic and is price competitive with the container terminals. However, the mid-stream operating environment is less attractive for shipping lines due to higher risk of damage to containers and cargo during the mid-stream handling process.

Figure 2-5: Mid-Stream Container Handling

Source: Phuoc Long ICD Web Site

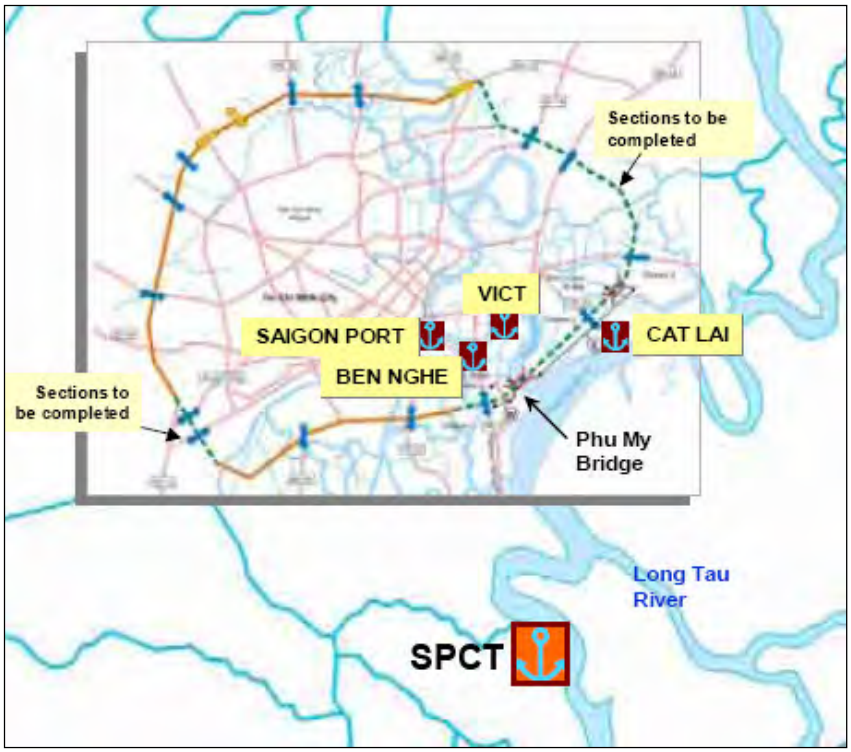
2.1.4 Soi Rap River Terminals

The Soi Rap River is the location for a new container terminal and several proposed general cargo terminals. They are (status):

- Saigon Premium Container Terminal (under construction).
- Saigon Port Hiep Phuoc – proposed new general cargo terminal (licensed).
- Long An Industrial Park – proposed new general cargo terminal (concept / not licensed).

The location of the Saigon Premium Container Terminal is illustrated in Figure 2-6 and terminal profiles are provided in Table 2-3.

Figure 2-6: Location Map of Saigon Premium Container Terminal



Source: SPCT

Table 2-3: Profile of Soi Rap River Terminals

Terminal	SPCT* Phase 1a	SPCT* Phase 1b	Saigon Port Hiep Phuoc
Estimated Capacity (TEU)	750,000	750,000	General Cargo
Number of Berths	2	2	3
Berth Length	500m	450m	820m
Maximum Draft at Berth	12m	12m	12m
Estimated Completion	2009	2010+ based on market conditions	2012

* Terminal information based on DP World presentation at port conference, December 2008. Until the Soi Rap River is dredged, access will be via the Long Tau River and vessel draft will be limited to 9m.

Source: DP World Presentation December 2008, Terminal Web Sites and Vietnam Seaports Association

Saigon Premium Container Terminal (SPCT) is a joint venture between DP World and state-owned Tan Thuan Industrial Promotion Company. The terminal is located along the western shore of the Soi Rap River in the Hiep Phuoc Industrial Park and upon completion will have 950m of berth with projected capacity of 1.5 million TEU per annum. The development will be in two phases with the first two berths scheduled for 2009. Completion of the new Phu My road bridge (part of ring road #2) is expected to provide improved highway access to the terminal.

Access to SPCT will initially be via the existing Long Tau River and vessel draft will be limited to a maximum of nine meters. Planned dredging of the Soi Rap River will provide a more direct and deeper access channel to SPCT. SPCT is expected to compete strongly for cargo originating to the south and west of HCMC, including refrigerated cargo from the Mekong Delta, and SPCT will have barge connections with ICDs to service many markets.

The Soi Rap River area is also the location for proposed general cargo terminals that are expected to offer some, but limited, container handling capacity. They are **Saigon Port Hiep Phuoc** (licensed) and **Long An Industrial Park Terminal** (concept, not licensed). There is also additional waterfront property available for terminal development.

2.1.5 Cai Mep River Terminals

Five container terminals are under construction or planned for the east bank of the Cai Mep River. They are, running north to south:

- Tang Cang Cai Mep
  - Phase 1 – Tang Cang Cai Mep Container Terminal
  - Phase 2 – Tang Cang Cai Mep International Terminal (TCIT)
- Cai Mep International Terminal (CMIT)
- Cai Mep Container Terminal (CMCT)
- Saigon Port-SSA International Container Terminal (SSIT)
- Gemalink Container Terminal

The location of these five terminals is illustrated in Figure 2-7 and profiles are provided in Table 2-4.

Table 2-4: Profile of Cai Mep Container Terminals

Terminal	Tang Cang Cai Mep Phase 1	Tang Cang Cai Mep Phase 2 - TCIT	CMIT	CMCT	SSIT	Gemalink
Local Partner	Saigon Newport	Saigon Newport	Saigon Port	Vinamarine	Saigon Port	Gemadept
Foreign Partners	n/a	Hanjin, MOL and Wan Hai	APM Terminals	TBD	SSA Marine	CMA-CGM
Estimated Capacity (TEU)	400,000	800,000	1,100,000	Phase 1 500,000 Phase 2 500,000	1,350,000	1,000,000
Number of Berths	1	2	2	Phase 1 – 1 Phase 2 – 1	2	2
Berth Length	300m	600m	700m	300m + 300m	600m	500m
Maximum Draft at Berth	14m	14m	14m	14m	14m	14m
Estimated Completion	Opened June 2009	TBD	Q3 2011	2013 (Phase 1)	Q1 2011	2014

Source: Terminal Web Sites and Vietnam Seaports Association

Tang Cang Cai Mep Container Terminal has two phases of development. The first phase opened in June 2009 with a single 300m berth. The second phase, Tang Cang Cai Mep International Terminal (TCIT), will provide 600m of berth and is a joint venture between Saigon Port and three foreign shipping lines – Hanjin, MOL and Wan Hai.

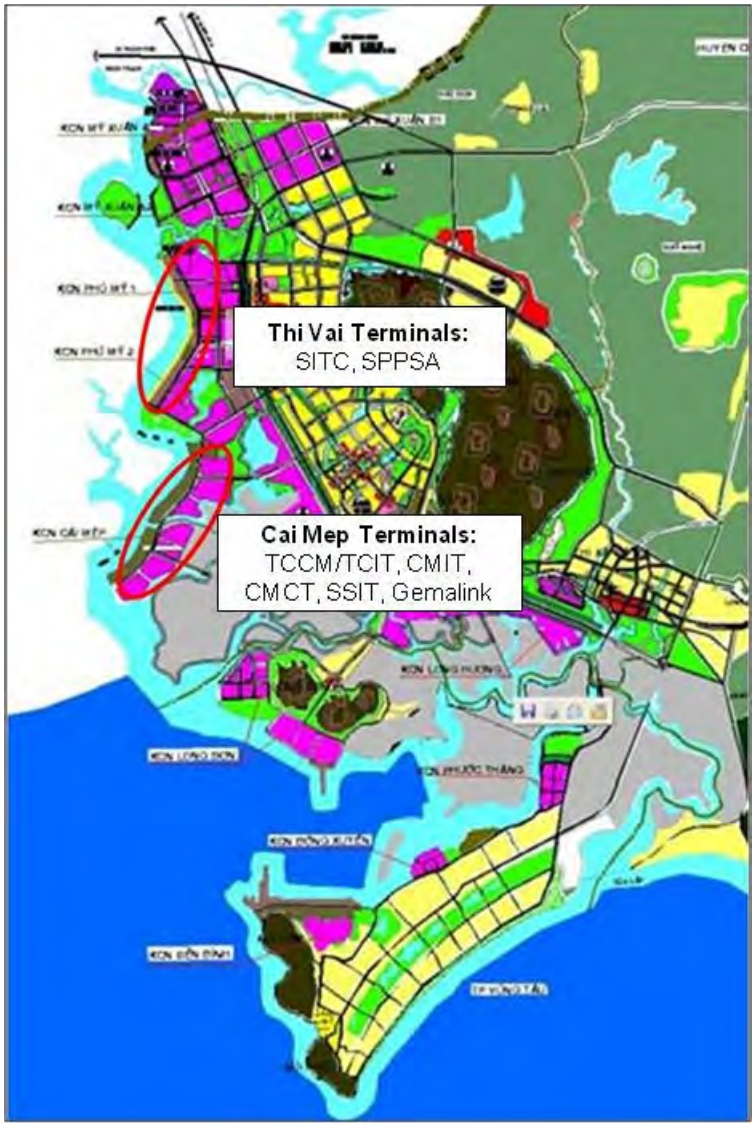
Cai Mep International Terminal (CMIT) is a joint venture of Saigon Port and APM Terminals. The terminal is under construction with a projected opening date in third quarter 2011.

Cai Mep Container Terminal (CMCT) is under construction by the Vietnamese government through Vinamarine, with funding provided by Japanese development aid. The first phase is a single 300m berth projected to be that will be bid out to a terminal operator and expected to start operations in 2013. The second phase, another 300m berth will be developed based on market conditions.

Saigon Port-SSA International Container Terminal (SSIT) is a joint venture of Saigon Port and SSA Marine. The terminal is under construction with a projected opening date of the first quarter of 2011.

Gemalink Container Terminal is a joint venture between Gemadept and Terminal Link, the terminal operating arm of CMA-CGM. The terminal has a projected completion date of 2014.

Figure 2-7: Area Map of Cai Mep and Thi Vai Container Terminals



Source: Ba Ria-Vung Tau Industrial Zones Authority

2.1.6 Thi Vai River Terminals

Two container terminals are under development along the east bank of the Thi Vai River. They are:

- Saigon Port – PSA Container Terminal (SPPSA)
- Saigon International Terminal Vietnam (SITV)

Profiles of these two terminals are provided in Table 2-5. There are proposals for a third container terminal (My Xuan A2 Terminal) but there are no confirmed investors or timelines for construction. Also under development with financial assistance from Japan is the Thi Vai General Cargo terminal.

Table 2-5: Profile of Thi Vai Container Terminals

Terminal	SPPSA	SITV
Local Partner	Saigon Port	SICC
Foreign Partner	PSA	Hutchison
Estimated Capacity (TEU)	1 million (Phase I)* 1 million (Phase II)*	0.5 million (Phase 1)** 0.5 million (Phase 2)**
Number of Berths	2 and 2	3
Berth Length	600m and 600m	730m
Maximum Draft at Berth	12m	12m
Estimated Completion	Phase I opened in June 2009 Phase II 2015	2010

* Based on public information from PSA and estimate of phases.

** Based on public information and estimate of phases.

Source: Terminal Web Sites and Vietnam Seaports Association

Saigon Port – PSA Container Terminal (SPPSA) is a joint venture of Saigon Port and PSA. The first phase of the project opened in June 2009, while the second phase is expected to follow up to five years later.

Saigon International Terminal Vietnam (SITV), a joint venture between SICC and Hutchison Port Holdings (HPH), the project is expected to come on stream in 2010.

2.1.7 Other Projects

As well as the above terminals under construction and planned for the Cai Mep/Thi Vai area, there are two other proposed projects in the region. The projects are:

- A container terminal involving Busan Port Authority, located south of the Gemalink project.
- The Ben Dinh-Sao Mai Port located at Vung Tau, which is joint venture between Vinalines and China Merchant Holding.

2.1.8 Terminal Operating Systems

Cat Lai and VICT, the current dedicated container terminals in HCMC, have industry standard systems in place for terminal operations. Terminal operating systems (TOS) used are:

- Cat Lai – TOPX provided by Realtime Business Solutions, an Australian company.
- VICT – SPARCS provided by Navis, a U.S. company.

Cat Lai installed its new TOPX terminal operating system during the summer of 2008. The system installation and training process caused some disruptions to terminal productivity, which were overcome a few months later. VICT went live with the SPARCS terminal operating system in March 2008.

Both terminals are using their systems for terminal operations management including planning of ship loading and discharge with shipping lines. They use electronic data interchange (EDI) to communicate with the shipping lines. However, the terminals do not have EDI connectivity with other elements of the container logistics system – customs, ICDs, barge operators, and trucking companies – which have limited or no information technology (IT) capabilities. Communication with these parties is by e-mail and fax.

2.1.9 Container Lift Charges

Representative container terminal charges are provided in Table 2-6 and were derived from interviews with container terminals, shipping lines, and ICDs. The charges quoted in this report do not reflect any volume or other discounts a container terminal may offer its larger customers

Table 2-6: Representative Container Terminal Charges in the HCMC Region

	20-foot	40-foot
Stevedoring (US$ per Lift)		
Container Terminals	$50	$75
Mid-Stream Operations	$50	$70
Container Yard (US$ per Lift)		
Container Yard	$12.50	$22.50

Source: Interviews

2.2 Inland Container Depot Assessment

2.2.1 Market Role

The Inland Container (or Clearance) Depot (ICD) is a key component of the container logistics system in the HCMC region. The project team interviewed major operators of ICDs in order to develop an understanding of their market role and services. The ICD provides the following major functions:

- Receipt of import containers by barge or truck from the container terminals or mid-stream operations
- Shipment of export containers by barge or truck to the container terminals or mid-stream operations
- Container storage
- Bonded warehousing
- Container Freight Station
- Customs clearance
- Delivery and receipt of loaded and empty containers by truck
- Receipt of local truck cargo and direct load to containers
- Deconsolidation of containerized cargo and distribution by local truck.

The ICDs generate revenue primarily from lift-on/lift-off charges, storage, and container freight station (CFS) services. Some ICDs may also operate empty container depots where revenues are generated from storage, repair and maintenance, and pre-trip inspections of refrigerated containers. The ICDs have basic operating systems and do not conduct EDI with container terminals and customers.

The major ICDs identified during the study, either operating or proposed, are shown in Table 2-7.
:

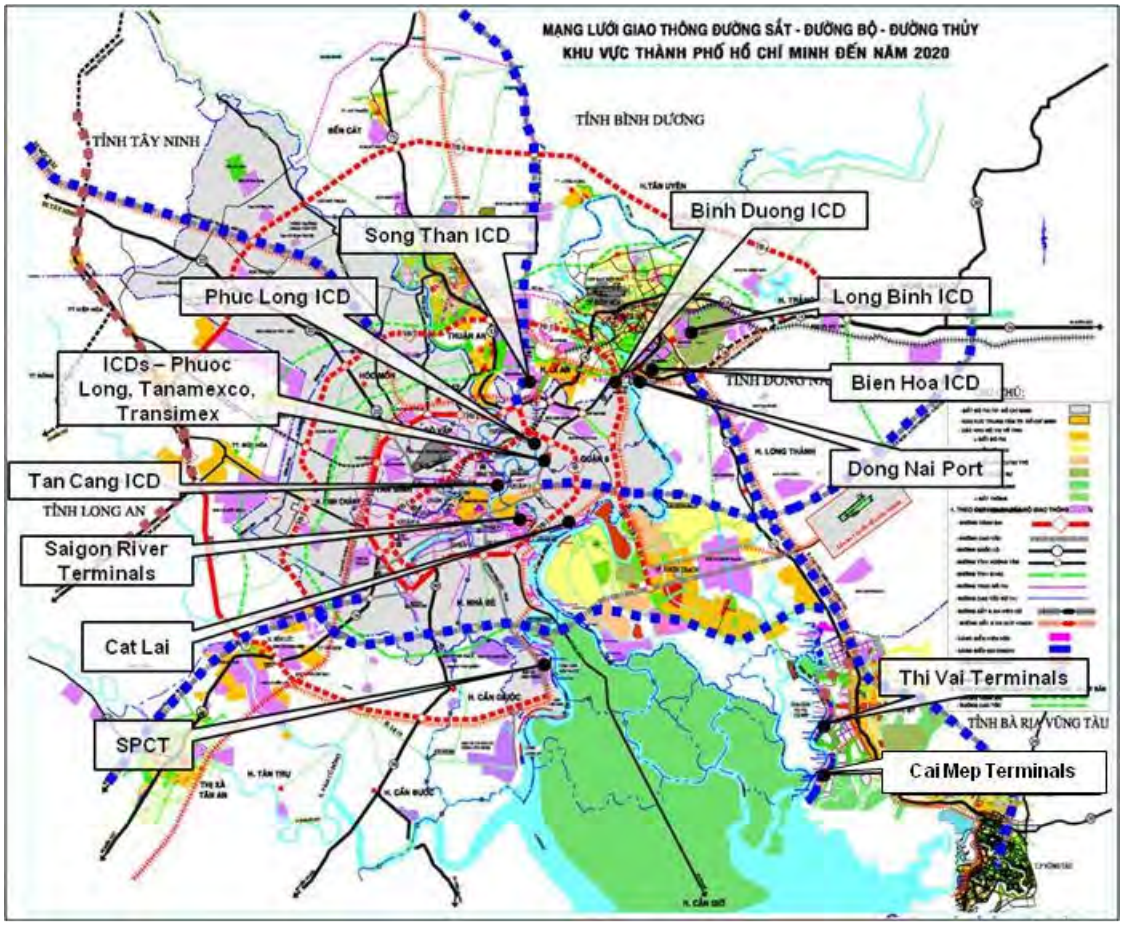
Table 2-7: Operating and Proposed ICDs

ICD	Status	River Location	Total Estimated Area (Hectares)	Estimated Annual Throughput (TEU)
Bien Hoa	Operating	Dry ICD with river access 5km away on Dong Nai River	18	Not available
Binh Duong	Operating	Dong Nai River	Not available	110,000 in 2008
Phuc Long	Operating	Saigon River	16	252,000 in 2008
Phuoc Long	Operating	Saigon River	44	470,000 in 2007
Long Binh	Under Development	Dry ICD	80 (phase 1)	Not applicable
Song Than	Operating	Dry ICD	50	Not available
Tan Cang	Operating	Saigon River	72	Not available
Tanamexco	Operating	Saigon River	12.5	365,000 in 2007
Transimex	Operating	Saigon River	9	280,000 in 2007
Dong Nai	Proposed	Dong Nai River	18.7	Not applicable

Source: Interviews and Company Web Sites

The location of the existing and proposed ICDs, along with the container terminals, is shown in Figure 2-8. The map also shows the long term master plan for regional highway improvements, which is discussed in Section 2.6 of the report.

Figure 2-8: Location Map of HCMC ICDs and Container Terminals



Source: HCMC Department of Transportation

2.2.2 Bien Hoa ICD

Opened in 1999, Bien Hoa ICD is located on Highway 51 (Figure 2-9) on 18 hectares of land adjacent to the Bien Hoa I and II industrial parks. The facility has ten warehouses, nine of which are bonded, covering an area of 46,000 square meters. The operator is Tin Nghia Company, which also has interests in industrial parks. The ICD has access to the Bien Hoa river port, which is approximately 5km away on the Dong Nai River inside Bien Hoa I industrial park, and sits on 1.2 hectares of land.

Figure 2-9: Bien Hoa ICD and Bien Hoa River Port

Source: TranSystems and Google Earth

2.2.3 Binh Duong ICD

Binh Duong ICD (Figure 2-10) is located on the Dong Nai River and adjacent to the Dong Nai Bridge and Highway 1-A. It is operated by Gemadept, the same company that operates the Phuoc Long ICD and the mid-stream container handling operations. The facility had a reported throughput of 72,000 TEU in 2007 and 110,000 TEU in 2008 (according to the Vietnam Seaports Association).

Figure 2-10: Binh Duong ICD

Source: TranSystems and Google Earth

2.2.4 Phuc Long ICD

Phuc Long ICD, located off of Highway 1-A, provides a berth and storage area on a total 16 hectares (Figure 2-11). Previously a container depot, the facility has been operating as an ICD for one year. The operator also has empty container depots in the area that offer storage, maintenance and repair services, and pre-trip inspections of refrigerated containers. This is the only ICD to operate gantry cranes for handling containers on barge (Figure 2-12) and productivity is in the region of 20 moves per hour. Phuc Long handles 21,000 TEU per month, approximately 70 percent empty and 30 percent laden. Similar to other ICDs, Phuc Long has experienced a drop in throughput in late 2008. The facility has a maximum capacity of approximately 35,000 TEU per month (based on the ICD and two supporting empty container depots).

Figure 2-11: Phuc Long ICD

Source: TranSystems and Google Earth

Figure 2-12: Crane Operations at Phuc Long ICD

Source: www.phuclongicd.com

2.2.5 Phuoc Long ICD

A subsidiary of Gemadept Corporation, Phuoc Long ICD is located on Highway 1-A in District 9 of HCMC. Phuoc Long operates both as an ICD and a container terminal, the latter through the provision of mid-stream operations for discharging and loading container ships (see discussion of mid-stream operations in Section 2.1). Phuoc Long had estimated total throughput of 478,000 TEU in 2005, 462,000 TEU in 2006 and 470,000 TEU in 2007 (based on interviews and the operator's web site).

Phuoc Long (Figure 2-13) comprises two properties – Phuoc Long I and Phuoc Long II – with a combined 4 hectares of container yard. Phuoc Long II offers water frontage for handling barges with total berth length of 1,650 meters, and is used for receiving and staging export containers. Approximately 95 percent of the export containers arrive by truck and the remaining 5 percent by barge from the Mekong delta region. Phuoc Long I is located across the highway and is used for receiving and staging import containers. The operator is planning a third facility – Phuoc Long III – to open in mid-2009, which will provide a further five hectares of container yard. The operator provides local distribution of containers (ICD to/from factory) using an in-house fleet of trucks and chassis.

Figure 2-13: Phuoc Long ICD I and II

Source: TranSystems and Google Earth

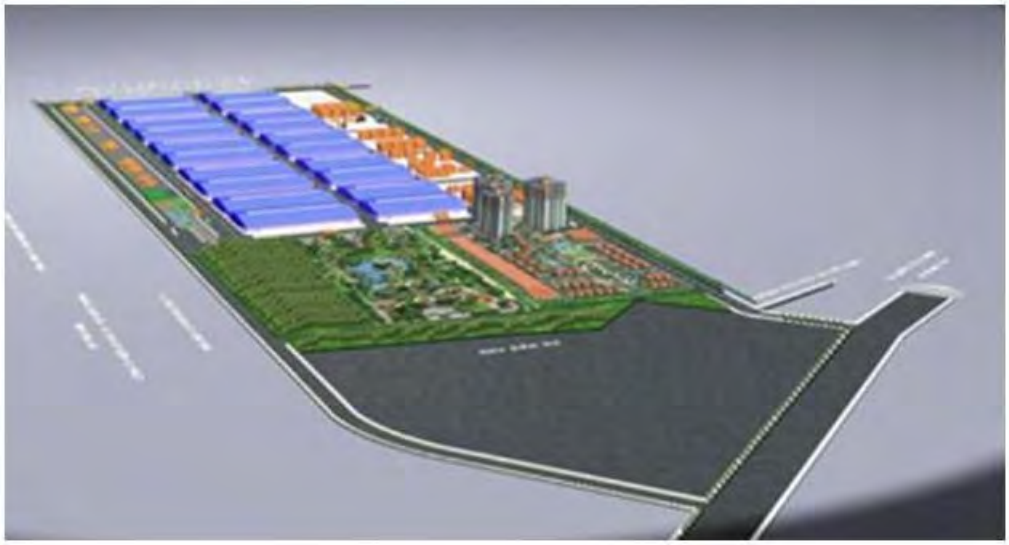
2.2.6 Long Binh ICD

Saigon Newport's new Long Binh ICD is located in the Long Binh Ward of Bien Hoa City, Dong Nai Province, 35-km from Saigon Newport's Cat Lai container terminal and 45-km from the new deep-water terminals at Cai Mep. The project site covers a total 280 hectares with development split into the following phases:

- Phase 1 is under construction and covers a total area of 80 hectares.
- Phase 2 has a total proposed area of 150 hectares.

The Phase 1 development involves the provision of an office building for administration, customs and logistics service providers; construction of the container yard; purchase and installation of yard cranes and equipment; terminal gate construction; four warehouses of 6,000 to 10,000 square meters each; other infrastructure; and installation of a warehouse management system. Development of Phase 2 will be subject to market and funding conditions.

Figure 2-14: Long Binh ICD



Source: Saigon Newport

2.2.7 Song Than ICD

Saigon Newport's Song Than ICD is located in the Song Than Industrial Zone II, in Binh Duong Province, 26-km from the Cat Lai container terminal. The dry ICD covers a total area of 50 hectares, with 9 hectares of container yard equipped with rail-mounted gantry cranes and 114,000 square meters of CFS warehousing. The facility is under expansion with the addition of container yard space and extended rails for the cranes, and the provision of new warehouse space. The ICD's container yard and CFS mostly support containers moving through the Cat Lai container terminal. Song Than has currently limited land for further expansion but is investigating the availability of adjacent land that would allow the ICD to nearly double its size.

Figure 2-15: Song Than ICD

Source: Saigon Newport

2.2.8 Tan Cang ICD

Saigon Newport's Tan Cang ICD is located on the Saigon River, upstream from VICT, Saigon Port and Ben Nghe. Originally a container terminal, ship access to the facility was obstructed by construction of the Thu Thiem Bridge (estimated air draft of 10m) downstream of the terminal. Since then Tan Cang has received and shipped containers by barge, primarily connecting to Saigon Newport's Cat Lai container terminal. The facility covers a total area of 72 hectares with 20 hectares of container yard, warehouse space and total berth length is 704 meters with four berths. The long term plans are to convert this facility to non-cargo real estate uses.

Figure 2-16: Tan Cang ICD

Source: TranSystems and Google Earth

2.2.9 Tanamexco ICD

Tanamexco ICD is operated by Tay Nam Import-Export Trading and Producing Company (Tanamexco), a state-owned company under the Ministry of Defense. The ICD is situated in Truong Tho ward, Thu Duc District, in close proximity to the Transimex ICD. The facility (Figure 2-17) covers a total area of approximately 12.5 hectares with 10 hectares of container yard, and total berth length of 100 meters. Expansion is centered on an additional four hectares at this facility and a proposed new dry ICD on seven hectares in Dong Nai Province, 30km from the current location. Tanamexco handled 365,000 TEU in 2007 and has an estimated annual capacity of 450,000 TEU.

Figure 2-17: Tanamexco ICD

Source: TranSystems and Google Earth

2.2.10 Transimex ICD

Transimex ICD is situated in Truong Tho ward, Thu Duc District and is 12km by road from the center of HCMC, 10km by road from the Cat Lai terminal, 12km by water from VICT and 70km by water from the Cai Mep/Thi Vai deep-water terminals. The ICD (Figure 2-18) covers a total area of approximately 9 hectares with 6 hectares of container yard, and total berth length of 180 meters. Transimex had a total throughput of 300,000 TEU in 2007 and an estimated 280,000 TEU in 2008. An estimated 70 percent of the ICD's throughput is generated by Dong Nai Province.

Figure 2-18: Transimex ICD

Source: TranSystems and Google Earth

2.2.11 Proposed ICDs

The proposed **Dong Nai ICD** is located at Dong Nai Port (Figure 2-19), across the river from Binh Duong ICD and adjacent to Highway 1A. Dong Nai Port has plans to convert 18.7 hectares into a new ICD and it is seeking investment partners. The project would include a 6 hectare container yard and a total berth length of 390 meters.

The existing terminals on the Saigon River (Saigon Port, Ben Nghe and VICT) and Cat Lai may develop ICD functions, connected by barge, for the new the deep-draft container terminals at Cai Mep/Thi Vai. The ICD functions would be in addition to handling the smaller regional and feeder container services.

Figure 2-19: Dong Nai Port and Site for Proposed ICD

Source: TranSystems and Google Earth

2.2.12 Future Role of ICDs

The ICD is an integrated component of the container logistics system in the HCMC region, providing a broad range of services to support the import and export of containerized cargo. Today, the ICDs support the existing river terminals – Cat Lai, VICT, Saigon Port, etc. Some of the existing ICDs face challenges because of their location in urban areas, which restricts expansion and causes problems with traffic congestion. Improved road access to some of the existing container terminals (for example, due to completion of the Phu My bridge) could allow direct trucking (to/from the industrial zones) to compete more effectively with barge service to and from the existing ICDs. With the phasing in of new deepwater terminals at Cai Mep/Thi Vai, the ICDs will function as an intermediary point between the new terminals and the major cargo generating centers of the region. The challenges with road traffic congestion (notably on Highway 51 for the new terminals) will support use of barge transport between the new terminals and ICDs.

In the medium to long term, some of the existing ICDs may be relocated and their sites converted to alternative non-industrial uses. A further challenge for the ICDs is the need to introduce and modernize information technology so they can more efficiently manage container flows and integrate with the container terminals, shipping lines, barge operators, customs, trucking companies and shippers. Technology recommendations for the ICDs are discussed in Section 5 of this report.

2.3 Industrial Production Zone Assessment

2.3.1 Industrial Production Zones

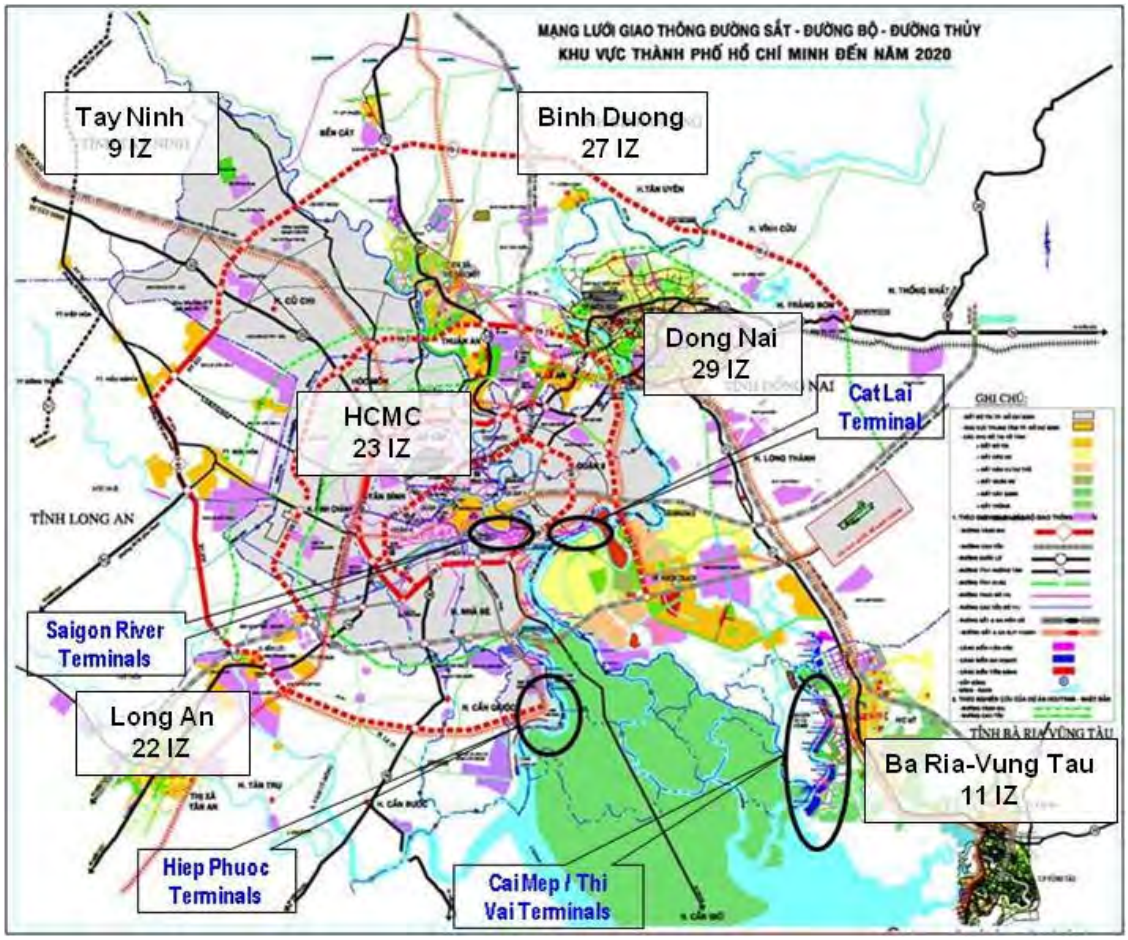
The development of industrial production zones (IZ) has been central to the expansion of Vietnam's international trade. Industrial production zones take two forms – industrial parks (IP) and export processing zones (EPZ). As stated in Article 3 of Vietnam's 2005 investment law, they are defined as:

> "*Industrial park* means an area specialized in the production of industrial goods and the provision of services for industrial production, which has definite geographical boundaries and is established under the Government's regulations."

> "*Export processing zone* means an industrial zone specialized in the production of goods for export, the provision of services for production of goods for export and export activities, which has definite geographical boundaries and is established under the Government's regulations."

The EPZ provides additional benefits to companies located within its boundaries. For example, there is an exemption from import tax on equipment, machinery, special-use vehicles as part of the fixed assets of the enterprise, as well as imported materials used in the production process for export. HCMC and the surrounding five provinces have been significant beneficiaries of the investment in industrial production zones. The region has 121 industrial production zones active or in the planning stage (Figure 2-20).

Figure 2-20: Current Industrial Production Zones



Source: Industrial Zones Authorities

The industrial production zones are important generators of containerized cargo, notably from the manufacturing plants of foreign companies, and they drive imports of materials for processing and exports of finished goods. At Cat Lai container terminal, which handled an estimated two-thirds of HCMC container traffic in 2008 (or 2 million TEU in 2008), up to 80 percent of container throughput (or 1.6 million TEU in 2008) is tied to Dong Nai and Binh Duong provinces.

Dong Nai and Binh Duong provinces are expected to remain leading generators of containerized cargo; these provinces accessible to the new deep-draft terminals by Highway 51 (noting that traffic congestion may be a concern) and by barge. Within Dong Nai province, further development of the Nhon Trach district and the new international airport (Long Thanh district) will be positive for the Cai Mep/Thi Vai terminals. Development of new zones in Ba Ria-Vung Tau province will support the adjacent Cai Mep/Thi Vai terminals. Expansion of industrial production zones in Long An province, southwest of HCMC is expected to favor the existing Saigon River terminals, and the new terminal on the Soi Rap River. The long term modernization of the region's highway system (discussed in Section 2.6) will improve access to current and planned IP/EPZs. Projects such as a new Highway 51 and new ring roads around HCMC would provide better connections between Cai Mep/Thi Vai and the industrial zones.

Local planning of the industrial production zones falls under the jurisdiction of the provincial industrial zone authorities:

- Ho Chi Minh Export Processing and Industrial Zones Authority (HEPZA)
- Dong Nai Industrial Zones Authority (DIZA)
- Binh Duong Industrial Zones Authority
- Ba Ria-Vung Tau Industrial Zones Authority (BIZA)
- Long An Industrial Zones Authority
- Tay Ninh Industrial Zones Authority (TANIZA)

Brief profiles of the each authority are provided below.

2.3.2 HCMC

HCMC has been the traditional center of industrial activity in the region, however rising land costs and a desire to relocate industry from the urban core has gradually seen a migration of industry to industrial zones surrounding the city and to neighboring provinces. HEPZA currently covers 15 industrial zones, rising to a total of 23 projected for 2020 under the Authority's guiding master plan. A key project is the Hiep Phuoc industrial zone, on the west bank of the Soi Rap River, which includes the new Saigon Premium Container Terminal project.

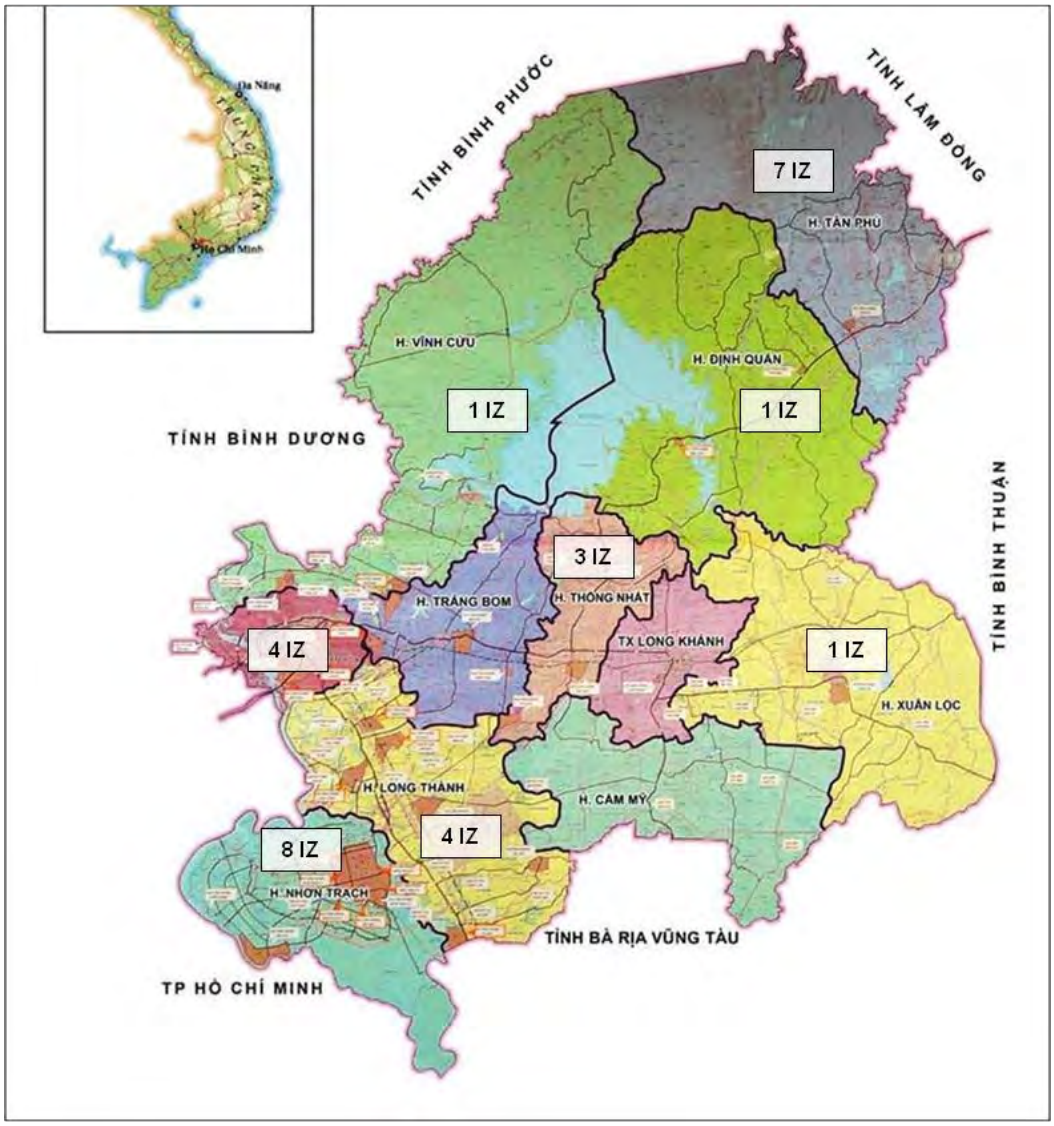
Figure 2-21: Map of Industrial Production Zones in HCMC

Source: HEPZA

2.3.3 Dong Nai Province

Dong Nai Province is a leading industrial center in the region and an important generator of containerized cargo. DIZA administers 29 current and planned industrial zones. The operating and largest zones are clustered in the southwest region of the province – Bien Hoa City, Nhon Trach District and Long Thanh District – and accessible to the existing HCMC container terminals and the Cai Mep/Thi Vai terminals by road and barge (via ICDs). Expansion is centered on Nhon Trach District and Long Thanh District, which would be favorable for the Cai Mep/Thi Vai terminals. In addition, expansion is planned for Tan Phu District in the northeast of the province, which would include agricultural related industries.

Figure 2-22: Map of Industrial Production Zones in Dong Nai Province



Source: DIZA

2.3.4 Binh Duong Province

Binh Duong Province is another important industrial center, notably the Vietnam Singapore Industrial Park (VSIP), My Phuoc Industrial Park and Song Than Industrial Parks I and 2, which is the location for Saigon Newport's Song Than ICD. Binh Duong Industrial Zones Authority administers 27 industrial zones.

2.3.5 Ba Ria – Vung Tau Province

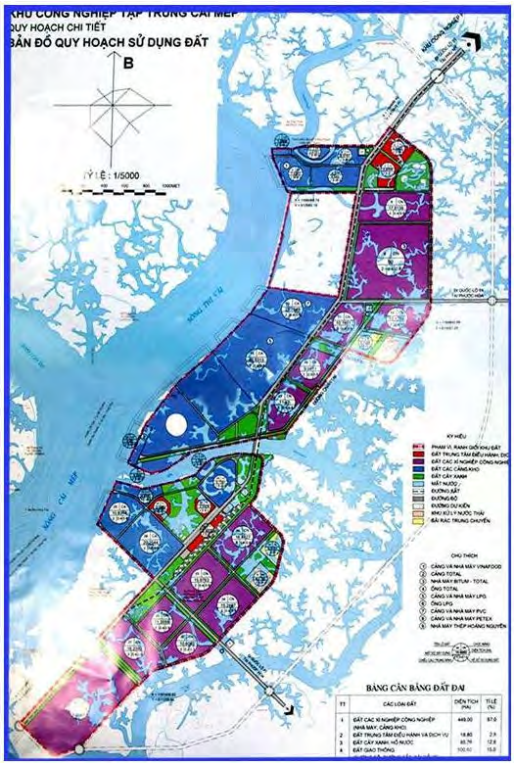
BIZA oversees 11 industrial parks and export processing zones (Table 2-8). Major new zones are being developed and planned around in the Cai Mep and Thi Vai area, which are projected over time to generate cargo for the new container terminals. Located on land adjacent to or in close proximity to the terminal will provide a low cost inland transport for companies active in these zones.

Table 2-8: Industrial Production Zones in Ba Ria-Vung Tau Province

Industrial Zones	Status	Description
Phu My 1	Operational	Total area 954 hectares at Phu My town, Tan Thanh District, along National Road #51, 75 kilometers from HCMC, 40 kilometers from Vung Tau.
Phu My 2	Operational	Total area: 620 hectares
Phu My 3	Under Development	-
Cai Mep IZ	Operational	Total area 670 hectares.
Dong Xuyen	Operational	The industrial zone has an area of 160.8 hectares. It is located at Ward 10, Vung Tau City and along National Road #51, 125 kilometers from HCMC, 7 kilometers from Vung Tau center via inland and 50 sea miles via water way.
Long Son	Under Development	-
My Xuan A	Operational	Total area 301 hectares.
My Xuan A2	Operational	Total area 313 hectares.
My Xuan B1 - Tien Hung	Under Development	Total area: 200 hectares.
My Xuan B1 – Dai Duong	Under Development	Total area: 146 hectares.
My Xuan B1	Under Development	Total area: 226 hectares.

Source: BIZA

Figure 2-23: Map of Industrial Production Zones in Cai Mep Area

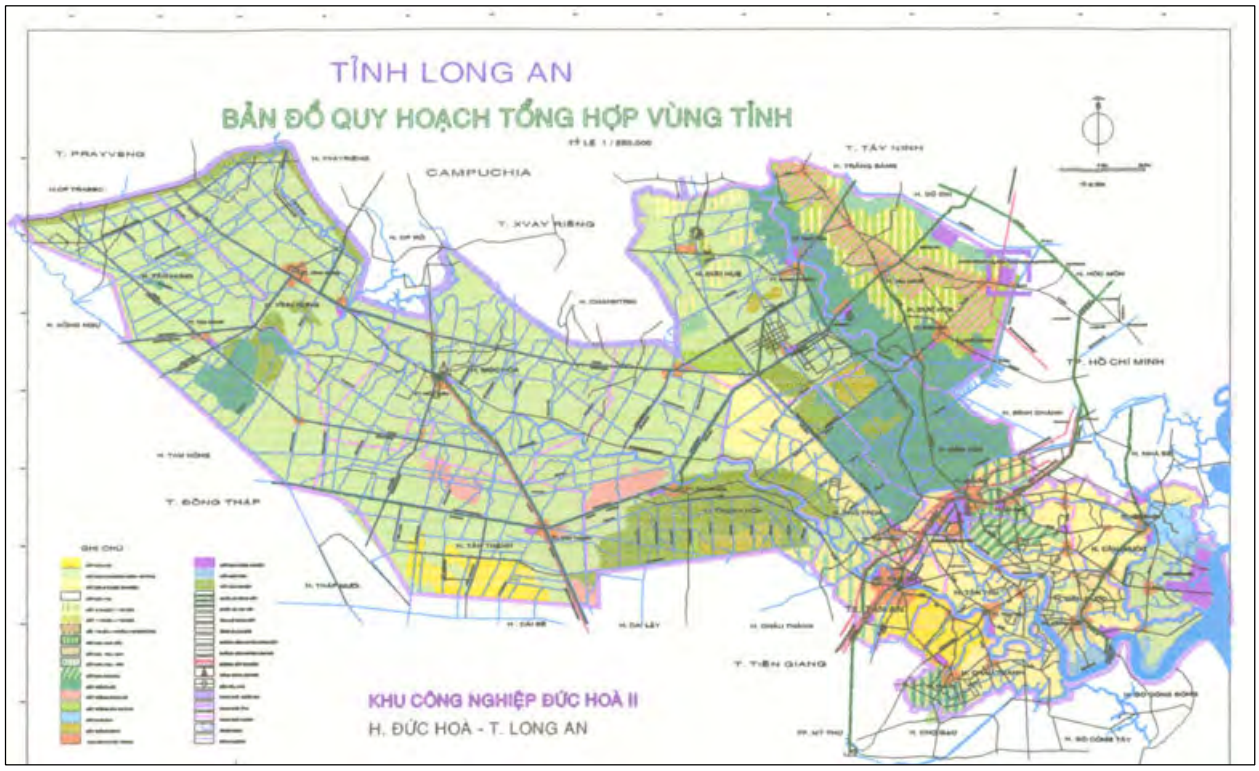


Source: BIZA

2.3.6 Long An Province

From the first part of this decade, Long An started to benefit from the higher cost of land in HCMC and the trend for relocation of industry from the urban core. The Long An Industrial Zones Authority administers 22 operating and planned industrial zones. These zones are projected to draw increased investment in the future due to lower costs compared to HCMC and improved transportation access to the province. The completion of the new Phu My bridge in 2009 (see Section 2.6), part of the #2 ring road project, will provide better highway connections between Long An and the container terminals on the Saigon River and Cat Lai. Further regional highway improvements under the region's master plan will also enhance highway access. The new container terminal on the Soi Rap River, due to open in 2009, will also improve access to Long An province.

Figure 2-24: Map of Industrial Production Zones in Long An Province



Source: Long An Industrial Zones Authority

2.3.7 Tay Ninh Province

Located to the northwest of HCMC, Tay Ninh province is projected to also benefit from competitive land costs compared to existing industrial areas. TANIZA administers nine current and planned industrial zones, clustered in the southern part of the province close to HCMC (Figure 2-25). Similar to Long An province, road access would improve under the region's long term master plan for highway development.

Figure 2-25: Map of Industrial Production Zones in Tay Ninh Province

Source: TANIZA

2.4 Transportation Company Assessment

2.4.1 Trucking Companies

The trucking industry is very competitive and highly fragmented, although there are a number of large trucking companies. The level of foreign participation in the business is limited but is likely to expand under WTO liberalization. Foreign companies are allowed to acquire a 49 percent interest in trucking companies, the majority stake held by a Vietnamese joint venture partner. In January 2010, three years after WTO membership, foreign companies can hold a maximum of 51 percent of a trucking company.

The major cost elements for trucking companies are drivers (including food), fuel, chassis lease, and overhead. Drivers pay normally runs from $200 to $300 per month depending on level of experience. The fuel component has fluctuated significantly over the past one to two years. Many trucking companies use secondhand tractor units imported from overseas, including from the U.S. market. The second units are under five years old to conform to Vietnam's import laws and they cost up to US$60,000.

2.4.2 Truck Drayage Tariff

The trucking companies quote standard tariffs for container movements within certain geographic zones. Actual rates are influenced by contract terms with individual customers, volumes and other costs. A representative tariff is shown in Table 2-9 for containers moving in the HCMC area. Zone 1 covers the Cat Lai container terminal and ICDs, while Zone 2 covers the Saigon River terminals – VICT, Ben Nghe and Saigon Port. The tariff rates include pick-up of empty container, delivery to cargo loading point, some waiting time, and delivery of loaded container to the container terminal or ICD.

Table 2-9: Truck Drayage Tariff

	ZONE #1 Cat Lai, ICD	**ZONE #2 VICT, Ben Nghe, Saigon Port**
Origin	**Truck Rate per 20' / 40' Container**	**Truck Rate per 20' / 40' Container**
HCMC Area	$85 / $100	$105 / $120
Bien Hoa Industrial Zone 1& 2	$100 / $115	$120 / $135
Nhon Trach Industrial Zone	$190 / $210	$210 / $230
Song Than (Binh Duong)	$90 / $105	$110 / $125
My Phuoc 1,2,3 (Binh Duong)	$200 / $220	$220 / $240
VSIP #1	$95 / $110	$115 / $130
VSIP #2	$160 / $180	$180 / $200

Notes: The truck rates exclude VAT, insurance and lift-on/lift-off fee.

Source: Trucking Company.

Saigon Newport's Cat Lai container terminal offers its own trucking tariff for container movements between Cat Lai and ICDs, the very competitive rates supporting container business at the Cat Lai terminal. The tariff for import and export containers is shown in Table 2-10.

Table 2-10: Cat Lai Truck Drayage Tariff

Route	Import Laden Dong per 20' / 40'	Export Laden Dong per 20' / 40'
Cat Lai – Tang Cang	190,000 / 380,000 ($10.87 / $21.75)*	Free
ICDs – Cat Lai	350,000 / 615,000 ($20.03 / $35.19)*	175,000 / 310,000 ($10.01 / $17.74)*
Cat Lai – Song Than ICD	420,000 / 745,000 ($24.03 / $42.63)*	210,000 / 370,000 ($12.02 / $21.17)*

Notes: The rates are inclusive of transport cost, lift-on/lift-off fees for transport and VAT.
* Converted to U.S. Dollars at an exchange rate of 17,475 Dong per U.S. Dollar
Source: Saigon Newport web site

2.4.3 Truck Trips per Day

Companies interviewed during the project commented on the problem with road congestion in the HCMC area and its negative impact on the number of round trips a truck can perform per day. They also observed that the situation had deteriorated over the last number of years due to the growth of traffic in the region and the slow pace of improvements to the region's road infrastructure. In addition, the twice per day bans imposed on container drayage through the city (6am to 9am and from 4pm to 9pm) disrupts truck service to and from the Saigon River terminals; although trucks moving between the south and the Saigon River terminals are less impacted by the bans. Trucking companies reported a range of two to four round trips per day depending on the final destination – ICDs or individual container terminals.

2.4.4 Technology

Trucking companies apply limited information technology to their business, its application mostly at the larger operators. A number of companies are testing or have installed Global Positioning Systems (GPS) to better manage their trucking fleets and drivers. GPS is seen as potentially good for security, in particular for shipments of higher-value products. In some cases, companies have reported post-installation difficulties with both software and hardware. The booking and delivery process is normally by fax or e-mail, while the gate process at container terminals is manual. Security is limited with drivers showing their identification at the terminal gates, but the terminal does not maintain a list of drivers.

2.5 Barge System Assessment

2.5.1 Barge Operators

Barges and barge services for containers are normally provided by independent companies under contract to container terminals, shipping lines and ICD operators. The industry is fragmented with numerous small companies as well as some larger operators – Falcon Shipping, Southern Waterborne Company (SOWATCO), Phu My Transport, Saigon New Port, Gemadept and PIP. For example, one company operates 13 barges, a mixture of self-propelled units and standard barges. Another operator has 50 small barges (16-54 TEU) and 12 self-propelled barges (50-72 TEU). The barge operators normally charge their customers on a per TEU basis and a representative market rate for transporting containers between the terminal and ICDs is $10 per TEU, with lower rates charged for transporting empty containers. Actual rates will be influenced by volumes, contract terms, and direction (import or export).

2.5.2 Barge Sizes and Operations

Barges come in a variety of sizes ranging from 10 TEU to 100 TEU, and include self-propelled barges with capacity of 36 TEU and 74 TEU, and flat-deck barges with capacity of 36 TEU, 74 TEU and 100 TEU. An example of a barge is shown in Figure 2-26. Barge service is normally provided 24 hours per day at the container terminals and ICDs. Barges are loaded and discharged using either shoreside gantry cranes or stick cranes, the type of equipment used varying from facility to facility.

Figure 2-26: Example of a Non Self-Propelled Container Barge Operating in HCMC Region

Source: Field Trip

Some of the barge operators service the Mekong Delta region and the Cambodian transit market. Mekong Delta service is provided multiple times per week, and some of the barges have on-board generators to power refrigerated containers. The Mekong Delta is a major source for exports of fish products including farmed shrimp. A terminal operator reported that four common carriers offer weekly service Cambodia for transit cargo. The cargo is treated as a transshipment move by the container terminal, and the cargo customs cleared at the Cambodian border.

2.5.3 Barge Activity at Existing Terminals

Container movements by barge account for a significant share of total throughput at terminals in HCMC. The share of total throughput handled by barge ranges from an estimated 10 percent to 30 percent, depending on the terminal. Completion of several highway projects, for example the Phu My Bridge in 2009, may ease barge usage at the Saigon River terminals. On the other hand, existing terminals are expected to handle new barge traffic to and from the new Cai Mep/Thi Vai terminals.

The terminals either contract with barge operators or directly operate barges to provide service between the terminals and ICDs. Saigon Newport operates some barges to service its Cat Lai terminal and Gemadept (Phouc Long ICD) operates barges for its mid-stream operations. The cost of barge service is charged to the terminals customers.

Export containers delivered to the terminals from ICDs by barge have a cut-off time at the ICD of 12 to 24 hours prior to the ship's expected time of arrival (ETA) at the terminal. If an export container is delivered by road, the cut-off time is normally up to six hours before the ship's ETA.

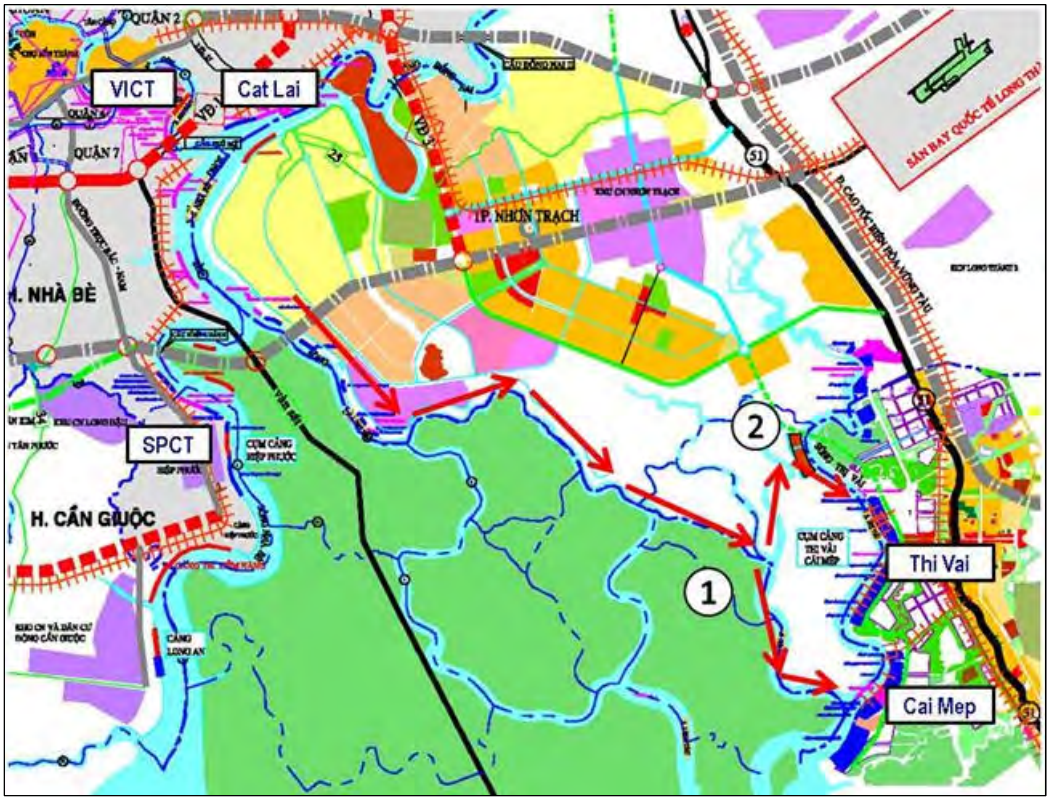
2.5.4 Barges and the Cai Mep/Thi Vai Terminals

Container terminal operators, shipping lines and barge operators are evaluating the requirements for barging to and from the terminals under development at Cai Mep/Thi Vai. Some larger-sized barges are already being built in preparation for the opening of the new terminals. A variety of ideas were offered during the interviews on how barging may operate.

Self-propelled barges would be preferred with capacity up to 100 TEU. The new terminals will have dedicated barge berths or can handle barges at the ships berth. The idea of transferring of containers directly between the ship and barge was raised, either by floating crane, ship cranes or terminal gantry cranes with sufficient outreach. However, there would be concerns with direct transfer between ship and barge; for example, floating cranes would present challenges from the point of view of productivity and risk of damage to containers, cargo and ship.

There were a broad range of estimates on the cost to barge between HCMC and Cai Mep/Thi – from $32 per TEU to $50 per TEU. Estimates of transit time between HCMC and Cai Mep/Thi Vai varied from 6-8 hours to as much as 10-12 hours, the difference reflecting river currents, river traffic conditions, and operating speed of self-propelled barges. Several routes, two illustrated in Figure 2-27, are available to connect the Cai Mep/Thi Vai terminals with the ICDs/terminals on the Saigon and Dong Nai Rivers.

Figure 2-27: Examples of Potential Barge Routes to Cai Mep/Thi Vai Terminals



Source: HCMC Department of Transportation and Interviews

2.6 Highway Assessment

2.6.1 Current HCMC Highway System

The highway system in the HCMC region has six major highways (Figure 2-28) providing connections to Hanoi, south to the Mekong delta region, and west towards Cambodia. The system is congested and requires significant investment to major and secondary highways, as well as the local road system.

Highway 51 links the new container terminals at Cai Mep/Thi Vai and the neighboring urban and industrial areas of Dong Nai, Bien Hoa, Binh Duong, HCMC and Long An. During the interview phase of this study, respondents stated that the present condition of Highway 51 was one of the main challenges for the new terminals, the highway viewed as not suitable for high volumes of container truck traffic. The master plan for the region (Section 2.6.2) includes the proposed construction of a new parallel toll road; however the timing of this project is uncertain due to challenges with planning, land acquisition and financing of the project.

Figure 2-28: HCMC Major Highways

Source: HCMC Department of Transportation

2.6.2 Master Plan for HCMC Highway System

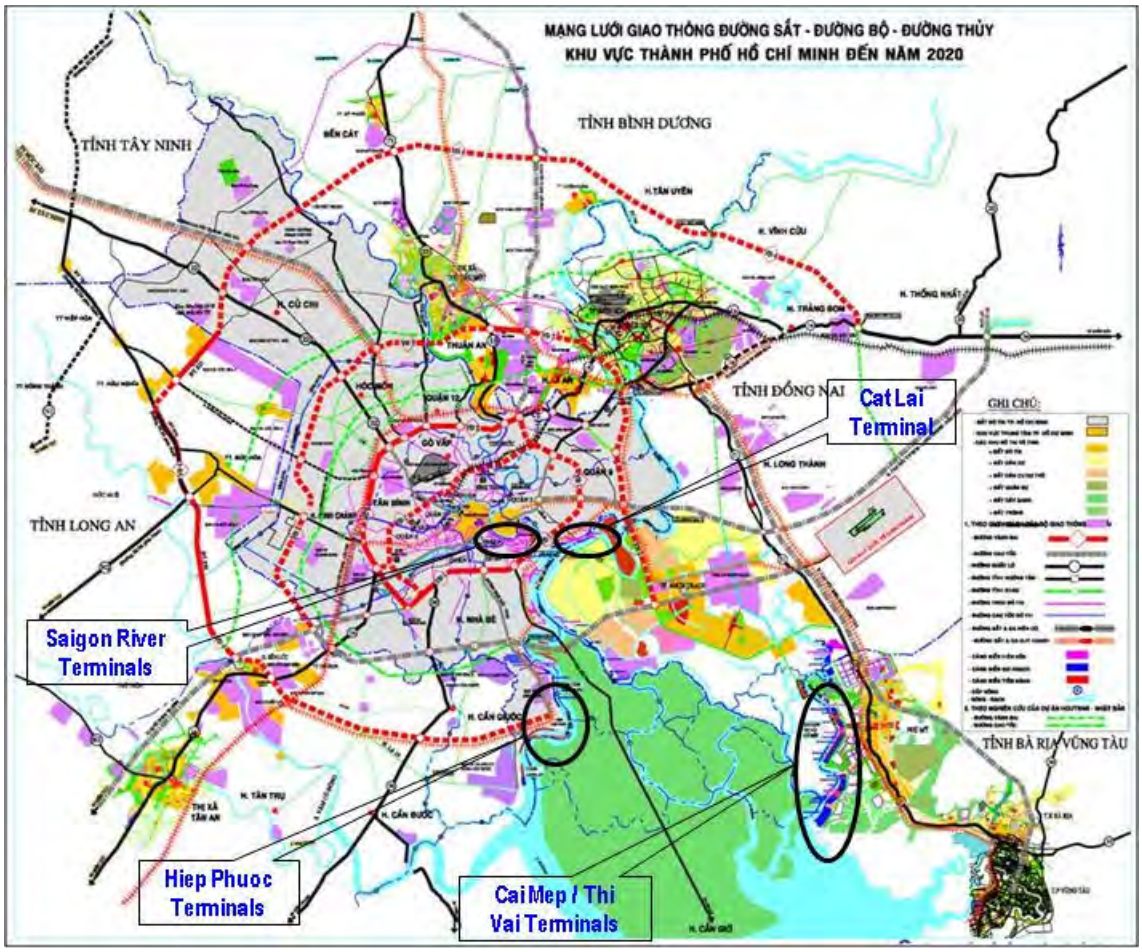
The future development of the HCMC highway system is guided by the regional master plan, which identifies major planned investments for the period to 2020. Investments in the system (Figure 2-29) are centered on the development of four belt roads and improvements to the major radial highways connecting HCMC to other regions. The proposed ring roads for HCMC are:

- #1 – an ungraded inner ring road.
- #2 – an additional inner ring road.
- #3 – an outer ring road with connections to major inter-regional highways in Nhon Trach district, Dong Nai province, Binh Duong province, HCMC/Trung Luong expressway and a final connection to the start of the southern inter-regional expressway in Binh Chanh district.
- #4 – the outer most ring starting in Dong Nai province, running to the HCMC/Trung Luong expressway and ending near the Hiep Phuoc port cluster.

Other major projects include:

- HCMC to Long Thanh (the new airport) to Dau Giay, including a new bridge across the Dong Nai River and a connection to Highway 51.
- Ben Luc to Nhon Trach and on to Highway 51.
- New Highway 51 to Vung Tau.

Figure 2-29: HCMC Highway Master Plan



Source: HCMC Department of Transportation

2.6.3 Vietnam Expressway Corporation

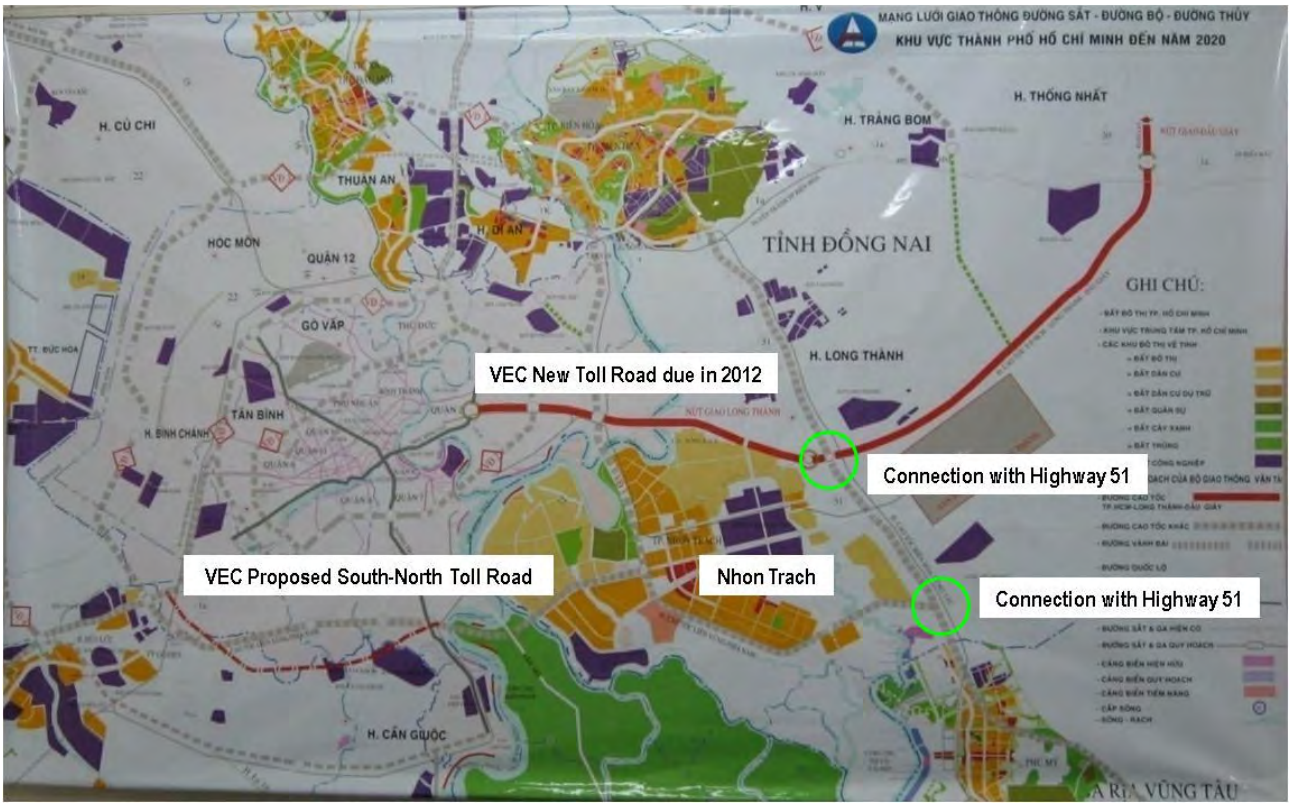
Vietnam Expressway Corporation (VEC) is a state-owned company that develops highway infrastructure around Vietnam. Projects are primarily funded through the Asian Development Bank (ADB) and bilateral aid. VEC currently has two projects in the HCMC region (Figure 2-30). They are:

- The approximately 50-km toll road running from HCMC to Long Thanh (near the new airport) to Dau Giay, which when completed will provide an improved corridor between HCMC, the proposed airport and towards Hanoi. Construction on this new toll road is scheduled to start in the first quarter of 2009 and finish in 2012, including a new bridge across the Dong Nai River. The highway is expected to shorten the distance between HCMC and Vung Tau by 20km.

- A new 55-km toll road connecting Ben Luc to Nhon Trach and Highway 51. Construction of this project is due to start in 2010, subject to funding, and would be complete by around 2015, including two new bridges across the Soi Rap and Long Tau rivers. This highway would shorten the distance between Ben Luc and Vung Tau by 40km.

The two VEC projects will improve truck access to several of the important industrial zones to the south and north of HCMC, including the new industrial city of Nhon Trach. Both projects will have interchanges with the existing Highway 51 and the proposed new Highway 51, and improve access to the Cai Mep/Thi Vai terminals.

Figure 2-30: Vietnam Expressway Corporation Toll Roads



Source: Vietnam Express Corporation

For the first project, VEC is projecting toll charges of 900 Dong (US$0.05)[9] per passenger car unit per km (PCU/KM), PCU the standard unit of measurement used in their financial models. A large truck is equivalent to four PCUs and

[9] Converted using an exchange rate of 17,800 Dong per U.S. Dollar

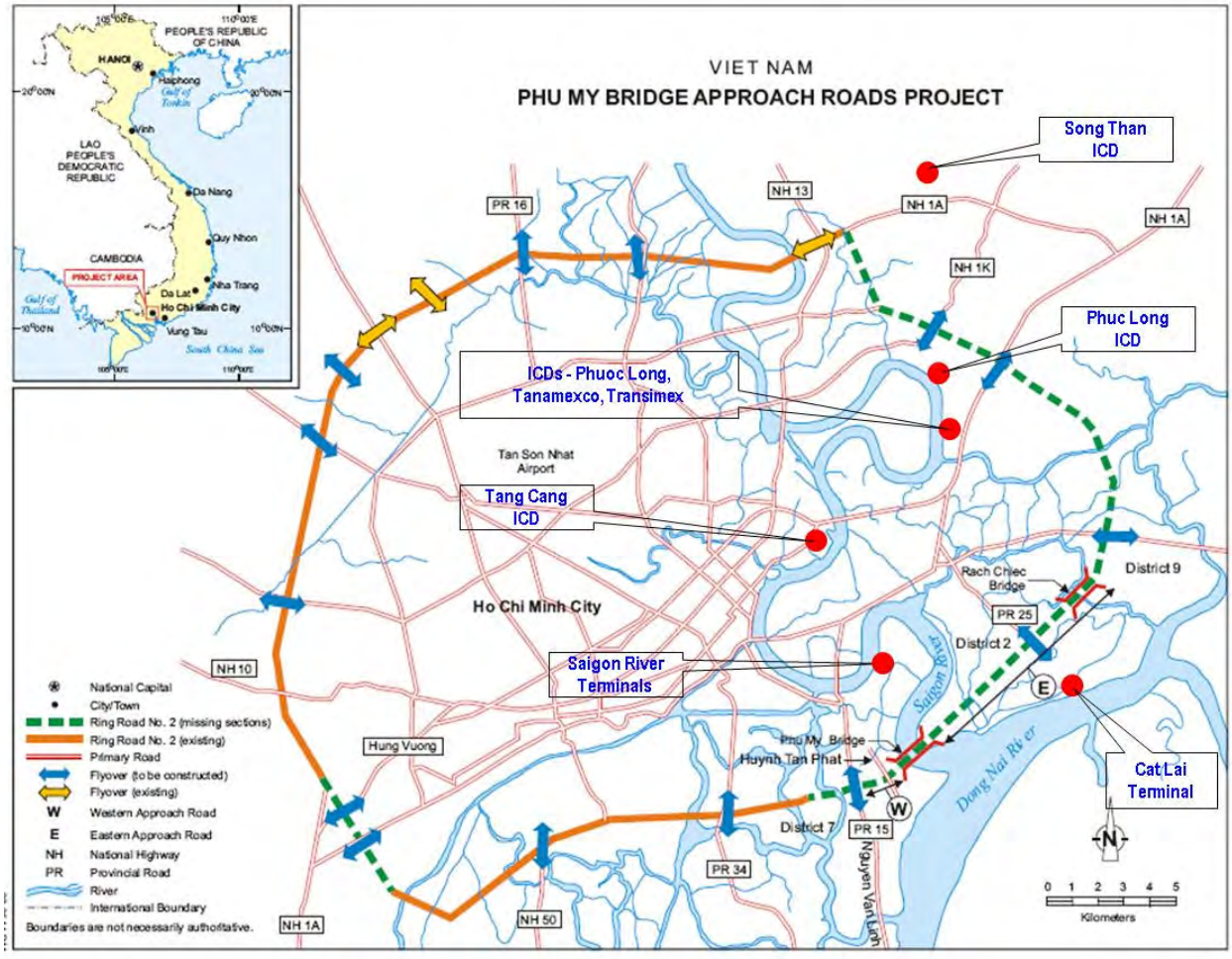
thus would be charged 3,600 Dong per km (US$0.20) or 180,000 Dong (US$10) for the 50-km distance. The toll will be levied using an intelligent transport system with payment upon exit from the highway. The maximum highway speed is expected to be 120km per hour, the highway will be fenced and there will be no access for motorbikes. This toll and access model would be used for other projects developed by VEC.

2.6.4 Phu My Bridge and Second Ring Road

Currently under construction with a projected completion date in 2009, the Phu My Bridge and approach roads will connect HCMC's District 2 with District 7 and will provide an alternate route around the central district of HCMC. The bridge is being construction under a concession agreement, while the two approach roads are being constructed by the local government with assistance from the ADB. When complete, the bridge will have a total length of 1,956 meters, provide eight traffic lanes and offer clearance of 45 meters for ship traffic. During construction, the clearance has been restricted to 37.5 meters, which has caused some disruption to ship traffic calling at the terminals upriver of the bridge (VICT, Ben Nghe and Saigon Port).

The Phu My Bridge is a key component of the second ring road, which is a priority project under the region's master plan for highway development. As shown in Figure 2-31, completion of the second ring road would provide improved access to the existing container terminals, network of ICDs and industrial zones.

Figure 2-31: Phu My Bridge and Second Ring Road, HCMC



Source: Asian Development Bank

2.6.5 Local Road Network

The local road network serving the container terminals and ICDs experiences heavy congestion several times during the day. In addition, many of the facilities have poor access roads that create problematic driving conditions for trucks hauling containers. For example, Figure 2-32 illustrates a truck maneuvering along an access road to one ICD. Given the extensive master plan for road improvements in the HCMC region, the financial resources required for those improvements, and the priority given to major highway projects, significant improvements to the local road network may not occur in the short to medium term. Therefore, the challenging traffic conditions around some facilities may remain part of the logistics system for some time. In some cases, this will continue to encourage use of barge transportation for the movement of containers between inland points and the container terminals.

Figure 2-32: Local Road Example

Source: Field Trip

2.6.6 GMS Southern Highway Corridor

The Greater Mekong Subregion (GMS) comprises Cambodia, China, Laos, Myanmar, Thailand, and Vietnam. With the assistance of the ADB, the GMS have been developing a program for regional economic cooperation that incorporates the long term development of strategic transportation corridors (Figure 2-33). One of these corridors – GMS Southern Corridor – is focused on improving transportation connections between the HCMC region, Cambodia and Thailand. Long term development of the 1,032km corridor will create a highway connection running from Vung Tau, and the deep-draft container terminal at Cai Mep and Thi Vai, through the HCMC region to Cambodia and onwards to Bangkok. Rail improvements are also proposed for this corridor (see Section 2.7). Assuming completion by 2020, the Southern Corridor would be expected to create new opportunities for international transit traffic through container terminals in the HCMC region.

The Southern Corridor incorporates[10] the Vung Tau to Bien Hoa highway (the proposed new Highway 51), which would cost an estimated US$679 million under a proposed BOT scheme. The projected completion date for this project is 2011; however the schedule is driven by funding and other issues (for example, acquisition of right of way) and is likely to slip beyond the 2011 date. Other corridor improvements include a key new bridge across the Mekong River in Cambodia.

Figure 2-33: Greater Mekong Subregion Economic Corridors

Source: Asian Development Bank

[10] Source: Vietnam country report presented by Ministry of Transport, Vietnam to the 12th Meeting of the GMS Subregional Transport Forum held in Danang, Vietnam in August 2008.

2.6.7 Impacts on Container Logistics System

Full implementation of the master plan for regional highway improvements is projected to have an impact on how containers flow through the HCMC region and will improve access to both existing and new container terminals and ICDs. However, the impacts will most likely occur in the medium to long term due to the complexity of many projects – the need for funding, land acquisition and so forth. The following are viewed as important long term impacts:

- Completion of the second ring road, including the Phu My Bridge, will improve road distances and access to the existing container terminals, ICDs and industrial parks. In addition, the second ring road will provide improved access to the Hiep Phuoc terminals on the Soi Rap River.

- Completion of VEC's HCMC-Long Thanh-Dau Giay toll road will improve access to the Dong Nai area, both for the existing container terminals and for the Cai Mep/Thi Vai terminals.

- Construction of VEC's Ben Luc- Nhon Trach-Highway 51 project would create enhanced access to cargo centers south of HCMC for the Cai Mep/Thi Vai container terminals. This project would also improve access to the Hiep Phuoc terminals.

- Construction of a new Highway 51, with connections to VEC's two projects and the regional ring roads, would greatly improve truck access to the Cai Mep/Thi Vai terminals.

- Construction of third and fourth ring roads would generally provide improved access to cargo centers to the north, west and south of HCMC.

- While the highway projects are expected to improve access to container terminals, they will also incur additional costs for trucking companies in the form of tolls. The impact on tolls may influence the decision to use truck versus barge, or the decision to move freight through one container terminal over another.

2.7 Container Rail Assessment

2.7.1 Current Rail Network

Vietnam Railways manages and operates the rail system in Vietnam. The system (Figure 2-34) has a total length of 2,600km, the principal line extending a distance of 1,726km between Hanoi and HCMC. In addition, the system has two links across the border with China. Future development of the rail network is guided by the Government's Master Plan for rail transportation until 2020, which gives priority to modernization of the Hanoi-HCMC line and also incorporates the proposed rail link from Vung Tau to the Cambodian border. Rail service remains underdeveloped due to the need to upgrade infrastructure, equipment and relatively poor service.

Figure 2-34: Vietnam Rail Network

Source: www.vr.com.vn

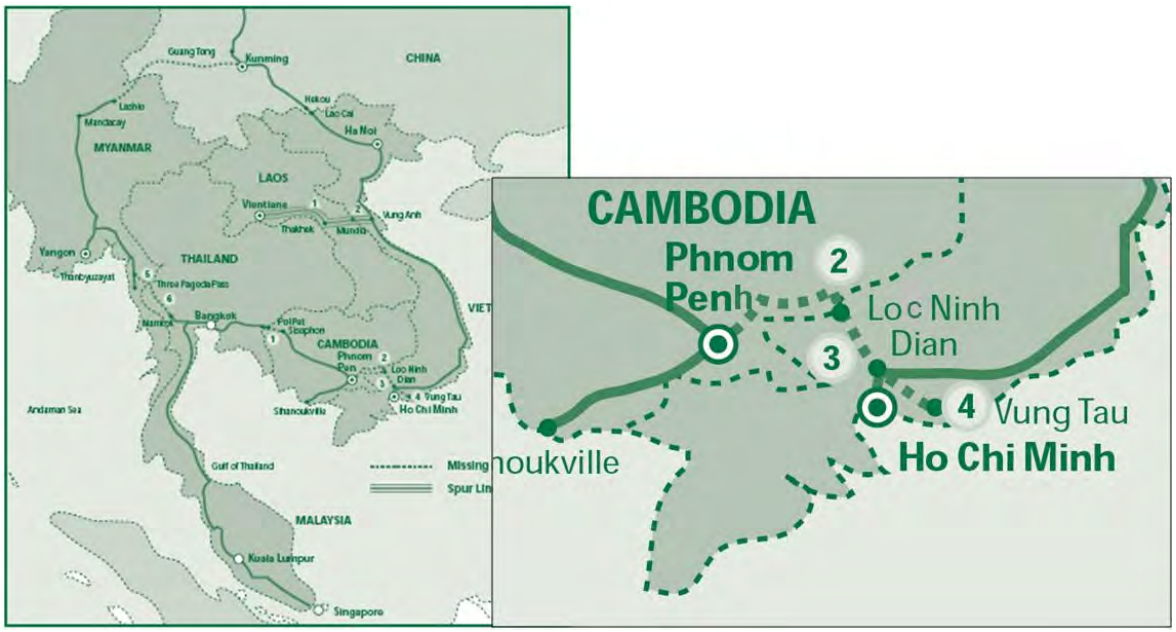
2.7.2 GMS Southern Rail Corridor

The GMS Southern Corridor incorporates development of a new 510-km rail line between Vung Tau, Vietnam and Phnom Penh, Cambodia. The project is one missing link of the regional Singapore-Kunming Rail Link (SKRL) project, which is designed to improve the rail network connecting the countries of Southeast Asia and China (Figure 2-35). The rail link has two components:

- Vietnam: Vung Tau – HCMC – Loc Ninh, a total distance of 224km.
    - Vung Tau – HCMC, a total distance of 75km
    - Loc Ninh – HCMC, a total distance of 149 km

- Cambodia: Loc Ninh – Phnom Penh, a total distance of 286km.

Figure 2-35: HCMC Region Rail Improvements and Singapore-Kunming Rail Link



Source: ASEAN

The project faces many challenges including funding, the need to standardize design requirements between the two countries, the need to standardize technology and other operational factors for cross-border movements. Development of the proposed 510km line would provide a direct rail connection from Vung Tau, and the Cai Mep/Thi Vai deep-draft container terminals, to Cambodia and Thailand, and could create opportunities for both short-haul and long-haul movements of containers by rail. Successful development of the corridor would also likely drive investment in multi-modal inland terminal facilities to service regional freight movements. The competiveness of rail service will be driven by a variety of factors such as freight rates versus trucking and barge, highway congestion, the ease of trans-border rail operations, and opportunity for in-bond transport by rail.

2.7.3 Benchmarking of U.S. Short-Haul Container Rail Service

In the U.S., rail service is generally not competitive with trucking over short distances (less than 500 miles or 805km). However, there are specific market environments where short-haul rail service provides a valuable and cost competitive service to importers and exporters. Examples of short-haul rail corridors and their major market drivers are shown in Table 2-11. For example, expensive trucking costs, heavy cargo and difficult highway driving conditions support the use of short-haul rail service to move containerized agricultural products from Central Washington State to the ports of Seattle and Tacoma, a distance ranging from 245km to 405km depending on the inland location. A large import consumption market, opportunities for export consolidation and investment by a port authority supported

development of the Virginia Inland Port and connecting rail service, 354km from the Port of Norfolk. The 450km Savannah-Atlanta rail corridor provides a competitive alternative for container shipping lines moving containers between the Port of Savannah and Atlanta. A central element for success is cooperation between port authorities, railroads, and shippers. The longer Heartland Corridor project, 870km of rail improvement between the Port of Norfolk and Columbus, Ohio illustrates the role of public-private partnerships in funding improvements to rail infrastructure, with cooperation between the private sector, all levels of government and the port authority.

Table 2-11: U.S. Short-Haul Rail Corridors

U.S. Short-Haul Rail Corridor	Distance	Market Drivers
Port of Norfolk-Front Royal / Virginia Inland Port	220 miles (354 km)	• Development driven by Port Authority. • Major railroad provides service. • Inland port located in/near major consumption markets; shipper distribution centers generate import cargo. • Rail allows for heavier export loads per container than truck, providing a lower transport cost per ton. • Expensive truck drayage of containers.
Port of Norfolk-Columbus Heartland Rail Corridor	531 miles (870 km)	• Development using Public-Private Partnership. • Cooperation between Federal, State and Local Governments, Norfolk Southern Railroad, and Port Authority. • Provide improved/faster rail corridor between the port of Norfolk and the Midwest.
Savannah-Atlanta	279 miles (450 km)	• Major railroad provides service to container shipping lines. • Short-haul container moves integrated with long-haul moves. • Expensive truck drayage of containers.
Pacific Northwest Rail Corridor: Wenatchee & Quincy	153 to 189 miles (245km to 304 km)	• Short-haul rail operator in cooperation with major railroad. • Exports of agricultural products. • Rail allows for heavier loads per container than truck, providing a lower transport cost per ton. • Expensive trucking over mountainous interstate highways.
Pacific Northwest Rail Corridor: Pasco	252 miles (405 km)	• Short-haul rail operator in cooperation with major railroad. • Exports of agricultural products. • Rail allows for heavier loads per container than truck, providing a lower transport cost per ton. • Expensive trucking over mountainous interstate highways.
Pacific Northwest Rail Corridor: Portland	185 miles (297 km)	• Short-haul rail operator in cooperation with major railroad. • Provides container shipping lines who don't call at the Port of Portland with ability to move large numbers of containers between the ports of Tacoma/Seattle and Portland, at a cost competitive with truck.

Source: TranSystems

2.7.4 Future Intermodal Rail Service

The successful long term development of rail infrastructure in Vietnam, both upgrades to the existing rail network and development of the rail link to Cambodia, would be expected to create opportunities for the introduction of intermodal rail service and the supporting infrastructure (intermodal rail yards, etc.). Potential future intermodal rail corridors include connections between the HCMC region and Cambodia, and Central Vietnam. In the project team's view, these opportunities are of a long term nature but should be considered in planning the introduction of new technologies to support the container logistics system in the HCMC region. The future success of intermodal rail service will be driven by a variety of factors including:

- Access to funding for rail network improvements.
- Development of supporting infrastructure for intermodal rail cargo.
- Location of ICDs near projected rail routes.

- Collaboration between rail authorities and operators in Vietnam and Cambodia.
- Ability to coordinate intermodal rail services with other rail corridor uses (for example, passenger trains).
- Ability to offer in-bond rail shipments to/from destinations in Cambodia and Vietnam.
- Competitive freight rates with trucking and barge services.

3 Survey of Companies Involved in Container Movement and Trade

3.1 Interview Process

The objective of Task 3 was to conduct a survey of companies involved in container movement in Vietnam in order to understand the current process for moving containers around the HCMC region, identify areas of strength and weakness, growth prospects, regulatory requirements, and future plans for trade expansion. Other aspects of the survey were to identify needs for investment to support trade growth, major warehousing and manufacturing concentrations that generate international cargo. To complete the survey, the project team undertook:

- An initial two-week field trip to Vietnam in December 2008 to conduct in-country interviews.
- A one-week field trip to Vietnam in January 2009 to conduct additional interviews.
- Telephone interviews with the U.S. offices of companies involved in the U.S.-Vietnam container trades.

The companies and organizations surveyed are summarized in Table 3-1 by type. The participants represented a broad spectrum of the container shipping industry and they were open to discussing the needs and outlook for container traffic in the HCMC region. Some interviewees have activities in multiple market segments – for example, operating container terminals and ICDs, or operating ICDs and providing truck service. Major findings from the interviews are presented in the remainder of Section 3. In addition, information on different aspects of the region's container trade obtained during the interviews was used to develop the market, infrastructure and process profiles presented in Sections 1, 2 and 4 of this report.

Table 3-1: Summary of Interviewees by Type

Type	Number of Interviews	Other *
Freight Forwarder / Logistics	8	3
Government Agency	4	2
ICD Operator	7	-
Barge Operator	1	-
Shipper	5	2
Shipping Line	8	-
Terminal Operator / Stevedore	5	1
Trucking Company	2	-
Commercial Real Estate	-	1
Industry Association	-	1
Local Port Consultants	-	2
Grand Total	**46**	**12**

* During the course of the study the project team met companies at several industry events; no formal interviews were conducted but some ideas were exchanged on the objectives of the study.

Source: TranSystems

3.2 HCMC Terminals and Infrastructure

Terminal overcrowding and congestion at HCMC during the summer of 2008 was mentioned as a concern, because the inability of terminals to load and discharge containers in a timely fashion caused delayed vessel departures, and missed feeder-connections. In addition, many container vessels had to wait at anchor for a berth to clear, which contributed to a backlog of vessels that extended to transshipment points such as Hong Kong and Singapore. Respondents suggest that this situation will only worsen given future increasing cargo projections to and from Vietnam, not only to the U.S., but inter-Asia as well. The current terminal and port infrastructure was not considered to be "up to the job".

> *"The ports cannot handle the projection of growth that the country is trying to go through, and the productivity is poor - the vessels tend to get backed up all the way to the transshipment location. Under normal [economic] conditions, most carriers I deal with limit the number of containers (400 TEU) that they will allow to go into HCMC because of the congestion." - Trading company*

Interviewees generally acknowledged that the current transportation infrastructure around HCMC would not be capable of handling projected volumes over the next five to ten years. Shippers see the need for comparable infrastructure performance with countries such as China and Indonesia, if Vietnam is to realize its potential as a future international trade leader. Establishing deep-water, high capacity terminals near HCMC was considered to be a key element that would support future trade growth in Vietnam. Deep-water terminals would enable larger vessels to call directly at HCMC, thereby eliminating the need to use a feeder service. Transit times could be reduced, and reliability would increase, In addition, larger terminals would facilitate higher load and discharge production, as reduced congestion would allow containers to more easily and efficiently move through the terminal, and on and off of the ships.

On par with port and port terminal issues, Interviewees expressed concern over the inland transportation system that is currently being used to access terminals at HCMC. The main reason cited is that the terminals are too close to the population areas, and few roads are dedicated to express traffic. One respondent mentioned that the roads are too narrow, and are often not paved. A retailer noted that truck traffic often moves during night and off-peak hours to address congestion delays; however, over-the-road congestion remains an issue.

> *"They are building their port structure, but their inland infrastructure is still lacking… if you have to go to the north, it can take you two days to get there." - Trading Company*

Other issues mentioned was a barge shortage for containers shuttled from up-river terminals to HCMC ports, as well as container weight restrictions over local bridges that restricted certain access routes to the port terminals. In addition to improved roads, several respondents suggested that a barge system between key existing river terminals, and inland factory areas that are accessible by river should be included in any new port development, because barging is an efficient way of circumnavigating HCMC traffic delays, and is less expensive than building roads or railroads.

3.3 Cai Mep and Thi Vai Terminals

The Cai Mep and Thi Vai terminals were unanimously acknowledged to be welcome additions to the infrastructure of the HCMC region. The key benefit was viewed to be the ability of these terminals to handle larger, direct services vessels. Infrastructure connecting the port to inland facilities was viewed to be equally important. A connecting highway from HCMC and other key industrial areas was considered to be an essential component of a port development.

> *"It is a good thing that they are not in HCMC because they won't have the congestion to deal with, but will they have the road infrastructure to get them where they need to go… All of these need to be considered equally"*

3.4 Ocean Carrier Service

Due to shallow draft restrictions, ocean carriers use feeder vessels to serve HCMC.[11] A feeder service generally lengthens transit times, and additionally increases the possibility of delays if vessel connections are missed. Interviews suggest that the vessel calling frequency, and transit times of the ocean carriers are acceptable given current volume requirements and draft restrictions; however, improved service, i.e. increased transit speed and vessel calling frequency, would be welcome.

Survey comments indicate that shippers accept that shallow draft restrictions around HCMC prevent ocean carriers from sending in large, direct liner service vessels, and the responsibility for improvement falls primarily on port authorities in Vietnam. None-the-less, one consequence of missed and late vessels due to port conditions is that shippers will use these service performance failures as leverage during rate negotiations with ocean carriers. Commodities have varying tolerances to accepting delays. Furniture was raised as an example of a commodity that was not as time sensitive as other "fast to market" commodities, such as apparel or electronic goods. Goods with a high inventory carrying cost, or that are highly seasonal are less tolerant to delays, and would benefit from a direct call at HCMC.

An issue related to ocean carriers was raised by a retail respondent, who mentioned that ocean rates would be reduced if direct call, rather than feeder service was established between HCMC and the U.S. Rates from China to the U.S., for example were noted to be about $200 less expensive. This impression was shared by other retail and trade company respondents. The project team contacted steamship companies to follow-up on this perception, and found that a direct call that actually reduced transit time and increased reliability, would not on its own be a reason to reduce prices. Increased volumes to and from Vietnam would be a greater influence on ocean freight rates.

In the interviews with container shipping lines, those operating in the European, U.S. and intra-Asia trades, there was an overall consensus that the long-haul Europe and U.S. trades would be better served out of the new deep-draft container terminals at Cai Mep/Thi Vai. The new terminals will allow the shipping lines to deploy larger ships in direct calls at these new terminals and secure associated economies of scale. Shippers moving cargo to the U.S. and European market are also interested in and recognize the benefits of direct calls for their shipments – reduced transit times and improved service reliability. One challenge raised by respondents are the tight schedules of current direct services in the Asia-U.S. and Asia-Europe; the addition of a direct call at Cai Mep/Thi Vai into these current services may require the elimination of an existing port call in order to maintain service schedules.

Differences of opinion arose over to what extent the intra-Asia trade would migrate to the new container terminals. The existing terminals – Cat Lai, VICT and other Saigon River terminals – and the new container terminal on the Soi Rap River can accommodate the smaller vessels operating in the intra-Asia trade. Intra-Asia operators also observed that the intra-Asia trades were unlikely to experience increases in ship sizes that would exceed the draft capabilities of these container terminals. A few respondents observed that the situation may evolve in a similar manner to the experience of Bangkok and Laem Chabang in Thailand, where the shallower draft port in Bangkok maintained a strong presence in the intra-Asia market after the opening of Laem Chabang. The extent to which intra-Asia cargo migrates to Cai Mep/Thi Vai will also be influenced by the major shipping lines; whether or not they want to consolidate all their cargo at a single terminal servicing larger ships and the smaller intra-Asia vessels.

Some respondents also commented on the opportunity to conduct transshipment at Cai Mep/Thi Vai. For example, they noted that the Thailand-U.S. trade may be an attractive business for transshipment at the new terminals. Similarly, the Cambodia market (both as transit and transshipment) was given as another opportunity for the new terminals.

[11] A feeder service generally uses smaller vessels to shuttle containers back and for the between small or restricted ports and larger deep water "relay" ports. After arriving at the relay port, a container would be loaded on a larger vessel for the final leg of the journey

3.5 Regulatory Issues and Security

Comments regarding regulatory issues appeared to be based upon the experience level of the respondent. One respondent suggested that it is much easier to get things in and out of Vietnam than it is to China, for example. Most respondents noted that Vietnam was basically on a par with most Asian countries. An NVOCC in contrast suggested that import documentation into Vietnam was somewhat restrictive as compared to other countries in the region. Documentation has to be original in several cases, and there are severe penalties for clerical errors. Several respondents indicated that having an office located in Vietnam is helpful in this area.

A suggestion to extend the HCMC customs zone to the new deep-water terminals was offered to simplify the documentation process:

> *"The Deep water area is a different province from HCMC, so there are customs issues. An "on-board" bill of lading at the new deep water terminal would cause customers to have to change their LC's to show on-board at the deep water district, not HCMC. This is a key streamline opportunity, and could reduce costs."*
> *- Steamship Representative*

With the implementation of U.S. Government security guidelines and regulations, such as Customs-Trade Partnership Against Terrorism (CTPAT), shippers consider port security issues as being generally under control, not just in Vietnam, but from foreign (non-U.S.) ports in general.

3.6 Equipment

A steamship company respondent suggests that equipment is easily sourced from key North and South Asia countries, such as Singapore and China. Standard dry 40-ft containers are readily available; however 45-ft containers were mentioned as being in short supply occasionally.

Truck availability was generally not a concern, except for very large shipments (20+ containers), because of the perceived high taxes that are assessed on truck tractors, which limits the ability of companies to buy trucks. This may affect truck availability during peak periods.

The small sizes of the factories in Vietnam are actually limiting the number of containers that can be delivered in a single shipment. Compounding this issue is that the current road network couldn't reliability deliver large shipments - fifty containers for example - to a single facility at one time.

3.7 Systems

U.S. importers generally use the transportation providers' system, such as the steamship carrier, or the 3PL's system, so information to and from Vietnam was considered to be equivalent with other countries. Survey comments highlighted data accuracy issues which resulted recently as terminals implemented new systems; however, these concerns have abated as data integrity issues have been addressed over the last few months.

3.8 Trade Growth and Economic Issues

Survey responses indicate that trade to and from Vietnam will continue to grow, and HCMC ports will need to expand to meet future demand. Port congestion issues are viewed as being a barrier of future growth in Vietnam. The timeline to develop a new port and infrastructure was considered to be a critical issue. Implications of prolonged infrastructure issues in Vietnam may be that manufacturers will soon begin to look elsewhere for sourcing options, especially on lower end apparel.

Inflation and property values in Vietnam are on the rise, which may eventually negate the advantages of doing business there. A shipper noted that warehouse costs in Hong Kong and Singapore are lower than what is currently charged in Vietnam. West Africa was noted as a potential future competitor with Vietnam, based on a recent trend in manufacturing there.

"The factories are being built by foreign investment now, or a joint venture for the most part... Before the Vietnamese infrastructure is developed a newer, better place will come along -, and [factories] will be shut down [as] [global industries] analyze their costs to get cargo in and out of [Vietnam as compared with other regions]. With the current world (economic) situation, I am hoping that they get what they need to build the infrastructure required…" - Shipper

Current port terminal capacity was also viewed as being insufficient to meet peak demand, and computer systems supporting those terminals were initially viewed to have provided incomplete information, especially during system implementations during this past summer. However, investment in container terminal operating systems has improved the situation.

4 Export and Import Cargo Process Maps

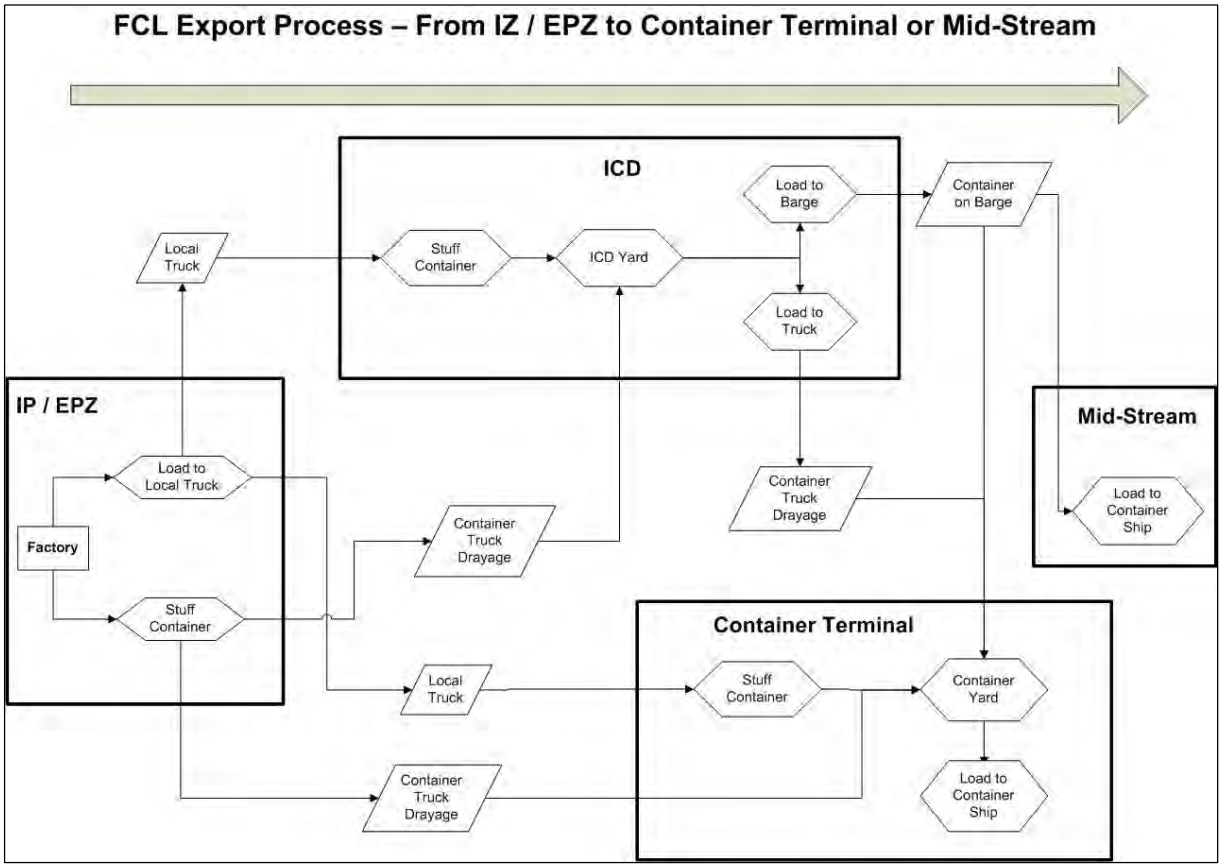
The objective of Task 4 is to describe the different transfers involved in moving containers in and out of the HCMC region, both the physical hand-offs of containers and information exchange. The evaluation provides process maps for cargo originating and destined for an industrial park or export processing zone, the principal generators of containerized freight, as well as describing the processes for Mekong Delta exports and for Cambodian transit cargo. The process evaluation is based on the project team's field trips to the HCMC region and interviews with companies involved in Vietnam's container trade.

4.1 Full Container Load Exports

Full container load (FCL) refers to a container that is fully used by a single shipper. The process for handling FCL export containers is illustrated in Figure 4-1. The major alternatives in the process relate to the location of container stuffing, use of an ICD as an intermediary point, transport mode between the ICD and container terminal, or use of mid-stream operations to load the container ship. The main options are:

- The container is stuffed at the factory/IP/EPZ, drayed to the container terminal for loading to ship.
- The container is stuffed at the factory/IP/EPZ, drayed to the ICD and then transferred by road or barge to the container terminal, or moved by barge to the mid-stream ship loading operations.
- Cargo is delivered to the container terminal by local truck, stuffed in the container, and loaded to ship.
- Cargo is delivered to the ICD by local truck, stuffed in the container, and then transferred to a container terminal or to mid-stream ship loading operations.

Figure 4-1: FCL Export Process

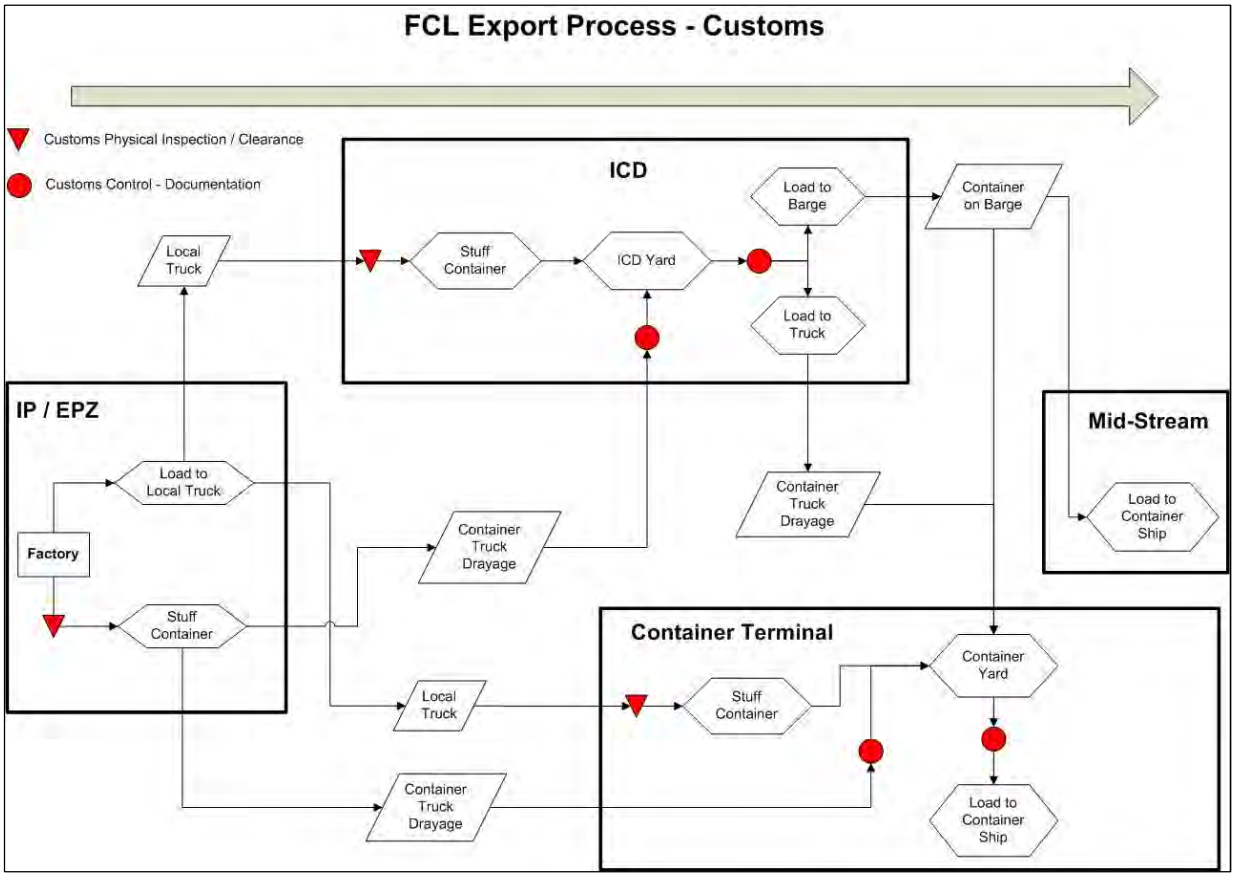


Source: Interviews

The FCL export process described above is also expected to apply to the new Cai Mep/Thi Vai container terminals. The decision to deliver to these terminals by truck or barge will be influenced by the origin point of the cargo, freight rates, and other factors such as traffic conditions on access roads to the terminals.

The current customs control process is illustrated in Figure 4-2. As discussed in Section 4.7, the decision to conduct physical inspections will be based on a risk assessment of the shipper and cargo. Physical inspections take place at the point of cargo loading into the container – the IP/EPZ, ICD or container terminal. Additional customs control will occur related to receipt of the container at the terminal or ICD, and clearance of the container to ship.

Figure 4-2: FCL Export Process – Customs

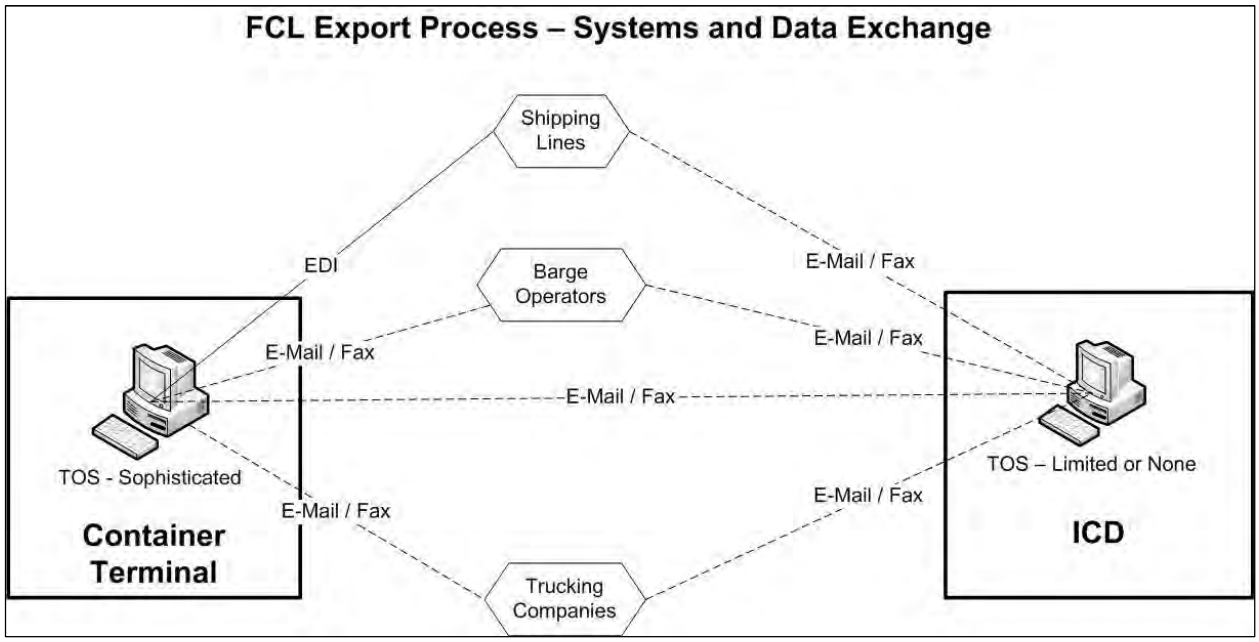


Source: Interviews

While individual entities have operating systems and there is EDI between some parties, the overall IT system is fragmented and requires improvement. Systems and data exchange technologies are illustrated in Figure 4-3. Specifically:

- Container terminals have industry-standard terminal operating systems (TOS) and use EDI with their shipping line customers. Communication and data exchange with ICDs, barge operators and trucking companies is by e-mail and fax.
- ICDs have limited TOS capabilities and use e-mail/fax to communicate with the container terminals, shipping lines, trucking companies, and barge operators.

Figure 4-3: FCL Export Process – Systems and Data Exchange

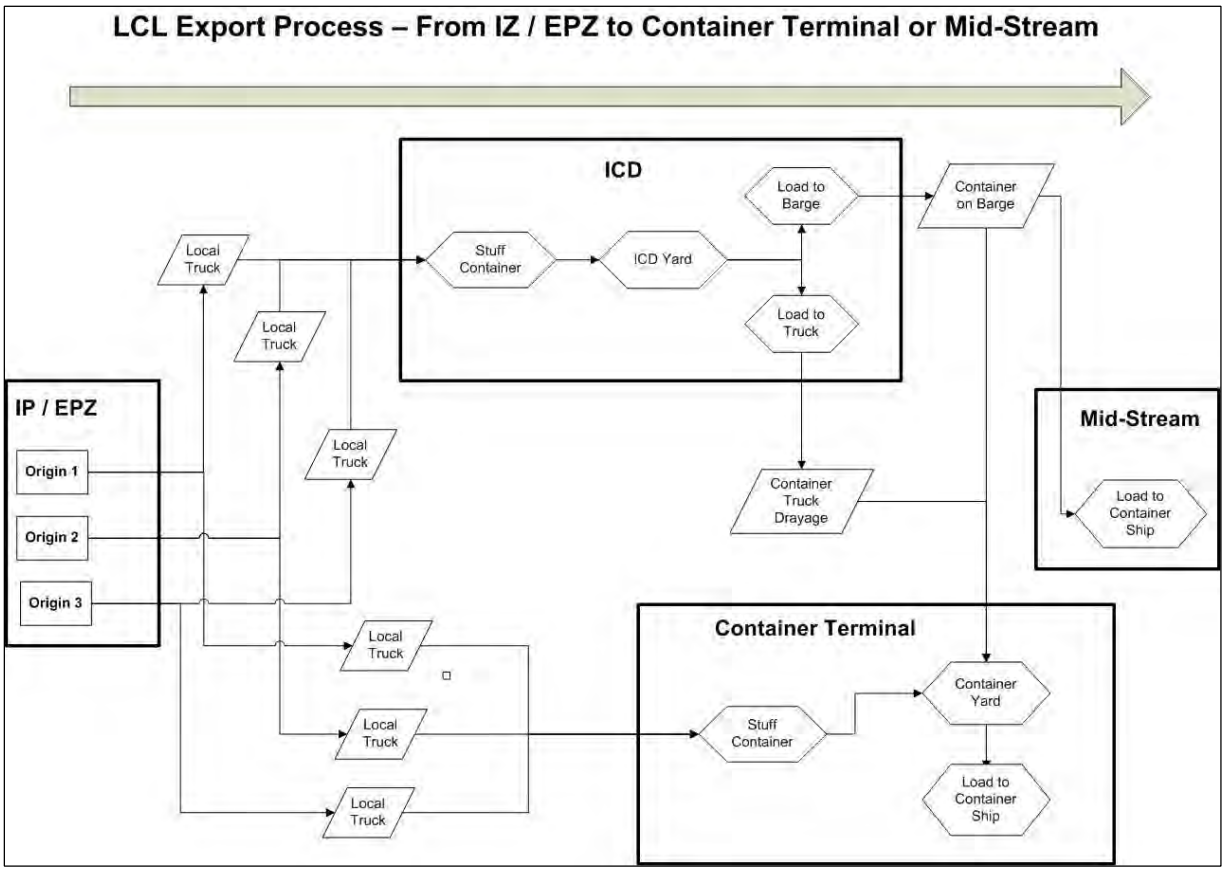


Source: Interviews

4.2 Less-than-Container Load Exports

Less-than-container load (LCL) refers to the use of a single container to ship the cargo of more than one shipper. The cargo is received and consolidated into the container at a container freight station, which can be located on a container terminal, an ICD or another location. The basic LCL process for export containers is illustrated in Figure 4-4. Once the cargo has been consolidated into the container, the process is the same as that described earlier for an FCL export container. If the cargo is consolidated at an ICD, then the container is transferred by truck or barge to the container terminal, or moved by barge to the mid-stream ship operations. As with FCL export containers, the customs physical inspection, if required, takes place at the location where cargo is loaded into the container.

Figure 4-4: LCL Export Process



Source: Interviews

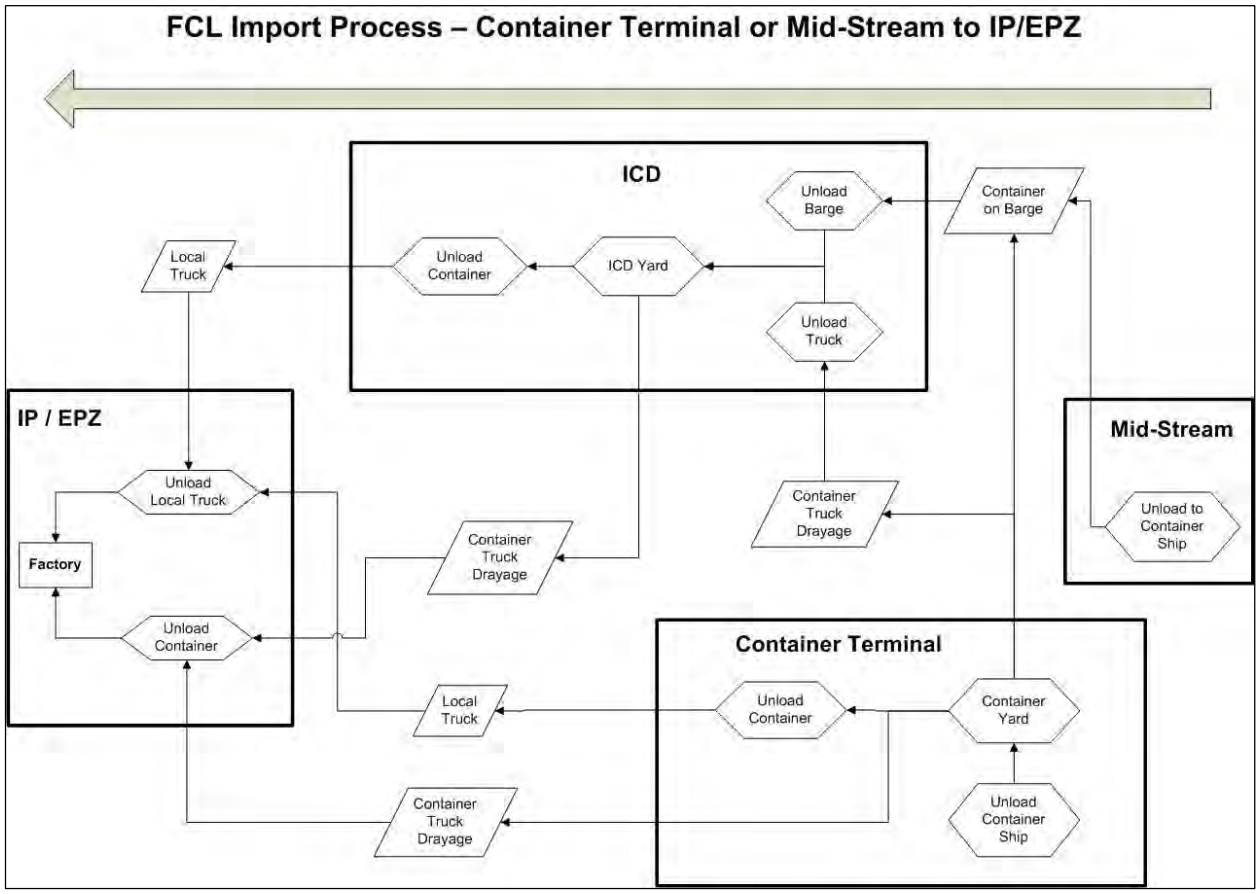
4.3 Full Container Load Imports

The process for FCL (Figure 4-5) import containers is the reverse flow as that described for FCL export containers. After discharge from the ship, the containers either:

- Move directly from the container terminal by truck to an inland point for unloading.
- Move by truck or barge to an ICD for deconsolidation (at the ICD's warehouse) or trucking to final destination.
- Move by barge from the mid-stream vessel discharge operations to the ICD for deconsolidation (at the ICD's warehouse) or trucking to final destination.

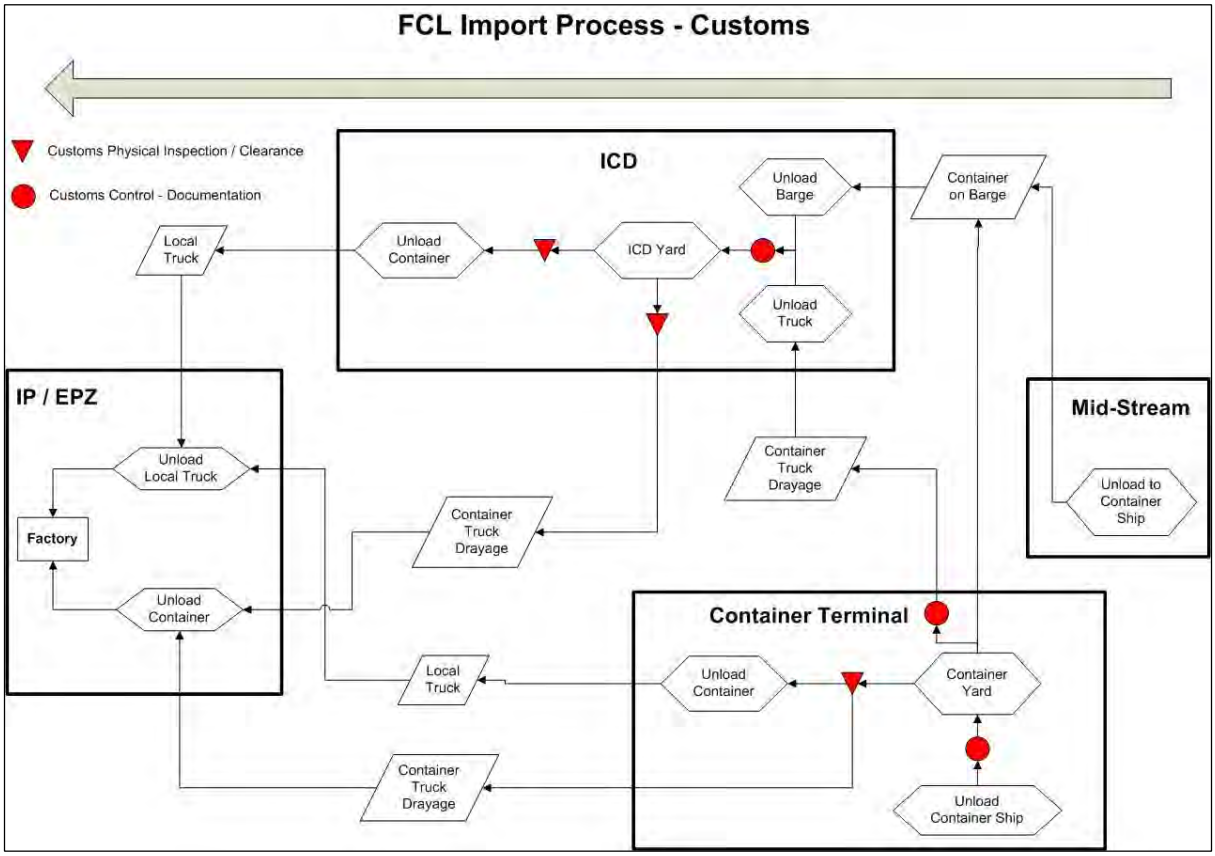
The customs process (Figure 4-6) is also similar in that if physical inspection is required, it takes place at the container terminal or ICD. Costs will also be similar for FCL import cargo as the costs described earlier for FCL export cargo.

Figure 4-5: FCL Import Process



Source: Interviews

Figure 4-6: FCL Import Process – Customs

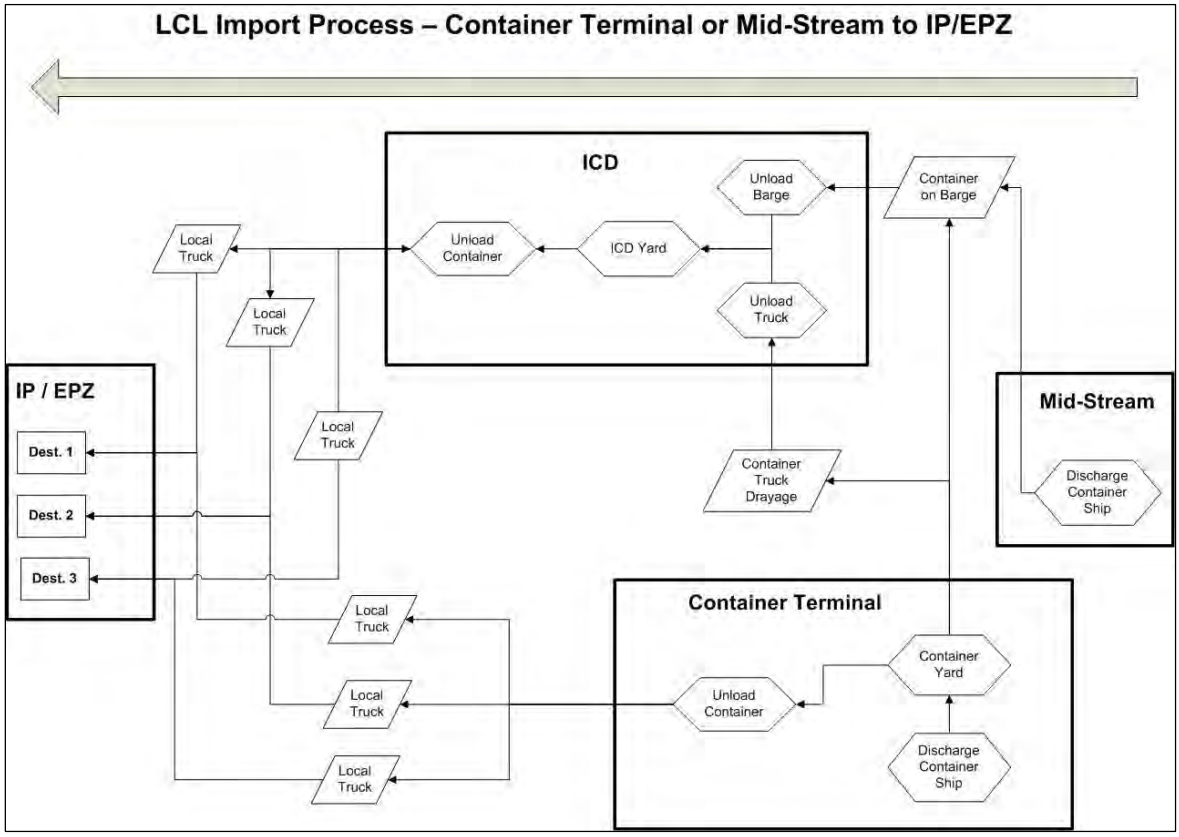


Source: Interviews

4.4 Less-than-Container Load Imports

The basic process for LCL import containers is shown in Figure 4-7. The handling is same from ship to container terminal or to ICD as encountered by FCL import cargo, the difference occurring at the deconsolidation facility and distribution to multiple destinations by local truck.

Figure 4-7: LCL Import Process



Source: Interviews

4.5 Mekong Delta Rice Exports

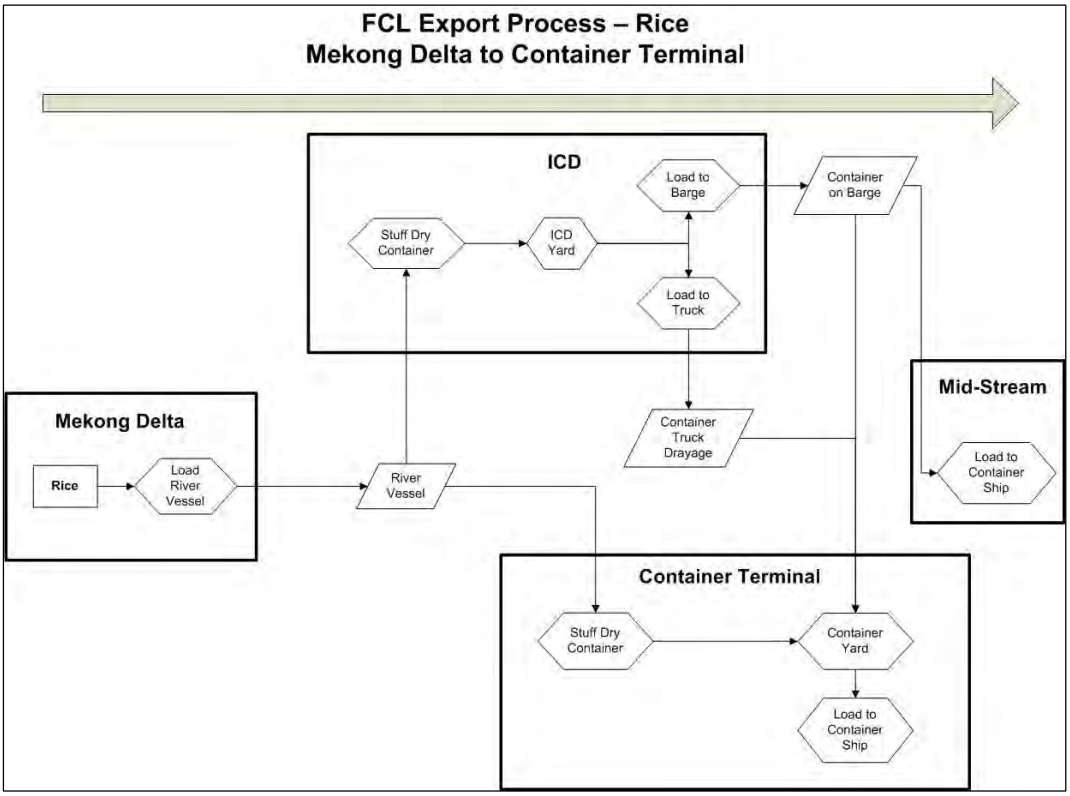
Vietnam is a major producer and exporter of rice, with three production seasons in spring, autumn and winter. The country shipped 4.6 million metric tons of rice to international markets in 2007[12], the annual volume of exports influenced by crop yields, domestic requirements and international demand. Annual exports were as high as 5.3 million metric tons in 2005. The Mekong Delta accounted for 52 percent of the country's rice production in 2007. The Southeast region around HCMC accounts for a further 5 percent of the country's rice production.

The marketing channel for rice comprises numerous local intermediaries, who purchase rice from the farms, and finally the large wholesalers in HCMC that sell into the domestic and international markets. Rice is mostly exported in bulk but a small quantity is shipped in containers. The decision to containerize rice is driven by several different factors such as the requirements of the specific overseas markets and importers, smaller volume shipments, higher quality rice, and the cost of shipment in containers compared to shipment by bulk vessel.

The export process is illustrated in Figure 4-8. Rice for export in containers moves through the following main steps:

- Shipment of 50-kg bagged rice from the Mekong Delta, in small bulk barges of up to 200 dwt in size (Figure 4-9), to a container terminal or ICD in the HCMC region.
- Discharge of the bagged rice at the container terminal or ICD (Figure 4-10).
- Stuffing of the rice into 20-ft containers at the container terminal or ICD (Figure 4-11)
- Once stuffed, the container moves through the same hand-offs described earlier for FCL exports.

Figure 4-8: FCL Export Process – Mekong Delta Rice



Source: Interviews

[12] Source: General Statistics Office of Vietnam

The development of the new container terminals at Cai Mep/Thi Vai could support modifications to the current export process. The river barges could bypass the existing terminals and ICDs, and call directly at the Cai Mep/Thi Vai terminals, where they are discharged and the rice stuffed into containers. Access to the Cai Mep/Thi Vai terminals would be via the existing canal and river system used today or via the ocean, in the latter case barges would have to have ocean going capabilities. The decision to ship direct from the Mekong Delta to the Cai Mep/Thi Vai terminals will be influenced by the following factors:

- The additional cost for transport to the Cai Mep/Thi Vai area – the exporters arrange transport by river barge and would incur an additional cost to move rice to the Cai Mep/Thi Vai terminals compared to the existing HCMC terminals and ICDs.
- Export destination – major export markets for containerized rice are in Asia and these markets may continue to be served by intra-Asia services using small container ships that call at the HCMC terminals instead of the new deep sea terminals.

Figure 4-9: River Vessel at ICD

Source: Field Trip

Figure 4-10: Discharge of Rice at ICD

Source: Field Trip

Figure 4-11: Stuffing of Rice for Export at ICD

Source: Field Trip

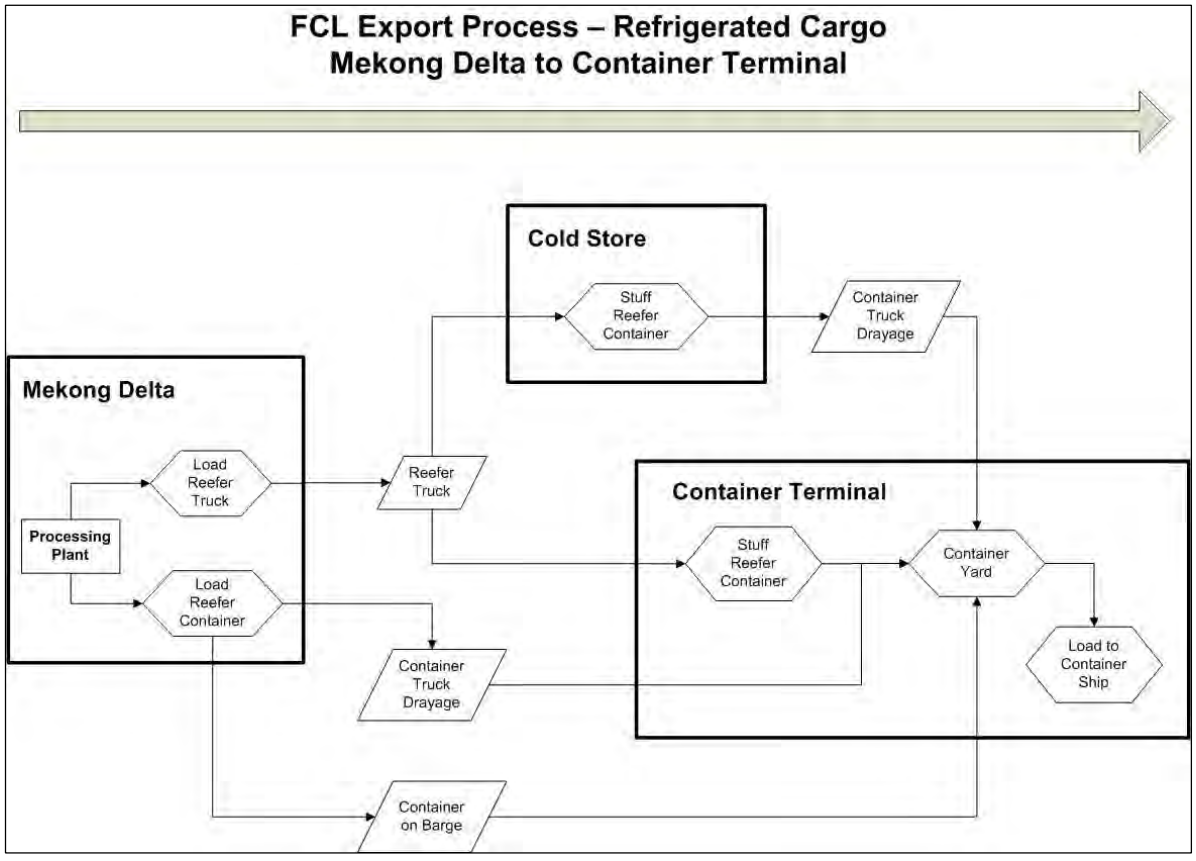
4.6 Mekong Delta Refrigerated Cargo

Vietnam produced 2.1 million MT of farmed aquatic products in 2007[13], a fivefold increase over the past decade. The Mekong Delta is the principal production center with a 72 percent share in 2007. In addition to aquaculture, Vietnam is also has an offshore fishery sector. In 2007, the total value of all fishery product exports was $3.8 billion, nearly five times higher than a decade earlier, and one of the leading export products is farmed shrimp. The Mekong Delta produced 317,000 MT of farmed shrimp in 2007, which was 82 percent of the country's total production (387,000 MT in 2007). The region is also a source for other refrigerated cargo, such as shipments of tropical fruits.

The export process for seafood from the Mekong Delta involves several different transport modes depending on the location of container stuffing, which can take place in the Mekong Delta, at a cold store or at the container terminal. The refrigerated containers are provided by the shipping lines. The process is illustrated in Figure 4-12 and the main steps are:

- Stuffing of the refrigerated container at the processing plant in the Mekong Delta and transfer by river barge or truck to the container terminal in HCMC. The barges have on-board diesel generators to power the refrigerated containers. Mekong Delta barge service (for all types of containers) is provided multiple times per week depending on the cargo volume.
- Stuffing of cargo into reefer trucks for transfer to HCMC where:
    - The product enters cold storage and is then stuffed into a reefer container at the cold store; or
    - The product is moved directly to the container terminal for stuffing to refrigerated container.

Figure 4-12: FCL Export Process – Mekong Delta Refrigerated Cargo



Source: Interviews

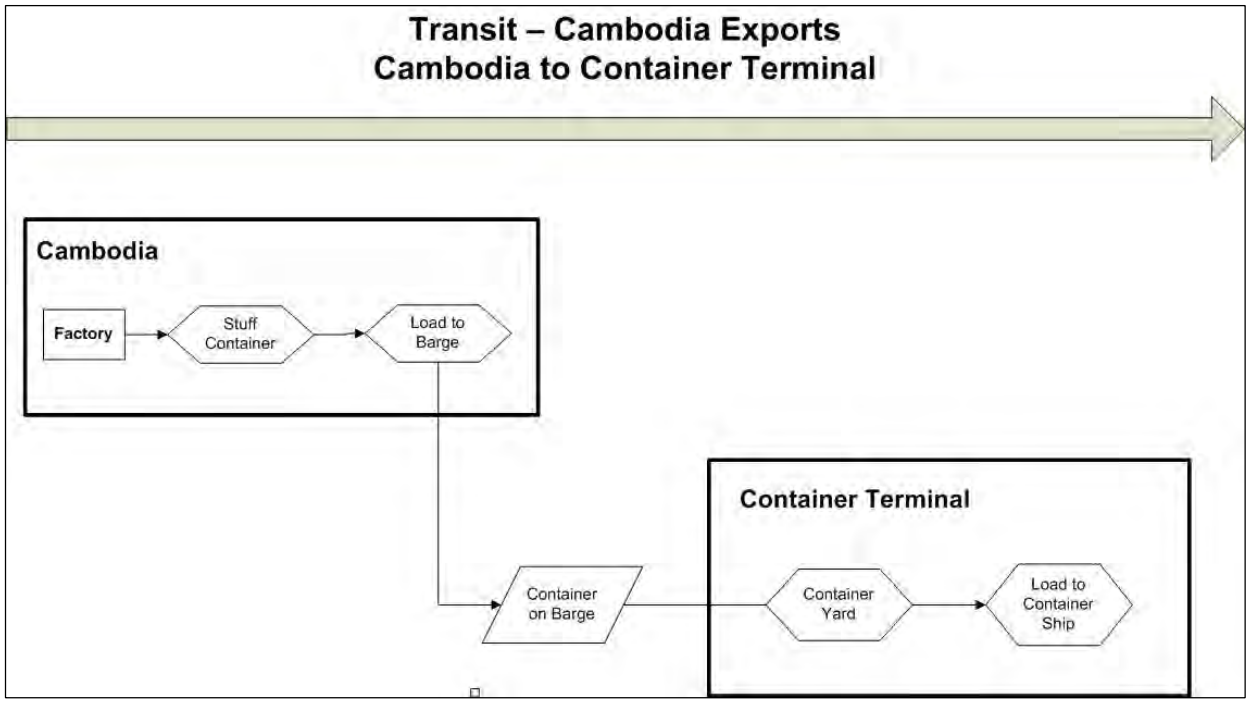
[13] Source: General Statistics Office of Vietnam

4.7 Cambodia Transit Cargo

The HCMC region acts as a minor gateway for transit cargo moving to and from Cambodia. The general flow of export and import containers is illustrated in Figure 4-13 and Figure 4-14. From Cambodia, export containers are loaded onto barges, which then move to the container terminals in HCMC. Import containers move in bond from the HCMC container terminals via barge to Cambodia, with customs inspection taking place at final destination. Alternatively, import containers are unstuffed at bonded warehouses and cargo is then moved to Cambodia by truck. Barge operators provide weekly service between HCMC and Cambodia.

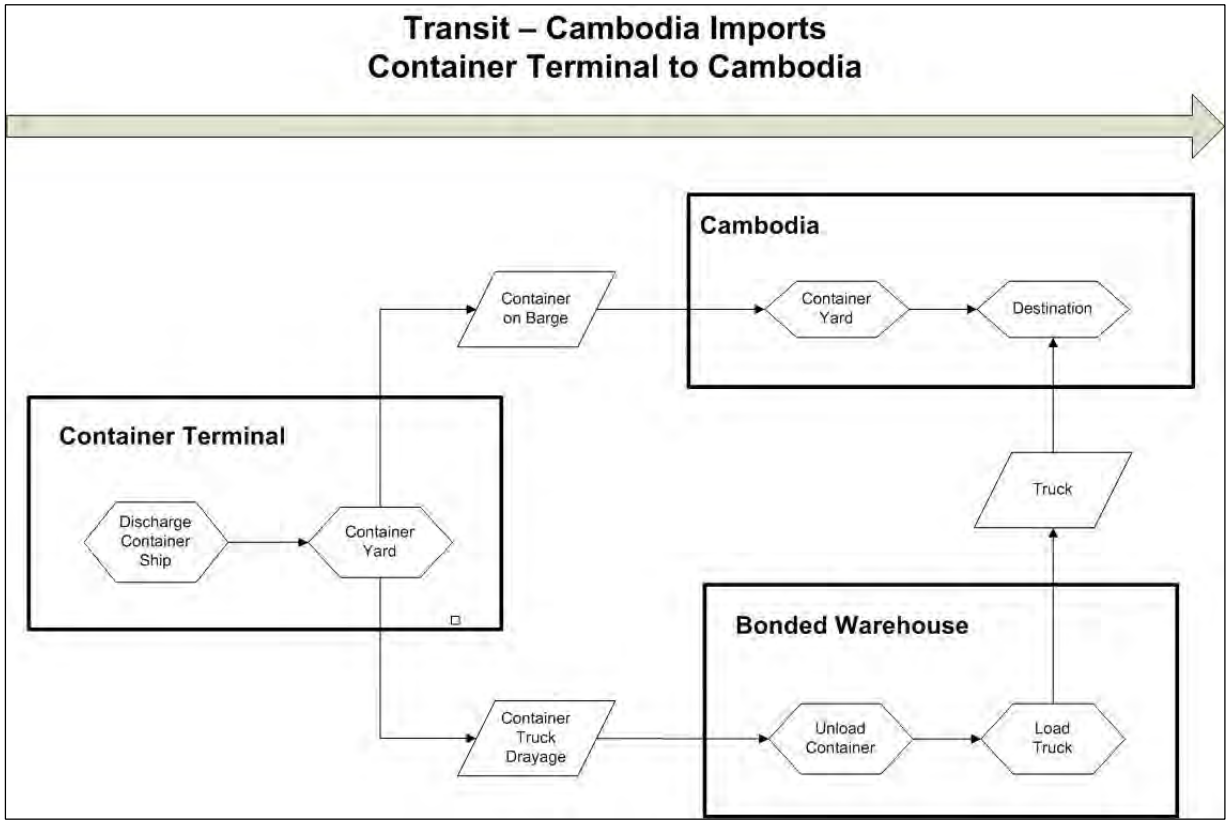
Several shipping lines observed that the Cai Mep/Thi Vai container terminals could attract additional Cambodian transit cargo, notably Cambodian trade with the United States as well as other Cambodian trades east of Vietnam. In the case of the U.S. trade, river barge service could connect Cambodia with direct U.S. services calling at the Cai Mep/Thi Vai container terminals.

Figure 4-13: Cambodia Transit Cargo – Exports



Source: Interviews

Figure 4-14: Cambodia Transit Cargo – Imports



Source: Interviews

4.8 Customs and Security

The project team conducted meetings with local customs offices to discuss the current customs clearance process and future changes to the process. In addition, the customs clearance process was discussed during the interviews with container shipping lines, shippers and other companies.

4.8.1 Customs Structure

The local customs offices in the HCMC region report to the General Department of Customs, which is part of Vietnam's Ministry of Finance. The terminals and ICDs of the HCMC region fall under different local customs offices as shown in Table 4-1. The local customs office maintains sub-offices at the container terminals and ICDs, and will also send inspection teams to designated industrial parks and export processing zones, or other locations requested by the shipper or consignee.

Table 4-1: Local Customs Offices in the HCMC Region

Local Customs Office	Container Terminals	ICDs
HCMC	VICT	Binh Duong, Phuc Long, Phuoc Long, Tanamexco, Transimex, Tang Cang
Dong Nai	Cat Lai	Bien Hoa, Long Binh
Binh Duong	-	Song Than
Ba Ria-Vung Tau	Cai Mep / Thi Vai	-

Source: General Department of Customs and Interviews

The new container terminals at Cai Mep and Thi Vai fall under the jurisdiction of the Ba Ria-Vung Tau Customs Office. The office is expected to initially have a customs team to provide customs clearance services at the first terminal that comes on stream. A new customs branch (or sub-office) will then be considered based on the need to support further new terminals and the volume of cargo moving through the terminals. Ba Ria-Vung Tau Customs Office will undertake inspections and clearance of containers with a declared destination or origin within its jurisdiction. For containers moving by barge between HCMC and the Cai Mep/Thi Vai terminals, customs inspection will take place at the declared place of receipt for outbound and the final destination for inbound.

4.8.2 Customs Lanes and Risk Management

Cargo can be processed under three lanes – green (low risk), yellow (medium risk) and red (high risk). The overall actions and other metrics by lane are shown in Table 4-2. The timing of the decision to allocate cargo to a specific inspection lane is driven by when the shipper or consignee submits their customs documentation. Documentation can be submitted up to 15 days prior to ship arrival or departure. Cargo assigned to the red lane must undergo physical inspection, which can take up to 2 days depending on the ease of access to the cargo. An estimated 15 to 20 percent of containerized cargo is allocated to the red lane.

Table 4-2: Profile of Customs Lanes

Lane	Main Action	Duration of Review
Green Lane	Review of documents	5 to 15 minutes
Yellow Lane	Intensive review of documents	15 to 30 minutes
Red Lane	Intensive review of documents and physical inspection	From 1 hour and up to 2 days

Source: Interviews

Customs uses an internal risk management system to determine the assignment of cargo by lane. The risk management system is a proprietary system that decides on risk levels based on the application of weighted criteria

(the weightings are confidential) such as profile of the shipper/consignee, cargo type, historical risk levels by cargo type and historical risk levels of the shipper/consignee. Scanners are expected to be installed at the existing Cat Lai and VICT terminals in 2009 to improve the inspection process of containers assigned to the red lane. Customs expects to introduce scanners at the new Cai Mep/Thi Vai terminals in 2010.

4.8.3 Customs Procedures

The standard customs procedure of **import and export cargo** follows five basic steps (according to Decision 874/QD-TCHQ issued 5/25/2006 by the Vietnamese Customs administration):

- Step 1: Accept documents, conduct examination and register customs form, decide method and level of inspection.
- Step 2: Examine the documents in detail, including applicable value and taxes.
- Step 3: Physical inspection of cargo (if required).
- Step 4: Collect applicable customs fee, confirm completion of customs procedure and return documentation.
- Step 5: Complete internal file.

The steps required for each lane are:

- Green Lane – Steps 1, 4 and 5 (exempt from detailed examination of customs papers and physical inspection).
- Yellow Lane – Steps 1, 2, 4 and 5 (exempt from physical inspection).
- Red Lane – all five Steps.

The principal customs procedures for **transit containers** are:

- Transit containers are exempt from customs inspection except in the case where it is suspected there is a violation of Vietnamese law.
- The entity responsible for transport of the transit container must submit to local customs a transit declaration document.
- Transit commodities are not subject to export-import tax or any other taxes.

4.8.4 Remote Declaration and E-Customs

Customs currently operates a remote declaration system via the internet that allows shippers or their agents to enter declaration information through the customs web site, while also submitting hard copies of documentation to customs. The share of cargo processed using remote declaration varies across the country; the national average reported as 60 percent with some districts achieving 100 percent usage. While remote declaration provides some level of "automation" it still falls short of a complete E-Customs system that would improve the efficiency of the customs clearance process. An E-Customs system is currently in development phase and is projected to be implemented over the next two to three years, the date of implementation varying by customs district.

E-Customs is being developed under the Customs Modernization Project for Vietnam, a project sponsored by the World Bank. The project cost of $77.7 million is funded through $65.9 million in aid from the World Bank and $11.8 million from Vietnam. The project started in late 2005 and is scheduled for completion in 2011. The World Bank, in its report "Status of Projects in Execution FY 08" released in October 2008, stated there were some delays in procurement of several project components including the identification and procurement of a comprehensive IT solution, and that the World Bank and local sponsor had agreed on an action plan to ensure the project remains on schedule. The project aims to facilitate trade and increase revenue collection, improve the production of foreign trade statistics, and enhance community protection and national security by improving the effectiveness, efficiency, accountability and transparency of the Customs Administration. The project has several objectives:

- Introducing modern Customs systems and procedures based on internationally agreed standards and best practice;
- Improving the organizational structure and strengthening the human, financial and physical resource capacity of the Customs Department; and
- Introducing appropriate information and communication technology to improve effectiveness, increase transparency, and lower transaction costs.

E-Customs has been undergoing testing at customs districts in the HCMC region with varying levels of progress. The HCMC Customs Office is still in the testing phase and is likely to go live with E-Customs post-2010, while Ba Ria-Vung Tau Customs Office expects to implement E-Customs by the end of 2009.

5 Technology Requirements and Solutions

5.1 Introduction

The final task of the interim report draws on the findings of Task 1 to 4 to identify the information technology (IT) gaps in the transportation logistics system of the HCMC region and to recommend appropriate solutions for the short term (5 years), medium term (10 years), and long term (15 years).

As discussed in previous tasks, the burgeoning cargo volume has increased the need for infrastructure improvements to be made in the HCMC area. While infrastructure projects are under way, it will be necessary to significantly improve the business processes to keep the stress on the existing infrastructure and environment to a minimum. Application of IT is a proven way to streamline business processes by cutting down on communications overhead, reducing errors, reducing use of resources, improving predictability and thus providing more effective cargo security.

The following sections provide an overview of typical applications of IT in the port logistics industry and then provide recommendations to the specific needs of the HCMC area. The Port Community System (PCS), which will be a primary focus of this section, will be discussed in detail. A major concern in the industry is security, both as it relates to securing the cargo (concerns of the shipper and the receiver) as well as protecting against terrorist-related activities. Current technology trends in container security will be discussed and appropriate recommendations will be made.

5.2 Information Technology in Port Logistics

5.2.1 A Brief History of IT in the Port Industry

IT started playing a major role in the container business in the 1980s when the business was reaching a point where business processes needed to be streamlined and automated to keep up with the increase in global shipping volume. At that time, text-based mainframe computers were the most powerful computing resources available. Since the associated costs were prohibitive, only the biggest terminals and vessel operators were able to afford such heavy computing resources. These expensive resources were directed towards certain segments of the overall logistics chain where the most benefit could be derived. So computerization first took place in the back office operations like documentation and billing.

Towards the end of the 1980s and early 1990s, computing power became relatively cheaper in the form of workstations. These workstations were smaller in size and they also offered highly graphical interfaces. At the same time, narrowband wireless technology and the mobile industrial-grade personal computers were also coming into the market. Premier ports of that time like Rotterdam, Antwerp, Singapore and Hong Kong were able to invest in these technologies and computerize the next segment of the logistics chain that required attention, which was, the vessel and yard operations. This gave rise to a group of applications that came to be known commonly as Terminal Operations System (TOS).

Around the same time as TOS was taking shape, vast improvements in computer communications were being made. This gave rise to applications involving communications between the various computers already in the industry, namely, between the computers of the terminal operators, shipping lines and customs authorities. As electronic communications started taking shape, standards started being put together for computers to be able to exchange information efficiently. Thus came about the importance of EDI. EDI made information exchange between ports and shipping lines more efficient and helped narrow down the time required between operations cutoff and sailing times of vessels, effectively contributing to the vessel turnaround and therefore helping to increase the overall productivity of terminals and vessel operators.

Towards the end of the 1990s and the beginning of this decade, improvements in computer communications technology made the internet globally pervasive and relatively cheap and accessible to all sizes of businesses. This created opportunities of computerization in the B2B (business-to-business) area. In the logistics sector, this opened up IT applications to beyond the big vessel operators and terminal operators. It allowed for independent IT vendors to offer computing resources in the form of web-applications, useable over the internet, to the rest of the port logistics community. This allowed for small operators like truckers, consignees, shippers and freight forwarders to streamline their operations with low IT costs. This group of applications is what is commonly called Port Community Systems (PCS).

As of today, 2009, TOS is fairly advanced and there are many IT vendors who offer a basic system which would take care of most of a terminal operator's needs. To put a TOS in place does not typically require more than limited customization of existing "off-the-shelf" software. But PCS is still a fairly new concept in the market. The challenge with PCS is that it caters to business processes beyond the confines of a container terminal and thus is exposed to more of the idiosyncrasies of the region that the terminal(s) serves. Implementing an effective PCS requires a high degree of involvement from the local logistics players. Though PCS as a product is not mature as yet, the concept is highly relevant to today's port business and thus, any community that is able to adopt a well structured PCS to serve them would reap significant benefits sooner rather than later.

5.2.2 Terminal Operations System (TOS)

A TOS generally refers to the set of software used to run the operations at a container or multi-purpose marine terminal. If there are five container terminals next to each other serving the same port area, it would be expected that five different TOS applications are being run, one in each terminal. Of course, they could all be from the same vendor or any number of different vendors. Since TOS systems have come a long way and their interfaces to external systems are reasonably well-defined, it is fine for different terminals to install TOS applications from different commercial vendors as long as the terminals' needs are satisfied by the capabilities of the TOS and the vendor. Some terminals have also developed their own in-house TOS.

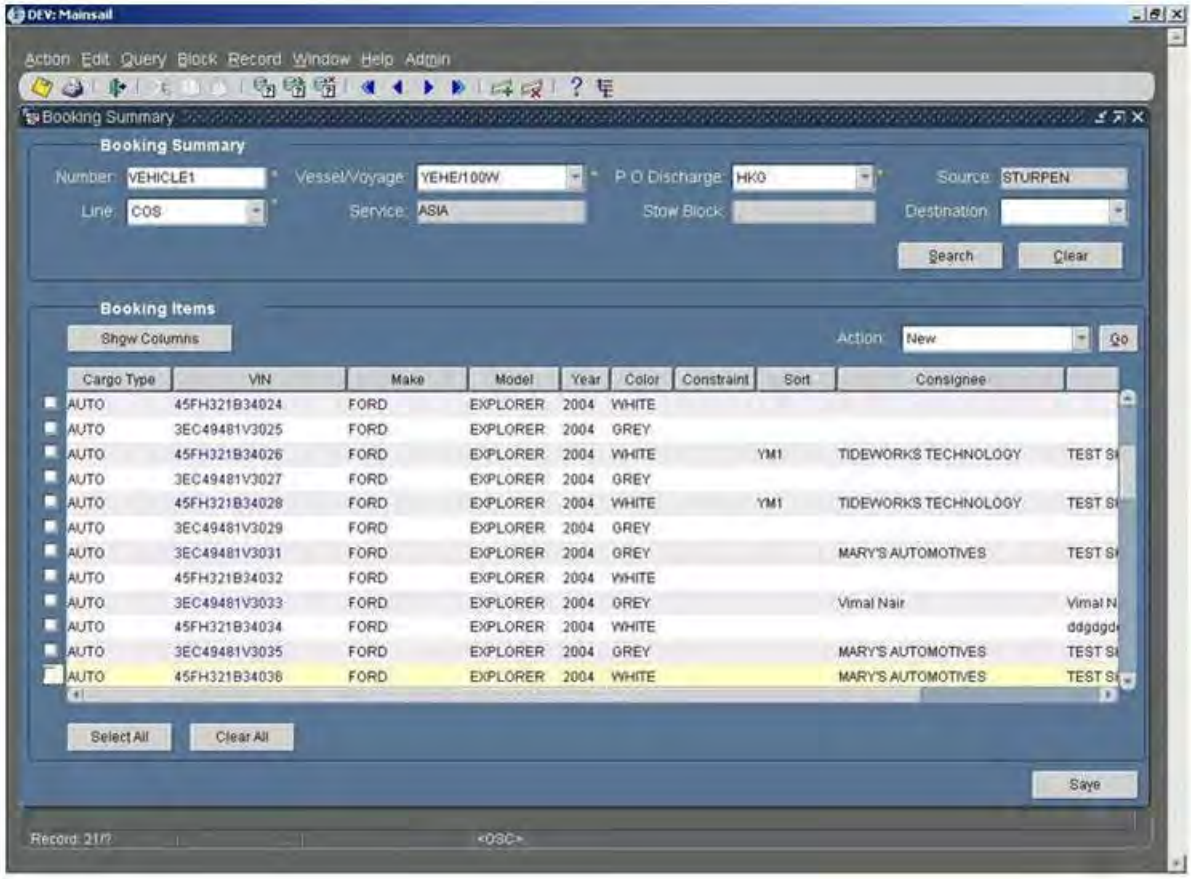
TOS addresses the needs of marine terminal operators (MTO) in particular and often offers interface to external port users like the shipping lines and truckers to access a limited set of data. The system will typically be used for planning of vessel moves, planning of yard and on-dock rail moves, keeping track of vessel and yard moves as they happen, keeping the inventory data up to date, controlling gate operations and exchanging electronic data with Customs, shipping lines and other external organizations. The typical components of a TOS are as follows:

Central Documentation, Database and EDI system

Most TOS have a central database which stores the data relevant to every aspect of terminal operations in a well-defined and structured manner. Simple user interfaces as well as comprehensive reporting facilities are part of the basic offerings of a TOS. The system will have the capability to format, send and receive industry standard EDI messages. Some of the common standards supported would include UN EDIFACT, ANSI X.12 as well as some new XML standards.

Though the primary users of this system would be users internal to the terminal operator, many TOS providers also offer web interfaces to external users like consignees, truckers, shippers and shipping lines through which the external users could access a limited set of data which allows them to plan their own activities related to the terminal's activities. Comprehensive audit trail and container/cargo history tracking are some of the fundamental features of this central database system.

Figure 5-1: Example of Database



Source: Tideworks Technology

Planning System

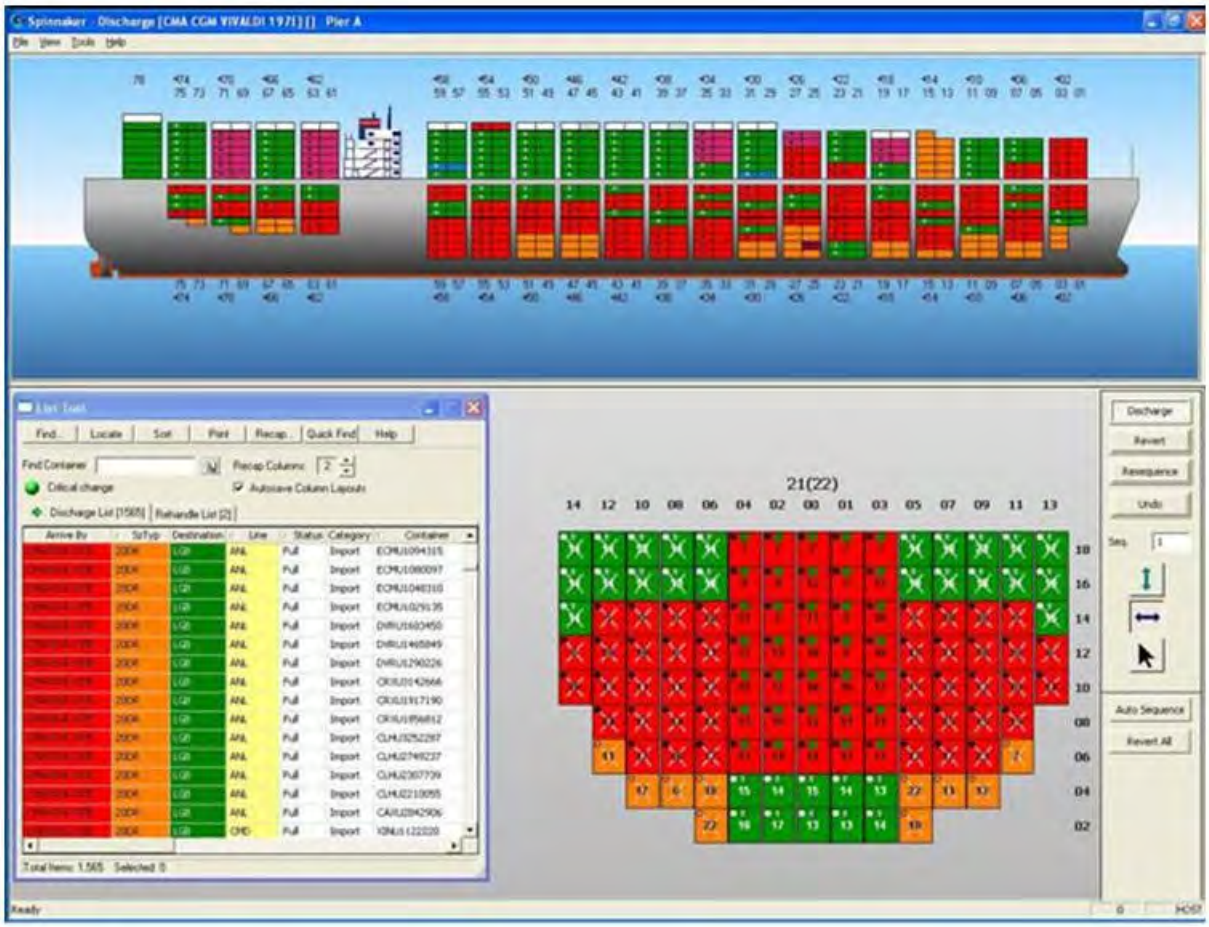
Every terminal operator with a reasonably high throughput (about 100,000 TEU and above) will encounter issues like inefficient crane/equipment utilization and less-than-desirable truck turnaround times. More often than not, poor planning would show itself as one of the root causes of such problems.

So most commercial TOS packages offer a graphical planning system. The planning system would have a rich, graphical interface that would offer various 2-dimensional (in some cases 3-dimensional) views of the yard layout, inventory, vessel stowage and vessel pre-stow. They also may offer tools like work flow planning (both quayside and in the yard) and customizable lists to allow vessel planners and yard planners to plan out the vessels and yard layouts prior to the actual operations.

Planning systems usually are fully integrated with or have real-time interfaces to the central database system to keep the data across the systems synchronized.

EDI capability, especially with regards to processing BAPLIE (stowplans) and MOVINS (pre-stow instructions), is a very important function within the Planning System.

Figure 5-2: Terminal Planning System



Source: Tideworks Technology

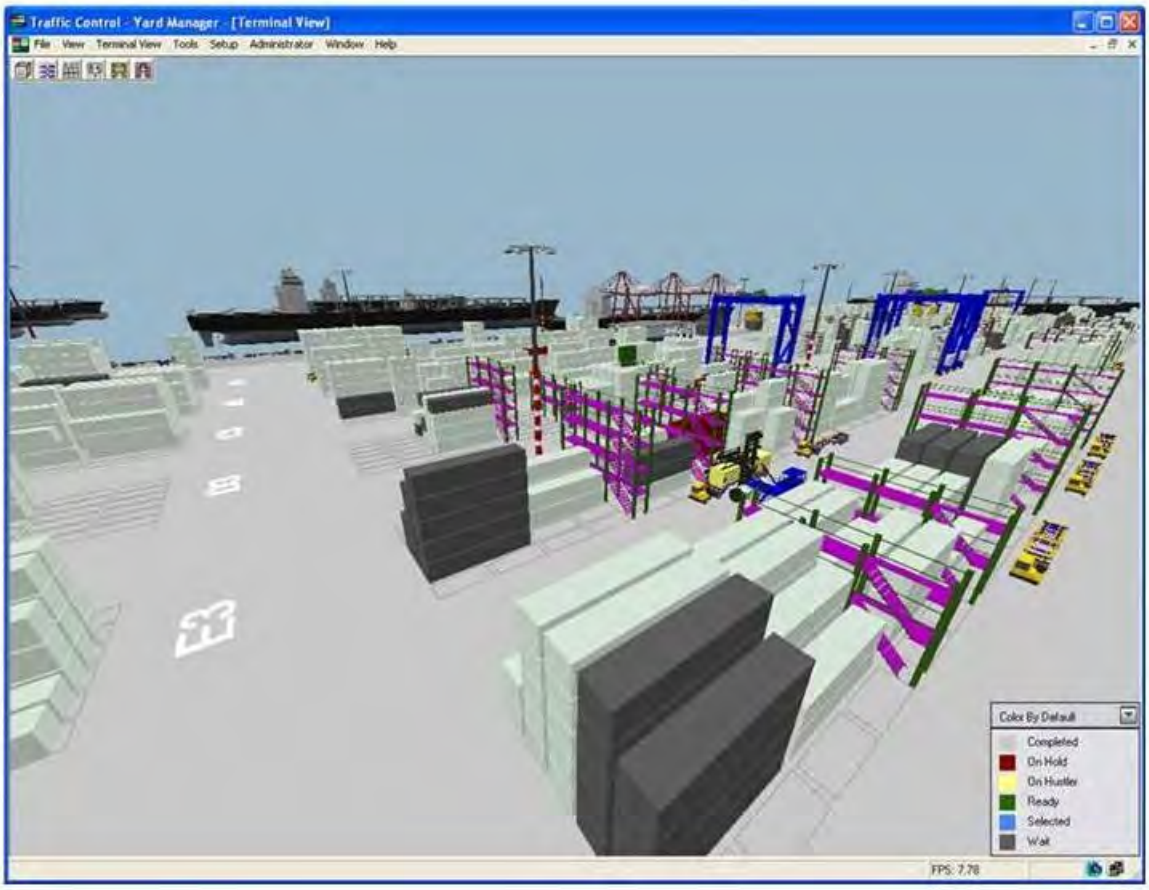
Equipment Monitoring and Control System

For terminals with higher throughput, equipment utilization becomes one of the key concerns. Some of the high-end commercial TOS vendors now offer a system which helps to replace radio communication and paper instructions with accurate, real-time, electronic dispatching of work instructions to equipment operators. Such a system is generally referred to as Traffic Control System or Equipment Control System.

This system tracks the real-time activities of container handling equipment, takes into consideration the operational priorities and dispatches work orders in a manner that optimizes the overall productivity of all the equipment. The system may also be able to detect operational bottlenecks and offer solutions to overcome those bottlenecks.

The system would typically be comprised of mobile computer interfaces for the operators as well as more graphically rich user interfaces for supervisors in the central control office of the terminal. Communications between the central server and the operator's mobile units would be either through narrowband or broadband wireless technologies depending on the terminal's physical layout and Wireless Local Area Network (WLAN) infrastructure preference. A typical traffic control system would also have the capability to interface with real-time location detection systems (GPS/RTLS), which, if available, make the overall tracking of equipment movement and inventory more accurate and up to the minute.

Figure 5-3: Traffic Control System



Source: Tideworks Technology

Automated Gate Systems

A major area of concern when it comes to operational bottlenecks is often the gate operations. A large amount of processing takes place at the gates, with activities ranging from container number verification, to customs checking, booking verification, trucker validation and trouble handling. Delays at the gate could have adverse impact on the operations within the terminal as well as the traffic situation along the public roads leading to the terminals. Gate congestion is known to cause much distress to public transportation as well as contribute heavily to environmental pollution.

Over the years, many technologies have come together to help automate many of the tasks and shorten the processing time at the gate. Some of these technologies are:

- Weigh-In-Motion (WIM) Scales
- Tagging technologies
    - to detect the container number
    - to detect truck number
    - to detect chassis number/track chassis movement
- Gate pedestals and kiosks with various I/O devices:
    - intercoms or handsets to communicate with gate staff
    - video displays and/or touch screens
    - ticket printers for printing instructions and/or interchange receipts

        - identification capture devices (card readers, biometrics, etc.)
    - Video Cameras to capture the images of containers for
        - container number recognition
        - security screening
        - inspection
    - Optical Character Recognition (OCR) Technologies
    - Computer controlled gate arms
    - Message signs

Some TOS vendors offer Automated Gate Processing as part of the overall TOS package. Such automated systems are highly recommended for container terminals which have high gate processing needs. The automated gate system may have a real-time interface to the central database system as well as the planning and/or traffic control system so that gate processes may make the latest status available for both the internal and external users (via the Web if applicable) as well as to assign yard moves to container handling equipment (CHE) operators in the yard.

Figure 5-4: Automated Gate Systems

Source: Tideworks Technology

5.3 Port Community System (PCS)

While TOS provide services for the users from the gate and onto the terminal, their value to users port-wide is enhanced when they operate in a coordinated fashion for the entire port community.

PCS has been in existence since the 1990s, but they were first implemented as an extension of the TOS and used to ride on the IT infrastructure of the TOS. The functionality available to users outside of the terminal, like Truckers, was tied to the individual terminal that the TOS served. So a trucker who serves different terminals in the same region would have to interact with different flavors of what could be called PCS.

Although advances in the internet made it possible for PCS to exist outside of the TOS infrastructure, most of the terminal operators chose to continue offering services tied to just their own terminals but making more use of the internet infrastructure.

Some regional authorities however, saw the necessity for having community systems which could serve all parties equally. This would allow the PCS to evolve its services to a comprehensive set that would enhance the overall efficiency of the whole region, rather than just one particular terminal.

Figure 5-5: Structure of Port Community System

Source: Tideworks Technology

5.4 PCS Case Study – USA

The PCS structure described above, in which different stakeholders participate to enhance the productivity of the overall port system, has been implemented in different forms around the world. One example of such a system is the PCS that is being put in place in India by the Indian Ports Association. Another very good example is eModal.com that started offering its services in California, in 1999 and has become the leading PCS system in the U.S. This section describes the main components of the eModal PCS as a benchmark for the type of PCS that could be implemented in the HCMC region.

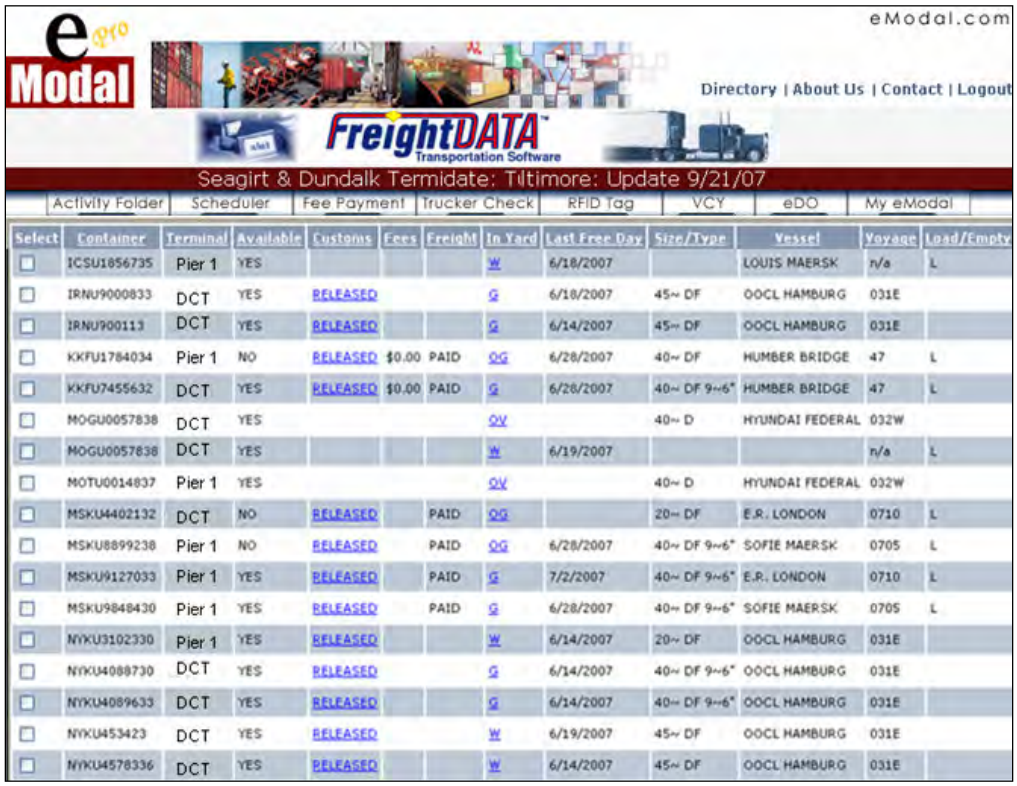
At the core of the eModal PCS is the common portal that is used by trucking companies, customs and freight brokers, importers and exporters, to check on status information from various TOS. This provides the marine terminal operators (MTO) with a platform to present common applications to the community of port users. Trucking companies, for example, thus perform more efficiently through one application. Naturally, this then allows all participants in the transportation chain to benefit accordingly.

5.4.1 Common Portal

Participating MTOs send container and booking information to eModal via various means, including ftp and web-services. The MTOs include information for container status such as availability, holds, fees due, last free day, size/type and more. Users of the PCS can use container numbers to retrieve the corresponding MTO-provided data.

Users benefit because all of the MTOs' data is provided via a common portal. MTOs benefit because users are now ascertaining all needed information prior to going to the terminal – thus increasing efficiencies at the terminals and in the surrounding infrastructure regions. Users benefit further when functional applications are provided. Examples of such functionality include on-line fee payments or scheduling appointments. Other benefits include less trouble window time, efficiency for truckers, and efficiencies for shipping lines to avoid storage charges.

Figure 5-6: Container Folder Information is Displayed on the User's eModal Web Page



Select	Container	Terminal	Available	Customs	Fees	Freight	In Yard	Last Free Day	Size/Type	Vessel	Voyage	Load/Empty
☐	ICSU1856735	Pier 1	YES				W	6/18/2007		LOUIS MAERSK	n/a	L
☐	IRNU9000833	DCT	YES	RELEASED			G	6/18/2007	45~ DF	OOCL HAMBURG	031E	
☐	IRNU900113	DCT	YES	RELEASED			G	6/14/2007	45~ DF	OOCL HAMBURG	031E	
☐	KKFU1784034	Pier 1	NO	RELEASED	$0.00	PAID	OG	6/28/2007	40~ DF	HUMBER BRIDGE	47	L
☐	KKFU7455632	DCT	YES	RELEASED	$0.00	PAID	G	6/28/2007	40~ DF 9~6"	HUMBER BRIDGE	47	L
☐	MOGU0057838	DCT	YES				OV		40~ D	HYUNDAI FEDERAL	032W	
☐	MOGU0057838	DCT	YES				W	6/19/2007			n/a	L
☐	MOTU0014837	Pier 1	YES				OV		40~ D	HYUNDAI FEDERAL	032W	
☐	MSKU4402132	DCT	NO	RELEASED		PAID	OG		20~ DF	E.R. LONDON	0710	L
☐	MSKU8899238	Pier 1	NO	RELEASED		PAID	OG	6/28/2007	40~ DF 9~6"	SOFIE MAERSK	0705	L
☐	MSKU9127033	Pier 1	YES	RELEASED		PAID	G	7/2/2007	40~ DF 9~6"	E.R. LONDON	0710	L
☐	MSKU9848430	Pier 1	YES	RELEASED		PAID	G	6/28/2007	40~ DF 9~6"	SOFIE MAERSK	0705	L
☐	NYKU3102330	Pier 1	YES	RELEASED			W	6/14/2007	20~ DF	OOCL HAMBURG	031E	
☐	NYKU4088730	DCT	YES	RELEASED			G	6/14/2007	40~ DF 9~6"	OOCL HAMBURG	031E	
☐	NYKU4089633	DCT	YES	RELEASED			G	6/14/2007	40~ DF 9~6"	OOCL HAMBURG	031E	
☐	NYKU453423	DCT	YES	RELEASED			W	6/19/2007	45~ DF	OOCL HAMBURG	031E	
☐	NYKU4578336	DCT	YES	RELEASED			W	6/14/2007	45~ DF	OOCL HAMBURG	031E	

Source: eModal

5.4.2 On-line Fee Payments

For charges such as demurrage, users can select the container with the fees due from the container list entered into eModal, then pay on-line with an electronic check or via credit or debit card. eModal advises the MTO of the container(s) and fee(s) collected so as to remove any hold. Collected monies are remitted to assigned MTO bank accounts less administrative fees. Trucks arriving at the marine terminal are processed through more efficiently as the truck need not stop to pay fees due.

5.4.3 eModal Scheduler™

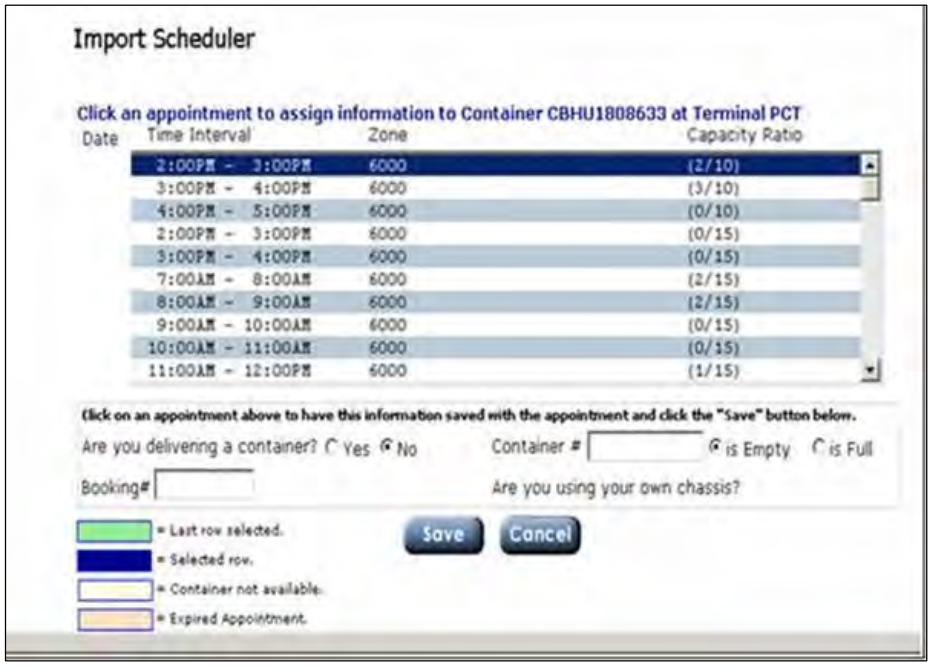
eModal Scheduler™ is an appointment application initiated by the MTOs for the trucking community. Marine terminals allocate a capacity of trucks that can be in a zone, such as rows or lanes, within a given time interval on the terminal. These options are then made available for the trucking companies. The system gains further efficiencies as more terminals participate in the single appointment system, as the truckers benefit by only having to work from one appointment system.

With the eModal Scheduler, terminal operators determine which yard spots of containers will be divided into zones. The terminal then determines how many trucks can access that zone in a given time interval. The marine terminal sends its containers to eModal for posting to the container folder. Trucking companies log in to eModal, select the container to make a reservation and submit. eModal provides the user with time options available based on the zone the container is located in and the number of appointments still available.

Figure 5-7: eModal's Scheduler

Source: eModal

Figure 5-8: eModal Appointment Scheduler

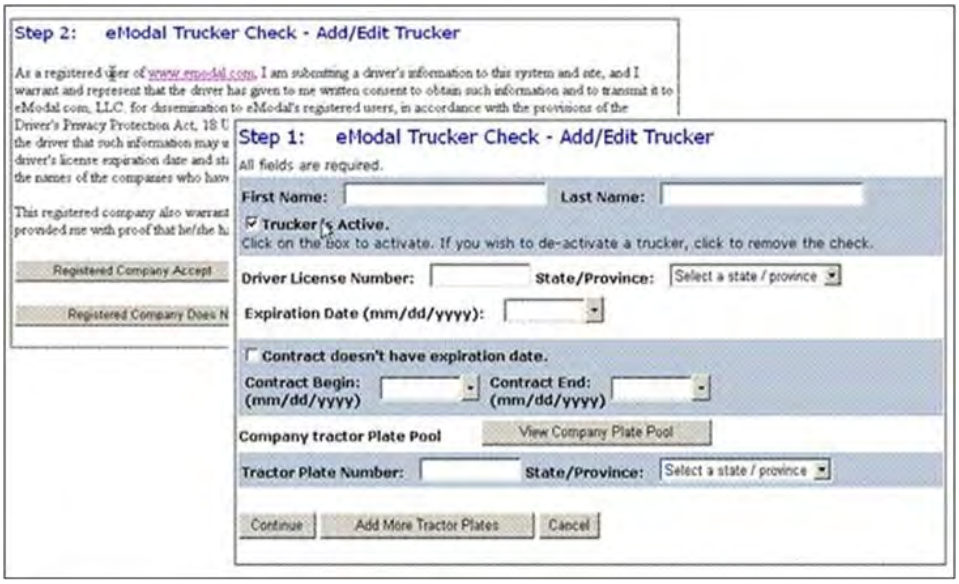


Source: eModal

5.4.4 eModal Trucker Check™

For both security and the ability to manage the trucking companies, street turns (that is, the need to deliver an empty container for cargo loading and bring back a loaded container back to the terminal) and their drivers wanting access onto the marine terminal, MTOs on both U.S. coasts have subscribed to eModal Trucker Check™. The eModal Trucker Check™ application requires trucking companies to register information about their company, trucks, and drivers via the eModal Web interface. The information is securely stored in the eModal database. Marine terminal systems pull Trucker Check™ data from the eModal servers at terminal-determined frequency. As trucks arrive at the terminals, their information is matched to that stored with eModal.

Figure 5-9: eModal Trucker Check



Source: eModal

5.4.5 Managing Empty Containers

A common portal for the port community also provides benefits away from the marine terminals. For example, eModal provides a Post/Search application for empty containers and truck drivers. The application allows for users to re-use containers, often referred to as "street turns." The service reduces unnecessary truck trips to the port, re-uses steamship line container assets more efficiently, and is good for the environment.

5.5 PCS Case Studies – Developing Countries

5.5.1 India

In 2006 and 2007, the Indian Ports Association pursued an initiative to develop a centralized PCS , which would provide a single window system for the port communities in India, including the port authorities, terminal operators, service providers, and other stakeholders. The proposed PCS had similar structures and functionalities as those described in detail Section 5.4. The project had several broad objectives:

- Develop a centralized and intelligent electronic message switching facility to and from the community members.
- Maintain a centralized database to improve track and trace efficiency and shipment/service visibility.
- Data repository for research and analysis.
- Develop web-based application to access and support the information of the central database in secure fashion.
- Single source for information exchange with links to the systems at the Ports and other trading partners.

The initial web portal (www.indianportscommunitysystem.com) for the "Indian Ports Community System" has been established and it provides several functions that include: stakeholder registration, user login, vessel call status for 13 major ports in India, and a help feature.

5.5.2 Ivory Coast

A port community system is being developed in the Ivory Coast to interface with shipping lines, customs, the port authority, container terminals, truckers and other stakeholders. In 2007, Abidjan Port Synergie (APSNet) was formed as a public-private partnership (PPP) to establish and manage the PCS. The company includes the Port Autonome Abidjan, the local port authority, and other parties. The PCS project includes deployment of a full private network to ensure the rapid, safe and reliable exchange of data between the stakeholders.

A further aspect of the Ivory Coast project is to provide importers and exporters located in neighboring landlocked countries (Mali, Burkina Faso and Niger) real-time information on the clearance status and location of their goods. This is an example of the trans-border capabilities that can be built into a PCS, and illustrates the potential for a PCS deployed in the HCMC region to integrate data related to transit cargo moving to and from Cambodia.

5.6 Information Technology Gaps

5.6.1 Electricity

In HCMC area, availability of modern technology is not an issue. The latest computing and communications equipment are readily available with major technology vendors like IBM, HP, Microsoft and Cisco investing heavily. However, the electricity infrastructure may need some attention. It was highlighted during our study that HCMC area experienced quite a few blackouts during the warm months of April to July of 2008. The stability of the electricity supply is indispensable to the reliability of the IT infrastructure.

5.6.2 IT Manpower

As far as IT manpower is concerned, the technical colleges and universities in Vietnam, coupled with privately run computer schools, are filling the workforce with IT literate manpower capable of handling technical tasks like systems administration, technical support and software programming. What is lacking is local expertise in applying technology to business processes. Mid-level IT management skills, like conceptualizing large scale IT projects, re-engineering processes and managing projects from the beginning to end, are still not easily available to meet the demand. So such skills need to be imported in the form of foreign contractors and expatriates.

5.6.3 Customs

The Customs Department, which is a significant player in the overall logistics scene, has not been computerized fully as yet. As discussed in earlier sections of this document, the customs department has been testing a computerized solution that allows for declaration of cargo to be submitted remotely over the internet through a web-interface. It is expected to take a few more years for the system to be completely implemented replacing all the manual paperwork. However, until an E-Customs system that has EDI capabilities to exchange declaration and clearance information is in place, the customs department would still be considered as lagging behind in its use of IT.

5.6.4 Inland Container (Clearance) Depots

The study team met with quite a few ICDs in the HCMC area. Of those ICDs, only Song Than ICD and Phuc Long ICD indicated that they had a computer system to keep track of container movements. As far as exchanging electronic information with container terminals is concerned, only Song Than ICD indicated that their system interfaces with Cat Lai terminal's computer system. So with the exception of these two ICDs, it seems like all the ICDs need to invest in computer systems to keep track of container movements as well as to exchange electronic data with shipping lines and container terminals, and in some cases, with the customs.

5.6.5 Container Terminals

As mentioned in Section 2, only Cat Lai terminal and VICT terminal have installed industry standard TOS . Terminal operators are aware that a TOS system is a fundamental requirement to keep up with the increasing cargo volume. All the new terminals in Cai Mep/Thi Vai and Soi Rap areas will be putting TOS systems in place before they become operational.

5.6.6 Freight Forwarders

Large international freight forwarders like APL Logistics and Expeditors International have their own end-to-end tracking systems based on state of the art technologies. But local freight forwarders, for the most part, operate totally manually.

5.6.7 Trucking Companies

Trucking companies are yet to use technology to manage their fleets. Some companies indicated that they have been testing some systems but they have not been successful as yet. But smaller operators are not yet using IT to a meaningful extent.

5.7 Information Technology Recommendations

In the earlier parts of this section, we have briefly looked at how IT is being used in the port industry in the rest of the world. Here we shall discuss how technology could be adopted in HCMC to serve the area well over the next 5, 10 and 15 year periods.

5.7.1 IT – Next 5 years

Terminal Operating System (TOS) at every marine terminal

As of 2009, many new container terminals are being built or planned for the next few years. It is expected each terminal operator will put in place a reliable TOS system from an established vendor. The TOS system is one of the fundamental building blocks of an overall IT landscape for the logistics chain.

The terminals should also invest in a good location detection technology (RTLS/DGPS) as well as a broadband wireless communications infrastructure so as to be able to make use of the latest development in Traffic Control/Equipment Control features that some of the TOS packages offer. Many terminals in other parts of the world have tried and tested these technologies. So the terminals in HCMC area should take advantage of the lessons learned by the industry and invest in these technologies from the onset. The location detection technologies would not only allow for TOS systems to optimize operations and reduce operational bottlenecks, they will also increase the overall accuracy of the inventory. This would lead to reduction in lost containers as well as reduction in unnecessary yard-to-yard moves.

Automated gate systems with self-service kiosks, cameras and weigh-scales would also be highly recommended. Having all of this equipment interfacing with the TOS would ensure a multi-pronged approach towards increasing the accuracy of the data. Capturing such information in a timely manner allows the TOS to send work instructions to the equipment operators ahead of time and thus will help to reduce turn-around times.

Computerize every Inland Clearance Depot

ICDs are an important element of the container logistics system in the HCMC region. Containers move by barge and truck between the ICDs, marine terminals and inland locations. Many of the concerns that the terminals have, such as accurate inventory, reducing truck wait time and security of cargo, are all shared by the ICD operators. Today, many of the ICDs are not computerized and with the cargo volume projected to increase in the future, the ICDs will need to computerize in order to stretch their resources to their optimum level of usage. The recommendation for computer systems at the ICDs will allow them to participate in the timely exchange of electronic information with the container terminals and other entities in the logistics community, and to participate in a Port Community System. Furthermore, since the ICDs are such an integral part of the overall logistics landscape in HCMC, any IT plan for the region will not its realize the full potential without the participation of the ICDs.

ICDs are mainly dealing with loading and unloading barges and trucks, which are not as complicated as loading and unloading container vessels at the container terminals. They also provide FCL and LCL services. Yard layouts at ICDs are simpler than at the container terminals. The busiest current ICD handles 500,000 TEU per year. Given the relatively simpler ICD operations as compared with container terminals, the ICDs would not necessarily need to implement the full range of functionality available in most container TOS systems. There are some TOS vendors who offer systems well suited for small to medium-scale mixed operations.

Develop a Port Community System

The HCMC area is experiencing two significant challenges at the moment. One is congestion due to the inadequate physical infrastructure and the other is the environmental impact of ever increasing number of vehicles on the road. The Vietnamese government has extensive highway improvement projects for the region, including an improved Highway 51 connecting to the Cai Mep/Thi Vai terminals. However, given the timeline for some of these improvements, the increasing cargo volume will continue to place stress on the available infrastructure and environment.

From the logistics point of view, it would be ideal to keep the number of hours trucks are on the road for a given load to be kept to a minimum. However, to achieve this would require the truckers to work with accurate and timely information. Truckers would need to be informed of when they are able to pick up their cargo or when they need to drop off their cargo, and they should be served efficiently by the terminals and the ICDs when they get there. The ICDs and Container Terminals would need to know truck arrival times so they can ensure that the right container handling equipment is available to serve the trucker.

As described in earlier sections, a PCS that is independent of any one terminal operator or any single player in the logistics chain would be the ideal solution for ensuring that information is exchanged between the various parties for mutual benefit. So it is highly recommended that a PCS be put in place in the HCMC area. The PCS project should

initiated while the terminal's computer systems are being planned for, so that the important information exchange mechanisms can be worked out in compatible stages between the various players in the community.

In the first 5 years, it would be ideal if the following features are among those offered by the PCS:

1. Trucker Registration: Registering every trucker and who they are authorized to work for. This would allow for prescreening of truck drivers, which is one of the security measures put in place in many ports in the U.S.

2. Online Payment of fees: Truckers or consignees could pay fees and dues on line and thus reduce the amount of time the trucker needs to spend at the gates. It will also remove the need for truck drivers having to handle cash.

3. Scheduling: Terminals could work out schedules with truckers so that the truckers can be efficiently served and the terminals can plan their resources ahead of time. The HCMC authorities, who currently impose some restrictions on containers moving by truck, would also be able to make use of the PCS to build in rules and restrictions for truck travel times.

4. Virtual Container Depot: Some ICDs and other inland container depots may not be large enough to justify a computer system just so that they can participate in the electronic information exchange. But it is essential that every player in the chain has the ability to feed information into the PCS and benefit from the information available there. A virtual container depot feature would extend basic container depot management functions, like inventory management, to these small operators while allowing them to exchange information electronically with other community members.

5.7.2 IT – Next 10 to 15 years

Given that technologies for logistics and terminal operations in particular are very dynamic, it is somewhat difficult to project what the port's technology needs might be ten to fifteen years into the future. Furthermore, recommendations made now for long-term needs would involve the most advanced, cutting-edge (and therefore expensive) technologies currently available; however, by the time of implementation, recommended technologies may have come down significantly in price or even become obsolete. In any event, an analysis and justification – based on volume, cost of ownership, return on investment, etc. – for proceeding with long-term recommendations should be undertaken at time of implementation.

Optical Character Recognition Systems at the Gate

Optical Character Recognition (OCR) systems for container number recognition are currently being used in some high-volume terminals around the world. They help to reduce manpower at the gate at some terminals. They also reduce manual intervention at the entry and exit points and thus reduce chances of containers being tampered with, which translate to greater security. Depending on the volume and the security needs, OCR could be considered as an add-on to the TOS systems over the next 10 to 15 years.

E-Customs in Place

An E-Customs system is expected to be fully implemented by the Customs Department in the short to medium term. It is expected to be totally interfaced with all the terminal systems, freight forwarder systems, and shipping line systems. Through PCS, consignees, shippers and trucking companies will be able to submit declarations and check on customs status more efficiently.

Modern Rail Facility

A rail system connecting Cai Mep/Thi Vai area with inland points is under study. If the rail project proceeds, the latest GPS, Electronic Seal and RFID technologies should be employed to track every container on the trains almost every

step of the way. The computer system that tracks the containers would naturally be a candidate to be connected to the PCS. This provides yet another window into tracking of containers by members of the logistics community.

Traffic Monitoring System

A key concern in the HCMC area is the regulation of traffic within the city as well as around its periphery. At the moment, the transportation department has restricted truck traffic to certain parts of the city to certain hours of the day. Future traffic growth, driven by trade and the increasing standard of living putting more vehicles on the roads, will require the Department of Transportation to regulate the flow of vehicles in and around the city. In the long term, some form of a traffic monitoring and regulating system is advisable.

With PCS playing a central role in disseminating information about container movements to the whole community, it is expected that the timely information that PCS would have in its database will be a valuable input to the traffic monitoring system. The traffic monitoring system would in turn be able to feed information to PCS which could then be used by the different parties (terminals, etc.) to regulate their gate/yard hours and thus allow for a more synergistic flow of traffic (container traffic and civilian traffic) that is continually optimized by the array of computer systems in HCMC's electronic ecosystem.

5.8 Cargo Security

One of the requirements of this study is to recommend systems that can provide improved levels of security for the terminals and cargo.

Security for the terminals and cargo could be divided into two distinct yet inter-related categories:

- Cargo Security: Protecting the cargo in transit from damage or theft, that is, ensuring that the cargo that is shipped reaches the receiver in the state expected by the shipper.
- Port Security: Securing property (port facilities, vessels etc.) and people from dangerous cargo meant for malicious purposes (terrorism related).

Cargo security has been a concern of every shipper and receiver for as long as the transportation of goods has occurred. Cargo can be lost, stolen or damaged while on transit. Prevention of such loss or damage is the responsibility of every service provider all along the logistics chain. Ports, being one of the most important links in that chain, hold a significant part of that responsibility.

Port security has become an ever-increasing source of international concern over the last few years. Spearheaded by the United States Department of Homeland Security (USDHS), many laws and regulations have been introduced to attempt to prevent malicious cargo from reaching the shores of the U.S. As the U.S. is one of the biggest trading partners of Vietnam, it will be necessary for ports in Vietnam to adhere to the U.S.-established security requirements, as well as other internationally adopted codes (i.e. ISPS).

For both cargo and port security, a fundamentally sound set of security policies and procedures are the essential building blocks. Technology, in the form of hardware and software, helps by facilitating the implementation of these policies and procedures within the business processes they automate.

For cargo security, existing technologies could be used to a great extent. The TOS and PCS systems highlighted above allow for many features to be implemented helping ensure a higher level of cargo security at the ports. Port security has reached prominence relatively recently. Bodies like USDHS and USCBP have attempted to implement many new procedures to ensure early detection of illicit cargo before it reaches the borders of the U.S. Some of the technologies made necessary by these policies may be very expensive for any one port or terminal to invest in, and thus may need some direction and assistance from the Vietnamese government departments. Some of these technologies will also be outlined below.

5.8.1 Cargo Security – Next 5 years

Password Protection and Encryption

TOS and PCS are applications designed around users and roles. Each user is identified with a user id and password along with other credentials. The password is stored in the database in an encrypted form which would be difficult to decipher even for System Administrators who have access to the database.

Each user is associated with different roles according to the job function. The roles the user is tied to determine the functionality available to that user. For example, a gate clerk would be tied to a "Gate Clerk" role while a yard supervisor would be tied to a "Yard Supervisor" role. Gate transactions are available to those with the "Gate Clerk" role and yard functionalities are available to those with the "Yard Supervisor" role. Thus, the same person would not, for example, be able to perform a gate-in transaction as well as a yard inventory update. Such segregation of access based on different job roles allows for the terminal management to ensure that illicit acts against cargo by ill-meaning staff in the terminal are made close to impossible.

The network traffic between a user accessing the web-versions of the applications (both PCS and TOS) is encrypted using SSL (Secure Socket Layer) technology. This ensures that the sensitive information that is transmitted between the system and the user over public networks is secure from "sniffing" or "eavesdropping". This reduces the risk of an authentic user's credentials being stolen and used for wrongful purposes.

Driver Verification

Stolen cargo has been one of the key areas of security concern in the U.S. and many other parts of the world. In Vietnam however, stolen containers have not been much of an issue over the past few years, but it has started to increase recently, and the risk is expected to increase as container volume increases.

Quite often, containers are stolen through collusion between truck drivers and port personnel. One of the key measures put in place in the U.S. which has helped to reduce the incidents of stolen containers is the verification of truck drivers.

PCS and TOS systems play a key role in this area. PCS allows for trucking companies to register the drivers who are authorized to drive on their behalf. The driver's particulars, including a photograph and driver's license details are entered by the trucking company representative through a web interface. The trucker details are kept in a highly confidential database within the PCS. This information is then sent electronically to the respective TOS systems (via secure means) at the terminals.

When the driver arrives at the terminal gate, the information that has already been received by the TOS is used to verify if the driver is authorized to pick-up or drop-off the particular container for the particular trucking company. With an Automated Gate System (AGS) in place, photographs of the driver, the container and truck could all be captured at the gate and stored together with the transaction details for future verification purposes.

PCS also allows for entering pre-arrival information. Before a driver arrives at the gate, the shipper, consignee or trucking company could enter the details in the PCS system. The information would typically include the purpose of the truck's trip, the associated container details as well as the details of the truck (and chassis, if applicable). When the truck arrives at the gate, in addition to verifying the driver, the truck license could also be verified to ensure that the right driver is driving the right truck.

If an OCR system is part of the AGS, the truck number verification as well as the verification of the driver-truck combination could be done automatically by the system.

Such pre-entry of the driver, truck and cargo details by a party other than the one handling the container coupled with an automated verification at the point of entry into the terminal, helps to reduce the likelihood of drivers and members of the terminal operating staff colluding to tamper with the container or its cargo.

5.8.2 Cargo Security – Next 10 to 15 years

Electronic Seals

Electronic Seals have been a means considered for easy detection of tampering for many years now. Though the cost of electronic seals has come down significantly, the issue of agreeing on particular standards across the industry is yet to be ironed out. However, given the increasing importance placed on cross border standards in an increasingly automated industry, it is expected that some form of agreed standard would be arrived at within the next 10 to 15 years. At that point, electronic seals could be installed on containers when they are ready to be shipped and the seals could be automatically verified at the entry and exit points at the terminals and ICDs.

GPS enabled devices

GPS (global positioning system) devices have become common place now. Even cell-phones are now being embedded with GPS devices together with 3G broadband communication capabilities. So it is only a matter of time before uniquely addressable, GPS-enabled, high-bandwidth communication devices (like cell-phones) are made available for industrial use.

It is expected that such technology would be viable on a large scale in the HCMC area within the next 10 years, though some companies are already running trials on a small scale. The devices could be mounted on trucks and monitor the location of the truck at any given moment, the speed at which it travels at any point on its route, any deviation in the route taken to the destination, undue delays or stoppages along the way. The devices could feed these data into the PCS. PCS could have intelligence built into it to alert users of scenarios which could point to the possibility of security breaches.

The devices could also have the ability to interact with the driver and perhaps even with the electronic seals on the containers. With these capabilities, the PCS could dispatch instructions to the driver on behalf of the trucking company, the terminal or the transportation authority of the HCMC area. If the devices are further capable of detecting the electronic tags of individual packages of cargo within the container being conveyed by the truck, a constant vigilance on every piece of cargo is possible all along the route. If cameras are embedded in such devices, even images and video footage could be transmitted to relevant users of a PCS.

Such a scenario is a real possibility with the advances in technology that we have already seen. The viability of such an implementation depends very much on the adoption of these technologies by the transportation and logistics industry, the cost-benefit of such technologies, and the support and direction from the relevant authorities in the HCMC area.

Tagging of Containers

Just as GPS devices could be tied to trucks, they could also be tied to containers. If they are tied to containers, the container and contents could be automatically tracked all along the route across the world. The challenge of course is to agree on a standard that could be adhered to by everyone around the world. It is expected that such a standard would be arrived at and the major container lines and ports would put in place the necessary technology and procedures within the next 15 years.

5.9 Port Security

5.9.1 Port Security – Next 5, 10, 15 years

Port security, as highlighted above, mainly deals with alerting the U.S. authorities of dangerous (terrorism related) cargo ahead of time so that they could be stopped from reaching the U.S. shores. Since the U.S. is an important

export market for, and potentially a significant recipient of future transshipment cargo as well, some technologies arising out if this need would be of concern to the logistics community in HCMC area.

As most of these technologies are relatively new, expensive and they depend on the co-operation of many parties across and within borders, it is difficult to assume that any one of the initiatives could be adopted and implemented completely within a short time horizon of 5 years. They are most likely to be implemented to some extent within the next 5 years but most likely to be completely implemented over the next 15-year horizon.

Container Security Initiative

The container logistics system and Vietnamese customs are currently not in a position to meet the requirements of and participate in the U.S. Container Security Initiative (CSI), which is a program intended to help increase security for containerized cargo shipped to the United States from around the world. CSI addresses the threat to border security and global trade posed by the potential for terrorist use of a maritime container to deliver a weapon. CSI proposes a security regime to ensure all containers that pose a potential risk for terrorism are identified and inspected at foreign ports before they are placed on vessels destined for the U.S. As part of the program, CBP has stationed multidisciplinary teams of U.S. officers from both CBP and Immigration and Customs Enforcement (ICE) to work together with the host foreign government counterparts. Their mission is to target and prescreen containers and to develop additional investigative leads related to the terrorist threat to cargo destined to the United States. The three central components of CSI are:

- Identify high-risk containers. CBP uses automated targeting tools to identify containers that pose a potential risk for terrorism, based on advance information and strategic intelligence.
- Prescreen and evaluate containers before they are shipped. Containers are screened as early in the supply chain as possible, generally at the port of departure.
- Use technology to prescreen high-risk containers to ensure that screening can be done rapidly without slowing down the movement of trade. This technology includes large-scale X-ray and gamma ray machines and radiation detection devices.

Several ports around Asia participate in the CSI program, including Singapore, Japan (Yokohama, Tokyo, Nagoya and Kobe), Hong Kong, South Korea (Busan), Malaysia (Port Klang and Tanjung Pelepas), Thailand (Laem Chabang), China (Shanghai and Shenzhen), and Taiwan (Kaohsiung and Keelung).

To be eligible for participation in CSI a port must meet the minimum standards:

- The Customs Administration must be able to inspect cargo originating, transiting, exiting, or being transshipped through a country. Non-intrusive inspection (NII) equipment (including equipment with gamma or X-ray imaging capabilities) and radiation detection equipment must be available and utilized for conducting such inspections. This equipment is necessary in order to meet the objective of quickly screening containers without disrupting the flow of legitimate trade.
- The seaport must have regular, direct, and substantial container traffic to ports in the United States.
- Commit to establishing a risk management system to identify potentially high-risk containers, and automating that system. This system should include a mechanism for validating threat assessments and targeting decisions and identifying best practices.
- Commit to sharing critical data, intelligence, and risk management information with the USCBP in order to do collaborative targeting, and developing an automated mechanism for these exchanges.
- Conduct a thorough port assessment to ascertain vulnerable links in a port's infrastructure and commit to resolving those vulnerabilities.
- Commit to maintaining integrity programs to prevent lapses in employee integrity and to identify and combat breaches in integrity.

Transportation Worker Identification Credential (TWIC)

Dangerous cargo (terrorism-related) normally find their way through the security systems of ports with some help from insiders who have privileged access to restricted port areas. In order to address this in the U.S. ports, Transportation Security Administration and U.S. Coast Guard have put in place an initiative called the Transportation Worker Identification Credential (TWIC™) program.

The program's goals are:

- Positively identify authorized individuals who require unescorted access to secure areas of the nation's maritime transportation system;
- Determine the eligibility of an individual to be authorized unescorted access to secure areas of the maritime transportation system;
- Enhance security by ensuring that unauthorized individuals are denied unescorted access to secure areas of the nation's maritime transportation system; and,
- Identify individuals who fail to maintain their eligibility qualifications after being permitted unescorted access to secure areas of the nation's maritime transportation system and revoke the individual's permissions.

The program involves issuing a smart card with an embedded computer chip that contains biometric information about the person. Card readers will be installed at various check points. The card holders will need to flash their cards at the various restricted areas before gaining access to those areas.

At the moment, the technologies involved are on trial in the U.S. But it is expected that over the next 5 to 10 years, the program will be fully implemented in all the U.S. maritime facilities. Over the next 10 to 15 years, it is expected that the program, in a similar form or as a variant, will be implemented in other parts of the world, including Vietnam.

5.10 Hardware and Software Specifications

This section covers the basic hardware and software requirements to implement the recommendations put forward in this document.

5.10.1 TOS Server

Depending on the selected Terminal Operating System, the hardware requirements may vary considerably. A typical TOS system may run on a mid-range IBM® class server (e.g., IBM RS/6000) and UNIX/AIX operating system or similar. A robust TOS will usually utilize a powerful and proven database, such as the Oracle® Relational Database Management System (RDBMS), although an SQL server may be an option depending on the TOS vendor. A typical TOS server may have the following technical specifications:

- 7026-6H0 4way 750Mhz 2x4110, 2x3102, 2x6230, 2x6235, 6282, 6324, 6283, 2830
- 7014-T00 w/ sides, front, back
- 7208-345 w/ shelf
- 7316-TF1
- 9910-P33 UPS (2)
- AIX 4.3.3 cds

Some vendors may be able to offer alternatives to a mid-range IBM server on an AIX platform, especially given the acceptance and promulgation of the Linux OS. This would enable the deployment of the TOS, for example, over a PC server cluster.

This hardware might look something like the following:

Function	Quantity	Specification / Features
TOS Database Servers	2	Single processor HP DL580 2.8Ghz dual core
TOS Application Servers	2	Single processor HP DL580 2.8Ghz dual core
SAN	1	HP MSA1000 w/ two disk drawers (28x36GB FC disk)
Network Switch	2	Cisco 3750 stacked
Load-balancer	2	F5 Big IP 1500 in HA configuration
Operating System	Per Server	Redhat Enterprise Linux

5.10.2 TOS Clients

A typical TOS client might have the following minimum technical specifications to ensure processing speed and reliability:

- IBM compatible 2 GHz computer
- 1GB RAM
- 10 GB available disk space for install
- Windows XP
- Internet Explorer 7.0

5.10.3 Graphical Planning System

Server

Most graphical container planning systems are a client/server application. Typically, both the server and clients will run on Windows® PC's. A typical server for a graphical planning system may have the following minimum technical specification:

- IBM compatible 1.5 GHz computer
- 2 x 18 GB hard drives (mirrored)
- 512 MB RAM
- Windows 2000
- 15 MB available disk space for install
- 500 MB available disk space for data

Clients

The minimum technical specification for planning system clients may look like the following:

- IBM compatible 933 MHz computer
- 256 MB RAM
- 20 GB available disk space for install
- Windows XP

5.10.4 Web Access to TOS

Depending on the technology vendor selected, web access to the TOS may require one or more web servers. For the immediate recommendations, a single web server (additional to any web servers EPSA may currently have) should be sufficient.

Server

The minimum technical specification for the web server – for the web application(s) offered by the technology vendor – may look like the following:

- IBM compatible computer with 1.2 GHz PIII processor
- 18 GB hard drives (mirrored)
- 512 MB RAM
- Windows 2000 Server with IIS services installed

"Clients"

Client PC's accessing information in the TOS via the web server would, of course, be the responsibility of the party interested in gaining said access. As a guide, and again depending on the vendor / solution selected, the minimum technical specification for terminal customer PC's would be very basic and perhaps look like the following:

- Internet connection (preferably, high-speed)
- MS Internet Explorer 7
- Recommended screen resolution 1024 x 768

5.10.5 Mobile Data Units (MDU) / Remote Data Terminals (RDT)

Hardware

Mobile Data Units (MDU's) or Remote Data Terminals (RDT's): In most cases, much more efficiency can be gained when a TOS is utilized in conjunction with handheld MDU's and/or vehicle-mounted units.

Wireless computing vendors have gained general acceptance in major ports worldwide. A typical example of the type of technology available for port / marine terminal applications can be found with PSION Teklogix, a leader in this field.

Model 7535 Hand-Held Computer

The 7535 is a rugged handheld designed to perform in the harshest conditions in warehouses, manufacturing facilities, yards, distribution centers or ports.

Key Features:

- IP65 rated for dust and water protection and tested for 26 5ft/1.5M drops to concrete
- Utilizes Windows CE .NET and Intel XScale architecture
- Ergonomic design and lightweight (23oz-650g) with sunlight readable display
- Supports Compact Flash and SD I/O expansion card slots for memory or radios, and 802.11b, Bluetooth and GSM/GPRS radio technologies
- Backwards compatible with 7035
- RFID and Symagery Smart Image capture options

8530 Vehicle-Mount Computer

The 8530 is a Windows CE .NET based vehicle-mount computer engineered to deliver maximum performance in the harshest mobile environments. Ideal for warehouses, ports, yards and wide-area mobile applications. The 8530 is similar to the 8525 but with a detachable keyboard and full VGA screen.

Key Features:

- IP66 rating for maximum dust and water protection
- Shock and vibe rated for vehicle mounting
- Microsoft Windows CE .NET and Intel XScale architecture
- Compact Flash, SD/MMC and Type III PC-Card
- WLAN (802.11 and Narrowband),WWAN (GSM/GPRS, CDMA)
- Crisp, bright easy-to-read display

Software

MDU software: The MDU's will operate on the OS provided by the hardware vendor. The application that they run will be that of the TOS vendor. Depending on the vendor selected, this software may be included in the TOS package, or may be sold as an optional module, or add-on.

5.10.6 RF Infrastructure.

In order to take full advantage of the TOS and the mobile computing technology, an RF network will need to be established. This network may either be broadband (802.11x) or narrowband. Initially, because of the lower cost of equipment (antennas/access points) and the lower cost of associated 'civil works', a narrowband network would be advisable. The selected mobile computing vendor can provide specifications for either type of WLAN.

5.10.7 Gate Control Systems (CCTV-type solution).

Several vendors provide supplemental technologies specifically designed to streamline gate processing and put gate checkers in a more secure, office environment. With these systems, containers may be visually checked via a series of cameras in the gate lanes. This type of solution not only greatly enhances speed and safety in the gate process, but also breaks the traditional association of one checker to one lane, thereby resulting in labor cost savings as well.

Hardware

The hardware required for this type of gate control system may vary from relatively simple to very complex. At a minimum, it would require two or more video cameras per gate lane; some sort of "kiosk" for the trucker interaction (video screen, intercom, and possibly other input/output devices); a telephone communication routing system (PBX or similar), or alternatively Voice Over Internet Protocol (VOIP); video servers and routers; appropriate workstations and video displays for the remote checkers; cabling and associated civil works. Again, because of the complexity of such a system and the many variables involved it is difficult to provide more detailed specifications.

Software

Gate Operating System (GOS). Depending on the vendor(s) selected for the gate control systems, there may be additional costs associated for the licensing of the Gate Operating System – the software that controls the gate camera system, the voice communication, and data input.

5.11 Performance Specifications

The following performance specifications are given as a general guideline. The exact performance criteria for each system will take into consideration the operational needs and the expected volume of the terminal at the point in time when the system is to be put in place.

For TOS, the recommended average response time for a user-input is 5 seconds. That would mean that any user should not have to wait for more than 5 seconds for a response from the system, on the average. But there will be times within a day when the system is processing an unusually large number of transactions. At such times, it would be acceptable if the system is able to respond within 15 seconds. But this 15-second response would be considered a worst-case scenario and it should not continue for more than 5 minutes at a stretch and not more than once or twice in a day.

For PCS, the recommended average response time for a user request is 5 seconds. But due to the nature of internet traffic, the worst case response time could be up to 1 minute during peak hours. As PCS is expected to be very busy exchanging electronic information with terminals, shipping lines, ICDs, Customs and various other entities in the logistics chain, the system should be sized appropriately to process all the EDI exchanges within reasonable time. It is difficult to spell out the exact performance criteria without taking the number of EDI exchanges into consideration. But as a rough guide, the PCS should be able to process real-time EDI messages from 3rd party systems within 5 minutes. Batch EDI messages should be processed by the time agreed on for the specific type of EDI message.

5.12 U.S. Sources of Supply

The following represents an illustrative list of relevant U.S. technology suppliers and service providers.

Name of Company	Product(s) or Service(s)	Web Site
APS Technology San Diego, CA (858) 571.4444	OCR systems and automation technology solutions for marine container terminals and intermodal/Rail operations	www.aps-technology.com
Alien Technology 18220 Butterfield Blvd. Morgan Hill CA 95037 Phone: (1) 408.782.3900 Fax: (1) 408.782.3910	RFID solutions for supply chains; Alien designs and delivers RFID system architectures and hardware devices, including ICs, controllers, RFID readers, antennas, and tags.	www.alientechnology.com
CargoSmart Ltd. San Jose, CA (408) 325-7600 Business.development@cargosmart.com	Application and integration services for the ocean container transportation industry	www.cargosmart.com
Dell Austin, TX (800) 274-3355	Desktop PC's, enterprise hardware, peripherals	www.dell.com

Descartes Systems Group Waterloo, Ontario[14] (519) 746-8110 jwiggins@descartes.com	Collaborative logistics solutions, including integrated software applications and network services	www.descartes.com
Convergys/Intervoice[15] Santa Clara, CA (408) 982-2000 info@intervoice.com	Voice and speech recognition technology; voice response systems; automated customer service solutions	www.intervoice.com
eModal Irvine, CA (949) 474-3140 ggose@emodal.com	Port Community Systems, trucker database creation & management, integration services	www.emodal.com
Embarcadero Systems Corporation[16] Alameda, CA (510) 749-7400 info@esystem.com	TOS & planning software, terminal security systems, gate control systems; subsidiary of Ports America, Inc.	www.embarcaderosystems.com/
Hewlett Packard Palo Alto, CA (650) 857-1501	Desktop PC's, printers, peripherals, enterprise hardware	www.hp.com/
IBI Group Seattle, WA (206) 521-9091 ckilts@ibigroup.com	Systems integration; toll collection software; traffic management software	www.ibigroup.com
IBM ARmonk, NY (602) 248-7104 mcmanusj@us.ibm.com	Computer systems, software, storage systems and microelectronics	www.ibm.com/us/
Intermec Technologies Everett, WA (425) 348-2600 info@intermec.com	Mobile computing; wireless networking; RFID tags and readers	www.intermec.com
L.A. King Co. Long Beach, CA (562) 424-0979 jmoser@lakingco.com	Marine terminal gate control technology and integration	www.lakingco.com
LXE Norcross, GA (770) 447-4224 info@lxe.com	Wireless computing solutions, RF data collection networks	www.lxe.com/us/

[14] Although Descartes is a Canadian based company, the company has offices in the U.S.
[15] Intervoice has been acquired by Convergys
[16] Embarcadero Systems Corporation (ESC) is a value-added reseller for Total Soft Bank, a Korean company.

Motorola Inc. 1303 E. Algonquin Road Schaumburg, Il 60196 (847) 576-5000	Wireless and broadband communications; enterprise mobility solutions; mobile devices; networks.	http://www.motorola.com/us
PSION Teklogix Erlanger, KY (800) 322-3437	Integrated mobile computing solutions, including hardware, wireless networks, software, and professional services	www.psionteklogix.com/
SAIC San Diego, CA (800) 430-7629	Information systems and technology solutions, e-business solutions, wireless solutions, OCR technologies	www.saic.com/
Tideworks Technology Seattle, WA (206) 382-4470 info@tideworks.com	TOS & planning software, systems integration, gate control technologies	www.tideworks.com
TradeBeam, Inc. San Mateo, CA (650) 653-4800 info@tradebeam.com	Manufacturers of products for global supply chain execution with a complete, web-native B2B infrastructure	www.tradebeam.com
OAX Austin, TX (512) 892-8800 inquiries@oax.com	Business optimization tools, operations performance solutions; previously known as Vantage Ops	www.oax.com
Zebra Enterprise Solutions Oakland, CA (510) 267 5000	TOS & planning software, Logistics visibility and control, Real-Time Location Systems (RTLS)	http://zes.zebra.com

6 Interim Presentation

The project team conducted an Interim Presentation on March 25, 2009 at Vinalines' head office in Hanoi. The presentation covered the main research activities undertaken by the project team during Tasks 1 to 5 of the study, the major findings and conclusions of these tasks, and a review of next steps to complete the logistics study. The presentation was structured as follows:

- Project Status
- IT Concepts
- Task 1: Container Trade and Trends
- Task 2: Current and Future Infrastructure Plans
- Task 3: Survey of Companies
- Task 4: Export and Import Process Maps
- Task 5: Technology Requirements and Solutions
- Next Steps

The presentation participants are listed in Table 6-1.

Table 6-1: Attendees at Interim Presentation

Project Team	**Project Position**
Joe Ritzman, SSA Marine	Project Manager
Thiagu Goudan, Tideworks	IT Specialist
Dennis Sheridan, TranSystems	Market Analyst
Vinalines	**Title**
Bui Van Trung	Vice President
Dau Manh Hung	Deputy Director, Business & International Relations Department
Hoang Thanh Hai	Deputy Director, Planning & Investment Department
Pham Phi Long	Expert, Planning & Investment Department
Le Duc Trong	Expert, Planning & Investment Department
Nguyen Viet Anh	Deputy General Director, Vinalines Logistics JSC

Source: TranSystems

The project team provided Vinalines with electronic and hard copies of the Interim Report approximately ten days prior to the presentation, allowing time for Vinalines staff to review the report and prepare questions for the project team. In their comments, Vinalines requested the following changes to the Interim Report:

- The inclusion of information on the domestic coastal container trade.
- Additional discussion on how to improve the handling of Cambodian transit cargo.
- Additional discussion on the future role of ICDs.
- Examples of Port Community System (PCS) projects in developing countries.

The project team addressed the above comments by updating Task 1 to 5 for the Final Report. Several comments made during the presentation on implementation strategy and financing of a PCS have been addressed in Task 7 of the Final Report.

7 Development of Implementation Plan and Cost Estimates

7.1 Introduction

In Task 5 of the interim report, IT recommendations were made for the next 5, 10 and 15 years. The main recommendations for the next 5 years were:

- Implement a Terminal Operating System (TOS) at every container terminal
- Computerize every Inland Container/Clearance Depot (ICD)
- Develop a Port Community System (PCS)

The first recommendation is one that is expected to be carried out by the individual marine terminal operators as and when they start their operations since TOS is considered a standard component of their basic IT infrastructure.

The second recommendation is one that is not so straight forward as the individual operators of ICDs will need to see the benefit of computerizing their operations. Commercial software packages are available for managing small, mixed-operations cargo terminals. These packages could be adapted to suit the ICD operations. But considering that many ICD operators may not be able to justify the cost of having their own IT infrastructure, it might be more cost effective for them to participate in a PCS to keep their costs low as well as to respond to technological changes quickly.

The third is the main recommendation of this entire study. The PCS is meant to fill the gaps in the overall logistics IT landscape as has been discussed in Task 5. The Interim Presentation to Vinalines (Grantee) in March 2009 focused on the benefits of a PCS to the logistics community in HCMC. Members of Vinalines' working group present at the presentation were in agreement that PCS will offer many benefits and that the study should propose a strategy for the implementation of a PCS as soon as possible.

This section outlines a strategy for the implementation of PCS, details a phased implementation plan, and estimates the associated costs.

7.2 Implementation Strategy

7.2.1 PCS Champion (Sponsor)

The function of the PCS in the overall logistics landscape was described in Task 5 and illustrated in Figure 5-5. Individual businesses like terminal operators, freight forwarders and shipping lines have their own IT systems focused on their core operations. The peripheral activities which do not fall within their core business are often left out of their technology focus. As seen earlier in Task 5, the trucking community is one such example.

For PCS to succeed there must be a relatively neutral Champion (or sponsor) who would be able to encourage the whole logistics community to participate. The PCS database will be built on input from certain members of the logistics community, the PCS database then used to provide functions to certain other members. Some members may be contributors of some information while being consumers of some other information. For example, the trucking companies would contribute information about drivers while the container terminals will be making use of this information to validate truckers at the gate. In the example of gate scheduling, the terminal operators would be contributing the information on container delivery and pick-up schedules, and the trucking companies would be making use of that information.

Since the main beneficiary of a PCS is not any single member of the container logistics community but rather the whole community itself, the champion of the system would need to be an organization or authority whose key performance indicators would include the overall efficiency of the logistics community.

Two examples of PCS initiatives in developing countries were discussed during the Interim Presentation. One was in Ivory Coast and the other was in India. In the case of Ivory Coast, the champion is the Abidjan Port Authority as well as the Abidjan Maritime Federation. Both of these organizations together represent a large sphere of influence over the logistics community. In the case of India, the champion is the Indian Ports Association which is an influential body regulating the logistics community in India. In both of these examples, the champion had the authority vested in them by the state or the business community at large, directly or indirectly, to implement IT solutions for the benefit of the entire logistics community.

In the case of the HCMC region, it is recommended that an influential state-related body be identified as the Champion. The Champion should be well-respected with the appropriate commercial and government relations to pursue implementation of the PCS over the proposed 5-year period.

7.2.2 PCS Joint Venture

Once the Champion has been identified, it is recommended that a private sector company (or companies) experienced in putting a PCS in place be identified. The company (or companies) should have an established track record of having brought a disparate group of players together to collaborate towards putting an efficient PCS in place. Getting any two parties to agree on a business model is in itself a big challenge. To bring a multitude of players to the same drawing board to agree on common strategy and committing to contributing to and using the PCS services would be an enormous challenge. So the experience of the private company (or companies) would be critical to the success of the venture.

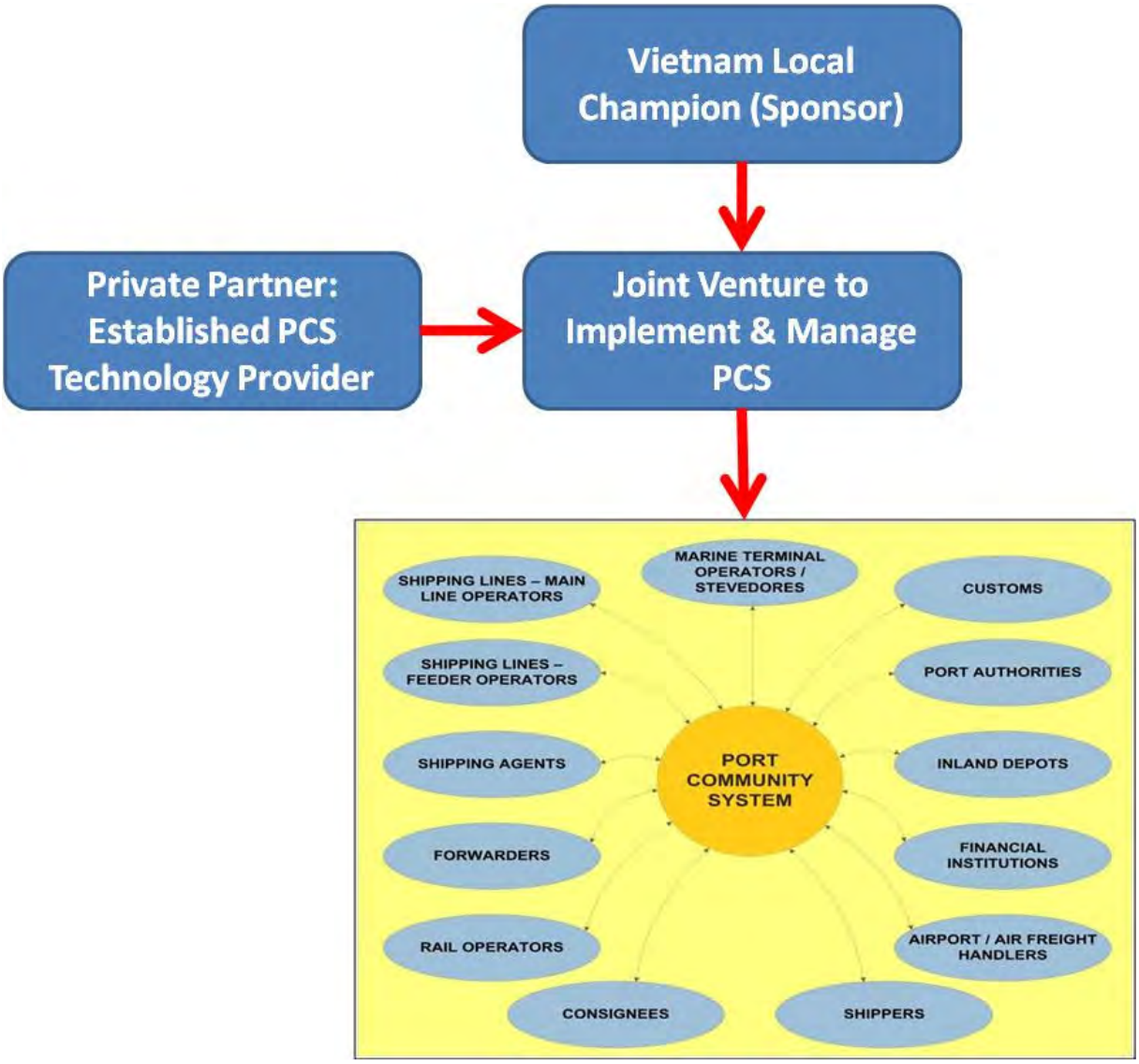
Once the Champion and private partner (or partners) has been identified, they should form a local joint venture (JV) in Vietnam to implement and operate the PCS. While the Champion provides the support, the JV would execute the entire PCS project.

7.2.3 Proven PCS Product

The next important step is identifying a PCS product. There have been many variations of PCS developed in different parts of the world. Some of these products may not be easily adaptable to HCMC's needs while some may. It is strongly recommended that the product identified must have proven capabilities, be web-based, scalable, and can easily be localized to Vietnam, which includes translation to Vietnamese and incorporation of local rules and regulations.

The above implementation strategy is summarized in the organization chart shown in Figure 7-1.

Figure 7-1: Organization Chart for PCS Implementation



Source: Study Team

7.3 5-Year Implementation Plan

The overall implementation plan is provided as a Gantt Chart in Appendix A.

The Gantt Chart gives a simplified overview of the key tasks and when they are expected to begin and end. The 5-year plan is divided into six phases. Phase 1 is outlined in greater detail as it comprises of steps which lay the foundation for the PCS. Phases 2 to 6 are presented in sequential order for the reason of simplicity. Some tasks associated with these phases could be done in parallel and some could be done ahead of tasks associated with earlier phases. Once Phase 1 has been completed, the rest of the phases should be reviewed and a more detailed plan should be put together.

Overall, it is expected that the six phases would take about 5 years to be fully implemented and functional, but the benefits and positive impacts of the system would begin to be realized as early as Phase 1 of PCS implementation

The following sections look at each of the phases in some detail.

7.3.1 Phase 1 - Container Enquiry Functions

The most important steps in Phase 1 would be to establish the Champion, form the Joint Venture (JV) and identify the PCS vendor. These steps were described in Section 7.2, "Implementation Strategy". As a precursor to these important steps, it is recommended that Vinalines (the Grantee) form an Implementation Committee to ensure these steps are taken on time.

The PCS features will be offered through the PCS website; the website will be established in Phase 1 in collaboration with the PCS vendor. The first feature to be delivered through the PCS website should be kept simple and the main objective would be to establish the communications between the IT systems in the community as well as to sign up members for PCS. So it is recommended that PCS first offers a portal through which PCS users could request the details pertaining to containers of interest to them. In addition to container details, the PCS could offer news from terminals as well as vessel schedule details.

At the end of Phase 1, the necessary awareness would have been created in the community and a reasonable number of users would have been signed up.

Completion of Phase 1 is expected around June of 2011, which would be about 6 to 18 months after completion of the first two container terminals at Cai Mep/Thi Vai. The PCS would contribute to more efficient operations at these terminals, as well as the overall HCMC logistics system. In addition, Phase 1 and later phases of the PCS would support the other new terminals under construction and planned for the Cai Mep/Thi Vai area.

7.3.2 Phase 2 - Gate Scheduling

Once Phase 1 has laid the foundation for PCS, gate scheduling could be planned for the next phase. Gate scheduling is recommended next mainly to help reduce the congestion on the roads, which is a critical current and future challenge for the regional logistics system. With gate scheduling performed by the trucking companies before dispatching their drivers to the terminal, waiting time can be reduced and the truck fleet is more productive. These in turn have positive benefits for highway congestion and regional air quality.

At the new Cai Mep/Thi Vai terminals, Gate scheduling would offer the terminals an effective way to regulate the truck traffic along Highway 51 and assist them with more efficient planning of their gate and yard activities. Highway 51 is and will continue to be a heavily utilized transport corridor with a projected 3 million truck trips per year or 8,000 to 9,000 truck trips per day when all the terminals are complete (see Section 8.2 for further discussion of projected truck trips). Gate Scheduling and other elements of PCS are expected to contribute to traffic management along the Highway 51 corridor.

7.3.3 Phase 3 - Trucker Validation

By the time gate scheduling is done, the trucking companies would be well versed with using the PCS and the terminal users will be accustomed to making use of information obtained through PCS. Then the functionality of Trucker validation could be introduced. This functionality would require the trucking companies to input information about their trucks as well as drivers into the system. This information would then be sent to the container terminals on a regular basis. The TOS systems would then use this information to validate the trucker when he arrives at the container gate. This function would be one of the most important functions in improving the cargo security of the logistics chain as has been discussed in Section 5.2 of this report.

7.3.4 Phase 4 - Online Payment of Fees

The next function would be to collect online payments. The PCS system would need to work with some financial institutions to establish a process for collecting payments. Then the PCS could allow consignees, shippers, shipping lines etc. to make the necessary payments before the trucker reaches the gate. The payments may include demurrage charges, storage charges, fumigation charges and other such charges which are due at the terminal before a container could be picked up by the trucker. This could avoid up to 30 percent of the problems at the gate and thus contribute significantly to the overall gate productivity. It also helps to remove the need for manual handling of cash.

7.3.5 Phase 5 - ICD Functions

Although the ICD functions are recommended as Phase 5, these functions could be explored as early as Phase 2. Requirements gathering could be started early and a couple of ICDs could be selected as pilot users. While the rest of the PCS functions are being implemented for the community at large, the ICD functions could be worked on in small sub-phases. For example, a simple container tracking function could be added right from the beginning followed by Gate and Electronic Data Interchange (EDI) functionality.

7.3.6 Phase 6 - Barge Operations Features

Just like trucking companies, barge operators move containers between ICDs and Container Terminals (see Section 2.5 for discussion of barge operations). Barging is and will remain an important part of the HCMC logistics system and could benefit from integration into the PCS. The features offered to trucking companies, as well as some features that shipping lines have in their own cargo tracking systems, would be applicable to barge operators. Furthermore, the barges may be calling at multiple terminals per trip and this type of shuttling activity would be conducive for a PCS. Several examples of possible barge activity integration into PCS are:

- Capture the container stowage profile of each barge and relay that information to the TOS at the receiving container terminal or ICD, so the facility can better plan container discharge and loading operations.
- Schedule barges (like scheduling of trucks at the gate) so that each container terminal and ICD can better allocate berths and related equipment.
- Better manage, schedule and track barge movements on the river system.

The PCS provider would evaluate specific IT needs of barging (for example, tracking of barges), hold discussions with barge operators on IT requirements, and modify PCS features to accommodate the specific barge needs. Similar to the ICDs, a few barge operators could be selected to test barge-related PCS functions. As with Phase 5, Phase 6 could be explored during earlier elements of PCS implementation.

7.4 Cost Estimates for 5-Year Implementation Plan

7.4.1 General and Administrative Costs

The JV is not expected to have many staff on payroll. A General Manager would take care of business development and marketing, and a senior technical person with the necessary IT knowledge would work with the PCS vendor and the IT teams and users (terminals, ICDs, trucking companies, etc.) to define communications protocols used for

information exchange. The total general and administrative (G&A) costs are projected to be US$107,000 per annum (Table 7-1) broken down into the following three components:

- The staff cost for two experienced senior staff and one administrative assistant is projected to be about US$70,000 per year. The cost is based on employment of local personnel. Staff cost would be higher if the JV employs non-local (expatriate) staff to fill the general manager and senior technical positions.
- The office rental and operating cost is projected to be about US$25,000 per year.
- Other costs may, for example, include the need to provide training to users (see training requirements in Section 7.4.2).

Table 7-1: Projected Annual General & Administrative Costs

Cost Component	US$ Amount	Comment
Staff	$70,000	Two senior local staff – a general manager and senior technical person – plus one administration.
Office Rental & Operating Costs	$25,000	
Other Costs	$12,000	For example, any training requirements for users.
Total Projected G&A Costs	**$107,000**	

Source: Study Team

7.4.2 Training Requirements and Costs

Training is one element of the implementation plan to ensure all PCS members and users are familiar and can interface with the PCS portal and functions. The PCS website would be user friendly with integrated training features, so that community members can perform login and user features with relatively limited external support. The JV staff would be available to provide initial PCS demonstrations and ongoing assistance to users. The cost is incorporated into the G&A costs shown above.

7.4.3 IT Costs

Please note that the IT cost information provided here is for general guidance on establishing a PCS based on the broad findings of this study. Specific costs may vary significantly once the JV prepares a detailed Business Plan for exact PCS requirements to service the HCMC region. Cost components were arrived at in consultation with a leading provider of PCS technology and services.

IT costs will form the majority of the overall cost of PCS implementation and operation. IT costs would include:

- Software,
- Hardware,
- Hosting of the hardware, and
- Manpower costs associated with software changes and system administration.

The JV can take two approaches to IT requirements and therefore IT costs.

The first approach is to outsource the whole IT operation to a vendor – known as the ***Application Service Provider (ASP) Model***. The vendor will own the hardware, software and provide the necessary professional services to keep the system up and running. The JV would lease the entire solution from the vendor. The PCS could reside in a commercial grade datacenter in the HCMC area, elsewhere in Vietnam, or anywhere in the world. With the current efficiencies in data transmission over the internet, the actual location of the system is not very important. What is

important is that the system is operated by a vendor who is experienced in running highly scalable internet-based systems.

The second approach would be for the JV to own and operate all the hardware and software associated with the PCS – this is the ***Own and Operate Model***. This would involve initial procurement of the hardware and software as well as continued upgrades and maintenance as necessary. Investment in highly trained IT professionals would also be necessary in order to keep the systems up to date and running efficiently.

The IT model selected has a significant bearing on start-up and annual operating costs of the PCS. The IT costs by model are summarized in Table 7-2, with the ASP Model offering the lowest cost option for implementation and operation of the PCS. The ASP Model has a projected annual IT cost of US$150,000, which compares to the Own and Operate Model's projected first-year IT cost of US$510,000 and subsequent annual IT cost of US$350,000.

Under the ASP Model, the assumption is that the PCS solution is hosted by the external vendor at a location outside Vietnam using the vendor's current infrastructure. The "System Hardware/Software lease" would be for the purchase of additional hardware and system software (like Windows operating system) as well as for hosting the system in a high-grade computer center. The "PCS Software licensing" would be to license the proven PCS system (for example, a proven U.S. system currently has more than 38,000 active users). The "Professional Services" and "Travel Expenses" may vary depending on the customization that needs to be done to the current version of the PCS software.

Under the Own and Operate Model, the JV would incur significantly higher costs to procure and maintain its own hardware and software for the PCS. The cost incurred in the first year would include the one-time procurement of hardware and software as well as the manpower costs associated with running such an IT setup. For subsequent years, the procurement cost would be replaced by the annual maintenance costs of the hardware and software.

Table 7-2: Projected IT Costs by PCS Operating Model

IT Component	Application Service Provider Model (US$)	Own and Operate Model (US$)	Comment
Hardware and System Software Lease	$20,000		Per Year
PCS Software Licensing	$60,000		Per Year
Estimated Professional Services	$60,000		Per Year
Estimated Travel Expenses	$10,000		Per Year
ASP Model - Total Projected IT Cost	**$150,000 Per Year**		
System Hardware/Software Procurement		$200,000	One-Time Start-Up Cost
Data Center Cost		$60,000	Per Year
Annual Hardware/Software Maintenance		$40,000	Per Year
PCS Software Licensing		$60,000	Per Year
Estimated Professional Services		$60,000	Per Year
Estimated Travel Expenses		$10,000	Per Year
IT Staff costs (assuming a team of 5 staff)		$120,000	Per Year
Own & Operate Model – Total Projected IT Costs		**$510,000 First Year** **$350,000 Subsequent Years**	Excludes annual hardware / software maintenance

Source: Study Team

7.4.4 Projected Total Costs and Recommendation on Business Model

The total projected cost for implementation and operation of the PCS is presented in Table 7-3:

- The projected total annual cost is US$257,000 under the ASP Model and US$457,000 under the Own and Operate Model (an initial US$617,000 in the first year of operation under the Own and Operate Model).

- The projected total 5-year cost to develop and start-up the PCS is US$1.29 million under the ASP Model and US$2.45 million under the Own and Operate Model.

The Study Team recommends that the Grantee adopt the ASP leasing business model for the initial 5-year period in order to keep the implementation and operation costs to a predictable low level, while focusing JV resources on getting the PCS successfully adopted by the container logistics community in the HCMC region. Use of an external PCS vendor provides access to proven technology, which lowers the technology and financial risks associated with introduction and operation of the PCS. Risk mitigation from proven technology includes reduced financial costs and less technology development requirements compared to the alternative business model.

After the initial 5 years of operation, the revenue model of the PCS is expected to have stabilized and the scale of PCS usage is expected to have increased substantially. At that point in time, the JV could revisit the own-and-operate model to evaluate if it would offer any economy of scale as compared with the ASP leasing model.

Table 7-3: Projected Total Costs for PCS Implementation and Operation

	Application Service Provider Model (US$)	Own and Operate Model (US$)
G&A Cost	$107,000	$107,000
IT Cost	$150,000	$510,000 (first year)
		$350,000 (subsequent years)
Projected Total Annual Cost	**$257,000 Per Year**	**$617,000 First Year**
		$457,000 Subsequent Years
Projected 5-Year Total Cost	**US$1,285,000**	**US$2,445,000**

Source: Study Team

7.5 10 to 15-Year Implementation Plan

As discussed in Task 5, it is very difficult to predict the level of technology that would be available for use over a long time horizon like 10 and 15 years, given the rapid changes that take place in the IT industry. Several currently available technology strategies were discussed in Task 5 for possible long-term implementation. Several of these technologies have been incorporated into the implementation Gantt Chart provided in Appendix A. They are:

- Transportation Worker Identification Credential (TWIC)
- GPS Tracking for trucks and barges
- Links with Intelligent Transport Systems

Although the above milestones are listed under the 10-to-15 year implementation chart, it is possible that some of them may be feasible for implementation within the first five years. Their earlier feasibility will be tied factors that include to the successful implementation of PCS, user interest in these technologies, cost/benefit trade-offs, and government regulations. For example, Government requirements for enhanced security may accelerate implementation of a TWIC program. Similarly, Government updates to road regulations to improve supervision of commercial vehicles may accelerate adoption of GPS technology by trucking companies.

7.6 Cost Estimates for 10 to 15-Year Implementation Plan

The technologies recommended in the 10 to 15-year time horizon are likely to be purchased and installed primarily by the user community instead of by the JV operator of the PCS. For example, the trucking companies would most likely fund the purchase of GPS devices for their trucks and container terminals would be expected to purchase of TWIC cards for their terminal workers. Some examples of technology costs are provided at the end of this section.

Additional costs incurred by the JV are projected to be driven by the need to alter the PCS business model, to adopt new technologies that may emerge in the future, and to pursue future PCS opportunities in other regions of the country. Areas where the JV may plan for future long-term additional costs relate to:

- A shift from the APS Model to the Own and Operate Model (as described in Section 7.4). This model would only be considered if the JV has substantial business needs that would benefit from an in-house IT operation.

- Newly developed hardware and software technologies that support upgrading the underlying PCS portal and functions. However, such costs may be directly borne by the PCS vendor (under the recommended ASP business model) and the JV would most likely incur incremental annual leasing and licensing costs.

- Application of the PCS model to other region's of Vietnam. The Study Team is recommending that the project sponsor (with the recommended support of USTDA) consider studying the use of PCS in other regions of Vietnam. The application of a PCS in these regions may require additional resources at the JV.

- Extension of the PCS model to accommodate growth of regional transit cargo (both truck and rail) and/or future rail intermodal rail services. Again, the JV would likely incur incremental management and development costs to support PCS expansion.

As stated earlier, the cost of new technologies recommended for longer term implementation are most likely incurred by the user community. Two examples of potential unit costs for GPS and TWIC technologies are provided below.

GPS Tracking of Trucks

The introduction of GPS tracking for trucks is projected to cost up to US$150 per truck for the GPS hardware and installation, plus a monthly service charge of about US$10 to US$20 per truck payable by the trucking company to the GPS tracking service provider (which could be the JV PCS provider or another entity). These cost estimates are based on discussions with Skeye Indochina, a Vietnamese provider of GPS technology and fleet management solutions. The estimates incorporate assumed future reductions in hardware and related costs due to future technology innovations, and the following cost elements:

- Hardware – the GPS unit for the truck (the most expensive start-up cost for GPS tracking).
- Communication services provided by an external telecommunications provider.
- Software costs, which include front-end development and ongoing support.
- Data Center costs.
- Maps – a blend of free maps and some pay-as-you go map solutions for specific functions or information.
- Salaries for support team, and administrative staff
- Other costs – office rent, etc.

Transportation Worker Identification Credential (TWIC)

The technology recommendations in Task 5 included proposed solutions to improve terminal and cargo security. One such solution is to use technology to positively identify those individuals allowed to have unescorted access to a container terminal, ICD or other cargo-related facility. The technology solution uses a smart card with an embedded computer chip that contains biometric information about the person. Card readers are installed at various check

points (for example, terminal gates) and the card holder must flash their cards at the check points before gaining access to the restricted areas. In the United States, TWIC cards have been issued to more than 1.1 million workers involved in the U.S. transportation industry, including container terminal workers, port authority staff and truck drivers. The U.S. Transportation Security Administration (TSA), which administers the program, currently charges a one-time fee of US$132.50 to process an application and issue a TWIC card valid for five years, and US$60 for a replacement card, if the original is lost, stolen or damaged. These fees are based on U.S. labor and overhead costs incurred by TSA to process applications and current technology costs for the cards. It is anticipated that introduction of TWIC to the HCMC logistics system would result in lower fees for users, due to cheaper local labor and overhead costs, and benefits from future improvements in technology and reductions in technology costs. Individual facilities (container terminals, ICDs, etc.) would also incur costs to install card readers at individual access points.

7.7 Project Financing

The 5-year cost of implementing the PCS is a projected US$1.29 million under the recommended ASP Model. The total cost is viewed as reasonable given the expected benefits offered by the PCS, which would help improve the efficiency and security of the HCMC container logistics system. The project could be funded through a blend of internal resources, external financial support, and subsequently transaction fees. This section describes several funding options that should be explored by the Champion and its joint venture partner as part of their business strategy for implementation of PCS.

7.7.1 Internal Resources

The study team recommends that a local Champion pursue implementation of the PCS. If Vinalines (the Grantee) decides to pursue implementation then it could use its internal resources, seek external funding, or both. Vinalines is a diversified company with interests in ocean shipping, ports, inland facilities and logistics services. In 2007, the company had total revenue of 14.6 billion Dong (an estimated US$820 million) compared to 11.2 billion Dong in 2006, and 6.4 billion Dong in 2002[17]. Vinalines generated profits each year during the period 2002 to 2007. The study team did not have access to detailed information on Vinalines financial position, but the cost of the proposed project (at an estimated US$257,000 per year and a total US$1.29 million over the 5-year implementation period) appears to be within the financial resources available to Vinalines. In addition, part of the cost may be partially funded by a joint venture partner as well as other funding sources. Potential external funding sources are described below.

7.7.2 Multi-Lateral Agencies

Agencies such as the World Bank and the Asian Development Bank (ADB) provide funding to developing countries for investment in transportation and trade infrastructure, including information technology, to support economic development. The PCS project is designed to improve the efficiency of the container logistics system in the HCMC region, supporting economic development in Southern Vietnam by improving the flow of international trade through the region's container terminals and contributing to the region's international trade competitiveness.

The World Bank is currently sponsoring the Customs Modernization Project for Vietnam, a project designed to modernize the customs process through the introduction of E-Customs (see description in Task 4). The project cost of $77.7 million is funded through $65.9 million in aid from the World Bank and $11.8 million from Vietnam. It is noteworthy, that this project is scheduled for completion in 2011, which is a similar timeframe for introduction of the PCS. Vietnamese Customs would be one of the stakeholders that would be targeted for connection to the PCS system.

The ADB has been providing financing for infrastructure projects in Vietnam, including new highways in the HCMC region. Many of these projects include introduction of Intelligent Transportation Systems (ITS) technology to manage traffic flow on major highways. Similar to Customs, there is potential to integrate highway ITS systems with the PCS to improve regional traffic flow.

[17] Information on revenues and profitability obtained from www.vinalines.com.vn

Given the interest of multi-lateral agencies in supporting the application of IT to improve the efficiency of transportation infrastructure and international trade processes, it is advisable that the PCS Champion and its JV partner consider approaching these agencies to discuss funding requirements for the PCS project.

7.7.3 U.S. Agencies

The presence of a U.S. company as the JV partner, including the use of U.S. developed PCS technology, would create the opportunity for potential funding assistance from U.S. Government agencies that support overseas development and U.S. exports.

EX-IM Bank

The Export-Import Bank of the United States (Ex-Im Bank) is the official export credit agency of the United States. Ex-Im Bank's mission is to assist in financing the export of U.S. goods and services to international markets. Ex-Im Bank does not compete with private sector lenders but provides export financing products that fill gaps in trade financing. The Bank assumes credit and country risks that the private sector is unable or unwilling to accept. Ex-Im Bank offers a range of products including:

- Working capital guarantees (pre-export financing);
- Export credit insurance;
- Loan guarantees and direct loans (buyer financing); and
- Finance lease guarantees.

The specific terms offered by Ex-Im Bank are dependent on a variety of criteria including the project type and location, percent of U.S. export content in the project, local foreign country resources and private sector funds. Ex-Im Bank has several special initiatives that target specific regions and sectors. One such initiative, the "Transportation Security Exports Program" (T-SEP), may be of potential interest for the solutions proposed in this study. Under T-SEP, Ex-Im Bank provides enhanced financing support for U.S. exports that are related to international transportation security. Specifically, Ex-Im Bank will provide the following enhancements to its normal support for eligible transportation security transactions under its medium- and long-term insurance, guarantee and loan programs:

- Local cost (that is, value of goods and services originating in the country of the buyer or end-user) coverage up to 15 percent of the Net Contract Value (equal to the exporter's contract value less the value of items not shipped from the U.S. and less any Local Costs included in the contract value).
- Maximum allowable repayment terms.

These enhancements are intended to facilitate additional purchases of U.S. exports related to transportation security by international buyers. Eligible exports fall in one of two categories: (1) Transportation Security Exports or (2) exports related to Foreign Transportation Security Projects, which are foreign projects designed to improve the security of international transportation for passengers and cargo. Under T-SEP, Ex-Im Bank has supported U.S. exports tied to port security system projects in Egypt and Jamaica.

OPIC

The Overseas Private Investment Corporation (OPIC) helps U.S. businesses invest overseas, fosters economic development in new and emerging markets, and complements the private sector in managing risks associated with foreign direct investment. Currently, OPIC services are available for new and expanding business enterprises in more than 150 countries worldwide. Over the past five years, OPIC has supported several projects in Vietnam in the power, information technology and economic development fields. OPIC promotes U.S. best practices by requiring projects to adhere to international standards on the environment and worker and human rights. OPIC's general requirements applied to projects are:

- All projects or transactions considered for OPIC financing must be commercially and financially sound.

- They must be within the demonstrated competence of the proposed management, which must have a proven track record of success in the same, or a closely related business, as well as a significant continuing financial risk in the enterprise.
- Investors must be willing to establish sound debt-to-equity ratios that will not jeopardize the success of the project through excessive leverage.

USAID

The U.S. Agency for International Development (USAID) is an independent U.S. federal government agency that provides economic, development and humanitarian assistance around the world. The types of assistance USAID provides include:

- Technical assistance and capacity building
- Training and scholarships
- Food aid and disaster relief
- Infrastructure construction
- Small-enterprise loans
- Budget support
- Enterprise funds
- Credit guarantees

USAID has conducted a broad variety of projects in Vietnam; examples are:

- Support for the development of Vietnam's "National Single Window", which is designed to accelerate customs clearance and the release of cargo by enabling data for imported goods to be submitted, processed and cleared in a single integrated process. Vietnam and other ASEAN member states have agreed to create their National Single Windows by 2012 in order to build an ASEAN Single Window (ASW). The ASW is intended to support regional trade and economic growth.
- With Vietnam Customs, development of new guidelines on the application of customs duties consistent with the requirements of the U.S.-Vietnam Bilateral Trade Agreement and the World Trade Organization.
- Provision of production and market access expertise for cocoa farmers in the Mekong region.
- Assistance to Vietnam's banks to modernize their IT operations and systems.

8 Development Impact Assessment

8.1 Introduction

The primary objective of this study was to identify ways to improve the efficiency of the container logistics system in the HCMC region. After an evaluation of the current system and a review of infrastructure under construction and proposed, the study team recommended several IT applications (see Task 5) that would provide greater integration among the different stakeholders, thus improving the system's efficiency and security. The primary recommendation is the introduction of a Port Community System (PCS), which would support more efficient exchange of information among stakeholders on container logistics. Task 7 described an implementation and cost strategy for the PCS, incorporating short to medium term steps (over the next 5 years) and longer term objectives (looking out 10 years and 15 years). The purpose of Task 8 is to describe the development impacts of the Study's recommendations and to present a means by which implementation of the recommendations, as well as their development impacts, can be monitored by USTDA over a six-year period following completion of this study. The development impact discussion is presented under the following categories:

- Infrastructure
- Market-Orientated Reform
- Human Capacity Building
- Technology Transfer and Productivity Enhancement
- Other Impacts or Benefits
- Assessment of Impacts: 6-Year Time Frame

8.2 Infrastructure

The recommendations in this study are centered on the introduction of information technologies, notably a PCS, to improve the efficiency of the HCMC container logistics system. These technologies do not require direct investment in new physical infrastructure for their implementation and operation; instead the technologies will complement the existing and future logistics infrastructure in the region.

The technologies, notably the PCS, are projected to:

- Allow the current and future regional container logistics system to more efficiently handle the region's container traffic.
- Support more efficient movement of container truck traffic to and from container terminals, ICDs, industrial parks and other facilities.
- Support more efficient movement of container truck traffic on regional highways, including Highway 51 which provides access to the new container terminals at Cai Mep/Thi Vai.
- Allow improved management of truck scheduling, reduce truck idling time, and control of empty container flows.
- Enhance the security of the logistics system by providing real-time information on container location.
- Assist with controlling the environmental footprint of container traffic on the HCMC region.

The use of the PCS to improve the future flow of traffic along Highway 51, the landside access corridor for the new Cai Mep/Thi Vai container terminals, is an important element of projected impacts. In the next 10 to 15 years, these terminals are projected to handle the majority of containers in the HCMC region and they will generate significant truck traffic. An estimated 9.8 million TEU of new capacity is projected to come on line at Cai Mep/Thi Vai in the 10 to 15-year time horizon (see Task 2). Applying some assumptions[18] related to capacity utilization, truck share, and the

[18] For illustration purposes only, the example assumes average terminal capacity utilization of 80 percent, 60 percent of throughput moves by truck, and 65 percent of containers are 40-ft. Actual percentages will be driven by future operating practices and market conditions.

split between 20ft and 40-ft containers, these terminals could, for example, generate 3 million truck trips per year or 8,000 to 9,000 truck trips per day. An important benefit from introduction of the PCS would be the enhanced management of these substantial truck volumes for improved efficiency on Highway 51.

For several reasons, the region's logistics system is projected to continue to use barge transportation for a significant share of container movements. Barge transportation can offer lower cost and more efficient service for specific markets – for example, the Mekong River Delta. Barge transportation can circumvent highway congestion and allow the single movement of large number of containers between locations. Barging allows individual container terminals to better access locations that are less easily accessible by road.

8.3 Market-Orientated Reform

Over the past two decades, Vietnam has transitioned towards a market-based economy, opening up to competition, private business, Foreign Direct Investment and international trade. Important milestones have been accession to the World Trade Organization (WTO) and membership of the ASEAN Free Trade Agreement, as well as bilateral trade agreements with the U.S. and Japan. Foreign companies have made significant investments in Vietnam, in areas such as manufacturing and infrastructure. Foreign terminal operators are partners in the development of new container terminal infrastructure in the HCMC region. Foreign companies participate in the logistics, warehousing and trucking sectors. Under WTO, Vietnam's transportation sector will become more accessible to foreign investors and operators. Under the guidance of the World Bank, Vietnamese Customs is modernizing its processes for international cargo, which will improve the efficiency and security of international trade. Vietnam is supporting the development of regional transportation corridors to handle transit traffic for Cambodia, Laos and Southwest China. Support is through the development of regional transportation infrastructure and the application of customs procedures specific to transit cargo. Under Vietnamese customs procedures, transit containers are exempt from inspection except in the case where it is suspected there is a violation of Vietnamese law and transit commodities are not subject to export-import tax or any other taxes.

The market-oriented economic environment is suitable for the introduction of the PCS and other technology recommended in this study. The study team did not find any specific market-oriented reforms required to implement and operate the PCS. For example, under the existing economic environment a foreign technology can participate in a joint venture to develop the PCS with the Vietnamese Champion (Sponsor).

However, the study team believes an important factor in successful implementation of the PCS will be protection of intellectual property and data. The PCS relies on software applications and exchange of information between stakeholders on container movements; this data exchange must occur in a secure environment to ensure the cooperation of the various stakeholders. The JV must adopt and apply intellectual property and data protection procedures consistent with Vietnamese law and international agreements. A key component of the U.S.-Vietnam Bilateral Trade Agreement (BTA) is the commitment of both countries to protect the intellectual property of the nationals and companies of the other. Effective protection supports the introduction of new technologies to developing countries. Providing adequate protection of intellectual property rights is also a core requirement for countries, including Vietnam, that have joined WTO. The WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) spells out the minimum necessary legal and enforcement standards WTO members must meet.

8.4 Human Capacity Building

The employment impact of projects can be evaluated under several different job categories based on the extent of their relationship to the project. The categories are:

- Direct Jobs – individuals employed directly by the JV to operate the PCS.
- Induced Jobs – those jobs created locally and regionally due to purchases of goods and services by those directly employed by the JV

- Indirect Jobs – those jobs supported by the JV's purchases from local suppliers (for example, office supply services, equipment, etc.)
- Related Jobs – employment at local companies (for example, exporters) that benefit from the logistics efficiency gains provided by the PCS and other IT.

As an IT intensive business, the JV will directly employ a small number of management and technical staff to operate and manage the PCS system. These positions will offer competitive salaries and benefits to attract suitably qualified personnel. Induced and indirect jobs will be supported by expenditures of the JV and JV staff.

The greatest employment impact from the PCS will be through the improved efficiency of the container logistics system. The PCS is designed to help improve the flow of containers in, out and through the HCMC region. Companies that operate the container logistics system (container terminal operators, trucking companies, ICDs, etc.) would benefit from the PCS by being able to handle increased cargo volumes. During the interview phase of this study, shippers stated their concern about congestion in the HCMC region and how this could have a negative impact on the region's appeal as a manufacturing center and for foreign direct investment. The efficiency gains provided by PCS would be expected to address some of their concerns and would contribute to the region's ability to maintain existing investment and employment, and compete for new investment and new jobs ("Related Jobs") with China and other countries in Southeast Asia. The PCS would help support long-term expansion of employment at the region's export processing zones and industrial parks, which currently are significant sources of employment and international cargo. For example in the HCMC province, fifteen export processing zones and industrial parks employ an estimated 170,000 workers (source: HEPZA). At a higher level, the introduction of PCS technology and the improved logistics system would support the Vietnamese Government's goals for national economic development.

Training is an element of the implementation plan to ensure all PCS members and users are familiar and can interface with the PCS portal and functions. Specific training on the PCS is expected to be provided to one person per company (container terminal, ICD, trucking company, etc.). Most training would be available through the PCS website, which would be user friendly with integrated training features. The JV staff would be available for additional support. Examples of training incorporated into the web site could include:

- General functionality offered by the portal. For example, container information enquiry, gate schedule enquiry, vessel schedule enquiry, community news etc.
- Targeted functionality for container terminals. For example, how features integrate with the TOS and use of trucker information by the terminal gate staff.
- Targeted functionality for trucking companies. Examples would be maintaining their driver information as well as fleet information, and booking of gate schedule.

8.5 Technology Transfer and Productivity Enhancement

The recommendations on technology presented in this Study involve the introduction of IT systems and practices not currently used in the HCMC region for container handling or only used in limited circumstances. The technologies were described in detail in Task 5 of the Study, therefore only a brief listing is provided here. Advanced technologies and processes include:

- Port Community System
- GPS
- Optical character recognition systems
- Electronic seals
- RFID for tracking containers
- Container Security Initiative
- Transportation Worker Identification Credential

As stated above in the discussion on infrastructure impacts, the primary impact of the project is to contribute to the overall quality of the HCMC container logistics system by supporting a more efficient flow of containers at container terminals, ICDs, and other facilities, as well as over regional highways. In addition, the project will support improved container security. Integration with Vietnamese Customs (through E-Customs) will also contribute to an improved logistics system.

8.6 Other Impacts or Benefits

The successful introduction of PCS and other technologies to the HCMC region will provide the foundation for applying these technologies to other port systems in Vietnam. The technologies and business models applied in the HCMC region can be similarly used in other regions. The port system in North Vietnam, serving Hanoi and surrounding provinces, has been experiencing strong growth over the past few years. In 2008, container throughput in North Vietnam was 1.4 million TEU, a gain of 28 percent over 2007. In addition, this port system connects to the large population centers of southwest China. The North Vietnam logistics system suffers from similar challenges as the HCMC region – accommodating strong cargo growth, traffic congestion, security issues, etc. – that could be similarly countered by use of technology. The port system in Central Vietnam is less developed and serves a smaller market, but it also experiencing growth and is an important future transit gateway for Laos. In 2008, the ports of Central Vietnam handled 155,000 TEU, a gain of 20 percent over 2007. The Study Team recommends:

- The Grantee, with USTDA support, evaluates the feasibility of applying the PCS and other technologies to the port logistics system in North Vietnam.

- The Grantee, with USTDA support, assesses the feasibility of applying the PCS and other technologies to the port logistics system in Central Vietnam.

- The Grantee, with USTDA support, investigates how PCS and other technologies can be used to foster regional integration by improving major transit corridors, for example through North Vietnam into Southwest China.

8.7 Assessment of Impacts: 6-Year Time Frame

The central recommendation of the study is the implementation of a PCS to improve the efficiency of the existing and future container logistics system serving the HCMC region. As discussed in Task 7, the recommended implementation strategy is undertaken by a Vietnamese Sponsor in collaboration with a PCS technology provider. Task 7 and Appendix A illustrate the proposed 5, 10 and 15 year timelines for implementation of the PCS and other technologies. The impacts described above flow from successful implementation of the PCS; therefore, the Study Team recommends that the assessment of impacts be performed by monitoring the PCS implementation strategy, notably the initial 5-year plan. The monitoring program centers on regular contact with:

- Vinalines (the Grantee),
- The JV entity established to implement the PCS, and
- The Study Contractor

Contact should be scheduled to occur at key milestones of the proposed implementation strategy, as summarized in Table 8-1. Vinalines and the JV provide status reports to USTDA on each major component of the implementation plan. These status reports will provide USTDA with a regular perspective on the progress of the project. In addition, Vinalines and the JV can provide selected key performance indicators (KPIs) on PCS activities to gauge impacts of the project. KPIs could be provided on PCS membership (for example, type and number of users) and PCS performance (for example, number of transactions processed through PCS). The KPIs will allow USTDA to evaluate projected impacts. For example, a high level of membership and usage would indicate the logistics community views the PCS as a success and providing efficiencies, thus indirectly confirming some of the projected impacts described earlier.

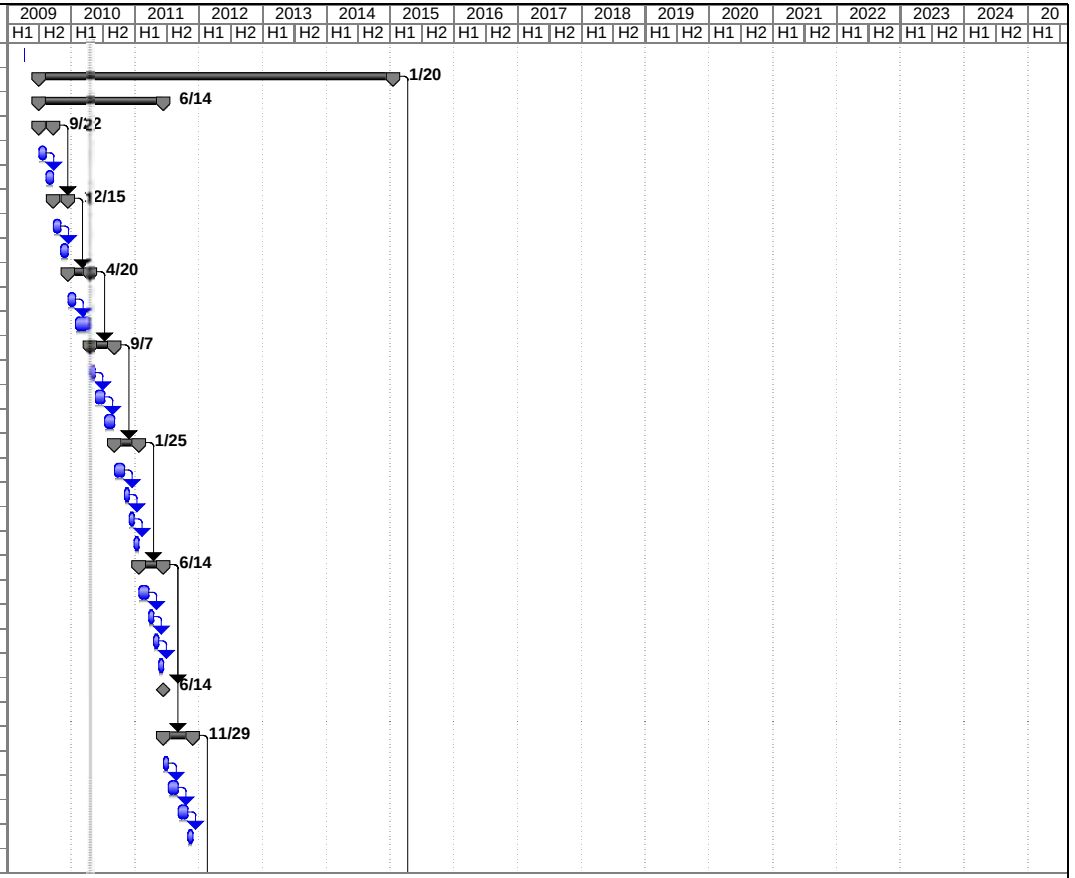
Table 8-1: Outline of 6-Year Strategy for USTDA to Monitor Implementation of the PCS

PCS Implementation Plan (detail in Appendix A)	Potential Performance Metrics Provided to USTDA by Vietnamese Champion / JV		
Phase	**Implementation Complete**	**Membership KPI (e.g. type & number of users)**	**Performance KPI (e.g. number of transactions)**
PCS Phase 1 – Container Enquiry Functions			
Form Implementation Committee	Status Notification		
For Joint Venture Company	Status Notification		
Identify a PCS Vendor	Status Notification		
Customize PCS Product	Status Notification		
Link PCS with TOS	Status Notification		
Signup and Train PCS Members	Status Notification		
Release PCS Portal with Container Enquiry Features	Status Notification		
PCS Phase 2 – Gate Scheduling	Status Notification	KPI Update	KPI Update
PCS Phase 3 – Trucker Validation	Status Notification	KPI Update	KPI Update
PCS Phase 4 – Online Payment of Fees	Status Notification	KPI Update	KPI Update
PCS Phase 5 – ICD Functions	Status Notification	KPI Update	KPI Update
PCS Phase 6 – Barge Operations Feature	Status Notification	KPI Update	KPI Update

Source: Study Team

9 Appendix A: PCS Implementation Schedule

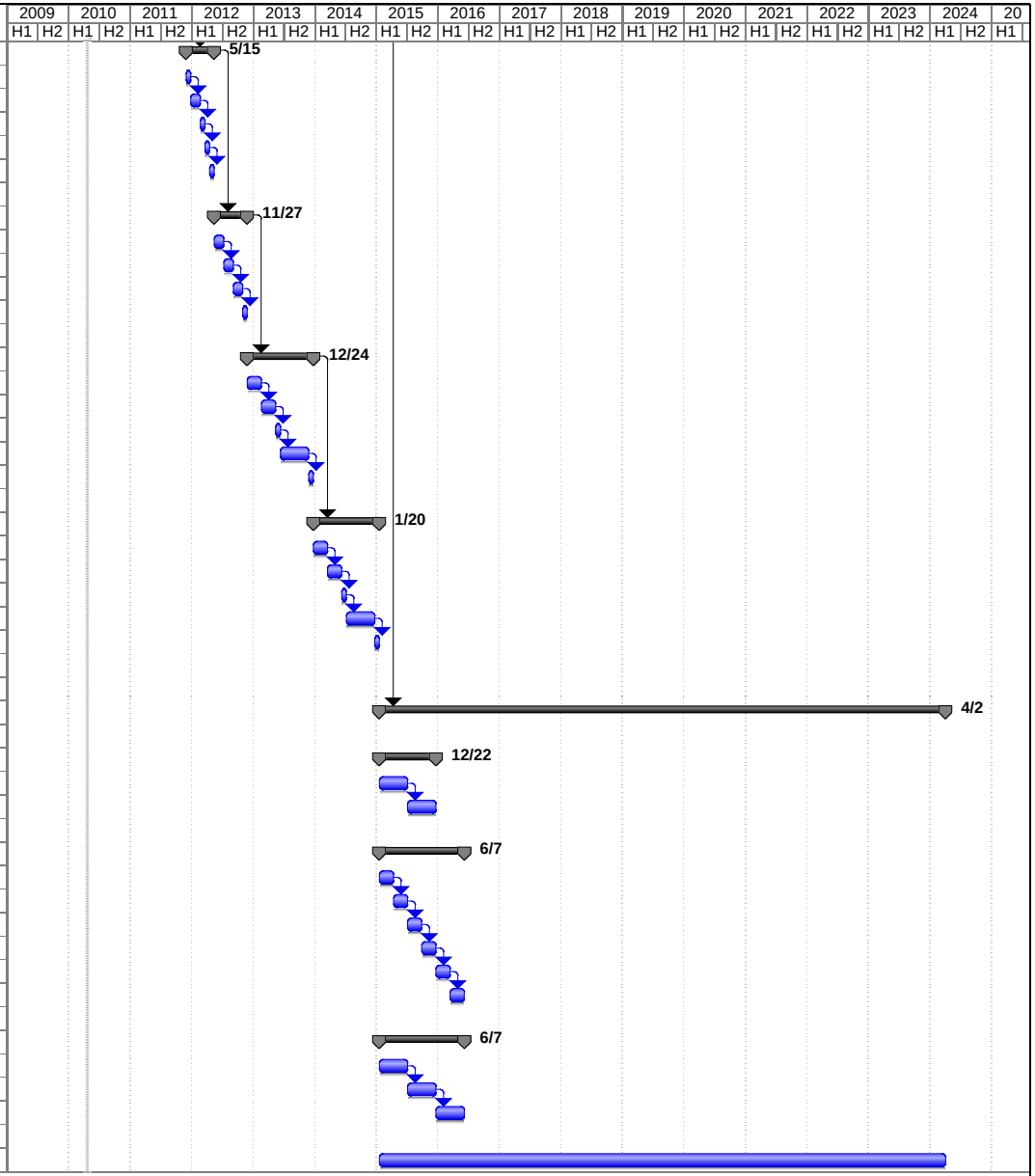
ID	Task Name
1	
2	**PCS 5 year plan**
3	**PCS Phase 1 - Container Enquiry Functions**
4	**Form Implementation Committee**
5	Identify Implementation Committee
6	Establish Committee
7	**Form Joint Venture Company**
8	Committee to Identify Champion and JV Partners
9	Form JV
10	**Identify a PCS vendor**
11	Establish PCS Product Requirements
12	Select a PCS vendor
13	**Customize PCS Product**
14	Identify gaps between Vendor's product and local needs
15	Translate to Vietnamese if necessary
16	Make changes to the product to close the identified gaps
17	**Link PCS with TOS**
18	Discuss with Terminal Operators on EDI protocol
19	Test the protocol
20	Turn on continuous information exchange with the terminals
21	Test the portal with the container enquiry feature
22	**Signup and train PCS members**
23	Identify participating companies (Terminals, Truckers, Shippers, Lines etc.)
24	Provide training to administrative users
25	Administrative users to add general users
26	Provide training to general users
27	Release PCS Portal with Container Enquiry features
28	
29	**PCS Phase 2 - Gate Scheduling**
30	Add Gate Scheduling Info to EDI between TOS and PCS
31	Fine tune and test the Gate Scheduling function
32	Provide training to PCS members on the new function
33	Release Gate Scheduling function
34	



HCMC PCS
Implementation Schedule

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

ID	Task Name
35	**PCS Phase 3 - Trucker Validation**
36	Train all registered trucking companies to register drivers and truckers
37	Capture Truck and Driver information
38	Start sending Truck and Driver information to TOS
39	Work with TOS developers to make use of truck information at the gate
40	Implement trucker validation function at the container terminals
41	
42	**PCS Phase 4 - Online payment of fees**
43	Work with financial instituions on processing online payments
44	Link with TOS to exchange payment information
45	Train PCS users on the new payment function
46	Implement online fee payment
47	
48	**PCS Phase 5 - ICD Functions**
49	Collect requirements for ICD function
50	Build ICD functions into PCS
51	Train ICD staff on the functions
52	Conduct trial with a small number of ICDs
53	Open up ICD functions for all ICDs
54	
55	**PCS Phase 6 - Barge Operations Features**
56	Collect requirement for Barging operations
57	Build Barging features into PCS
58	Train Barge operators on the functions
59	Conduct trial with a small number of barge operators
60	Open up Barging functions to all barge operators
61	
62	
63	**PCS 10 to 15 year Plan**
64	
65	**Implement Transportation Worker Identification Credential (TWIC)**
66	Capture TWIC information in PCS
67	Make TWIC information available to Container Terminals and other port facilities
68	
69	**GPS Tracking for trucks and barges**
70	Identify GPS devices for trucks and barges
71	Identify vendor(s) to supply and install GPS devices on trucks and barges
72	Build Truck and barge tracking features into PCS
73	Conduct trials with a select group of companies
74	Conduct training
75	Open up fleet tracking and management features to all trucking and barging companies
76	
77	**Link with Intelligent Transport System**
78	Work with ITS vendor to exchange information with PCS
79	Provide real-time traffic information of HCMC area on PCS
80	Provide projected truck traffic volume to ITS
81	
82	Other PCS functionalities to be identified in future



HCMC PCS
Implementation Schedule

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

10 Appendix B: Container Terminal Security

During the logistics study, Vinalines expressed an interest in strategies for security at a container terminal. This topic lies outside the terms of reference of the regional logistics study and so it has been addressed separately by the Study Team in this appendix to the final report. The discussion draws on experience at container terminals in the U.S. and U.S. Federal Agency requirements on terminal and cargo security. The review focuses on the following topics:

- Terminal Security Plan
- Terminal Security Measures
- Container Inspection Equipment
- Funding of Security Equipment
- Recommendations

Terminal Security Plan

Security at a container terminal can be addressed and managed through a Terminal Security Plan (TSP), which establishes specific objectives and processes for maintaining and enhancing terminal security. The TSP is periodically updated by terminal management to incorporate changes to government regulations, industry requirements and technology. In the United States, ports and terminals must maintain a security plan approved by the U.S. Coast Guard, and the plan must be in accordance with the rules and regulations contained in the U.S. Maritime Transportation Security Act (MTSA) of 2002, the International Ship and Port Facility Security (ISPS) Code; any relevant State security requirements; and the maritime industry's "best practices" standards.

The steps to creating a TSP are broadly defined as:

- Security vulnerability assessment – this involves a review of existing security measures and response plans, and an assessment of risks to facilities, vessels and operations. Steps may include:
  - Identify any particular motives that may exist to threaten or harm the facility, facility personnel, cargo, or operations.
  - Identify critical operations, activities, and persons that are important to protect.
  - Obtain an overview of security measures in place. Prioritize operations, areas, systems, and personnel for threat assessment, focusing on those found to be most critical.
  - Develop a security survey checklist that reflects the existing measures assumed to be in place, and critical operations with response to physical, personnel, and information security.
  - Survey the port or terminal using the checklist; identify the measures in place; and comment on deficiencies, training needs, safety conflicts, manning constraints, and security equipment. Upon completion of the survey, an evaluation of identified weaknesses of existing security measures along with recommendations for remedial actions is developed in concurrence with the findings.
  - Identify threat scenarios and security incident scenarios that reflect the motives of potential attackers. Identify prioritized operations, areas, systems and personnel.
  - Assess likelihood and potential consequences of those scenarios.

- TSP – this involves creation (or update) of a plan to help the port authority or terminal operator detect, deter, and respond to threats to facilities and operations, and to mitigate any potential consequences that may result from such incidents. The plan should reflect the geographic, operational, and threat environments specific to the terminal, identify critical assets, credible threats, and vulnerabilities, and reduce risks through improved preventive security countermeasures. Components of the TSP include:

  - Organization and Training

- Access control
- Restricted areas
- Security systems & maintenance
- Facility Monitoring
- Communications
- Ship and cargo security
- Reporting system with government agencies
- Audits and exercises

- Engage in periodic security audits and training to ensure that proper procedures and tools are in place, and that staff is adequately trained to respond to threats.

Terminal Security Measures

The Study Team conducted a review of general security measures undertaken at U.S. container terminals. The following are principal components:

- Terminal is completely fenced using industry standards for design, sizing and installation.

- An automated access control system prevents unauthorized access to the terminal. Access to the terminal is strictly controlled to those who must have access to the facility for operational purposes.

- Video surveillance is used to monitor key areas of the terminal – gate, operational areas, and boundaries – and to detect and record suspicious activities, as well as routine terminal access.

- Terminal lighting is sufficient to provide the security personnel and camera systems the opportunity to visually observe all critical areas of the facility day or night.

- Terminal personnel undergo security training and they are required to undergo a security background check to reduce the potential for security incidents.

- The terminal and security personnel are trained in security awareness, security duties and appropriate responses to security incidents.

- All information (i.e., TSP) developed and actions to be taken in these processes are considered security sensitive Information, and are protected from disclosure and must be disclosed to only those officials with a "need to know" the specific information.

Container Inspection Equipment

Over the past five to ten years, a central element of strategies to improve terminal and cargo security has been the introduction of container scanning equipment to conduct non-intrusive inspections for a variety of potential threats; for example, explosives, drugs, and illegal migrants. The equipment is designed to support and not impede the day-to-day operations of the terminal. Major U.S. suppliers of equipment include:

- OSI Systems, Inc. (OSI), Hawthorne, California
- American Science and Engineering, Inc., Billerica, Massachusetts
- L-3 Communications, New York
- Science Applications International Corporation (SAIC), San Diego, California

The discussion below provides examples of equipment used by terminal operators and is based on a review of products offered by the above companies.

Intelligent Intermodal Solutions (IIS) offered by SAIC provides automated processing at the gates and on the quay to improve efficiency, throughput and security. Components of the system are:

- At the gates, the IIS system uses Optical Character Recognition (OCR) to read numbers on containers, chassis and license plates.
- In the lanes, kiosks automate the terminal transaction for drivers.
- On the quay, an OCR system reads container numbers and records stow positions as containers are moved by cranes.
- The IIS server stores images and data from IIS components and other sources throughout the terminal, and exchanges data with the terminal operating system (TOS).
- Using IIS workstations at central locations, clerks can manage the gate processes remotely, and inspectors can check containers for damage online.

Figure 10-1: OCR technology automatically identifies equipment at the gates and on the quay

Source: SAIC

Container inspection can be conducted at a checkpoint within the terminal and/or at the terminal gate using portals that scan the containers. The portal's supporting IT system integrates and stores the images and data. If a potential security risk is detected, the container is immediately diverted for secondary inspection, while other containers continue to proceed through the primary inspection checkpoint. The portals have high productivity so as not to disrupt the normal terminal operations. In addition, some portals are mobile and can be relocated to another point in the terminal.

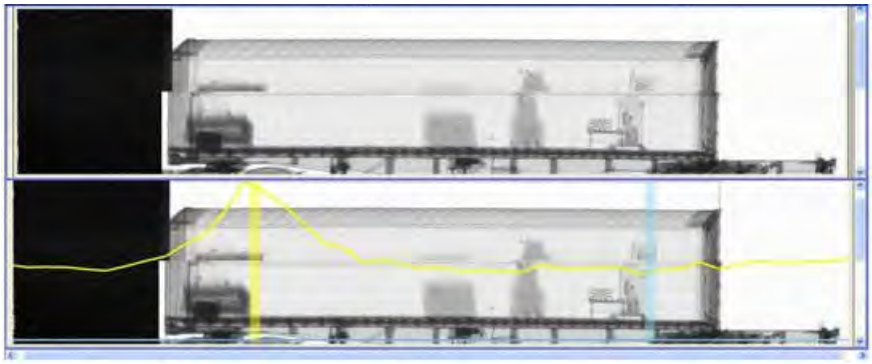
Figure 10-2: Drive-Thru Container Inspection Portal

Source: OSI Systems

Figure 10-3: Stationary Vehicle and Rail-Mounted Inspection Portal

Source: American Science and Engineering

Figure 10-4: Example of a Scanned Container Image



Source: SAIC

Funding of Container Inspection Equipment

The purchase of security equipment from U.S. equipment suppliers could be funded through assistance from U.S agencies including the Ex-Im Bank, OPIC and USAID. A profile of these agencies was provided in Section 7.7 of the final report.

Recommendations

The above discussion provides an overview of terminal security strategies that can be used as a template by Vinalines for its terminal operations in Vietnam. The Study Team's general recommendations are:

- Create a TSP for each facility consistent with local and international requirements and standards,
- Adopt appropriate equipment and technologies for container scanning consistent with local and international requirements and standards, and
- Consider funding support from U.S. Government agencies for the acquisition of security equipment and technology from U.S. suppliers.