An IT and Economic Study on the Future of Hong Kong Air Cargo Industry: Long-term Impact of WTO Accession and Direct Links

從資訊科技及宏觀經濟探討中國加入世貿及三通對香港空運業的遠期影響

Prepared by

Waiman Cheung, Sung-Chi Chu, Y.V. Hui, Larry C. Leung, & Anming Zhang

Center of Cyber Logistics
The Chinese University of Hong Kong & City University of Hong Kong

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Contents

Introduction

After 14 years of negotiation, China has successfully joined WTO as a member since November 2001. As 80% of Hong Kong air cargo trade is related to Mainland's external trade, it will mean substantial adjustments for the Hong Kong air cargo industry. It is also evident that direct links between Mainland and Taiwan are likely to take place in the foreseeable future. We note that 1/6 of Hong Kong trade is related to Mainland and Taiwan trade.

The air cargo industry must examine the long-term economic impact of both WTO and direct links on the industry. It must also examine the logistics and IT infrastructure needs within the same context. There will be new requirements for air cargo logistics as well as logistics-related information technology, as more international standards are expected of the Hong Kong air cargo industry. Innovative public policies would be imperative in helping the industry in becoming more competitive globally. Further, e-Commerce and Supply Chain Management have become critical aspects of air cargo logistics, the industry would be well served if such aspects can be addressed within the WTO and direct link context as well.

In this study report, we organize our investigation into four parts:

1. An Overview of China Air Freight and WTO Accession - Existing trade flows and air-cargo flows within "Greater China" (i.e. among Mainland China, Hong Kong, and Taiwan) and between Greater China and the rest of the world will be described. We will also examine the nature of impacts of the WTO entry and direct flights on trade flows and air-cargo flows, as well as on emerging trade flows and regional trading and air-cargo hubs.

2. Emerging business opportunity and managerial strategy – The current governance of China of the logistics industry will be studied from the ownership perspective.

3. Policy recommendations for the Hong Kong SAR Government – We will discuss the liberalization of air cargo routes ("open-skies") along with the general trade liberalization under the WTO and the direct flights between Taiwan and the

Mainland. This includes the issues of whether HONG KONG should liberalize its air-cargo routes unilaterally, and whether Hong Kong's air passenger market should also be liberalized. Recommendations on how to fully realize Hong Kong's potential, suggestions to customs coordinations among the Hong Kong, Taiwan and Mainland governments, and a view on regional coordinations between Hong Kong and Guangdong in airports, roads and customs are provided.

4. A study of logistics and IT infrastructure needs with WTO accession and direct links – we will discuss global standards of air cargo logistics industry, the requirements on IT infrastructure, a web-based air cargo logistics community network, and feasibility of IT integration of customs and other trade agents. Competitions among regional and international 3rd party logistics service providers will also be discussed.

Two forums

Two open forums were conducted to share results with sponsors and practitioners and to receive feedback from the industry agents.

Forum 1, entitled "WTO Implications on Air Cargo Logistics in China," highlighted China's role in world's foreign trade, and eventually in the global economy in the near future. It would be evident in the face of this continued growth that Hong Kong's air cargo industry should find expanded opportunities. Yet the direct engagement of the mainland with the world also portends challenges to Hong Kong's intermediary role. Foreign multinationals and forwarders may find direct entry into China's own markets easier and bypass Hong Kong as a bridgehead. The Beijing-Shanghai axis of airports may attain critical mass in terms of network connectivity, flight frequency, and airline profitability such that Hong Kong's hub role will be considerably diminished. A more international standards are expected of the Hong Kong air cargo industry, there will be new requirements for air cargo logistics as well as logistics-related information technology. WTO may well be a two-edged sword for Hong Kong. This forum brings related issues to the forefront of analysis and collaborative discussion involving the academic community, the industry, and our government.

Forum 2, entitled "Integration of Hong Kong and Pearl River Delta: Issues and Concerns for the Air Cargo Industry," focuses on issues arisen from the emerging position of the Pearl River Delta (PRD) regions with respect to Hong Kong. It is well know that the PRD is the hinterland of Hong Kong, and that Hong Kong has successfully acted as its gateway since the opening of China's economy in the 1980's. The tremendous growth and prosperity of the region enjoyed as a result will no doubt be further spurred by the recent efforts of our Governments. Integration of Hong Kong and the PRD is inevitable, yet its ramifications to the air cargo industry are unclear, especially with the introduction of CEPA (Closer Economic Partnership Arrangement). We believe the development of a well coordinated logistics infrastructure, both in terms of physical and information flows, will be a necessary condition for the realization of the full integration potentials. This forum provides an opportunity for members of the Hong Kong air cargo community to exchange facts and idea of the latest development for the following concerns:

- Impact of CEPA on air cargo logistics in PRD,
- Ground logistics support including highways, bridges, and warehouses, etc. in the region,
- IT readiness for e-logistics and recent development in PRD
- Strategic importance of the five airports and potentials for collaboration, and,
- Business opportunities for Hong Kong logistics agents in PRD.

This report and other forum-related materials will be available for download at http://ccl.baf.cuhk.edu.hk or http://www.ccl.cityu.edu.hk after November 15, 2003.

Part I: An Overview of China Air Freight and WTO Accession

I.1 Introduction

Since 1980's, China economy has enjoyed a rapid growth in terms of Gross Domestic Product (GDP) and external trade. Air cargo industry has been benefited from the growth of entire economy and becomes an important sector in the Mainland. This chapter describes air cargo trends in China, identifies major air transport hubs, and examines cargo movements between them.

China airport statistics started to be available from 1980. Passenger throughput and cargo (plus)[1] throughput as shown in Table I.1 have registered similar growth rates as the other four variables. Again, the passenger variable has shown a drastic drop since 1996 (though growth has remained positive). Probably for the first time, the freight variable has shown a significantly higher growth rate than the passenger variable. It should also be pointed out that the load factor has typically been lower for freight than for passengers. In that sense, freight capacity might have been historically under-utilized and the recent spurt indicates a catch-up process.

Table I.1. Mainland's Aviation Growth

Period	Passenger Traffic (of domestic carriers)	Passenger-kilometre performed (of domestic carriers)	Freight Traffic (of domestic carriers)	Tonne-kilometres Performed (of domestic carriers)	Airport Passenger Throughput	Airport Cargo (plus) Throughput
Ave. growth rate						
1950-1955	38.0%	42.2%	43.8%	44.4%		
1955-1960	33.2%	23.3%	46.5%	38.8%		
1960-1965	5.2%	8.9%	-3.1%	-1.1%		
1965-1970	-4.0%	-6.3%	6.3%	7.0%		
1970-1975	44.6%	53.7%	4.8%	11.3%		
1975-1980	19.8%	20.8%	13.8%	18.5%		
1980-1985	16.8%	24.2%	17.0%	24.2%	16.9%	20.0%
1985-1990	17.3%	14.6%	13.6%	14.5%	16.9%	11.1%
1990-1995	25.3%	24.2%	22.3%	22.2%	26.9%	24.4%
1995-2000	5.6%	7.3%	14.2%	17.7%	6.0%	15.3%
1980-2000	16.0%	17.4%	16.7%	19.6%	16.4%	17.6%

Sources: *Statistical Data on Civil Aviation of China*, various issues.

This part also describes air cargo trends within Greater China (i.e. among Mainland China, Hong Kong and Taiwan), as well as between Greater China and other foreign trading partners. China's WTO entry should give a further boost to its cargo traffic. The chapter would examine the impact of WTO entry towards China air cargo industry and discuss the future trend of flows and regional hubs.

I.2 Regions and Airports

I.2.1 Six Regions

For aviation-related purposes, the mainland may be divided into six regions (Figure I.1):

1. Northern China,
2. Eastern China,
3. Central and Southern China,
4. the Northeast,
5. the Southwest, and,
6. the Northwest.

For each of the six regions, there is one or more major airports. Table I.2 provides information on the regions, the major airports, and the hub carriers.

We adhere to the division in the publication Statistical Data on Civil Aviation of China. That division is essentially the one followed by the Civil Aviation Authority of China (CAAC) when it decentralized the airline industry into six aviation bureaus and six corresponding airlines in 1987.

[1] Cargo (plus) Includes cargo, mail and luggage, while the latter two items would not include in cargo (only).

Figure I.1. Major Airports

Table I.2. Major Regions

Region	Provinces Included	Major Airports	Major Airline	Share of Aircraft Movements	Share of Passenger Throughput	Share of Cargo (plus)
North 華北	Beijing, Tianjin, Hebei, Shanxi, and Nei Mongol	Beijing	Air China	13.8%	18.0%	22.2%
Eastern 華東	Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, and Shandong	Shanghai, Xiamen, Hangzhou	China Eastern	26.2%	29.2%	34.4%
Central and Southern 中南	Henan, Hubei, Hunan, Guangdong, Hainan, and Guangxi	Guangzhou, Shenzhen, Haikou	China Southern	36.6%	27.7%	25.6%
Southwest 西南	Sichuan, Guizhou, Yunnan, and Tibet	Chengdu, Kunming, Chongqing	China Southwest	3.3%	13.5%	10.4%
Northwest 西北	Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang	Xian	China Northwest	5.7%	5.4%	3.1%
Northeast 東北	Liaoning, Jilin and Heilongjiang	Dalian, Shenyang	China Northern	5.5%	6.2%	4.2%

Sources: *Statistical Data on Civil Aviation of China*, various issues.

Northern China includes Beijing, Tianjin, Hebei, Shanxi and Nei Mongol (Inner Mongolia). The major cities are Beijing and Tianjin. Beijing is China's political and cultural center and historically, being the capital, has played the role of the international gateway. The Beijing Capital International Airport (BCIA) ranks number one in passengers and aircraft movements and number two in air cargo among Chinese airports, whereas of the six regions, North China ranks number three in air cargo in 2000 (915 thousand metric tons; see Table I.3 below. A second airport of the region is the Tianjin Airport which nonetheless is significantly smaller. An important driver for Beijing air cargo growth is the high-tech industry in the Beijing and Tianjin area. The region itself has only the third largest market share in terms of aircraft movements, passenger throughput, and cargo throughput. Aviation policy mandates that at present and in the near future, there is only one major domestic carrier in the region and this is Air China.

The eastern region includes Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi and Shandong with major cities such as Shanghai, Nanjing, Hangzhou, and Xiamen. Shanghai is both a national and international hub. One major driver for Shanghai's air cargo growth is the economic strength of its catchment area, the Yangtze River Delta (YRD) which extends along the Yangtze River to cities as far as Wuhan (though Wuhan is sometimes marginally grouped with the central and southern China region as is done here). Eastern China is the busiest aviation region in the mainland in terms of passenger and cargo throughput though it still lags behind the central and southern region in terms of aircraft movements. Shanghai air cargo growth has been the highest in the past decade compared to other cities in China. The major carrier is China Eastern Airlines.

Central and southern China includes Hunan, Guangdong, Hainan and Guangxi covering major cities such as Guangzhou, Shenzhen, and Haikou. It has the largest number of aircraft movements though this is not matched in terms of shares in passenger and cargo throughput. The expanse of the region is such that Luoyang in the north and Haikou in the far south are included, thus boosting the aircraft movements of the region. (Since Luoyang which is far north is included, it is not illogical to include Wuhan.) Shenzhen also benefits from being close to Hong Kong. A short trip by land would enable a passenger disembarking at Hong Kong International Airport (HKIA) to enjoy much cheaper domestic air fares in Shenzhen. The cargo throughput of the region ranks second among the six regions with 973 thousand tonnes in 2000. The principal driver for Guangzhou air cargo growth is the strength of industrial base in Pearl River Delta (PRD) but Guangzhou's hub development has been affected by Hong Kong. The construction of the new airport in Guangzhou and other logistics service facilities in the area will increase Guangzhou's competitiveness.

Chengdu is the hub of the southwest which includes Sichuan, Guizhou, Yunnan, and Tibet and which includes major cities such as Chongqing and Kunming. This region has a number of international routes, mainly to Southeast Asia. Otherwise, international air cargo passes through hubs such as Hong Kong, Shanghai, Guangzhou, and Shenzhen. Relatively slow economic growth has hampered this region. Of late, the central authorities have recognized this backwardness and launched the "go west" campaign in earnest. [2] Since this region relies heavily on natural resources, faster growth is likely to boost passenger throughput ahead of cargo throughput.

Xian is the hub of the northwest which includes Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang. The other major city is Lanzhou. Again, the region has only a few international routes, mainly to mid-Asia. Air cargo traffic to major parts of the world have to through Beijing, Shanghai, and Hong Kong. Air cargo tonnage in northwest region is the lowest (151 thousand tonnes in 2000) among the six regions. Again, the region should benefit from the "go west" campaign but its immediate impact on air cargo should be minimal.

Shenyang is the hub of the northeast region which includes Liaoning, Jilin and Heilongjiang. The other major cities are Dalian and Changchun. The region only has a limited number of international routes, to Korea and Japan. The majority of international air cargo transport passes through Beijing.

Table I.3 gives quantitative measures of the aviation traffic of these six regions and their major airports in the year 2000. These measures include the number of aircraft movements, passenger throughput, and cargo throughput. In Table 1.3, it is noted that only Beijing and Shanghai have more than one airports in the city. For

Beijing, the existence of two airports is unimportant as the other airport is extremely small. The functional specialization of the two airports in Shanghai, Hongqiao and Pudong, has been evolving; in terms of global analysis, it is not necessary to make a distinction for now.[3]

Table I.3. Major Airports in 2000

	Aircraft Movements	Passenger Throughput	Cargo (plus) throughput (tonnes)	Aircraft Movements (share of national total)	Passenger Throughput (share of national total)	Cargo (plus) throughput (share of national total)	share of China's imports plus exports
National Total	1757117	133691886	4001777	100.0%	100.0%	100.0%	100.0%
Northern China	242235	24080850	914730	13.8%	18.0%	22.2%	11.0%
Beijing*	189704	21870700	774205	10.8% (1)	16.4% (1)	19.3% (2)	
Eastern	460829	39047695	1349956	26.2%	29.2%	34.4%	40.6%
Shanghai*	160528	17683129	878902	9.1% (2)	13.2% (2)	22.0% (1)	
Xiamen		3551531	99484	2.5% (10)	2.7% (9)	2.5% (7)	
Hangzhou		2492442	74631	1.5% (18)	1.9% (12)	1.9% (11)	
Central & Southern	642748	36977317	972952	36.6%	27.7%	25.6%	39.8%
Guangzhou	132776	12790999	491868	7.6% (3)	9.6% (3)	12.3% (3)	
Shenzhen	74251	6422685	202743	4.2% (4)	4.8% (4)	5.1% (4)	
Haikou		4362743	71064	3.2% (7)	3.3% (7)	1.8% (12)	
Southwest	213579	18086754	414959	3.3%	13.5%	10.4%	1.6%
Chengdu	58844	5524709	158635	3.3% (6)	4.1% (6)	4.0% (5)	
Kunming		5604096	125034	3.9% (5)	4.2% (5)	3.1% (6)	
Chongqing		2780359	75721	2.1% (11)	2.1% (10)	1.9% (10)	
Northwest	100503	7210415	151228	5.7%	5.4%	3.1%	1.4%
Xian		3878988	76445	2.9% (8)	2.9% (8)	1.9% (8)	
Northeast	97223	8288855	187951	5.5%	6.2%	4.2%	5.7%
Dalian		2751613	76283	2.0% (9)	2.1% (11)	1.9% (9)	
Shenyang		2420455	58138	1.4% (19)	1.8% (15)	1.5% (13)	

Numbers in brackets are the national rank.
*: figures include both airports in the city.
Sources: *Statistical Data on Civil Aviation of China*, various issues.

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[2] The "west" consists of the provinces of Sichuan, Gansu, Guizhou, Yunnan, Qinghai, and Shaanxi, the municipality of Chongqing, the autonomous regions of Ningxia, Tibet, and Xinjiang. They account for one-quarter of the population but more than half the land.

[3] Shanghai has just decided to shift all international flights from Hongqiao to Pudong. The move would occur at the end of October 2002, when the Hongqiao facility would become a domestic airport and supplement Pudong operations. The move is intended to bolster air traffic at Pudong airport, which has been under-used since it was opened in 1999. Only 6.9 million passengers traveled through Pudong airport in 2001, despite a designed capacity of 80 million. In contrast, Hongqiao in 2001 had

I.3 Air Cargo

Concentrating on air cargo, we can classify the major airports in the mainland into four tiers:

1. market shares around 20 percent – Beijing and Shanghai;

2. market shares around 10 percent – there is only one in this subset, Guangzhou;

3. market shares above 3 percent – Shenzhen, Chengdu, and Kunming; and

4. market shares below 3 percent – the rest.

Using cargo (plus) figures though cargo (only) figures are not that different, we can see that the total throughput of Beijing, Shanghai and Guangzhou takes up more than half of China's total. They are at the center of the most important economic and industrial zones in China. Beijing is serving the Beijing/Tianjin economic development zones; Shanghai is serving the YRD; and Guangzhou is serving the PRD. Chengdu, Shengyang and Xian are domestic hubs of their regions. International air cargo traffics from these three regions is fed into major hubs at Shanghai, Beijing, Guangzhou, and Hong Kong.

Between the two mainland cities, Beijing led in the 1980s as Beijing occupied most of the international airlines and domestic routes. Shanghai began to pick up after 1990 and became the leader in air cargo transport after 1995. Shanghai air cargo throughput is higher than Beijing's throughput and is significantly higher than Guangzhou's. Its throughput of about half a million tonnes is distinctly higher than that of those immediately ranked below. Shenzhen, Chengdu, and Kunming generally have less than 0.2 million tonnes each. The latter two airports have throughput in the range of 125-159 thousand tonnes. Total throughputs of this group occupy 12% of total China air cargo throughput. The third group consists of Xiamen, Xian, Chongqing, Dalian, Hangzhou and Haikou.

Shanghai, Beijing and Guangzhou are the three major airports in China and are also gateways for international air cargo imports and exports. The three airports

passenger throughput of 13.8 million – doubling Pudong's throughput. It handled 1.1 million tons of cargo, against Pudong's 410,000 tons.

occupy a major share of 54% of total China air cargo throughput in 2000. Shanghai ranks first among all China airports with a total throughput of 879 thousand tonnes in 2000. There has been a healthy growth of approximately 15% in both inbound and outbound air cargo from 1999 to 2000. Beijing ranks second with a total throughput of 774 thousand tonnes in 2000. An annual growth rate of approximately 23% is observed in inbound, outbound and total throughputs in 1999-2000. Guangzhou has a total throughput of 492 thousand tonnes in 2000. Inbound air cargo has an annual growth rate of 17% in 1999-2000. The outbound statistics has a growth rate of only 4.5% in 1999-2000. It may be due to the superior performance of the Hong Kong International Airport and Shenzhen Airport, and the limited capacity and facilities at Guangzhou Airport.

I.4 Including Hong Kong

Since the changeover of sovereignty in 1997, Hong Kong has been formally and universally recognized as Chinese territory. Under the policy of "one country, two systems", it is governed as a Special Administrative Region (SAR) and remains a customs area separate from the mainland. China's foreign trade figures for example still consider Hong Kong a "foreign" entity in that particular sense. Hong Kong also has air traffic rights that are quite different from those of mainland's major aviation cities. Air routes between Hong Kong and the mainland are neither "domestic" nor "international" but are grouped under the ambiguous category of "regional routes". To a large extent, Macau, the other Special Administrative Region, shares these similarities but Macau's airport is far less important than Hong Kong's.

As pointed out in Section I.1, freight data in mainland consists of air cargo, mail, and luggage. It is only after 1993 that disaggregated data was available where air cargo data can be isolated. There are also two other issues that one should be mindful of when comparing Hong Kong and the mainland. The first issue is Hong Kong's definition of domestic-versus international and the second issue has to do with the concept of throughput, which could be misled into "double counting" if not interpreted carefully.

Hong Kong acts as a major gateway for China's imports and exports and benefits from the economic development in China. The economic reforms at Shenzhen and the PRD in the early eighties initiated a demand for air cargo services in the region which to this day has been met mainly by Hong Kong's airport. It is also a major aviation hub in itself. Surprisingly, Hong Kong has apparently not collected data on the more commonly used variables of aviation, namely, passenger traffic, passenger-kilometres performed, freight traffic, and tonnes-kilometres performed – these are four of the six variables covered in Table I.1 in the case of the mainland. Probably, the fact that Hong Kong was under British rule until 1997 led to ambiguity about the domestic-versus-international distinction and about all variables that are related to distance. (Should tonnes-kilometres performed on the Hong Kong-London route be counted as domestic or international? Before July 1, 1997, the Hong Kong-London route was considered a domestic route; apart from Cathay Pacific and British Airways, no other carriers operated on the route. After July 1, 1997, as stipulated in the Basic Law (1991, Section 4), all international air services to, from or through Hong Kong, which do not operate to, from or through Mainland China, are governed by the Government of the Hong Kong SAR under special authorizations from the Central Government.)

Instead, we only have throughput data. Since Hong Kong has only one airport, all throughput is by default international or regional, that is, if we view its flights to and from the mainland as regional. While throughput values are generally about twice the amount of traffic values, growth rates are unaffected by this "double count". Table I.4 shows the average rates of throughput growth. Both passenger and cargo have shown consistent growth though not at levels as high as cities on the mainland. Cargo throughput has generally grown faster than passenger throughput; in recent years, it dipped only once in 1998 though passenger dipped both in 1997 and 1998.

Table I.4. Hong Kong's Aviation Growth

Period*	Airport Passenger Throughput	Airport Cargo Throughput
average growth rate		
1976-1980	11.8%	12.3%
1981-1985	7.1%	11.0%
1986-1990	13.6%	9.8%
1991-1995	8.5%	14.2%
1996-2000	3.4%	8.9%
1981-2000	8.1%	11.6%

*: Hong Kong uses the fiscal year for aviation statistics. So 1976-1980 for example means 4/1976-3/1981.
Sources: *Annual Report of the Hong Kong Civil Aviation Department, various issues.*

Table I.5 incorporates information on Hong Kong and juxtaposes such data with mainland's figures. We include only the three major airports of the mainland, Beijing (BCIA), Shanghai (two airports), and Guangzhou. We also introduce the distinction between domestic routes and non-domestic routes. Domestic routes are intra-mainland routes. Non-domestic routes are either international routes with other countries or regional routes with the Special Administrative Regions, Hong Kong and Macau.

We also want to suggest that Hong Kong's air cargo volume is in fact about treble that of the entire mainland's international air cargo. Aside from Hong Kong's figures, Table I.6 also has data on the breakdown of domestic and non-domestic routes. These estimates are extrapolated from other available data and admittedly preliminary. But we should note the following possibilities:

1. that the proportion of domestic cargo in "freight traffic" in the mainland is higher than that of international cargo;

2. that the two largest airports, Beijing and Shanghai, probably handle more international cargo than domestic cargo; and

3. that Shanghai's airports handles significantly more international air cargo than the BCIA.

Table I.5. Hong Kong juxtaposed with the Mainland, 2000

	Aircraft Movements	Passenger Throughput	Cargo (only) throughput (tonnes)	Aircraft Movements (share of the mainland total)	Passenger Throughput (share of the mainland total)	Cargo (only) throughput (share of the mainland total)
Mainland Total	1757117	133691886	2989888	100.0%	100.0%	100.0%
domestic routes		123000000^	1927400^			64.5%
reg. & intern. routes		11000000^	1062500^			35.5%
Beijing (BCIA)	187190	21691077	557366	10.7%	16.2%	18.6%
domestic routes	142461	14996965	277987*	8.1%	11.2%	9.3%
reg. & intern. routes	44729	6694112	280377*	2.5%	5.0%	9.4%
Shanghai (two airports)	158543	18306103	684651	9.0%	13.7%	22.9%
domestic routes	113763	11384515	256600^	6.5%	8.5%	8.6%
reg. & intern. routes	44780	6921588	428000^	2.5%	5.2%	14.3%
Guangzhou	132776	12790999	406674	7.6%	9.6%	12.3%
domestic routes						
reg. & intern. routes						
Hong Kong#	186450	32636318	2229545	10.6%	24.4%	74.6%
mainland routes		5706481	125144		4.3%	4.2%

Figures given in this table may differ slightly from figures given in earlier tables.
#: Hong Kong data applies to the fiscal year, 4/2000-3/2001.
*: cargo (only) plus mail; ^: estimated or extrapolated, sometimes from cargo (plus) data.
Sources: *Statistical Data on Civil Aviation of China*, various issues; *Yearbook of China Transportation and Communications*, various issues; annual report of the Hong Kong Civil Aviation Department, various issues.

I.5 The International Network

Because of data-related difficulties, we will begin our discussion of mainland's international network with a diagram instead of a table. Figures I.1 and I.2 shows the "domestic triangle" which connects mainland passengers and cargo to major international routes and it consists of Beijing, Shanghai, and Hong Kong. In other words, the airports of these three cities are mainland's gateways to the rest of the world. Hong Kong replaces Guangzhou which is one vertex of the triangle central to the domestic network. The term "domestic" is put in parenthesis because

Hong Kong is a Special Administration Region and unlike other mainland cities, a separate customs area. The term "triangle" is also put in parenthesis because the arc connecting Beijing and Shanghai is intentionally drawn short so that they may appear to be one vertex instead of two. We will explain this shortly. (For simplicity, all arrows in the diagram are drawn one-way, radiating from China outwards.) Some other domestic airports may be important in regard to certain international routes, such as Chengdu and Kunming vis-à-vis Singapore and Thailand and Dailin vis-à-vis Japan and Korea, but they remain peripheral in the grand scheme of things.

Published data does not provide enough information on the originators and recipients of China's international air cargo. So we must start from a higher aggregation level. China's major partners in international trade are the following six countries/territories:[4]

1. Japan (with a market share of 17.5 % of China's imports plus exports in 2000);
2. United States (15.7%);
3. Hong Kong (11.4%);
4. Korea (7.3 %);
5. Taiwan (6.4 %); and
6. Germany (4.2 %)

We first group Japan and Korea together as Northeast Asia; geographically they are close to each other and the transport pattern is not that different. Germany is China's largest European trading partner and other Western European countries are connected similarly. England has a market share of 2.1%; the Netherlands, 1.7%; and France, 1.6%. So Germany should be seen as representative of a number of European countries. Together with the US, these regions constitute the major originators of China's imports and recipients of China's exports. Obviously, the

[4] Feenstra, R.C. (1998), "Integration of Trade and Disintegration of Production in the Global Economy," Journal of Economic Perspectives, Vol.12, No.4, 31-50.
Feenstra, R.C., W. Hai, W.T. Woo, and S. Yao (1998a), "The US-China bilateral trade balance: Its size and determinants," NBER Working Paper No. 6598.
Feenstra, R.C., W. Hai, W.T. Woo, and S. Yao (1998b), "Discrepancies in international data: An application to China-Hong Kong entrepot trade," American Economic Review, Vol.89, No.2, 338-343.

overall pattern of trade is not necessarily replicated for air cargo but in our judgement, air cargo should follow the pattern in the main..

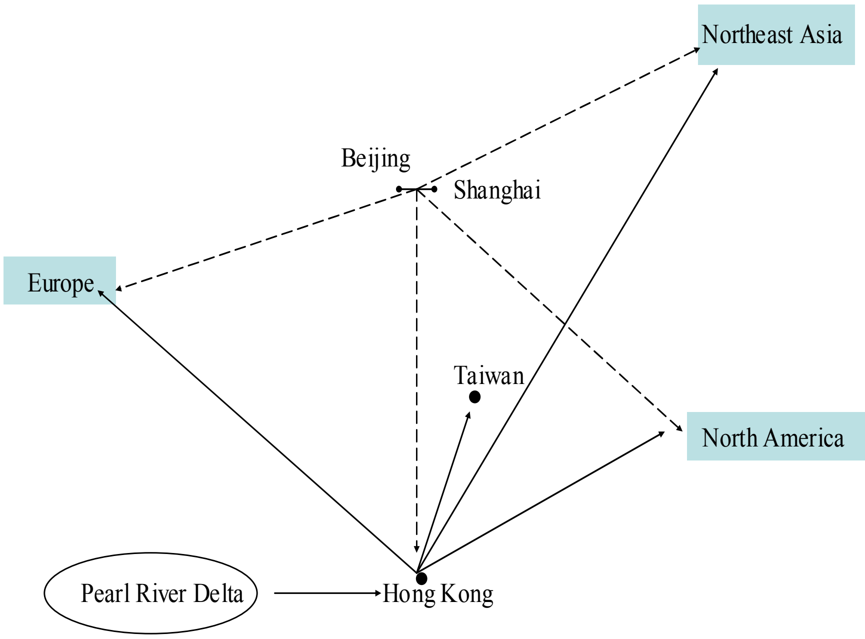

Figure I.2. The International Network

Hong Kong and Taiwan have their peculiarities and are not comparable with the three regions. Hong Kong is not the origin of many of its exports to the mainland nor is it the final destination of many of its imports from the mainland. Rather, it is an entrepôt whose activities have not been fully captured and accurately measured by the many statistical agencies concerned. (See the references in the preceding footnote.) There are still no direct transport links between Taiwan and the mainland. The large volume of trade, probably with the majority going from the island to the mainland, must necessarily go through an intermediary party. Such a role has been filled predominantly by Hong Kong, involving ocean and air transport, and in a more limited way by Macau.

Take for example the US in Figure I.2. The likelihood is that air cargo destined for America will be: 1. transported from Beijing and/or Shanghai, or 2. transported via Hong Kong. In the first instance, it may be transported (a) direct from Beijing, (b) direct from Shanghai, or (c) on one of the Beijing-Shanghai routes before being flown over the Pacific. There is indication that at least with China's domestic carriers, the third method seems to have the largest market share. We would venture to say that even at this point, neither Beijing nor Shanghai is generating enough business by itself. This is illustrated by the proximity of the two points in the diagram. In terms of physical distance, the two cities are surely distinct from each other but neither is self-sufficient as a node in the international network.

That neither Beijing nor Shanghai has attained enough critical mass, still deficient in both connectivity and frequency, may be seen by comparing each's international traffic with the world's major airports. Both airports presently have less than 50 routes to foreign cities whereas Frankfurt and the London airports in Europe and Bangkok, Hong Kong, Seoul, and Singapore all have more than 100.

There is yet another major method for mainland's air cargo to be transported to the US. In all likelihood, this is not air cargo originating from northern or eastern China. Hong Kong plays the role of a node between the mainland and the US. There are likely to be three types of mainland air cargo that use Hong Kong International Airport. First, Hong Kong is still the gateway to the southern China region. Southern China has played an important role in China's "Reform and Opening" and remains the most active economic development region in China in regard to international trade (40% of exports plus imports). While some cargo does get transported to and from Hong Kong by air, the major part is transported by land and river. Second, Hong Kong's airport is the node at which cargo from regions in the southwest such as Chengdu and Kunming gets connected to the major east-west routes or routes to Northeast Asia. Finally, Hong Kong's airport also serves to connect Beijing-Shanghai to the major east-west routes. Goods may be first transported from these two major airports of the mainland to Hong Kong before being flown over the Pacific. Only the first and third types of cargo flows are shown in Figure I.2. If Beijing or/and Shanghai is "big" enough, the third type of cargo flow will be very small.

We use the US as the example here, but it should be obvious that China's traffic with Germany and the other Western European countries follows a similar pattern. For Northeast Asia, there is probably less of a hub role for Hong Kong; cargo originating from northern and eastern China would not be hubbed through Hong Kong.

There is one final link in Figure I.2 not yet discussed and it pertains to Taiwan. In the fiscal year 2000, the throughput of Hong Kong's airport stemming from Taiwan amounted to about 290,000 tonnes with just about equal volumes going in opposite directions. In the inbound direction, the cargo should be destined for either southern China or the Beijing-Shanghai areas. Establishment of direct transport links between the two Chinese polities should first of all eliminate the intermediary Hong Kong in the latter cases as Taiwan cargo could then be transported to Beijing-Shanghai either by air or by a combination of sea and air links. Whether the intermediary can be completely displaced in the former cases will depend on the emergence or non-emergence of the Guangzhou airport and/or Shenzhen airport.

In Table I.6, we provide one set of guesstimates of mainland and mainland-related air cargo. "Mainland-related" air cargo refers to cargo loaded at HKIA that has originated in southern China and transported to that airport by land or river as well as cargo discharged at that airport that is to be transported to southern China by land or river. We think that such cargo still outweighs the air cargo produced by or destined for northern and eastern China that generally uses Beijing and/or Shanghai as its connecting nodes to Western Europe, North America, and North Asia. In the table, we have indicated mainland-related cargo to have a volume of about one million tonnes and mainland cargo proper a volume of about 0.8 million tonnes but we would not be surprised if the former is 2 to 3 times of the latter. In our judgement, there should be more mainland-related cargo transported in the outbound direction than in the inbound direction though it would be more difficult to make a judgement about such a balance with cargo at the Beijing-Shanghai airports.

It may have been the intention and policy of the mainland aviation authorities to have Guangzhou play the role of a third gateway to the international aviation network in the long run. But for now, that airport has been given rather limited international air traffic rights by CAAC, and has been eclipsed by the Hong Kong airport so that its international routes and traffic have fallen below what is warranted by its level of domestic traffic.

Table I.6. Guesstimates of the Distribution of Mainland's Air Freight Traffic, 2000, tonnes

	W. Europe, N. America, & North Asia	Taiwan	sub-total of the corresponding row
Beijing-Shanghai	800000	0	800000
Beijing-Shanghai via Hong Kong	40000	50000	90000 (based on Hong Kong data)
southern China via Hong Kong	1000000	240000	
sub-total of the corresponding column	1840000	290000 (based on Hong Kong data)	

We know more about commodities transported on international routes than on domestic routes. Cargo carried on international routes falls under international trade. This has to be reported to the customs departments of the trading countries. The limited data we have indicated that the following are the largest categories on China's international routes:

1. electrical equipment, sound recorders of reproducers, television image and parts;
2. pearls, precious, and semi-precious stones;
3. nuclear reactor, boiler and parts;
4. optical instruments and parts;
5. non-knitting apparel and clothing accessories;
6. knitting apparel and clothing accessories;
7. organic chemicals;
8. aircraft instruments and parts;
9. medicine; and
10. organic chemicals.

I.6 China and Its WTO Accession

For China's domestic economy, most goods are transported by rail, by river/sea, or by road. China's road infrastructure has been improved a lot. Table I.7, for instance, shows the composition of domestic transport activities, in terms of revenue passenger kilometers, in recent years. The average annual growth rate of road transportation in China was over 11% during 1980-2001, which is greater than the average annual growth rate of all modes of transportation (8.7%). As a consequence, road transport has noticeably become more important in intercity transportation: its proportion of passenger kilometers of all modes has increased from 32% in 1980 to 55% in 2001.

Table I.7. Modal Split in Domestic Transport in China (billion RPK)

Modes	1980	Ratio (%) 1980	1985	1990	1995	1998	1999	2000	2001	Ratio (%) 2001	Ann. Growth 1980-2001
Rail	138.3	60.6	241.6	261.3	354.6	369.6	404.6	441.5	463.7	36	5.93%
Road	73.0	32.0	172.5	262.1	460.3	594.3	619.9	665.7	720.7	55	11.52%
Water	12.9	5.7	17.9	16.5	17.2	12	10.7	10.1	9	1	-1.70%
Air	4.0	1.7	11.7	23	68.1	80	85.7	97.1	109.1	8	17.05%
Total	228.2	100	443.6	562.9	900.2	1063.7	1130.0	1226.1	1302.5	100	8.65%

Source: *China Transport Yearbook (2000).*

Notwithstanding the improvements, overall road infrastructure development in China has not kept pace with economic growth, especially in view of the need for developing an air cargo industry where cargoes are time-sensitive and high value-added (relative to the weight of the goods). The majority of China's public roads is Class III and IV (for speed not exceeding 60 kilometers per hour) and expressways are only a tiny proportion (less than 1%). This is in sharp contrast to the US and other developed economies where high-grade and high-speed roads have been an integral part of the development of the air cargo industry, in general, and of the integrated air express market, in particular.

However, China's more developed areas enjoy a much larger share of high-grade roads (Beijing, Shanghai, and Guangzhou gateways in particular). The long-haul road infrastructure in China has generally been improved significantly, and that there is little problem to deliver cargo from main cities to main gateways, Beijing, Shanghai and Guangzhou by truck.

In terms of demand for air cargo transportation, Just-In-Time (JIT) pressure have yet reached the level that would provide impetus for domestic air cargo operations on any significant scale. Few companies involved in international trade currently face acute JIT pressure, but a large majority of these are anyway located close to Beijing, Shanghai or Hong Kong and use predominantly road links to them to access international air cargo routes. In short, development of air cargo services across the interior of China is likely to be slow in developing, but in due course should become substantial businesses.

Table I.8. GDP and Composition of Air Cargo in China, 1993-2001

	GDP		Total Air Cargo		Cargo		Mail	
	Bn RMB	Ann. Growth (%)	Tons	Ann. Growth (%)	Tons	Ann. Growth (%)	Tons	Ann. Growth (%)
1993	3,463	-	733,387	-	681,865	-	51,522	-
1994	4,676	35	907,026	24	838,119	23	68,907	34
1995	5,848	25	1,313,690	45	1,225,943	46	87,747	27
1996	6,789	16	1,600,444	22	1,488,682	21	111,762	27
1997	7,446	10	1,853,47	16	1,757,975	18	95,772	-14
1998	7,835	5	2,160,378	17	2,056,709	17	103,669	8
1999	8,207	5	2,702,384	25	2,617,189	27	85,195	-18
2000	8,944	9	3,093,589	14	2,987,888	14	105,701	24
2001	9,593	7	3,392,759	10	3,273,484	10	119,275	13

Source: *China Transport Yearbook (2002).*

Table I.9. China's Air Cargo Carried by Hong Kong and Foreign Airlines, 1993-2001

	Total		Cargo		Mail		Luggage	
	Tons	Ann. Growth (%)	Tons	Ann. Growth (%)	Tons	Ann. Growth (%)	Tons	Ann. Growth (%)
1993	123,873	-	49,872	-	3,596	-	70,405	-
1994	145,998	18	58,162	17	3,457	-4	84,379	20
1995	220,904	51	116,826	101	4,307	25	99,771	18
1996	349,647	58	243,314	108	6,181	43	100,153	0
1997	449,194	28	331,488	36	4,612	-25	113,093	13
1998	507,276	13	373,984	13	14,436	213	118,856	5
1999	657,517	30	521,206	39	4,908	-66	131,402	11
2000	791,670	20	622,985	20	12,043	145	156,642	19
2001	648,197	-	636,219	2	11,978	-0.5	-	-

Source: *China Transport Yearbook (2001).*

The demand for aviation services changes with general economic growth, and has over the past decade generally grown at twice the GDP growth rate (Tables I.8 and I.9).

China's WTO entry should give a further boost to its cargo traffic. In 1999, China's market share of the world's trade was 4%. It is forecast that this figure will rise to over 6%, by 2005 after China enters the WTO.[5] Some observers are even more

[5] Salomon Smith Barney, "Industry Report: Asia Pacific," 9 November 2000.

optimistic on the positive impact of the WTO entry: China's share of world trade could grow to 7% by 2005.[6] Given the increased trading activities, lower import tariffs and lower non-tariff barriers, and upgrade in production to JIT manufacturing, China will see a significant increase in air cargo in the next 5-10 years.

I.7 China Aviation Development and Hong Kong

The Chinese domestic market will continue to enjoy increases in air cargo traffic thanks to strong GDP growth, strong export performance, higher personal disposable income, and the general opening of the market resulting from China's WTO entry. See Table I.10.

Table I.10. Major China Route Airfreight Growth Rates Forecast (%)

Sub-Market (Directional)	Average Annual Growth (%)			
	% of World FTK (1999)	1999-2009E	2009E-2019E	1999-2019E
Asia to China	0.82	7.7	5.7	6.7
China to Asia	0.78	5.4	4.8	5.1
Europe to China	1.11	7.2	5.5	6.3
China to Europe	2.85	7.3	5.4	6.4
North America to China	0.97	7.5	5.8	6.6
China to North America	2.94	7.6	6.6	7.1

Source: *Airbus Industries (Salomon Smith Barney, 2000).*

For comparison, the average annual growth rates estimated for the world total are: 6.1% for 1999-2009, 5.3% for 2009-2019, and 5.7% for 1999-2019. Thus, the Chinese market outpaces the world market. From the table, we also can see that the major markets are Europe and North America. Both markets had air cargo trade deficits with China in 1999. Since the WTO entry would see trade barriers (import tariffs) removed over a five-year period, the deficits are expected to fall.

With respect to major policy initiatives, CAAC announced in July 2000 that the aviation industry would undergo consolidation into three main groups, Air

[6] See "Hong Kong: An Air Transport Hub," a speech by Stanley Hui, CEO of Hong Kong Dragon Airlines at the <u>2000 Beijing Airport/Airline Operations Symposium</u>, May 2000.

China, China Southern Airlines (CSA) and China Eastern Airlines (CEA). The objectives of the consolidation are to build larger, more competitive and more efficient airlines to compete with foreign airlines after China's WTO entry. The latter will bring about a more liberal regime of international aviation for China, along with general trade liberalization.

Consolidation/merger leading to three mega-airline groups should be another driver for the Chinese airline industry. It is believed that CSA would benefit more than Air China and CEA from an improvement in the domestic market since it is the dominant player. Furthermore, CSA would have wider coverage and better economies of scale as a result of the consolidation.

In parallel with China's aviation liberalization and consolidation, Chinese mega-carriers will engage in more strategic alliances with major airlines in the world. This should further strengthen the Chinese airline industry and help foreign airlines penetrate into the Chinese market.

The impact of these developments on Hong Kong depends on various factors include Hong Kong SAR's aviation policy. On the positive side, a more liberal aviation regime should provide Hong Kong carriers more rooms to develop their businesses in the growing Chinese market. Also, stronger Chinese carriers may be more efficient in feeding traffic to Hong Kong which is the major regional air cargo hub. On the negative side, they could make the Chinese market more competitive (e.g. more foreign direct flights to China) and make Chinese carriers more efficient and possess more international route authorities. As a result, Chinese carriers will have enough capacity to fly directly so shippers, forwarders and airlines do not send their cargoes to Hong Kong for further distribution.

I.8 Remarks

We have given an overview of China's aviation network. The domestic air cargo market in the mainland is quite different from the international air cargo market. The former probably has less time-sensitive goods as the latter, owing to the still relatively low development stage in domestic industries and prevalent provincial/local trade barriers, and will for some time remain subservient to the domestic passenger market.

The domestic route network may be viewed as a tripod with the Beijing, Shanghai, and Guangzhou airports as the three major legs. The international network may be viewed similarly but Hong Kong replaces Guangzhou as the third leg, perhaps more by default than by design. The functional specialization between Hong Kong and Guangzhou is still evolving and will be influenced by both mainland and Hong Kong policies in the near term. Although Hong Kong itself remains a major source of cargo, its real significance rests largely on its success as a hub for cargo originating in its PRD hinterland. For such gateway traffic, HKIA faces competition from vicinity airports, namely, Macau, Zhuhai, Shenzhen, and Guangzhou. Based on the limited data we have, we have made the observation that as of yet Beijing and Shanghai still have a symbiotic relationship with each other and are not generating enough international traffic on their own. Between the two, Shanghai seems better positioned to attain a more self-sufficient role.

China's WTO entry should give a further boost to its cargo traffic. It is forecasted that China's market share of the world's trade will rise to over 6%, by 2005. Given the increased trading activities, lower import tariffs and lower non-tariff barriers, and upgrade in production to just-in-time manufacturing, China will see a significant increase in air cargo in the next 5-10 years.

Part II:

Emerging Business Opportunities and Managerial Strategy in the Air Cargo Industry in China: Before & After WTO

II.1 Introduction

After 14 years of negotiation, China had successfully joined WTO as a member since November 2001. The accession has induced many business opportunities for foreign companies, initiated swift regulatory re-alignments, and pushed towards trade liberalization. Clearly, these changes will affect the Hong Kong logistics industry.

China has played a significant role in world trade before WTO accession, and will no doubt continue to do so with wider impact to the world economy as a whole. In 2001, China's trade account for 3.85% of the world's total export and 3.93% of the world's total import (See Tables II.1 & II.2). These percentages are estimated to grow up to 6% by 2005.

Table II.1. Total Imports - World & China

Year	World Merchandise	World Commercial Services	World Total	China Merchandise	China Commercial Services	China Total	Share Merchandise %	Share Commercial Services%	Share Total %
1990	3,550,540	814,800	4,365,340	53,350	4,113	5,7463	1.50	0.50	1.32
1995	5238900	1194400	6433300	132080	24635	156715	2.52	2.06	2.44
1999	5912460	1367200	7279660	165700	30967	196667	2.80	2.26	2.70
2000	6710670	1457000	8167670	225090	35858	260948	3.35	2.46	3.19
2001	6441280	1443600	7884880	243610	39031	282641	3.78	2.70	3.58

Source : World Trade Organistion. Figures in USD million.

Table II.2. Total Exports - World & China

Year	World Merchandise	World Commercial Services	World Total	China Merchandise	China Commercial Services	China Total	Share Merchandise %	Share Commercial Services%	Share Total %
1990	3448160	783200	4231360	62090	5748	67838	1.80	0.73	1.60
1995	5122370	1190600	6312970	148780	18430	167210	2.90	1.55	2.65
1999	5699910	1379400	7079310	194930	26165	221095	3.42	1.90	3.12
2000	6430090	1465100	7895190	249200	30146	279346	3.88	2.06	3.54
2001	6155030	1458200	7613230	266160	32903	299063	4.32	2.26	3.93

Source : World Trade Organistion. Figures in USD million.

Note : Total Import = Merchandise Import + Import of Commercial Services
Total Export = Merchandise Export + Export of Commercial Services

The migration of production activities and the aggregation of Taiwan-based manufacturing plants especially in PRD and YRD have increased the necessity of cross-strait transport activities. Direct links between the mainland and Taiwan, not yet a reality, but will no doubt tip some existing trade balances. The establishment of direct links will create new opportunities in YRD, and further hasten the keen competitions between YRD and PRD. From the perspective of the forwarding industry in Taiwan, direct link can definitely reduce time and costs of transportation between two shores – apparent from the current roundabout to Hong Kong and Japan's outlining islands before reaching Taiwan with goods that originated from China. From another perspective, the Taiwan manufacturing economy might foresee a loss in production if the direct link is established. For the logistics industry, the migration of Taiwan-owned manufacturing outfits from PRD to YRD will take place in large scale if Hong Kong cannot maintain its edge with respect to airport facilities and IT support, serving as a hub to PRD.

At the same times, the phenomenon of international fragmentation will no doubt affect the production activity in China. International firms, to remain competitive, seek out countries that possess a comparative advantage in productive activities. As a result, China becomes the hinterland of major foreign countries - an emerging source nation of the world. Outsourcing of production blocks to countries like China creates new routes for the global logistics map. End-to-end logistics services must be integrated into the logistics industry in China. The demand for international service links in the form of distribution, logistics and transportation services will no doubt be increased.

We will see vertical integration of the logistics industry as the China logistics market grows. For example, The European parcel service, air freight and global air express provider, Deutsche Post World Net, expands its reach into other regions of the world. Such as the integration of Danzas, Deutsche Post Euro Express and DHL on April 1, 2003; subsequently the entrance into the U.S.A. market with a successful merger of the new DHL and Airborne Express (U.S.A.) on August 15, 2003. As a result of these integration maneuvers, DHL is now No. 3 in the U.S. express parcel delivery market, following UPS and FedEx. DHL already established a 50/50 joint venture with Sinotrans Ltd., China's leading transport and logistics firm. Deutsche Post World Net also has acquired 5% of Sinotrans Ltd. at its IPO on February 2003.

Nonetheless, we will discuss the air cargo industry in China after China's accession into the WTO from the ownership perspective. In this part, our objective is to provide a framework within which we could perhaps understand the industry a little better.

Enterprises in modern China started out being state-owned (that is, owned by the government, be they of national or regional responsibility). More recently, we have collectively-owned enterprises (owned by a group of people, typically belonging to a township or a village). At present, China also has quite a large population of privately-owned enterprises. If an enterprise has foreign ownership, they are Joint Ventures (JV). It is widely anticipated that many of these enterprises will some day take the form of share-holding in the future.

Currently, the output by privately-owned enterprise account for as much as 50% of China's Gross Domestic Product. In many industries, state-owned enterprises simply cannot compete with privately-owned or JV enterprises. It is well-known that state-owned enterprises are typically quite inefficient, incurring the kind of problems that a lack of market mechanism typically brings.

So, is this the case with the air-cargo industry? Is the industry currently dominated by privately-owned enterprises? If not, will State-owned enterprises gradually give way to privately-owned enterprises? With China's accession into the WTO, will foreign companies become a significant force in the industry? It is also well-known that regional interests have wielded considerable influence in the industry. Will such regional influence continue after WTO? In the ensuing sections, we will explore some of these issues.

II.2 Background - China's Air Cargo Industry before WTO

II.2.1 Dominated by of State-Owned Enterprises

Today, the air cargo industry in China is dominated by state-owned enterprises. The industry is considered as a strategic industry in China. It used to be referred to as a pillar industry. It has national security implications and it has long term economic impact. As a result, the industry is highly regulated and protected. Many elements of the industry also have their origins in the military.

Some example of such domination and protection:

- Three major airlines are still controlled by state-owned enterprises.
- Major airlines own cargo terminals in major cities such as Beijing and Shanghai.
- Foreign companies can only be minority owners in many logistics related sectors.
- Foreign companies cannot be class A forwarder.

II.2.2 Task Specialization of State-Owned Enterprises

It appears that to understand the air cargo industry, we need to understand the state-owned enterprises in this industry. The best place to begin would be China's State Council. Under the State Council, we find air cargo state-owned enterprises basically under two groups of offices (Figure II.1). The first group is ministries and commissions, where we find enterprises for trade and economic, transport, postal service, etc. The second group is simply referred to as offices under the State Council, where we have registry, civil aviation, & customs.

State-owned enterprises were established under the premise of task specialization, a concept dated back to the industrial revolution. If we specialize in a task, we have efficiency. Each state-owned enterprise is created to specialize in a mode, a region, or a specific air cargo service.

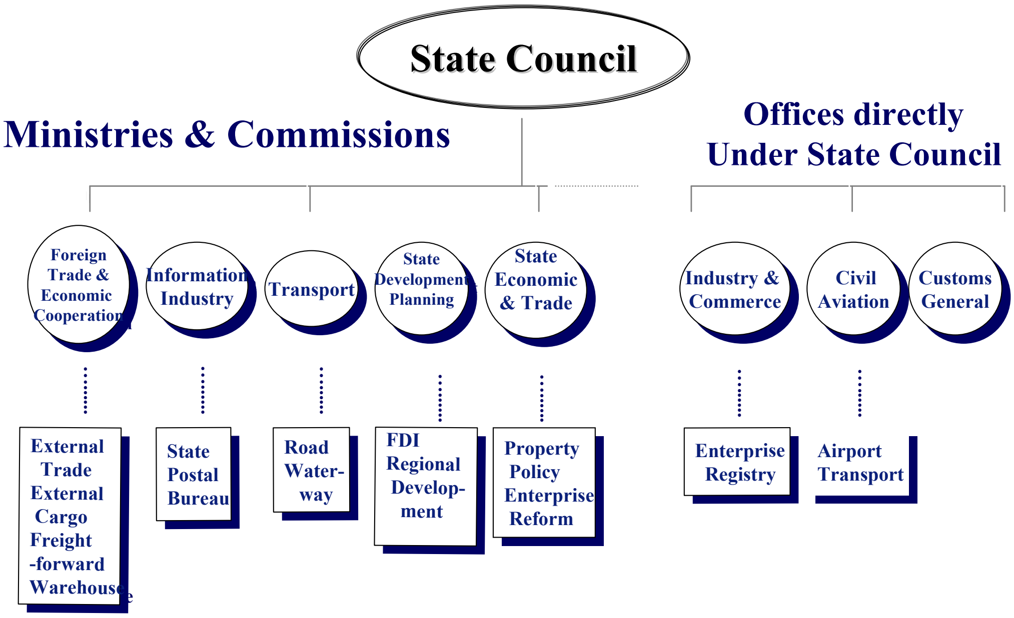

Figure II.1. Air Cargo Related Interests under the State Council

For example, a state-owned enterprise that is created to operate in freight forwarding would have little interaction with enterprises that specialized in aviation. Also a freight forwarding enterprise created to operate in a region such as Beijing would also have very limited interaction with a freight forwarding enterprise in another region such as Shanghai. This is task specialization at its best or at its worst, depending on how one views the situation. The original goal of task specialization is efficiency in the task itself. However, the over-emphasis on specializing on individual tasks has given rise to major problems in dealing with the entire air cargo logistics process. The problems are due to fragmentation.

II.2.3 Industry Fragmentation

Task specialization commonly breeds fragmentation. These fragmented and stand-alone enterprises have developed without consideration of each other. It is not uncommon to see difference practices or rules across different regions or modes or services.

And when cross-unit or cross-region problems exist, there is no effective central authority to solve such problems. There have been reports of meetings between different offices under the State Council, but they are of an ad hoc nature, and are unlikely to be effective.

There are no designated entities that are dedicated to solve cross-sectional problems or to make sure that the air cargo shipping process is smooth. This is a very important aspect as an air cargo shipment typically has to go through many modes of transport, travel across regions and are handled by a multitude of interests such as customs, bonded warehouse, etc. Without a regulating body to oversee the fragmented pieces, a smooth shipping process is not likely.

II.3 Integration of Air Cargo Logistics

To have a smooth and cost-effective air cargo logistics process, quite a bit of integration is needed. Both physical and information integration are vital. The integration has to cross different modes or services as well as across different regions.

Modern air cargo logistics requires the cooperation and collaboration of many industry agents (forwarding, trucking, warehousing, customs, terminal operators, airlines, and many other related service providers) as well as similar agents of different regions.

Also, with the trend of globalization and e-Business practices, the air cargo shipment process needs to be managed with effective information technology. The need to integrate the respective agents of an air cargo shipment process is unprecedented.

II.3.1 Alliances of State-Owned Enterprises - Cross-Ownerships

So, how are different fragmented state-owned enterprises integrated? State-owned Enterprises simply form alliances and partnerships with each other.

One can imagine the state-owned enterprises directly under the State Council as the "prime state-owned enterprises". Then we have a huge matrix of hybrids and hybrids of state-owned enterprises. They involve cross-ownership (own by state-owned enterprises across different regions, modes, and services).

And it is not uncommon to find a state-owned enterprises that have subsidiaries of partnerships along the air cargo logistics chain. Some examples of cross-ownership and vertical ownership are shown in Figures II.2 and II.3.

Enterprises	Ownership: Air	Road	Forward-ing	Ware-house	Trade
New National Express	✓	✓	✓	✓	✓
China Cargo Airlines	✓	✓	✓	✓	✓
Qingdao United Tian n Transportation	✓		✓		✓
Sinotrans Air Transportation Development	✓		✓		

Figure II.2. Cross Ownerships by Different Interests

Enterprises	Ownership: National	Province/ Municipality	City
New National Express		Beijing, Shanghai	Shenzhen
China Cargo Airlines	National	Beijing, Shanghai	
Qingdao United Tian n Transportation			Qingdao
Sinotrans Air Transportation Development	National		

Figure II.3. Cross Ownerships by Different Regions

II.3.2 Current Problems

Such forms of collaborations are merely cosmetic. There are no real integration in a structural sense. Insofar as information technology is concerned, China is still quite backward.

There are currently many initiatives to introduce e-Business platforms, e-Logistics standards, and internet-based customs process into the air cargo industry. But more importantly, these state-owned enterprises are highly protected and regulated that there simply is very little market mechanism in the industry.

Clearly, the industry lacks competition. The lack of central coordination and integration mechanism also allows regional monopoly or monopoly within a specific service to be developed. State-owned enterprises could have objectives other than profit making. It is quite typical to find inefficiencies such as poor consolidation and integration of shipments, and inadequate utilization and allocation of resource. Fragmentation and lack of integration also created huge problems in Customs; Customs in China is often considered as a major barrier towards modernizing the industry.

II.4 China Accession into WTO

The WTO spirit is to liberalize trading and distribution rights for foreign companies, to relax restrictions on services such as logistics, and to create opportunity for foreign investors in the air cargo industry. Figure II.4 shows the relevant WTO agreements. Clearly, foreign companies can assume majority ownership in forwarding and warehousing very soon (some of it is already happening). They can become wholely-own enterprises in the not too distant future (certainly no later than 3 and 4 years).

	Majority in Joint Venture	Wholly Foreign-Owned
	Within	Within
Road Transport Storage & Warehousing	1 yr	3 yr
Freight Forwarding Courier	1	4
Technical Testing s Freight Inspection	2	4
Rail Transport	3	6

Figure II.4. WTO Agreements on Transportation and Distribution Services

II.4.1 Airline Restructuring

WTO has provided major impetus for China to examine the competitiveness of their state-owned enterprises in many industries. Seemingly with the objective of becoming more competitive, the airline industry had recently undergone a major restructuring.

As a result, the airline industry, which previously has thirty plus airlines is now consolidated to have 3 major airlines: Air China, China Eastern Airlines and China Southern Airlines, based in Beijing, Shanghai and Guangzhou respectively. It has been speculated that the remaining airlines might form a consortium.

II.4.2 Separation of Regulating and Operating Business

Another new development is the separation of regulating and operating a business. Currently, the offices under the State Council both regulate and operate a business. There are clear conflict of interests. While China has deliberated such separation for a while, it is only recently that clear signals of such implementation are forthcoming. It is quite clear that China's accession into WTO has certainly sped up the process.

But implementing such separation is a major challenge. Some perplexing questions remain:

- Will the effort be complete and thorough?
- Can an industry which has been regulated and protected for so long opened up to fair competition?
- Can it be market driven?
- Will the industry be a level playing field?
- So, what is going to happen to the air cargo industry after WTO?
- What happen to those matrix of hybrid state-owned enterprises?

It is the opinion of some experts the process will likely be long and torturous. As an example of the kind of problems ahead, 3 different groups lay claim to have legitimate ownership of the new airport in Guangzhou. Even if the separation is successfully implemented, these enterprises are still state-owned enterprises. So, will there be implicit advantages in another form.

II.5 Remarks

II.5.1 Opportunities for Businesses to Invest in Integration Ventures

In examining the air cargo industry in China, the key irony appears to be that state-owned enterprises have task-specialized in an industry where integrating is equally as important if not more important.

It is clear that the state-owned enterprises have not done a good job in integrating air cargo shipments, individually and collectively. Their collaborations are based on convenience and competitions are largely non-existent because of a lack of market mechanism. This means that there should be a great deal of need and perhaps opportunity to develop integration, physically and with information.

With respect to physical infrastructure, China's major development has largely been centered around the major metropolitan areas. The transportation infrastructure beyond these major metropolitan areas remains very much undeveloped. Such inadequate infrastructure has created problems for distribution beyond those city limits. It also means that it is very difficult to form distribution networks of a comprehensive nature. The development of information infrastructure is somewhat analogous to the physical infrastructure in that such development is primarily limited to regional interests - again, major metropolitan areas. Even in these big cities, the use of information infrastructure is quite limited.

II.5.2 Regional interests continued to be reckoned with

Regional monopoly have developed and benefited from existing privileges on their own region. Integration among enterprises from different regions may tackle with different operational and regulatory obstacles first. The industry has experienced so much regional monopoly for so long. They have to be a force to be reckoned with. We think it will take a while for such monopoly to dissolve.

II.5.3 State-Owned Enterprises

As long as the air cargo industry remains a strategic industry, there will always be the presence of some form of state owned enterprises. I suppose we would expect to see quite a bit of consolidations in the hybrid state owned enterprises.

II.5.4 Joint Venture - may work this time

Under China's WTO commitments, most of the logistics-related sectors will allow the establishment of majority ownership joint ventures or wholly-owned firms according to sector-specific timetables. Starting from January 2004, Hong Kong companies may be able to provide 'integrated' logistics services or one-stop logistics services between Hong Kong and China. It is because the government of Hong Kong SAR has just signed the Closer Economic Partnership Arrangement (CEPA) with the Mainland government on 29 June 2003. CEPA is a Free Trade Agreement that goes beyond China's WTO commitments. Under the agreement, Hong Kong companies are offered a time advantage on forming joint venture or wholly-owned firms in the mainland over the rest of the world. And those foreign enterprises would have joint ventures with "strong" local partners, ones that are not just strong on paper. Shareholding will be the norm.

Part III: Air Cargo Policy

III.1 Introduction

There has been increased interest in the air cargo industry in Hong Kong in recent years. In his 1999 Policy Address[7] Mr. C. H. Tung, Chief Executive of the Hong Kong Special Administrative Region (SAR), said,

> *"To this end, we will implement a liberal policy for air cargo services so as to further develop Hong Kong into an international and regional air cargo hub. This, in turn, will create more jobs in the supporting service industries. A number of leading international air cargo carriers have expressed interest in expanding their operations in Hong Kong."*

The Asian financial crisis and China's increasingly integration with the world have been forcing a restructuring of the Hong Kong economy. Sectors such as real estate are in decline whereas sectors such as air cargo logistics fit in with existing strengths and may hold the potential for further development. The air cargo sector contributes to Hong Kong's external trade; though air cargo accounted for only 1% of all cargo handled by Hong Kong by weight in 2000, its value share was much higher at more than 26%. Aviation is also vital to travel and tourism which generates 6% of Hong Kong's GDP.

Hong Kong is already a major aviation hub in the world. Its airport handled 2.24 million tonnes of cargo and 32.1 million passengers in 2000, ranking it No. 1 for international cargo and No. 5 for international passengers in the global league of airports. It ranked second, after Memphis (Federal Express' base city), in terms of all air cargo handled. In Asia, it is the leading air cargo hub, outpacing Tokyo (Narita), Seoul, Singapore and Taipei.[8] Further, in the context of China's aviation, Hong Kong's air cargo volume is very large indeed: it is approximately treble that of the entire Mainland's international air cargo. Hong Kong is an aviation hub of China; and arguably, it is the most important air cargo hub at present.

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[7] Available at http://www.policyaddress.gov.hk/pa03/eng/index.htm.

[8] Recent discussions of Hong Kong's aviation industry can be found in Kwong (1988), Schwieterman (1993), and Law and Yeung (2002).

Hong Kong’s hub role should not be taken for granted, however. It is especially risky to think that the hub role may be maintained forever and exceptionally high growth rates will persist for a long time. After Section 2 describes industrial development in China, Section 3 discusses several important policy issues that Hong Kong is facing. Section 4 examines the impact of direct flights across the Taiwan Strait, and Section 5 focuses on regional coordination in the Pearl River Delta. Section 6 discusses the impact of the “Closer Economic Partnership Agreement.” Section 7 contains conclusion remarks.

III.2 Development in China and WTO Impact

Hong Kong’s air cargo sector is as much a part of China’s air cargo industry and route network as Hong Kong itself is a part of China’s trade and economic network. Hong Kong benefits from China’s economic development and acts as a major gateway for the country’s imports and exports. Thus, developments in China’s aviaition and air cargo industry will have a major impact on Hong Kong’s air cargo industry.

Three major events are currently driving changes in China’s aviation and air cargo industry: 1) the restructuring of its aviation industry; 2) the emergence of information technology and global “production fragmentation;” and 3) China’s entry to the World Trade Organization (WTO) in November 2001. Following the deregulation of its domestic aviation business in the 1980s, China has developed a highly fragmented airline industry with about two dozen carriers, some with only two or three planes. The resulting competition and overcapacity have brought financial losses to the industry, and have contributed to a drop in productivity. Having awoken to this undesirable state of affairs, the Chinese central government has started to restructure the industry. One of its measures is to consolidate the ten carriers under central government control into three large airline consortia, each with assets of about US$6 billion (RMB 50 billion) and fleets of more than 100 aircraft. The three consortia of Air China, China Eastern and China Southern will account for about 80% of flights inside China. It is believed that this consolidation would improve the competitiveness of China’s air cargo industry, and would thus pose constraints on the Hong Kong flow of China's international cargo, especially cargoes originated from, or destined to, central and north China.

The emergence of globally integrated, just-in-time production and distribution systems and the emergence of e-commerce and e-business over the last two decades have made air cargo in general, and air express in particular, the fastest-growth area in the cargo sector. Due to continuous declines in tariffs and other trade barriers, the international fragmentation of production, i.e., outsourcing various production blocks to countries that possess a comparative advantage in that productive activity, has become a dominant feature of globalization (e.g., Jones and Kierzkowski, 1990; Feenstra, 1998). This increases the demand for international service links in the form of transport services, and intensifies the search for a more efficient trade regime in international air cargo services. As a result, China's air cargo industry has had a tremendous growth over the last two decades, which is accompanied by fast developments in infrastructure such as airports, roads and telecommunications.

As part of its WTO accession, China has made substantial market access commitments covering the industrial, services and agricultural sectors. For example, in the Sino-US agreement, China has committed to lowering import tariffs on industrial products from 17.0% to 9.4% by 2005. Import quotas will be eliminated within five years of the WTO accession. For the first time, foreign companies will be given trading and distribution rights, phased in over three years after accession. In addition to industrial products, China has agreed to relax foreign investment restrictions on many important service industries, including distribution services, telecommunications, financial services, professional services and tourism. In freight forwarding, majority ownership in joint ventures will be allowed one year after accession, while wholly foreign-owned subsidiaries will be allowed within four years of accession. Foreign companies will no longer be obliged to undertake only international freight forwarding business. In most logistics sub-sectors, including storage and warehousing, express delivery and ground transportation, majority-owned joint ventures will be allowed one to two years after accession, while wholly-owned enterprises will be allowed in three to six years. So the accession will raise or maintain China's economic and trade growth, which will naturally benefit China's air cargo industry. It will also open more of the Chinese economy to foreign participation in transportation and logistics services, making these industry sectors more efficient and competitive.

III.3 Important Policy Issues

These developments post opportunities, as well as challenges, to Hong Kong's air cargo logistics industry. Since the changeover of sovereignty Hong Kong has been formally recognized as Chinese territory. Under the "one country, two systems" policy, it is governed as a SAR and remains a customs area separate from the Mainland. Hong Kong has air traffic rights that are quite different from those of the Mainland's cities. Air routes between Hong Kong and the mainland are neither "domestic" nor "international" but are grouped under the ambiguous category of "regional routes." To a large extent, Macau, the other Special Administrative Region, shares these similarities but Macau's air cargo sector is far less important than Hong Kong's.

III.3.1 Anomalous status in air traffic rights

One potential obstacle for Hong Kong to become a primary air cargo services hub for China is its anomalous aviation status. Routes to and from Hong Kong from international cities are controlled by Hong Kong's own aviation authorities but routes starting or ending in the Mainland's cities and which hub through Hong Kong are controlled by the CAAC in Beijing. This complicates the development of Hong Kong's hub role (Dodwell and Zhang, 2000). One complication is that Hong Kong can function in an environment of considerable ambiguity when deciding its international aviation policy. While governments elsewhere struggle to find a balance between their own producers and consumers (passengers and shippers), the SAR government has the additional headache of having to decide how to respond to Beijing's interests as well. The bilateral negotiations between Hong Kong and the US last summer may illustrate the complex countervailing pressures.

A further key issue is how air traffic rights will be assigned. At present, the Hong Kong-Mainland air services agreement makes no specific provision for dedicated air cargo services. As a result, air cargo is carried in the belly of passenger aircraft, and development is currently dependent on the development of passenger services linking Hong Kong with mainland cities. Since the only Hong Kong-based airline with extensive air traffic rights on the Mainland is Dragonair, development will largely come from mainland carriers serving the Hong Kong hub unless such rights are renegotiated. But most mainland carriers are still not competitive either regionally or globally. As manufacturers spread further into China's interior, they may consider a shift from surface to air transport to ensure timely delivery to international markets. Thus, it will be imperative for Hong Kong to ensure it has comprehensive rights to carry air cargo between the SAR and key business hubs throughout China's southern provinces. Otherwise, as factories are established in more distant provincial cities, they may prefer to uplift cargo to Shanghai or to other airports in mainland China (Dodwell and Zhang, 2000).

III.3.2 "One route, one airline" policy

Hong Kong has adopted a "division of the world" policy since the mid-1980s, with Dragonair servicing the Mainland and Cathay Pacific servicing the rest of the world. The policy has meant the designation of a single Hong Kong-based carrier – referred to as "single designation" – to each exclusive region, so it is also referred to as the "one route, one airline" policy. The original intent of the policy was to prevent the two Hong Kong carriers from competing with each other. Given the tremendous growth of the Hong Kong market since the mid-1980s, the "one route, one airline" policy needs to be reviewed. The arrangement is cumbersome for passengers and shippers. For example, if a traveler has to visit both Hong Kong and another destination on the Mainland, Cathay is simply not a most convenient option. He or she will have to use Dragonair or other airlines for the second leg of the journey from Hong Kong. The similar case applies to Dragonair. This interline connection negates the locational advantage of Hong Kong carriers when they try to compete effectively in international markets. Airlines in Australia, Europe and North America have already established their footholds on the mainland, whereas those in Southeast Asia, especially Singapore, Malaysia and Thailand, have also been gearing up their efforts to set up closer links with China.

The trading community and freight forwarders seem to favor changing the policy. If this happens, cargo arising from trade between China and other countries passing through the Hong Kong hub could be handled by a single Hong Kong carrier, rather than the current cumbersome Cathay Pacific-Dragonair (or other airlines) combination.

It is noted that the "division of the world" policy has been undermined by recent "multiple designations." Cathay Pacific has just been granted regulatory approval to operate limited flights between Hong Kong and three mainland cities, while making some concessions by opening up its routes to cities in Taiwan, Thailand, Japan, Malaysia, Bangladesh and Cambodia to Dragonair. However, the Government has not stated explicitly whether it is giving up its original policy and has not indicated what policy it intends to install in its place.

III.3.3 Customs

Customs administrations perform two basic functions: trade facilitation, and customs control (e.g., prevention of the infiltration of illicit drugs or other hazardous substances, protection of intellectual property rights, and tariff collection). Historically, tariff collection (revenue-raising) was the major function. As tariff barriers come down, customs revenue-raising function diminishes in relative importance. While continuing to fulfill their legal duties, customs administration has increasingly become an important device in facilitating trade.

For developing countries like China, revenue-raising remains the main function of customs. The consequential documentation requirement and tariff payment procedures would add to pickup and delivery times for air cargo. In the longer run, however, as tariff barriers come down, the tariff-collection function will be diminished in relative importance. As the role of customs administrations evolves more towards trade facilitation, the focus will be on how to improve the speed of goods and services across borders. Indeed, China is making important changes with respect to customs import and export regulations (see, e.g., Yin, 2002; Ruo, 2002). As a consequence, its customs is expected to rely more on pre-clearance of shipments, scanning of source documents such as air waybills, and greater utilization of risk management techniques for targeted examinations and audits. All those developments will have a positive impact on future growth of air cargo in China.

In the short run, however, many changes are taking place in the transition including: changes in tariff rates of thousand items; changes to many historical procedures; adoption of IT; reviews of national customs legislation and legislative amendments; and organizational changes.

It is not an easy job for the customs and related parties to smoothly manage the transition from historical to new procedures. Managing these changes is likely to introduce some adjustment costs. Thus, the positive effect of customs reform on China's air cargo sector in the short run may not be as high as that in the long run.

Hong Kong is a duty free port so revenue-raising is not the customs' main function. Only cigarettes, alcohol, hydrocarbon oil and industrial diesel are subjected to excise duty. The customs clearance procedure is much simpler as compared to China or even to such tariff ports as Canada, Australia, and the US. It acts mainly as an invigilation so as to ensure compliancy with the international requirement (e.g., licenses control, safety control). In comparison to the Mainland, Hong Kong relies much more on pre-clearance of shipments, scanning of source documents such as air waybills, and greater utilization of risk management techniques for targeted examinations and audits. Nonetheless, air cargo integrators, airlines and a number of heavy cargo handlers have considered Hong Kong's time-consuming customs clearance procedures as a key constraint on development of the hub either for air express services or for air cargo transshipment. For instance, frequent unfavorable comparisons were made with Singapore, where transshipment goods avoid customs by being held in a bonded zone during transfer.

Over the last several years Hong Kong has taken steps to tackle this competitive challenge. The recent removal of separate export/import licensing for transshipments has simplified Hong Kong's customs procedures. A new system called "Air Cargo Clearance System" (ACCS) has been adopted by HKIA since July

1998. ACCS, a tailor-made computer system owned by Hong Kong Customs, provides a common platform for direct system interface and electronic communication between Hong Kong Customs and the seven air cargo operators at HKIA. Airlines can submit electronic cargo data of their flights to ACCS via the computer system of the respective air cargo operators. Several special features of ACCS simplify the cargo clearance process and shorten clearance time.

In handling air-land transshipment, HACTL launched a "SuperLink China Direct" scheme in August 2000. The scheme facilitates the movement of air-land transshipment cargo from HKIA to the mainland via Lokmachau Control Point. By September 2002, 14 new destinations in the PRD were added to existing air-road connection network of Guangzhou Baiyun Airport, Shenzhen Airport and Huangpu Free Trade Zone. Simultaneously, handling sea-air transshipment cargo between the PRD and HKIA offers an alternative to road transport. Hong Kong Cargo Industry Services, HACIS, a subsidiary of HACTL, formed a joint venture with Chu Kong Air-Sea Union Transportation Company (CKSA), named Marine Cargo Terminal (MCT). MCT is capable to provide sea links to 16 ports in the PRD.

HACTL submits the paper manifest together with supporting documents to Customs and Customs will provide one-stop clearance services. If Customs action is required, the cargo will be cleared at HKIA. After clearance, the cargo will be loaded onto the designated truck with security seal and the cargo will not be cleared again at the Lokmachau Control Point if the seal is found intact.

HACTL and Hong Kong Airport Authority have just formed a joint venture on October 2003. The new logistics center will be operated at Shenzhen Futian Free Trade Zone, which locates one kilometer from the Lokmachau Control Point. The center is targeted at link up the cargo transport between HKIA and PRD. It will shorten the transit time by adopting customs pre-clearance, bypassing the consolidation process in Hong Kong and transporting the cargo to airport.

III.4 Direct Flights across the Taiwan Strait

Taiwan is the wild card that may affect Hong Kong's hub role in dramatic ways. Part of the recent increase in Hong Kong's hub air cargo flows can be attributed to the hi-tech and electronics industries which are starting to develop in Shanghai and Beijing. A large part of these industries has Taiwan origins. Many of the components and intermediate inputs have to be flown from Taiwan via Hong Kong to these cities in the mainland. The finished products are then connected to the three main trunk lines either directly from Shanghai and Beijing or via Hong Kong. In 2000, the throughput of Hong Kong's airport stemming from Taiwan amounted to about 290,000 tons with just about equal volumes going in opposite directions.

Shortly after China entered the WTO, Taiwan too joined the WTO. Taiwan has committed to lower its average tariff rate from 8.2% to 5.5% upon WTO accession. Together with a more relaxed regime of imports from the mainland, there will be more trading opportunities. Taiwan government also announced a change in its "no haste, be patient" policy, implying that the ban on direct links with the mainland may be relaxed.

Trade between Taiwan and the mainland grew in double digits annually in the 1990s. Intra-industry trade in electronics and machinery is the largest component in the cross-strait trade: In 2000, electronics and machinery represent 40% of the mainland's exports to Taiwan, and 46% of Taiwan's exports to the mainland. The absence of direct air links across the Taiwan Strait presents a great obstacle to this growing bilateral trade. All air cargo is still required to stopover in at least one of the airports, called "transit airports," in a third country or a special administrative region (such as Hong Kong or Macau) prior to entering the border on either side. Currently, Cathy Pacific, Dragonair, China Airlines and Eva Airways are the major airlines serving the Taiwan–mainland market. They compete with the major express couriers FedEx and UPS. Hong Kong is the exclusive transit airport for Cathy Pacific, Dragonair, China Airlines and UPS, while both Hong Kong and Macau serve as the transit airports for Eva Airways. FedEx uses its Asia–Pacific regional hub in Subic Bay as the transit airport. In February of 2001, FedEx scheduled two round-trip flights of Beijing–Shanghai–Subic Bay and Subic Bay–Taipei, with the inbound flights to Taipei stopping over at Kaohsiung to unload southern Taiwan packages (Lin and Chen, 2003).

Whilst FedEx and UPS fly all-cargo freighters, airlines utilize mainly the belly space of scheduled passenger flights. In the mainland-Taiwan market, Cathay Pacific flies between Hong Kong and Taipei, while handing over its shipments exclusively to Dragonair for the Hong Kong-mainland leg. Dragonair flies out of Kaohsiung airport using the available belly space on scheduled passenger flights. At HKIA, connections are made to Dragonair's extensive air passenger network in the mainland. Dragonair has also scheduled one round-trip weekly 747 freighter between Hong Kong and Shanghai, with two additional flights under planning.

At present, the majority of the cross-strait trade that re-exports or tranships through Hong Kong is destined for or originated from the Pearl River Delta, and is unlikely to experience drastic change after direct transport links – or san tong – between the two cross-strait polities are established. The other part of Taiwan-related air cargo is destined for or originated from the Beijing-Shanghai areas. In the inbound direction, the cargo was destined for south China and the Beijing-Shanghai areas. Establishment of direct links should in due course eliminate Hong Kong's role as a hub between Taiwan and Beijing-Shanghai.

Aside from Taiwan-related cargo, there are likely to be two further effects to direct links. They will lower transport costs between the two polities and hence facilitate better specialization between them. These will probably enlarge the economic pie and stimulate trading activities significantly. Direct links are likely to facilitate establishing Beijing and Shanghai as fully-fledged hubs in the mainland's aviation network. Aside from their own routes and flight frequencies, travellers and cargo at these two airports may henceforth make connections to the main trunk lines at Taipei as well. The scale effects of this cluster will be large. Taiwan-related traffic may not be the only traffic Hong Kong will lose. The new cluster of airports, namely, Beijing, Shanghai and Taipei, will more likely than not limit Hong Kong's hub traffic. A priori, we will not be able to tell whether the latter replacement or substitution effect will be stronger than the first income effect.

III.5 Regional Coordination in the Pearl River Delta

A significant amount of air cargo that flies out via Hong Kong comes from the Pearl River Delta (PRD). Likewise, a significant amount of inbound Hong Kong air cargo goes to the many sub-regions of PRD. That is, the Hong Kong air cargo industry serves many factories in PRD either in terms of being sources or destinations. As of today, very little is known regarding the areas that the Hong Kong air cargo industry serves. With China's accession into the WTO, the PRD is likely to continue as a predominant manufacturing region of the world. A study that can capture the changes in the air cargo service areas would provide a great help to understanding the true hinterland for Hong Kong air cargo.

Another important policy issue is the coordination of the PRD airports. There are five major airports in Greater PRD: Hong Kong, Guangzhou, Shenzhen, Macau and Zhuhai. Macau and Zhuhai are located in the west bank of the PRD. Since most manufacturing activities are in the east bank, both have a small catchment area. In 2001, the two airports together handled 84,000 tons of airfreight, accounting for only 3% of total airfreight handled in the Greater PRD. With Macau specializing in Taiwan routes, the prospect of direct flights between Taiwan and the mainland might further adversely affect its cargo potential. On the other hand, the construction of the Hong Kong-Zhuhai-Macau bridge will stimulate the development of Zhuhai and Macau, positively affecting their cargo potential. Shenzhen does have an overlapping catchment area with Hong Kong, and is closer to many manufacturers than HKIA. Its cargo throughput almost tripled between 1995 and 2001, and has grown much faster than HKIA's: Shenzhen handled 5.4% of HKIA's air cargo volume in 1995 but 10.7% of HKIA's volume in 2001.

Guangzhou handled about 22% of HKIA's air cargo volume in 2001. Like Shenzhen, Guangzhou is in direct competition with Hong Kong for air cargo originating from and/or destining to south China. Whilst Shenzhen will likely compete with HKIA for specialized or niche markets in the near to medium term, the new Guangzhou airport potentially is a much more serious competitor to HKIA, especially in medium/long term.[9] This is because it is a new airport with much enhanced cargo facilities, and it has a good geographic location with a sizable catchment area. Guangzhou is the base of China Southern Airlines, which is considered as the most competitive large Chinese airlines and has seen double digits growth in air cargo since 1995. Direct flight services are available to most major domestic cities.

It might have been the intention and policy of the mainland aviation authorities to have Guangzhou play the role of a third gateway (after Shanghai and Beijing) to the international aviation network in the long run. But, for now, that airport has been given rather limited international air traffic rights by the CAAC, and has been eclipsed by the Hong Kong airport so that its international routes and traffic have fallen below what is warranted by its level of domestic traffic. With the impending emergence of the new Guangzhou airport, the air cargo would certainly benefit from a clear depiction of the kind of collaborations and synergy that should be conducted between the airports. At the same time, it would change the competitive environment in the region. As indicated earlier, although Hong Kong itself remains a major source of cargo, its real significance rests largely on its success as a hub for cargo originating in its PRD hinterland.

We also see a need to examine this cooperation-competition interaction in a multi-airport setting. Here, on one hand, departing passengers and cargo shippers have the opportunity to choose between multiple departure airports in Greater PRD. The choice between departure airports would be based on flight characteristics (airfare, frequency, etc.) but also on airport characteristics (access time, distance and transportation cost, cargo handling capability, and customs procedures and clearance, etc.). On the other hand, the role of an airport also depends on airlines' strategy, e.g., their hubbing strategy for designated airports, which would depend

[9] Construction of a new international airport in Guangzhou is under way, and the first phase is planned for completion in 2004 when the airport will be in service. The passenger capacity would be 25 million and the cargo capacity would be 1 million tons per year, both of which would more than double the current capacities. The area covered by the new airport is more than four times that of the existing airport, suggesting large potential for further expansion. In effect, its eventual design capacity is with HKIA and Shanghai Pudong International Airport.

on airport charges and other costs, international as well as domestic air traffic rights, and other quality aspects of competing airports. Taken together, this suggests an airport and airline choice model needs to be developed to investigate both airport competition and airline competition in an overlapping area with multiple departure airports. Such a model would then be applied to Greater PRD for predicting the future roles of different airports in handling the region's air cargo. The multiple-airport experience of other regions, such as three airports in the San Francisco Bay Area (Oakland International, San Francisco International, San Jose International), four airports in London are (Heathrow, Gatwick, Stansted, Luton) and even regional airports in West Europe (Amsterdam, Brussels, Frankfurt, Paris), need to be examined and benchmarked.

For Hong Kong, both the quality and speed of access to manufacturers in the PRD and the rest of the mainland are important inter-modal concerns. However quickly air cargo can be moved from Hong Kong into the hands of a buyer in distant markets, little competitive advantage is gained if time is lost in getting goods to or from a factory in the Pearl River Delta. Historically, significantly more time has been spent in moving cargo from a factory to the Hong Kong airport than has been used on the onward air journey. It is not uncommon for goods to take 4 or 5 days to move from factory gates in the Pearl River Delta to take off from Chek Lap Kok. Insofar as buyers increasingly demand high-speed delivery of products or components, this time "lost" could constitute a significant competitive constraint. Hong Kong's future as a key air cargo hub for just-in-time supply chain management will therefore depend on success in speeding inter-modal transport by land, sea or air between Chek Lap Kok and factories in the Pearl River Delta.

An important component of this inter-modal network is the road network. Road links have been greatly improved with the completion of Guangzhou-Shenzhen Expressway and numerous locally-funded highways such as the Shenzhen-Shantou Expressway. The Humen Bridge which connects the GZ-Shenzhen Expressway with the Guangzhou -Zhuhai Expressway is in operation. The Guangdong authorities plan to build a network of twenty-five major roads linking major cities of the province with Hong Kong and Macau. Major Expressways in PRD include: Foshan-Kaiping, Guangzhou-Foshan, Guangzhou-Qingyuan, Guangzhou-Sanshui, Guangzhou-Shenzhen, Guangzhou-Zhuhai, Shenzhen-Santou, Huizhou-Yantian.

The expressways are merely one of the components. Decision makers in the air cargo industry need to have a comprehensive picture of the ground logistics infrastructure in this region, including: 1) the major air cargo flow into Hong Kong, 2) the amount of transport time, and 3) the respective costs of individual routes. Alternative routes of competitive advantage will soon be available to the freight transport industry. Potential impact of these changes in the transport process pattern in the PRD region needs to be investigated.

In addition, streamlining the customs clearance procedures across the Hong Kong-PRD boarders is extremely important for Hong Kong to remain as the preeminent air cargo gateway for south China. As China becomes a member of the WTO, its customs clearance procedures will soon be streamlined to match the growing import/export activities in the PRD region. In effect, efforts have been already made, and here is an example. At the beginning of 2001, Guangdong province, following the suggestions/proposals of business communities in Hong Kong and the PRD region, introduced a new customs system for vehicles coming overland. Cross-border trade in Guangdong has been developing rapidly for the last decade. A significant portion of such trade is part of Hong Kong air cargo flows. In fact, about 78% of Hong Kong air cargo business is traffic originating from, and/or destining to, the PRD region. About 25 thousand trucks cross Guangdong-Hong Kong borders each day and the figure is increasing by 15 to 20 per cent each year. In the past, trucks coming from Hong Kong had to be inspected at every customs checkpoint they passed before reaching their destination. Now firms can use a 24-hour computer system to make their customs declarations rather than having to renew their declarations at every checkpoint they pass. The 12-step customs procedure has also been reduced to five. Cars are also scanned electronically and drivers no longer need to stop to be checked. Customs transfer, a job that used to take more than an hour to complete, has been reduced to a two- or three-minute process. The reform has greatly increased the customs' efficiency and boosted the province's cross-border trade.[10]

III.6 CEPA and the Impacts on Future Air Cargo in Hong Kong

The Chinese mainland and Hong Kong signed the Mainland-Hong Kong *Closer Economic Partnership Arrangement* ("CEPA") on 29 June 2003, which will be implemented from 1 January 2004. Under CEPA the Mainland will eliminate most tariffs on imports from Hong Kong's manufacturing sector and allow Hong Kong's service providers greater privileges on the Mainland than their rivals from elsewhere around the world. More specifically, the Mainland will apply zero tariff for imports meeting the CEPA Hong Kong origination rules for some 273 types of goods, which cover 90% of Hong Kong export items, and will apply zero tariff at the latest by 1 January 2006 for other goods meeting the CEPA Hong Kong origination rules. Neither side will apply any non-tariff measure that is inconsistent with WTO rules to goods imported and originated from other side.

Given the existing mix and pattern of trade through Hong Kong, a significant trade/air cargo creation effect is not expected in the short term, nor will CEPA significantly impact customs procedures and clearance time. This may be seen from the following research results, quoted from HKTDC (2003),

> *"In 2002, Hong Kong's domestic exports to the Mainland amounted to US$5.3 billion, of which US$1.6 billion (30.8%) were consumed in the Mainland market, the rest being shipped back to Hong Kong after processing under the outward processing arrangement (OPA). Even within the US$1.6 billion non-OPA exports, the majority might also be exempted from tariff when imported into the Mainland as they are*

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[10] Parallel to this cross-border vehicle traffic is the cross-border river traffic, though the latter is much smaller in overall traffic volume than the former. New customs procedures announced recently will dramatically enhance the flow of such river trade between Hong Kong and PRD. The initiatives would include electronic submission of cargo manifests, allowing river vessels to bypass customs. Random inspections would take the place of mandatory checks. At present, about 400 to 600 vessels from Hong Kong have to drop anchor at Dachan every day to report and declare to customs.

deemed to be machines and intermediate goods required for the purposes of export processing. Only a small share of Hong Kong's domestic exports at present is believed to have been sold to Mainland end users and is therefore likely to benefit from CEPA.

Among the Mainland's 2002 imports of Hong Kong products that are covered by CEPA, the majority were industrial goods, including parts and accessories of electrical equipment and AV products (20.7%), textile yarns and fabrics (20.0%), plastic materials (11.6%), metal sheets and strip (6.6%). For consumer products, the major categories included in the CEPA zero tariff product list are cosmetic, garment, jewellery and watches. However, apart from garments which accounted for 13.9% of CEPA-related Hong Kong exports to the Mainland in 2002, other related domestic exports were very small."

The main effect of CEPA seems to be on the trade in services when seventeen service sectors will be liberalized. Indeed, Hong Kong companies can set up wholly-owned enterprises on the Mainland after 1 January 2004 to provide trade, logistics, freight forwarding, storage and warehousing, road freight transport and maritime transport services. This means that under CEPA, Hong Kong companies are permitted to provide direct non-stop road freight transport services between Hong Kong and each province on the Mainland. Since there is no time frame on when wholly-owned foreign enterprises can be established to provide integrated logistics services, CEPA represents a breakthrough for Hong Kong companies to penetrate the market. All these will likely exert an indirect but significant effect on trade (imports and exports) through Hong Kong.

In addition to the overall positive effect of CEPA, the recent developments in China (e.g., WTO entry, customs reform) will imply more international trade and more air cargo. The increased economic and trading activities will benefit Hong Kong as Hong Kong is a leading gateway linking China and the rest of the world. At the same time, there are also challenges. For example, as China improves its customs regulation and operation, more air cargo may go through the Mainland's gateways

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Inspections are done manually and often add several hours to each leg of the journey. See "Open gates boost river trade," *South China Morning Post*, 15 May 2002.

such as Shanghai, Beijing and Guangzhou. A countering force to this is that some of the manufactures may consider moving back part of their facilities to Hong Kong. Similarly, traders may move their operation bases to Hong Kong.

This last point has some implications for free trade zones and bonded cargo zones. In China, the five Special Economic Zones, open cities, and free trade zones may offer preferential duty reduction or exemption. Goods that stay in bonded cargo zones are duty free and may avoid customs. The regional economic integration discussed above will in general compress the existing circumstances of free trade zones. Under CEPA, the permission of Hong Kong-based companies doing foreign trade may undermine or weaken the preferential policies offered by bonded zones. Furthermore, bonded zones may lose investors if they turn to Hong Kong.

III.7 Concluding Remarks

- Hong Kong is arguably the most important air cargo hub at present, but the hub role should not be taken for granted. It is especially risky to think that the hub role may be maintained forever and exceptionally high growth rates will persist for a long time.

- Developments in China's aviation and air cargo industry will have a major impact on Hong Kong's air cargo industry. Three major events are currently driving changes in China's aviation and air cargo industry: 1) the restructuring of its aviation industry; 2) the emergence of information technology and global "production fragmentation;" and 3) China's entry to the WTO. The developments would pose both opportunities and challengers to Hong Kong's air cargo industry.

- One potential obstacle for Hong Kong to become a primary air cargo services hub for China is its anomalous aviation status. Routes to and from Hong Kong from international cities are controlled by Hong Kong's own aviation authorities but routes starting or ending in the Mainland's cities and which hub through Hong Kong are controlled by the CAAC in Beijing. This complicates the development of Hong Kong's hub role.

- One complication is that Hong Kong can function in an environment of considerable ambiguity when deciding its international aviation policy. While governments elsewhere struggle to find a balance between their own producers and consumers (passengers and shippers), the SAR government has the additional headache of having to decide how to respond to Beijing's interests as well.

- A further key issue is how air traffic rights will be assigned. It will be imperative for Hong Kong to ensure it has comprehensive rights to carry air cargo between the SAR and key business hubs throughout China's southern provinces. Otherwise, as factories are established in more distant provincial cities, they may prefer to uplift cargo to Shanghai or to other airports in mainland China.

- Given the tremendous growth of the Hong Kong market since the mid-1980s, the "one route, one airline" policy needs to be reviewed. The arrangement is cumbersome for passengers and shippers. Although the policy has been undermined by recent "multiple designations," the Government has not stated explicitly whether it is giving up its original policy and has not indicated what policy it intends to install in its place.

- China is making important changes with respect to customs import and export regulations (see, e.g., Yin, 2002; Ruo, 2002), which will have a positive impact on future growth of air cargo in China. In the short run, however, managing these changes is likely to introduce some adjustment costs.

- Over the last several years Hong Kong has taken steps to improve its customs clearance procedures and to use the IT extensively.

- Taiwan is the wild card that may affect Hong Kong's hub role in dramatic ways. At present, the majority of the cross-strait trade that re-exports or transships through Hong Kong is destined for or originated from the Pearl River Delta, and is unlikely to experience drastic change after direct transport links – or san tong – between the two cross-strait polities are established. The other part of Taiwan-related air cargo is destined for or originated from the Beijing-Shanghai areas. Establishment of direct links should in due course eliminate Hong Kong's role as a hub between Taiwan and Beijing-Shanghai.

- Aside from Taiwan-related cargo, there are likely to be two further effects to direct links. They will lower transport costs between the two polities and hence facilitate better specialization between them. These will probably enlarge the economic pie and stimulate trading activities significantly. Taiwan-related traffic may not be the only traffic Hong Kong will lose. The new cluster of airports, namely, Beijing, Shanghai and Taipei, will more likely than not limit Hong Kong's hub traffic. A priori, we will not be able to tell whether the latter replacement or substitution effect will be stronger than the first income effect.

- As of today, very little is known regarding the areas that the Hong Kong air cargo industry serves. A study that can capture the changes in the air cargo service areas would provide a great help to understanding the true hinterland for Hong Kong air cargo.

- Another important policy issue is the coordination of the PRD airports. Whilst Shenzhen will likely compete with HKIA for specialized or niche markets in the near to medium term, the new Guangzhou airport potentially is a much more serious competitor to HKIA, especially in medium/long term. With the impending emergence of the new Guangzhou airport, the air cargo would certainly benefit from a clear depiction of the kind of collaborations and synergy that should be conducted between the airports. At the same time, it would change the competitive environment in the region.

- We also see a need to examine this cooperation-competition interaction in a multi-airport setting. The multiple-airport experience of other regions, such as three airports in the San Francisco Bay Area (Oakland International, San Francisco International, San Jose International), four airports in London are (Heathrow, Gatwick, Stansted, Luton) and even regional airports in West Europe (Amsterdam, Brussels, Frankfurt, Paris), need to be examined and benchmarked.

- For Hong Kong, both the quality and speed of access to manufacturers in the PRD and the rest of the mainland are important inter-modal concerns. An important component of this inter-modal network is the road network. In addition, decision makers in the air cargo industry need to have a comprehensive picture of the ground logistics infrastructure in this region, including: 1) the major air cargo flow into Hong Kong, 2) the amount of transport time, and 3) the respective costs of individual routes.

- Streamlining the customs clearance procedures across the Hong Kong-PRD boarders is extremely important for Hong Kong to remain as the preeminent air cargo gateway for south China.

- Given the existing mix and pattern of trade through Hong Kong, a significant trade/air cargo creation effect is not expected in the short term following the CEPA. The main effect of CEPA seems to be on the trade in services when seventeen service sectors will be liberalized.

- Under CEPA, the permission of Hong Kong-based companies doing foreign trade may undermine or weaken the preferential policies offered by China’s free-trade and bonded zones. Furthermore, bonded zones may lose investors if they turn to Hong Kong.

Part IV: IT Infrastructure Needs

IV.1 Introduction

In this part, we will examine the IT infrastructure needs of the Hong Kong air cargo industry with respect to WTO accession and direct links. Specifically, we will study the following topics:

- Global standards of air cargo logistics – Standards are good for guiding smooth information flow between agents, yet there are many standards to follow. Some discussion on current landscape of standards will be provided, and the organizations that oversee the development and maintenance of these standards. The Web brings another dimension to the standardization process.
- Requirement on IT infrastructure – A survey of current IT communication infrastructure of China, Hong Kong & Taiwan will be given. This information provides a view of the IT readiness of each country to handle the increase in trade as a result of the direct links and international access to these markets, and to facilitate e-commerce and e-business of the industry.
- Web-based air cargo logistics network – A global network to provide agents of the air cargo industry to operate should be considered. Some implications from the proposed DTTN will be discussed.
- Competition between regional and international 3rd party logistics providers – The regulatory investment guidelines of China lead regional and international providers to situate themselves in the open market. Some views are provided on this matter.

IV.2 Global Standards for Air Cargo Logistics

As technology continues to enhance the efficiency of logistics information flow, focus is now fixed on achieving interoperability among agents of the communities. To understand better the complexity of information exchange in air cargo logistics, we would study current global standards that are used in practice. We will characterize the standards with respect to coding, messaging, and delivery. Moreover, the security of the information is also a main concern of many agents when they are required to transact in an electronic environment. Security concerns are both of the information secrecy and integrity. In the following sections, we will present a brief introduction to standards and its standardization process. We will identify both the organizations that developed and maintained these global standards. Some key standards will be discussed. The trend of global standards development is now concentrated on its interoperability and operability in the Web environment.

In an electronic environment where logistics transactions are enabled, and as agents are conducting these commerce activities online, standards guide systems in how information should be composed and interpreted. Information interchange can be characterized by its coding scheme, the message format and the delivery protocol employed.

Information is delivered over electronic media according to some protocols selected. For example, fax and emails are commonly used to deliver information to other agents. Information is considered to be composed as messages before it is sent. There messages follow certain standards. If it is an email, then you would expect, e.g., a 'reply-to' address encoded in the message. If the email has the quotation document as an attachment, then the document would likely to convert to some form defined by the MIME standard. Within this message, an airport coding could be used to identify the origin of the shipment. Moreover, a traditional Chinese coding scheme will be used instead of the ASCII coding for English.

Obviously, without standardization on logistics practices, transaction costs for global logistics would be very high in order to reduce errors and carry out conversions among incompatible coding and messaging standards. The necessity of global standardization is inevitable. It is a monumental task because the number of diverse communities in both the logistics and other industries to be involved.

To simplify our discussion here, we group the logistics industry into three major areas with respect to information flow. Manufacturers, buyers/sellers, and importers/exporters have standards in terms of the labelling of products to facilitate supply chain management (e.g., SSCC[11]). This is the first area where trade will be initiated.

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[11] Serial Shipping Container Code of EAN International and Uniform Code Council (UCC)

As products reached the hands of forwarding agents, some information flows are governed by standards like CargoIMP and P1024C in the airline industry, and sea/ocean agents use UN/EDIFACT and BAPLIE for certain information exchange. This second area is the core logistics services will be provided to facilitate the trade. As cargos are being shipped, other financial arrangements and regulatory reporting are also in force. The banking industry uses SWIFT while the insurance industry has its own information exchange guideline – ACORD[12]. Tradelink facilitates regulatory reporting with PC-based software or enabled in most cases with a Web interface. We term this last area as the regulatory and financial area.

For these three groups to interact in an electronic environment, the industry requires utmost efforts to bring interoperability issues on the table, especially on how the information should be exchanged. The Web seems to be a viable solution since the costs are low for adaptation in general. As e-Commerce is maturing and e-Business begins to take shape, it is very likely for operators to also operate online, in the same environment, and at where the information flow will be effected also.

In order for the logistics industry to enjoy direct information exchange by electronic means, agents must need to know of how it can be accomplished. Current practice is to seek the help of 3rd party logistics information service providers, or handle on an individual basis. What is on the horizon from the IT industry is the definition of XML suite for global approach in information representation and presentation. Once a bilateral agreement on standards is reached of two differing industries, and with new basic software component and proper infrastructure upgrade, information can be freely exchanged and processed electronically.

IV.2.1 Standards and Standardization

Standards provide rules for parties to follow in order to produce similar outcomes. It serves many purposes, from enforcing a disciplined approach to create quality, to harmonizing an industry of different communities, communities that with varying and differing opinions/requirements.

[12] Association for Cooperative Operations Research and Development; some messages are being

Standardization processes among these organizations are similar. Members based (e.g., EAN.UCC) organizations begin with a proposal for new standards or update to existing standards, followed by consultation; and if approved by member voting, then the standards will be incorporated in a timely manner. For standards organizations that deal with, not any specific industry, but IT infrastructure (e.g., W3C, IEEE), the process begins with a draft proposal from the public. The draft will be released for comments and for prototyping by developers. As the response is positive and no intrusive implementation problems, then the standard will become a recommendation (of different grades) for further development by more companies. Eventually, the standard becomes an official recommendation. This standardization process usually finds new popular standards are being in use sometimes before it becomes an official recommendation (e.g., HTML). Obviously, inputs from the industry users are pertinent to the wide adoption of any new standards. Key member associations of the logistics industry must participate in these standardization processes to better serve the members of the community in terms of adapting to the electronic environment in enabling efficient logistics services.

Logistics functions are no longer restricted in handling material flow and capital flow, but expand to manage information flow effectively. Internet and the Web together provide a virtual space for information interchange and communication in a relatively costless way. Standardization on electronic data interchange is as essential as the unified standards on physical goods and services in the entire market. By studying the current standards and protocols, we aim at suggesting a direction for future practices on standardization for the industry. Cross industry, internationalization, and different communities are the major hurdles. Participation in the standardization process by all parties is crucial to ensure a universal consensus on time table. Minimal interruption can then be guaranteed.

A problem specific to direct links, is the Chinese language character sets, so called simplified and traditional. The language character set encodings of these are different. Traditional Chinese is based on the unofficial Big5, commonly used in

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redefined using XML format.

Taiwan and Hong Kong. The GB2312, extended GB2312-1980 (Guojia Biaozhun Kuozhan or GBK) are supported in the ISO 10646 and Unicode 2.1 sets. GB18030-2000, a new Chinese National Standard has been adopted by IBM, Sun and major players in the information technology development worldwide.

IV.2.2 Global Standards

Many parties are involved in bringing a standard into existence. Committees, associations and consortiums, or organizations in general, are created to see through the whole process of standardization and its maintenance, management and future extension. The formation of such an organization could be driven by international bodies such as the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT)13 and the World Wide Web Consortium (W3C). Standards can be proposed by software companies (e.g., Microsoft's SOAP, etc.), computer companies (e.g., IBM's WSFL, etc.), and professional organization (e.g., IEEE's 802 standard suite, etc.).

Standards organizations can be industry-neutral, e.g., standards to ensure equity between traders in the market. Or industry-sector specific such that companies will form a consortium to bring standardisation into the business process to ensure interoperability. In some cases, the market leader of the sector will provide leadership to address relevant issues during development (e.g., Netscape's RSS14 and Microsoft's CDF 15 format). The National Institute of Standards and Technology 16 (NIST) of the United States government controls the standards development for all federal agencies. In other instances, it is the software developer community (e.g., SAX, etc.) that lobbies for consistency within the development of new technology. Users can also take actions to effect new standards or to merge competing standards together.

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[13] http://www.unece.org/cefact/

[14] RSS stands for "RDF Site Summary" or "Rich Site Summary", which is a method of describing news or Web from an online publisher to Web users. RSS is an application of XML that adheres W3C's Resource Description Framework (RDF) and originally developed by Netscape for its browser's Netcenter channels.

[15] CDF stands for Channel Definition Format, which is an application of XML that Microsoft is proposing as a standard way to describe a Web site channel.

[16] http://www.nist.gov

As e-commerce and Web-enabled activities proliferated into every aspect of global trading, the World Wide Web has added another dimension to the traditional view of standards and protocols. The dimension is in terms of integration and interoperability, and standards that business processes are now online. Most standards are now developed with a global perspective. The term 'global' implies that an organization is taking a borderless view in the standardization process and concentrating on the functionality of the standards. Internet and Web standards are global in nature.

In here, we provide key international non-governmental organizations for the development of global standards that will affect directly and indirectly the logistics industry. Coding standards are specific to the industry. Messaging and protocols are usually common to most industries.

ISO[17] **(International Organisation for Standardisation)** - A non-governmental organisation established in 1947 covers standards of all technical fields other than information technology (handled by a joint technical committee IEC). Standards such as ISO 9000 series standards are now commonly adopted, and the ISO 10646 character set is trying to establish the dominancy as the international character encoding.

ITU[18] **(International Telecommunication Union)** - formerly Consultative Committee for International Telephone and Telegraphy (CCITT), recommends standards and oversees their development related to telecommunications standards (e.g., audio compression/ decompression standards, V.34 standards for modem speed and compression, X.400 for message handling services, X.500 for accessing distributed directories, etc.).

IATA[19] **(International Air Transportation Association)** – with approximately 280 airlines worldwide, supports a number of EDI standards for airlines including the key Cargo-IMP[20] message standard. It also provides guidelines in dangerous goods handling, airline coding, and airport handling manual. Services provide to airlines

[17] http://www.iso.ch
[18] http://www.itu.int.
[19] http://www.iata.org
[20] Cargo Interchange Message Procedures

include CardAXS for centralised management of credit card settlement. Key associations of the industry include the IATA (International Air Transport Association). The association has introduced internet-based technologies to improve business process, noticably the BSPlink21 and CASSlink22 for financial settlements among airlines and agent customers. It has also partnered with other IT developers to enhance information accessibility and sharing (e.g., AgentHome23, CargoNet24, CargoIS25 and iiNET26).

EAN.UCC[27] **(European Article Numbering.Uniform Code Council)** - The UCC administers the Universal Product Code (UPC) and provides a wide range of integrated standards and business solutions for over 251,000 member companies doing business in 23 major industries. In joint cooperation with EAN International, the UCC functions as a primary resource for business and industry, developing worldwide standards for identification codes, data carriers, and electronic commerce. EAN International was established formally in 1977 with a head office at Brussels. It is a non-profit organisation that aims to develop a unique set of labelling and numbering schemes to identify products, shipping units, assets, locations and services. Their contributions include barcoding, EANCOM, and more recently, Global Data Dictionary (GDD).

ANSI [28] **(American National Standards Institute)** - a private, non-profit organization, it administers and coordinates the U.S. voluntary standardisation and conformity assessment system. It is established in 1918 in the United States. ANSI was a founding member of the ISO and plays an active role in its governance. ANSI

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[21] www.iata.org/bsplink. An internet-based system that links up airlines, agents and the BSP offices to allow online information exchange. All BSP markets will be served by the end of 2002.

[22] This link provides improved settlement facilities between carriers and forwarding agents. This was launched in the first quarter of 2002.

[23] www.iata.org/agenthome. Information portal for travel agency customers.

[24] www.iata.org/cargo. Information portal on cargo operations and procedures.

[25] www.iata.org/cargois. Information portal that provides statistics on cargo transactions for airlines and forwarders.

[26] www.iata.org/iinet. A web portal the links up carriers and trading partners worldwide for data exchange and information distribution.

[27] http://www.ean-ucc.org

[28] http://www.ansi.org

is one of five permanent members to the governing ISO Council, and one of four permanent members of ISO's Technical Management Board.

ASC X12[29] **(The Accredited Standards Committee X12)** - ASC was chartered by ANSI in 1979 to develop uniform standards for inter-industry electronic interchange of business transactions, EDI. ASC X12 develops, maintains, interprets, publishes and promotes the proper use of American National and UN/EDIFACT International EDI Standards. Its main objective is to develop standards to facilitate electronic interchange relating to such business transactions as order placement and processing, shipping and receiving information, invoicing, and payment and cash application data, and data to and from entities involved in finance, insurance, education, and state and federal governments. It has developed more than 275 transaction sets of standards that can be used to electronically conduct business-to-business operations.

UNECE[30] **(United Nations Economic Commission For Europe)** - was set up in 1947 by United Nations Economic and Social Council (ECOSOC) as one of five regional commissions of the United Nations. In 1986, the UNECE launched UN/EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport), a single international standard for electronic data interchange flexible enough to meet the needs of governments and private enterprise worldwide. Also, UNECE has recently enhanced its work on trade facilitation by creating a Centre for Trade Facilitation and Electronic Business (CEFACT[31]) - a unique body responsible for simplifying international trade procedures, harmonising and standardising information and documents and promoting best practices in trade facilitation worldwide.

IETF[32] **(Internet Engineering Task Force**) - is an open organisation that accepts technical submissions from anyone as Internet Drafts. Many existing protocols such as TCP start out as a draft or a Request for Comment (RFC). This task force began their work on creating and reviewing standards and protocols for the Internet (e.g., RFC 821, SMTP, etc.).

[29] http://www.x12.org
[30] http://www.unece.org
[31] http://www.unece.org/cefact

W3C[33] **(World Wide Web Consortium)** - focuses on the "plumbing" of the Web. Its standards are referenced and implemented in a much diverse Web technology base. Most of its developments are guided by the W3C board within. This consortium was formed to ensure the technical developments stayed in course to realise the idea of making the Web a semantic Web. The W3 consortium leads the standards development for the World Wide Web. Its push for the standardisation of XML as the lingua franca of the semantic Web firmly established its influential position in standards and protocols development. XHTML34 and SMIL35 are just two of the many pivotal standards and protocols coming out from W3C, mostly with recommendation status.

IEEE[36] **(Institute of Electrical and Electronic Engineers)** - a non-profit association of technical professional of over 377,000 individual members in 150 countries. Among other professional activities, the association is responsible for the development of more than 860 active standards, with 700 more under development. Key standards in telecommunication infrastructure include the wireless technology standards of IEEE 802.11x.

OASIS[37] **(Organisation for the Advancement of Structured Information Standards)** - OASIS is a non-profit consortium involves in promoting the adoption of e-business standards. It has more than 400 corporate and individual members in 100 countries to cooperatively to develop and disseminate methodologies and technologies. OASIS, as it stated in its website, is not "yet another standards body", but a forum to make standards easy to adopt in real-world applications.

A common goal to most of these organizations is to exploit the universality of the Web. XML has become the de facto standards for coding information for delivery via the WWW such that the information can be processed immediately. Standards and protocols (e.g., ebXML and SOAP) based on the XML syntax have

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[32] http://www.ietf.org
[33] http://www.w3.org
[34] Extensible Hypertext Markup Language
[35] Synchronised Multimedia Integration Language
[36] http://www.ieee.org
[37] http://www.oasis-open.org

been emerging to bring e-Business to every industry. Here are some recent developments based on XML that will have some impact to the logistics industry.

ACORD, the Association for Cooperative Operations Research and Development, is the insurance industry's nonprofit standards developer. ACORD provides resources for information about object echnology, EDI, XML and electronic commerce in the United States and aboard. It fosters the movement of the industry to adopt IT and to establish interoperability with other partners via the use of XML-based technology. Currently, it has standards for its members including AL3, OLifE, XML and ACORD Forms. For the banking industry, there are the noted SWIFT or SwiftXML and the BIPS (Bank Internet Payment System).

EDI is still being the dominating data interchange technology that is currently in use and practiced. The move to enable EDI via the Internet instead of using VAN that is most commonly deployed has been under development as an IETF (Internet Engineering Task Force) initiative – EDI Internet Integration (EDIINT). An Internet Draft to outline the requirements for Inter-operable Internet EDI has been issued in February 2001. The Internet Draft for secure peer-to-peer business data interchange over the Internet[38] over HTTP has been issued in January 2003. This draft deals with critical business data exchange commonly found in the logistics industry such as ASC X12 or UN/EDIFACT. Information exchanged is packaged using MIME or S/MIME approach.

UBL defines one payload specification of the ebXML framework for e-business. It has the potential to link up Rosetta.net (serving the high-tech industry partners), OASIG (auto industry), and CIDX (chemical industry) at different levels. Its xCBL 3.0 framework can provide liaison with ACORD, EIDX (electronic industry), ARTS (retails), xBRL (Accounting), Rosetta.net (high tech sector) and X12 and UN/EDIFACT (EDI).

IV.2.3 Security

Security can be approached and accomplished at different levels (See Figure IV.1). User Level security will rely on electronic certificates within a PKI framework.

[38] http://www.ietf.org/internet-drafts/draft-ietf-ediint-as2.-12.txt

Network Level can be accomplished at the protocol levels (such as IPSec) or with software and hardward firewall in limiting access to systems with sensitive information. System Level is commonly authenticated with username/password pair. Single sign-on can be setup among a network of trusted systems. Document Level commonly can be protected with signature to the whole document. There may be a need to only restrict access to certain part of a document (e.g., the creditor) but not the whole. XML authentication can be achieved at specific data items within a document that follows XML format.

Access control to distributed documents requires the definition and enforcement of a security model to ensure confidentiality (for only those that require identification) and privacy (for only those that have access right).

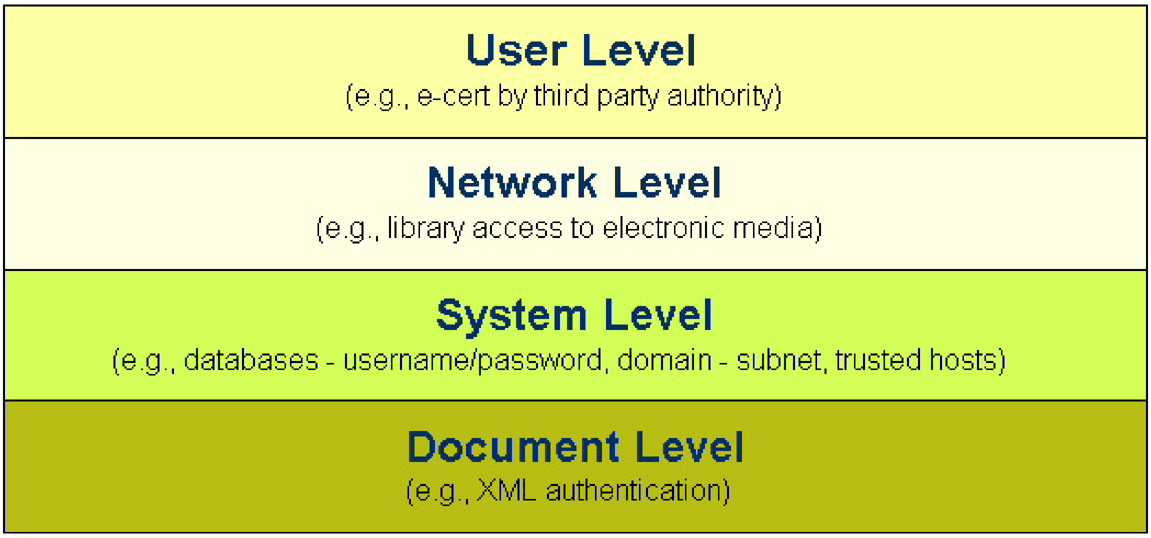

Figure IV.1. Access Levels for Security Protection.

Traditional access control is monolithic in nature, the need for cross-platform and coherent access is seldom warranted. With the connectivity of information via Web technology, access need is often not known beforehand, especially when logistics partnership is created on demand as needed.

IV.3 Requirements on IT Infrastructure

It is necessary for Hong Kong to judiciously examine the logistics and IT infrastructure needs within the context of China's accession to WTO and direct links between Mainland and Taiwan. It is highly plausible that there will be new requirements for air cargo logistics, to and from Mainland. Some players in the industry are already developing IT infrastructure to facilitate an e-logistics framework in Hong Kong. For example,

- Tradelink (established in 1997) with silknet and valunet, provides electronic connections between traders and forwarders, and these with the Hong Kong Trade and Industry Department. Similar electronic agent exists, e.g., in Taiwan (TradeVan) & Singapore (CrimsonLogic). Road Manifest (ROMAN) will be provided soon for electronic declaration of cross-border goods by truckers.
- Traxon (established in 1991) is a global logistic system provider for electronic data interchange between all participants in the air cargo transportation industry. It enables information exchange between airlines, customs, forwarders, shippers and consignees.
- COSAC was introduced in 1976 by HACTL, providing a common platform for shippers, consignees and freight forwarders in the cargo community to capture, process and exchange information electronically. The internet-based version was established in 1996. The SuperLink China Direct, offered by Hacis, provides customs pre-clearance for air cargo entered into Hong Kong, such that the goods can be trucked directly to China without stopping at the border.

In this section, we will examine a number of issues that should play an important role in guiding strategic efforts in IT infrastructure planning and development. In the context of the logistics industry, we will examine new requirements on IT readiness of the air cargo industry and the feasibility of IT integration of customs and other trade agents.

IV.3.1 New Requirements on IT Readiness of the Industry

The IT infrastructure in Hong Kong has seen significant improvement over the years. Broadband access and wireless communication both command a high percentage of penetration percentage. Most SME's would and could now have PC with Internet access. Large logistics firms or MNC's have more capabilities in handling electronic processing. Internet and personal connectivity solves only part of the problem in preparing the industry into the Web-enabled business environment. SME lacks the appropriate Web-based software to allow them to make use of the Web resources for information exchange and for the management of internal business process. And additionally, big firms face the same problem, integration to existing Web-based services is lacking due to different approaches taken by developers and 3rd party logistics services providers.

The use of SMS and/or MMS (multimedia message service) to facilitate logistics execution will become part of the IT infrastructure that is vital to improve the efficiency of the industry. This is another example where IT plays an important role as Hong Kong is moving aggressively forward to increase its stronghold as the logistics hub of the Asia-Pacific region. For example, HIT, partnered with a local wireless operator to provide timely information to truck drivers with respect to the location of specific container in the yard. This approach is feasible due to the fact that the penetration rate of cell phones with GSM capability is approaching 90% and the cost of short messages rests with the sender and at a cost from 50 cents to $1.50.

To fully take advantages of IT in the logistics industry, cooperation is needed among practitioners, government policy makers, industry leaders and technology adaptation of players. Any proposed approach must be able to tackle these issues:

Link Up Diverse Partnership. The logistics industry involves many players in the provision for supply chain logistics needs. Players are from different transportation modes, insurance industry and banking industry, and regulatory agents. The cooperation among these players in the logistics community demands certain level of IT sophistication in order to remain competitive as the top regional logistics hub, especially now with China's accession to WTO. Members of the community individually have attained different levels of IT sophistication, with the banking industry leading the way of information exchange and integration. A common operating environment that can link up these agents and can accommodate the varying levels of IT sophistication would be needed.

Web-based Applications. The Web has been successful in bringing partners closer together in terms of information sharing and access. Yet, there are not many Web-based software for agents to manage their own internal business process, and to collaborate online with partners in Hong Kong, Taiwan and Mainland. One of the key questions is again the multi-language issue. Recognition of terms can be achieved by ebXML-based registries across languages. But the unique problems associated with document translation and interpretation, say to and from English, remain to be resolved.

Standardization. The use of different technology in information exchange stems from piecemeal adoption of technology and prohibitively high costs associated with total solutions. This practice leads to adoption of various standards that each requires specially designed software to achieve communication interoperability. The various standards are necessary due to both the characteristics and operational differences of each transport modes, and domain-specific business processes. Coding standards does not create much interoperability problem and can be solved using conversion tables. Message standards that do not have embedded semantics require intelligence to decode the intent of the message. This colossus of information formats makes it difficult to leverage the connectivity of the Web for more effective communication. Not until XML was proposed, HTML did not solve the problem, XML may, with still certain level of sophistication in information management among players.

Privacy Guarantee. As paper-based information is being transmitted over the Internet using FTP or Web-based interface, the issue of privacy, data integrity and the like is becoming more paramount to deal with before the Web is the sole transporter of information. As information is stored and forwarded, the shepherd of this information must be clearly defined and safeguarded. Trade secrets and best practices can be gleamed off these transient holders (servers) without warning. How this global web of interconnected resources can be guaranteed to be secure and safe remain a sore spot for promoter of information exchange over the once self-regulated Internet.

Hence, what the industry will need is an online Web-based operating environment where multiplicative standards can be accommodated, logistics e-commerce enabled, and real-time management of logistics e-business. The environment must be secured, connecting the three epic centers – Taiwan, China & Hong Kong, each with autonomous control and neutrality guaranteed. Each such environment, or a community network, requires mature communication infrastructure. We will look at the communication infrastructure of China, Hong Kong & Taiwan next.

IV.4 IT Communication Infrastructure in Hong Kong, China and Taiwan

To enable communication among agents in Hong Kong, China and Taiwan, a community network can be built that leverages on the Internet readiness of the these countries. In this as well as the next sections, we examine the information technology infrastructure support in China (Shanghai and Beijing), Hong Kong and Taiwan respectively.

IV.4.1 China

To establish Shanghai to be the e-Commerce center of China, the government initiates the Infoport project in mid 90's to connect the entire province through a high-speed computer network. The necessary municipal IT infrastructure consists of fiber optic backbone network, broadband-based metro area network (MAN), and applications centers to handle e-Commerce initiatives. It is expected that the initiative will significantly drive down business transaction cost and subsequently attract more business opportunities. Similar efforts can also be found in Beijing. Beijing Telecom has adopted the fiber-to-the-building system and installed optical-remote-nodes equipment in buildings and residential areas to provide high-speed data and video transmission network.

IV.4.1.1 Fiber Optic Cable for Fixed Line Communications

Fixed line telephone is the major mode of communications through out China. In some cases, Integrated Services Digital Network (ISDN) is used for data communications or video conferencing. It is the aim of MII to reach a target of 280 million subscribers by 2010 by growing the industry with fiber optic technology. With a fibre reach of more than 90% of building complexes in both Shanghai and Beijing, logistics companies are prepped to incorporate the communication network into their daily operations. The communication network infrastructure can support 1,500,000 dial-up Internet users. Since 1999, ISDN service, with a peak speed of 64 Kbps, has been available, providing multimedia transmission.

IV.4.1.2 Broadband Network

An alternative for Internet access is offered by Shanghai Cable Network Co., Ltd[39] as they are reconstructing the city's cable TV network to allow two-way high-speed data transmission. This piloting effort will help Shanghai realize the integration of cable TV, fixed telephone and data networks.

Shanghai has already set up the necessary infrastructure of a broadband metro area network (MAN). The network, with a stem network bandwidth of 40Gega bits person second, is able to transmit and receive 15,000 to 16,000 video CD films at one time. Users can use Asymmetrical Digital Subscriber Loop (ADSL) to enjoy the broadband services. They can have a download speed of 4-8 Mega bits per second using twisted-pair wires and upload speed of 224-640 thousand bits per second.

The Shanghai Municipal Government plans to make the present network entirely interactive within three years, providing users faster, cheaper and better access to Internet and voice transmission services. The number of cable TV subscribers has been growing 10% annually nationwide. Currently only about half of

[39] A partnership of Shanghai Information Investment Inc., Shagnhai Cable TV Station, and Oriental Pearl Co., Ltd.

the lines are suitable for providing secure and stable transmission rate of up to 10 mega bits per second for internet access.

Beijing Telecom's existing networks, such as its frame relay networks and DDN networks, can only provide user access at a speed below 2 Mbps. This speed must be increased in order to provide various broadband services. Beijing Telecom started building a high-quality, high bandwidth, Broadband ATM Commercial Network in May.

The Beijing Broadband ATM Commercial Network has adopted a hierarchical network structure. The whole network is divided into two layers, the backbone layer and the access layer. The kernel layer’s nodes mainly handle the confluence of the whole network's operations flow and the interconnection with other networks. China Telecom has installed ATM backbone switches, each with a 20 giga bits capacity, and it has connected the kernel-layer nodes to the web-shaped networks through 2.5 giga bits per second links.

IV.4.1.3 Internet Service Providers and International Connectivity

There are total of over 500 Internet service providers (ISPs) providing Internet services for subscribers. Local ISPs are licensed by and gain global access through one of the ten interconnecting network providers, namely CHINANET, CBNET, UNINET, CNCNET, CMNET, CSNET, CSTNET, CERNET, CGWNET, and CIETNET. Among these network providers, only seven of them provide international connections (see Table IV.1 and Figure IV.2). They provide a total truck capacity of leased International connections of 7,597.5 mega bits per second. Foreign corporations and joint ventures are prohibited to operate as ISPs since China still bans foreign participation in its communication services. This will change after January 2004 when CEPA comes into effect.

Table IV.1. Connection Bandwidth to Foreign Countries (in Mbits/second)

	US	Hong Kong	Taiwan	Japan
China Telecom (CHINANET)	6290	1907	757	755
China Unicom (UNINET)	510	390	90	200
China Netcom (CNCNET)	2835	1442	310	355
China Mobile (CMNET)	208	-	2	-
China Science & Technology (CSTNET)	55	-	-	-
China Education & Research (CERNET)	310	2	-	10

Source: China Internet Network Information Center, CNNIC, http://www.cnnic.net.cn/mapinfo/200302/200306.jpg

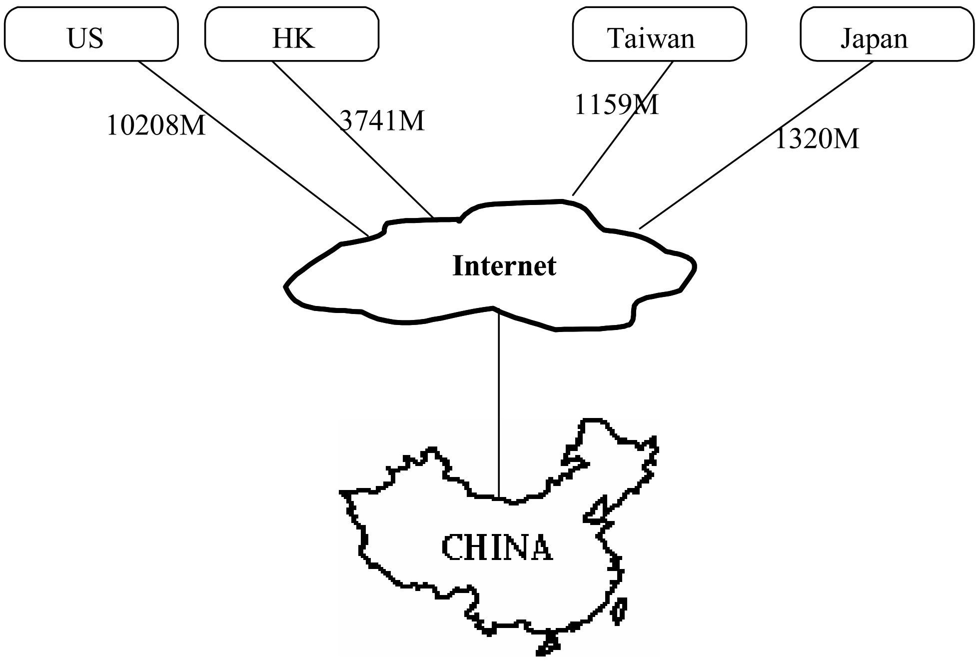

Figure IV.2. Connectivity to Foreign Countries

IV.4.1.4 Internet Subscribers

The number of Internet subscribers has been growing rapidly throughout major cities in China (see Table IV.2). At the end of July, 2003, Internet subscribers have reached 68 millions in China.

Table IV.2 Internet Subscribers

Date	Computers Online ('000)	Broadband Bandwidth	Subscribers ('000)
Jun. 1999	1,460	241M	4,000
Dec. 1999	3,500	351M	8,900
Jun. 2000	6,500	1,234M	16,900
Dec. 2000	8,920	2,799M	22,500
Jun. 2001	10,020	3,257M	26,500
Dec. 2001	12,540	7,597.5M	33,700
Jul. 2002	16,130	10,576.5M	45,,800
Jan. 2003	20,830	9,380M	59,100
Jul. 2003	25,720	18,599 M	68,000

Source: *CNNIC Semiannual Survey Report*

IV.4.1.5 Certificate Authority and Payment Gateway

Absence of a secure online payment system has severely restricted the development of e-commerce and e-business in China. China's central bank, The People's Bank of China (PBOC) and 13 commercial banks jointly established a Certificate Authority Center (CAC) for online payment. The CAC will offer security of online settlements by granting security certificates to online traders. It will serve as a certificate authority responsible for assuring the identity of electronic retailers and online shoppers. The computer-based record contains identification information and an encryption system that will verify digital signatures. Aside from facilitating e-commerce transactions, the system will allow bankcard holders to withdraw and deposit money from automated teller machines outside the city.

TOPE-Commerce suite is the first payment gateway built in China. The gateway is built by Shanghai Huateng Software Systems Co., Ltd. (SCUBE) and endorsed by the Shanghai municipal government. It is connected to China's Golden Card network at the Shanghai Bank Card Network Service Center (SNET). It enables merchants to accept both credit card and debit card payments from multiple banks in China through a single connection to the payment gateway (see Figure IV.3). Cyber Beijing is a joint venture that provides another payment processing platform for bankcard holders from different banks. The platform is backed by an ISP, China Information Highway Cyber Beijing and also has the support of the PBOC and many official agencies in Beijing, including the Beijing Municipal Government, the MII, and the National Department of Domestic Trade.

IV.4.1.6 Internet Exchange Centers

In China, the largest network provider, ChinaNet, owned by China Telecom, carries 80% of the Internet data traffic. The Ministry of Information Industries (MII) would like to establish three Network Access Points (NAP) respectively in Beijing, Shanghai and Guangzhou to resolve the interconnection problem among the network providers. While interconnection between operators should be settled by commercial negotiation the progress has been very slow resulting in expensive Internet subscription fee. Beijing National Internet Exchange Center, which is China's first NAP, was formally opened for service on March 2000. The center has adopted full-fiber access, high-speed data exchange, route arbitration, and network monitoring technologies, bringing the backbone bandwidth from 10Mbps to 100Mbps. It presently connects with all major network providers (see Figure IV.4)
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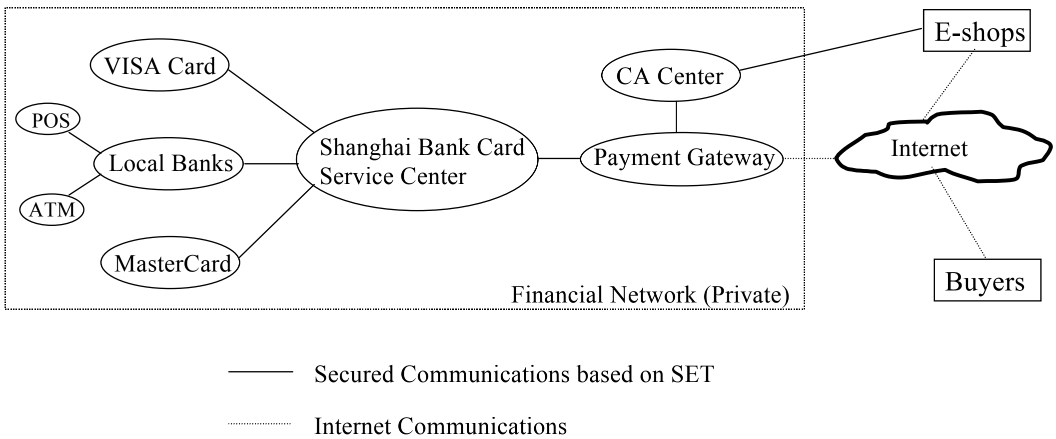

Figure IV.3. Electronic Payment Infrastructure in Shanghai

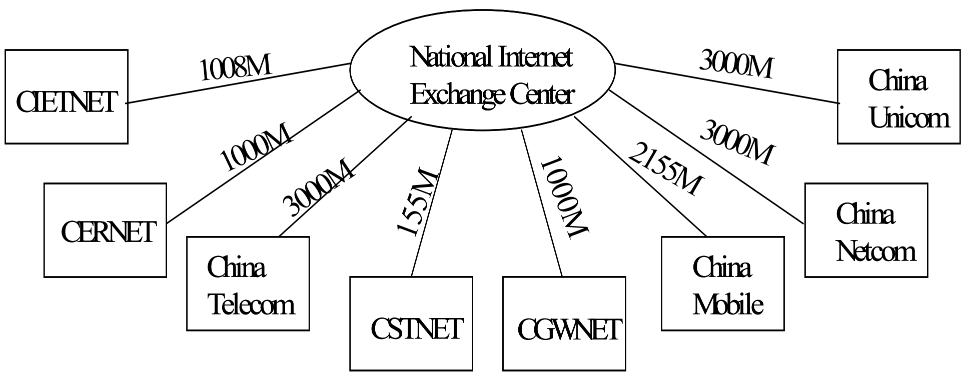

Figure IV.4. ISPs Inter-connectivity Through the Exchange Center

The Shanghai NAP which is the second NAP approved by the MII, was established in December 2000. Its major function is to facilitate Internet information exchange within Shanghai. It connects major ISPs in Shanghai and its surrounding districts. Internet requests and information flow within Shanghai will be routed to this center and distributed to the designated ISPs. The center can significantly improve reliability of the Shanghai Internet as well as reduces unnecessary information traffics passing through its international gateway. However, while the physical links are in place, this Internet exchange has not yet seen any traffic. The Shanghai Infoport project provides super computing to support growing e-commerce in Shanghai.

IV.4.2 Hong Kong

There are 232 ISP (Internet Service Providers) as of April 2003, serving dial up customers of about 1,360 K modem dial-up and about 1,055K broadband connections. We do not have a breakdown of how many of them are commercial customers. There are 8 operators provide fixed telecommunications network services (FTNS) in Hong Kong.

IV.4.2.1 Fixed Line Communications & Broadband Network

The Hong Kong fixed line telephone density is among the highest in the world (i.e., 71.7 telephones or 57 lines per 100 people). The local fixed line telecommunications network service (FTNS) market was deregulated on June 1995 following the expiry of the exclusive franchise of the former Hong Kong Telephone Company Limited for local telephone service. Since then, six companies have been licensed to provide local on a competitive basis. They are PCCW-HKT Limited, Hutchison Global Communications Limited, New World Telecommunications Limited, Wharf New T&T Limited, Hong Kong Broadband Network Limited, and i-Cable Communications Limited. At the same time, Hong Kong Cable Television

Limited is also permitted to offer telecommunications services over its hybrid fiber coaxial cable network.

Internet services are very popular in Hong Kong. With the increased competition and coverage of broadband service using asymmetric digital subscriber line (ADSL), fiber-to-the-building (FTTB), hybrid fiber coaxial (HFC) cable, local multipoint distribution system (LMDS) and other technologies, there is a growing trend of customers shifting from dialed-up to broadband service. The roll-out of broadband network in Hong Kong relies entirely on commercial telecommunications operators. The Telecommunication Authority authorized FTNS operators with the right of accessing buildings to their networks. It is therefore illegal for property developers to refuse access by an FTNS operator. By June 2002, there were around 1.8 million customers for dialed-up service and 0.82 million customers for broadband service with speed up to 10Mbps. By the end of the year, over 95 per cent of the households and virtually all commercial buildings are covered by the broadband network.

IV.4.2.2 Internet Service Providers and International Connectivity

In Hong Kong, the number of Internet service providers (ISPs) has grown from one in 1993 to 258 in year 2001[40]. An ISP has to hold a Public Non-Exclusive Telecommunication Service (PNETS) License, which costs $750 a year. The number of ISP has a dramatic increase in year 2000 because of the e-Commerce boom. It is now stabilized and even has a slightly decrease in 2002. Connection bandwidth to foreign country has been steadily increasing for most countries except for Japan and the US (see Figure IV.5 and Table IV.3).

Table IV.3. Connection Bandwidth to Foreign Countries (in Mbits/second)

	United States	Japan	Taiwan	China	Total (including other countries not shown)
9/2001	3051	1316	417	533	6308
3/2002	2720	2033	392	868	7173
9/2002	2692	1488	1364	891	8612
3/2003	4362	2049	1650	1035	12668

Source: Office of Telecommunication Authority

[40] Office of Telecommunication Authority

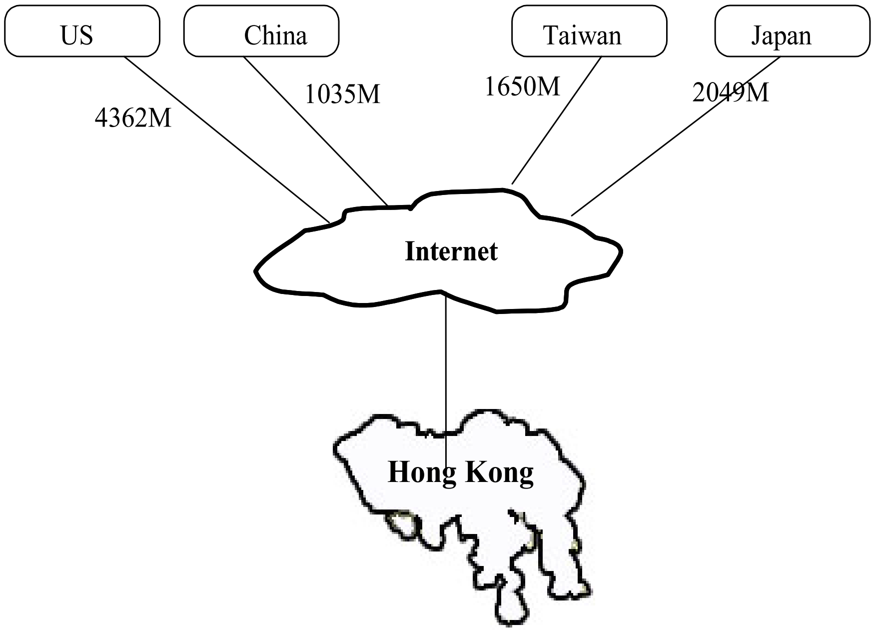

Figure IV.5 Connectivity to Foreign Countries, Hong Kong

IV. 4.2.3 Internet Subscribers

Internet penetration rate in Hong Kong are directly comparable to that of other advanced economies. According to the household survey conducted by the Hong Kong Census and Statistics Department in June 2001, household PC penetration rate has increased from 49.7% in 2000 to 60.6% and the Internet penetration rate increasing from 36.4% in 2000 to 48.7%.

Internet Service Providers (ISPs) numbered 259 by the end of the year. The number of registered customer accounts with dial-up access was over two millions or 30 dial-up access accounts per 100 persons. The number of broadband accounts increased significantly during in the year to over six hundred thousand or nine broadband accounts per 100 persons. Annual growth rate is at 59 per cent.

IV. 4.2.4 Certificate Authority and Payment Gateway

To enable the development of electronic business Hong Kong Postmaster was first to establish a public key infrastructure (PKI) and acts as a public Certification Authority (CA) in January 2000. It helps to provide a secure and trusted environment for the conduct of electronic transactions. The Hong Kong SAR

Government encourages private sector initiatives in the provision of certificate authority (CA) services. To simplify the regulatory, there is no mandatory licensing requirement for CAs to operate in Hong Kong. The Director of Information Technology Services is empowered to grant recognition to CAs, which have reached a standard acceptable to the Government. There are a total of three recognized CAs[41]; they are Digi-Sign Certification Services Limited, HiTRUST.COM (HK) Incorporated Limited, and Postmaster General.

The Bank of China (BOC) group has launched the first Hong Kong-based, online SET (Secure Electronic Transaction) payment gateway in conjunction with Hong Kong Telecom IMS in 1998. The payment gateway is for credit card transactions over the Internet in Hong Kong. The Hong Kong and Shanghai Banking Corporation Limited (HKSBC) have begun offering its Internet payment gateway services at the end of 1999. Their services support both the Secure Sockets Layer (SSL) and Secure Electronic Transaction (SET) security standards and allow HSBC's merchant customers to accept Visa, MasterCard and JCB payments over the Internet in different currencies. Other banks are planning to offer similar services according to a survey report done by KPMG in June 2000.

Recently, Citibank e-Business division and Maersk Sealand (a global container shipping line) have jointly launched a web-based financial service, CitiConnectSM. The Internet-based B2B payment gateway allows Maersk Sealand's customers to make payments online via Maersk's website. Shippers no longer have to write cheques and present them in person in exchange for Bills of Lading.

IV. 4.2.5 Internet Exchange Centers

Hong Kong Internet exchange (HKIX) is a cooperative project initiated, coordinated and operated by Information Technology Services Center of the Chinese University of Hong Kong. The goal is to interconnect the Internet Access Providers (ISPs) in Hong Kong so that intra-Hong Kong Internet traffic can be exchanged locally without routing through US. In Hong Kong, many ISPs have their own links to the US. They have to interconnect locally through HKIX in order to have faster

[41] Joint Electronic Teller Services Limited (JETCO) terminates its CA service as the original fourth

and less expensive access to local sites. Licensed ISPs can connect to the HKIX through a leased circuit (at least 1.536Mbps) and place a router at the University. Currently, major FTNS operators and over eighty ISPs are connected to the exchange center. The HKIX has already covered the majority of the Internet users in Hong Kong since an ISP can also be connected to the center indirectly through its upstream ISP. Other Internet exchange centers operating in Hong Kong include Level 3 Communications and Pilhana Pacific.

IV.4.3 Taiwan

The telecommunication market in Taiwan is growing at a steady rate (See Figure IV.6 and Table IV.4). There is an increase of 25% in the number of Internet users from 2000 to 2001 according to a report by ITU. Till April 2002, ADSL connection to Internet is offered by HiNet (a state-owned telecommunication corporation) to 77% (about 923,959 out of 1,201,691) of the broadband users (with negligible number offered by TANet – also state-owned). Private ISPs take up 22.8% of the same market. Private cable companies provide another broadband service via cable modem, with a comparable number of users (243,825).

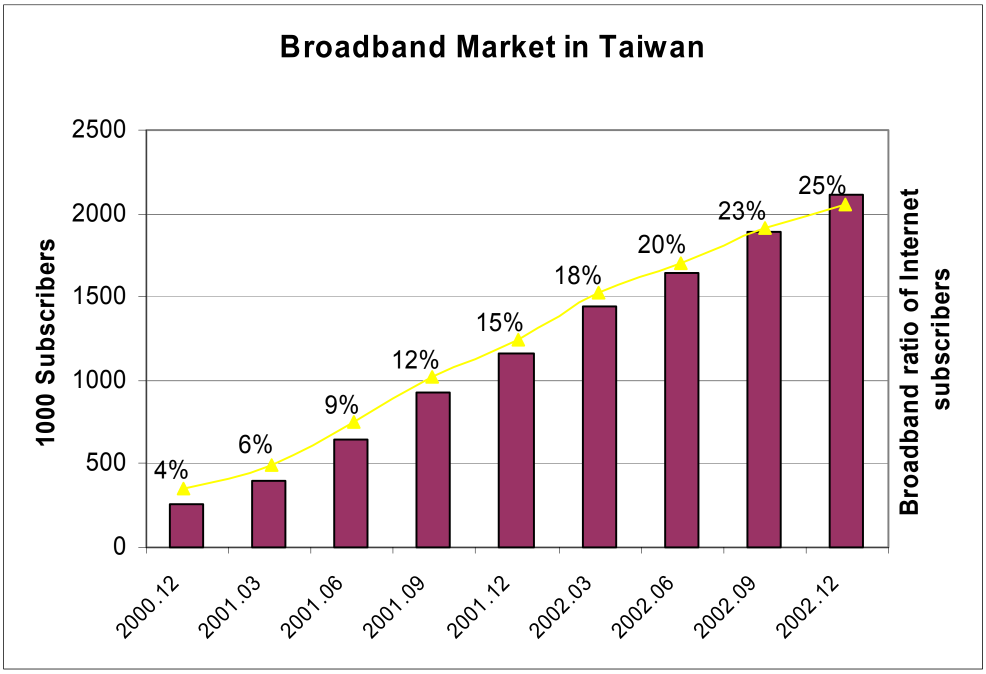

Figure IV.6. Broadband Market in Taiwan

certification authority effective on September 15, 2003.

Table IV.4. Broadband Market in Taiwan

	ADSL	Cable Modem	Others	Total
12/2000	116	113	33.8	262.8
03/2001	219	143	35	397
06/2001	446	164	36	646
09/2001	717	179	33.6	929.6
12/2001	920	213	31	1164
03/2002	1180	235	30.9	1445.9
06/2002	1400	210	29.6	1639.6
09/2002	1630	225	40	1895
12/2002	1820	280	16	2116

Source: FIND, ECRC, III/ sponsored by DOIT, MOEA; Directorate General of Telecommunications

HiNet provides high speed backbone connecting Taipei, Taichung and Kaohsiung with two 2.5Gbps circuits. For access to international hubs, HiNet provides direct access to USA, Hong Kong, China and Singapore and other Asian countries. Bandwidth to U.S.A. has a total 3.252Gbps capacity. Access to foreign countries provided by the top ten service providers is given in Table IV.5, with only four countries shown.

Table IV.5. Connection bandwidth to foreign territories, Taiwan, Mbps

	US	Japan	Hong Kong	China
HiNet	1333.63	178.94	89.47	200.26
TWGate	735	33	92	175
Seednet	311.04	1.02		2.05
ETWebs	310			
TFN	268.42			10.24
ISNet	200. 26	1.54	200.26	4.1
TANET	190.52			
EBT/APOL	157.57		4.1	6.14

Source: Institute for Information Industry
(http://www.find.org.tw/0105/howmany/howmany_disp.asp?id=38)

Internet usage in Taiwan has reached over half of the population in mid year of 2003[42]. Nearly half of those use broadband connection, with two key ISPs, Chunghwa Telecom and Seednet, providing 84% of all ADSL connections. Some

[42] Taiwan Networld Information Center

estimates the growth of Internet users could reach 1 million annually in recent years[43].

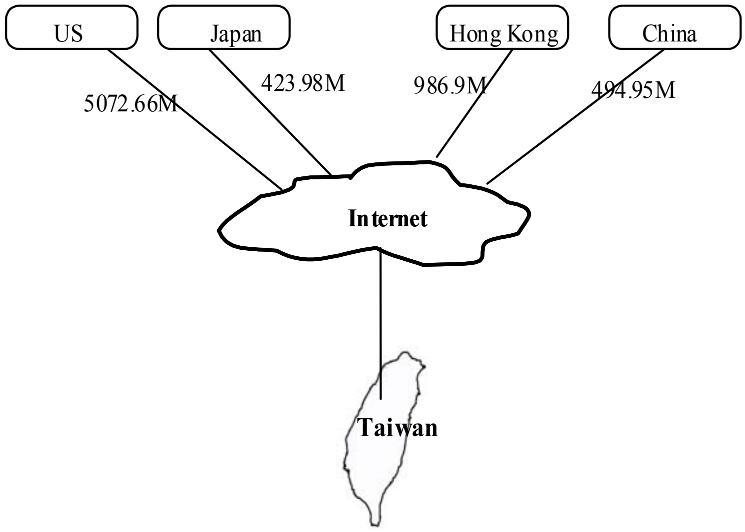

Figure IV.7. Connectivity to Foreign Countries, Taiwan

Evidently, Hong Kong, China and Taiwan are taking steps to ensure broadband Internet access is available to businesses anywhere in the country. The scope of coverage is understandably different due to their geographical sizes. No matter, the underlying communication infrastructure between Hong Kong, China and Taiwan is in place and can be expanded when needed. Information exchange via the Internet can be attained adequately for the logistics industry.

IV.5 A 4th Party Web-based Air Cargo Logistics Community Network for Hong Kong

Hong Kong is a major air cargo hub in Asia. As China began its second year as a member of the World Trade Organization (WTO), the demand for Hong Kong's air cargo service is likely to be intensified.

The air cargo logistic process is an information-intensive endeavour, requiring the cooperation of industry agents (Figure 3). In Leung, Hui, Cheung (2000), a framework for an air cargo e-business platform was first articulated. The proposed

[43] Taiwan News, September 10, 2003

e-platform is to enable online management of e-business processes, allowing effective coordination of the logistics process as well as collaboration between agents.

A community e-platform is particular suitable for the Hong Kong air cargo industry, whcih is unique in that the majority of its logistics agents are SME's. From an IT solution perspective, a typical logistics processes requires data interfacing of multiple components. To date, many of these components are piece-meal solutions and are not connected. For individual SME to acquire the needed IT sophistication is typically beyond their financial as well technical capabilities. A cooperative platform could be a cost-effective approach for SME's to acquire the needed IT.

A first step towards a logistics e-business platform is the development of conformance in data exchange and between the many different standards and protocols. This fundamental aspect can be handled technically by XML, and is being addressed in the proposed 'Digital Trade and Transportation Network' (DTTN). However, the DTTN platform merely resolves the information interchange problem and does not enable online cross-agent e-business management. That is, industry agents can only operate in a stand-alone environment, without online communication with other industry agents.

In here, we provide an overview and the operating environment of what DTTN can offer. Then we will provide a brief discussion on the community network that entails DTTN, and can be deployed in major cities in China and Taiwan to facilitate seamless logistics e-Business when direct links is achieved.

IV.5.1 Summary of Proposed DTTN

The proposed DTTN provides a *neutral* e-platform to link up players in the trade and logistics community. The e-platform offers a reliable environment for effective information exchange and service integration, and a state of the art technology portal for innovative value-added service deployment. The platform ensures global logistics community connectivity at a minimal costs to the Small and Medium Enterprise (SME), and serves as a 'catalyst' for SMEs to adopt e-business practice to 'improve the overall competitiveness of the logistics industry.' DTTN offers these expected functionalities in the context of SMEs:

- Reduce paperwork – enhance information flow
- Reduce processing time – enhance accuracy (less errors) and efficiency (no duplicacy)
- Improve competitiveness with and in Mainland China, especially now the PRD region
- Achieve one-to-many connectivity (instead of many one-to-one connectivities)
- Access community-based integrated value-added services
- Reduce operational impacts of regulatory changes and emerging technological advances
- Improve core business operational efficiency?
- Bring e-commerce/e-business capabilities into the mainstream for SMEs?

DTTN is characterized by these traits

- Neutrality
- Secure
- 24/7
- Accountability and confidentiality
- Non-intrusive

Key technology and standards supported

1. HTTP, SMTP, FTP (Web-based, E-mail and File Transfer)
2. UN/EDIFACT, ANSI X12, Cargo-IMP
3. Excel, Text file, CSV file, SMS
4. English, Chinese (Simplified, Traditional, and Hong Kong Specific - HKSCS), and other languages

Institutional Models

- Model C - Commercial Model: fund and own 100% by commercial operators
- Model A - Community-based Model: fund and own by a group of companies, one of which could be the Government
- Model G - Government Model: fund and own 100% by government

DTTN is intended to support key business activities involved in trading and logistics of players in the communities. Figure IV.8 below offers a sketch of activities DTTN will be able to handled with respect to information exchange.

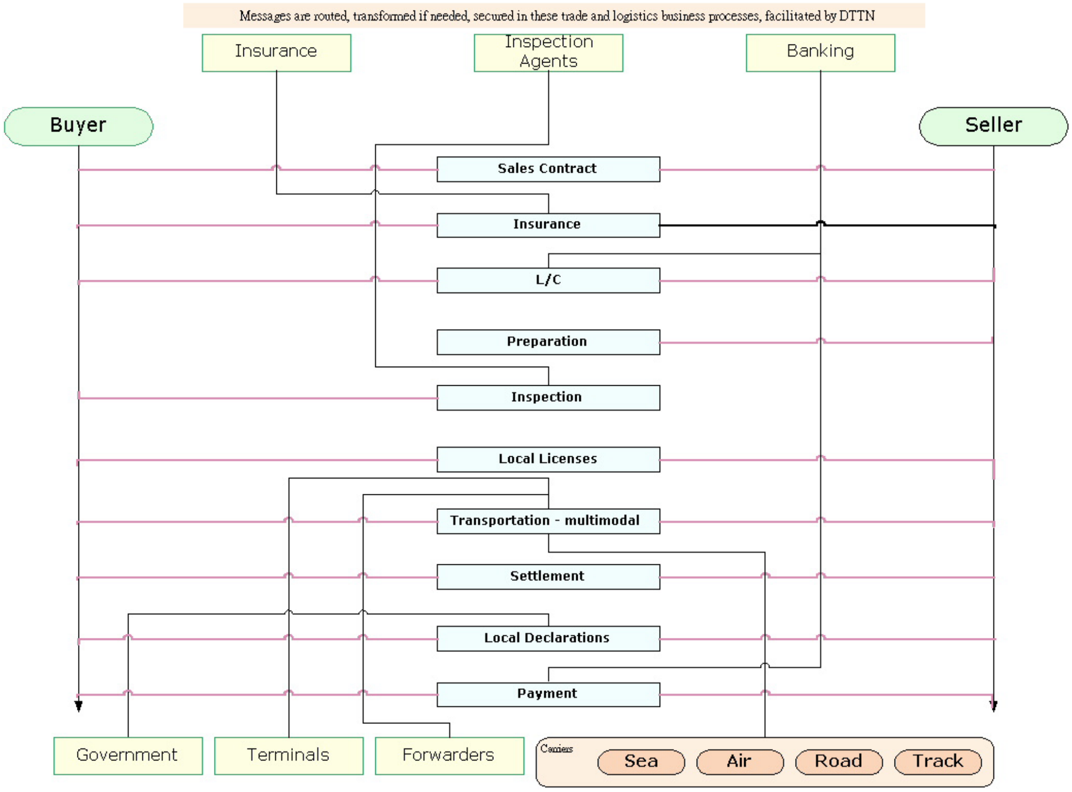

Figure IV.8. Activities with Information Exchange Involved in a Typical Shipment.

To allow SMEs and other big corporation to participate in this information exchange, DTTN devises key channels for ease of use and adopts XML (ebMS of ebXML) in its internal representation to allow quick extension to other emerging XML-based technologies. Figure IV.9 shows the access channels:

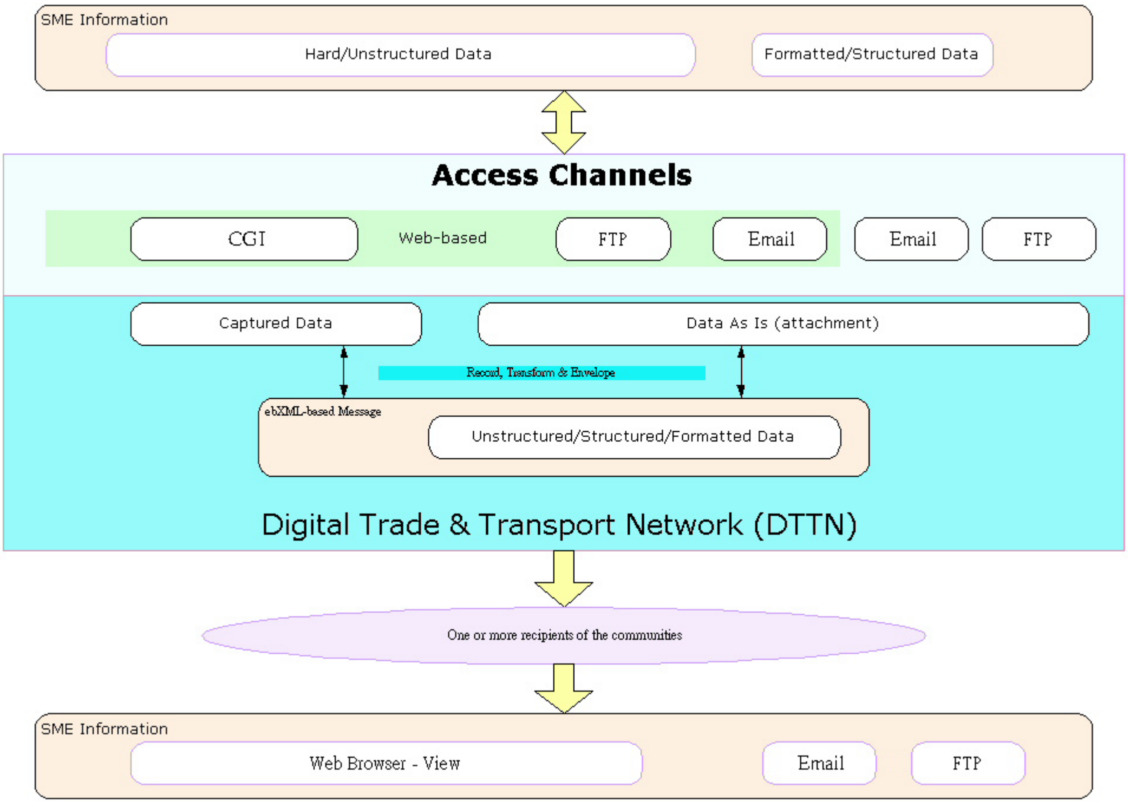

Figure IV.9. DTTN Access Channels

IV.5.2 Web-based Air Cargo Logistics Community Networks

A Web-based community network is needed for the Hong Kong air cargo logistics industry. This 4th party network provides not only information exchange capability such as that propsoed in DTTN, but also, in the same environment, allows logistics e-commerce and e-business. This network accomplishes logistics integration in virtual space. Such network, if deployed also in China and Taiwan, individually enable the logistics sevice providers in each country, and at the same time, can be connected into a *network of community networks,* of direct links in the virtual sense also. This integrated super community network, or 5th Party Community Network (See Figure IV.10) leverages the current development of cross-border customs facilitation (PAA), direct links, and emerging technology such as XML, SAML, and Web services. Services provided would mostly be coordination among different customs procedures, and notably of language reconciliation.

Research remains to be conducted to further understand the role of this 5th party network.

Thus, in here, we propose *a 4th party Web-based air cargo logistics community network* (a platform here after) for the industry in Hong Kong. This platform is a community website where industry agents can operate concurrently. The platform allows online interaction between industry agents, thus enabling integration and collaboration in the logistics process. E-Commerce activities – part of some e-business processes, are enabled. Though such online trading of logistics services, hardly an accepted practice of agents in the industry, would not likely to manaifest itself online in the very near future.

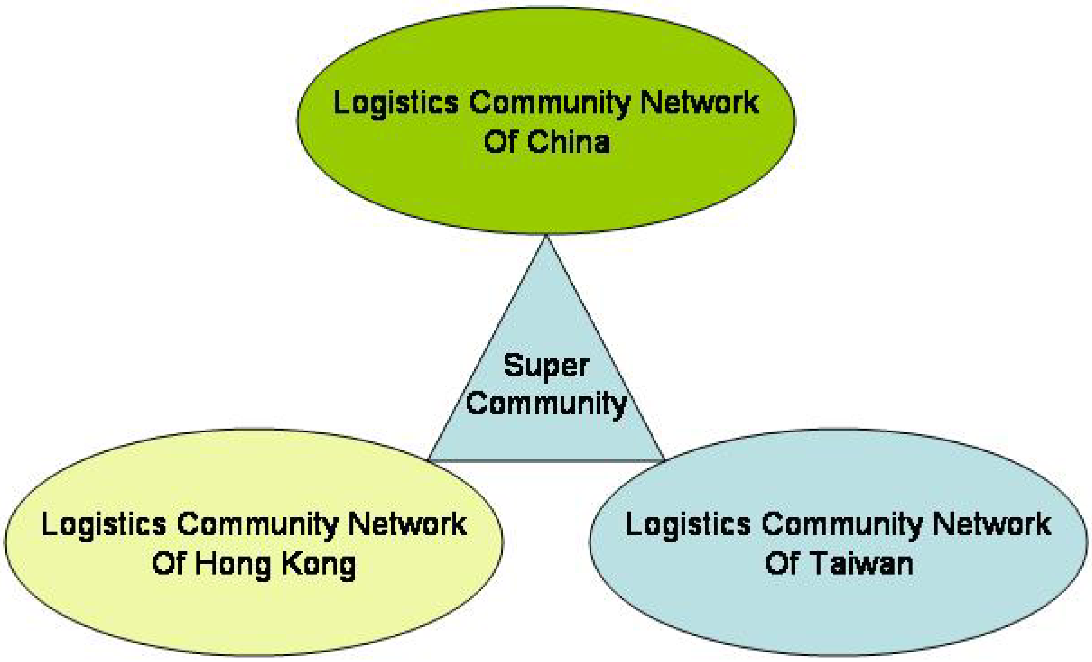

Figure IV.10. Super Community Network – linking Community Networks in Hong Kong, China & Taiwan

The platform conducts e-business processes online. E-business processes are the management of business processes online. Such processes consist of tracking, tracing, controlling and integrating of interrelated activities within a business process and across different agents. Procurement, distribution, supply chain, customer relations are typical business processes that have been conducted or managed via the Internet. The management processes require that the platform –

along with the traditional issue of connectivity, security, and interactivity – to be interoperable and integrative.

Other issues such as ownership, neutrality and costs structure will be and should be answered in the DTTN (Digital Trade and Transport Network) project that is currently undertaken by the HKSAR government. A successful party in the implementation and eventual management of DTTN will be announced early next year.

IV.5.3 Remarks

With DTTN in sight[44], efficient customs services are imperative in support of electronic commerce and in enabling e-business. Yet, the promotion of internationally accepted, modern customs practices remains said then done, not because it was lack in common interoperability goal, but more of the policy and privacy of countries involved in the development of common procedures. There is no single document that explores in-depth what each of these "best practices" is, how they should be implemented, and what legislative environment is required (TLIAP, 2000). This makes it hard to streamline and standardize customs procedures that respond to the significant recent developments in international trade, production and e-commerce. Efforts such as the Pan-Asian E-Commerce Alliance (PAA)'s pilot project Secure Cross Border Transaction Service will establish a coalition of practitioners, developers and governments to streamline customs clearance across countries in the Asia Pacific region.

Also, there are also efforts to bring speed to services across borders. The need to rely more on pre-clearance of shipments, scanning of source documents such as air waybills, and greater utilization of risk management techniques for targeted examinations and audits must be quickly installed. Recent advancement of electronic technology will help in faster clearance and may be more.

[44] Hong Kong SAR will soon announce the implementation of DTTN by one of the three bidders towards the end of this year.

The push for RFID is ongoing. The adoption of RFID will cut down errors and simplify most processes along the logistics chain. RFID, Radio Frequency Identification[45], is a technology that stores electronic information in a tag. The tag can be as small as spherical shape that has a small diameter similar to a lead in a pencil, and a length of about half an inch. Or it can be a 5x4x2 rectangular tag. Frequencies could range from 30KHz-200KHz, 850MHz-950MHz, and 2.4GHz-2.5GHz, depending of the distance from which data can be read and written to the tag by a host; or velocity of the object that carries the tag. Information can be read and written in a non-contact type and non-line-of-sight (not like barcodes where line-of-sight must be established, with direct contact of reading light source to the barcode.) The tag's information is available independent if the tag is covered by snow, mud, or implanted under the skin of an tracked animal, such as a dog. Moreover, the information stored can be maintained (updated).

The key proponent of RFID is its automated data capturing without human intervention. A container does not need to be opened to validate each waybill. The tag carries no power, but gets energy from the electromagnetic field. The electromagnetic signal is usually generated from a reader (or interrogator) that intends to extract information carried on the IC in the tag. This technology is not new. The magnetic strip that you find in some electronic products sold in stores is a RFID tag. Advances in other technology have helped the acceptance of these RFID tags. The issue on security of over-the-air retrieval of data always deters users to see the benefits of such tag. Frequency hopping and encryption technology remove the undesirable operational characteristics. Benefits of such tags to the manufacturing industry, logistics industry and the consumer are many. To the consumers (e.g., buyers or importers), accurate and guarded information on a product can be obtained – place of manufacturing, date of product, etc. To the manufacturers, it can reduce counterfeits of products, and smooth the information flow in, say, a supply chain, or a demand chain.

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[45] http://www.rfid.org

The effective use of RFID must be supported by a network infrastructure proposed as the EPC (Electronic Product Code) Network. The network technology is based on research carried out at MIT. The Uniform Code Council, Inc. (UCC) and EAN International, alliance with MIT, form a not-for-profit outfit (AutoID U.S., LLC) to oversee the development of the technology. EAN.UCC has been working on identification and labeling of products in the supply chain for more than 25 years. For example, UPC and EAN13 (GTIN) are the products. No doubt, this technology can enhance the effectiveness of track-and-trace when coupled with wireless communication. Important cargo flow can be delivered at the point of inspection directly to the community network.

IV.6 3rd Party Logistics Providers – Competitions Among Regional & International

In the past, logistics services in China are dominated by local/regional companies, or state-owned monopoly. With accession to WTO and open market policy, many other local industries benefit from the influx of foreign investments. The distribution of products within and to international countries is creating problems for the local logistics industry. In general, the logistics industry of China is not well-developed, with inadequate infrastructure and lack of professional skills, especially in the realm of global logistics.

Liberalization of foreign investment in this sector is urgently needed. Even though some joint venture (JV) logistics companies are setup in recent years, there are still much room for 3rd party logistics (3PL) providers. As a result, many foreign trading companies distribute their goods by their own divisions or rely on the limited foreign transporters/ freight forwarders in China.

The logistics market of China is young and still not saturated; there are room for both Hong Kong regional and international 3PL providers to expand. Competitions among these 3PL providers will be measured by not only their regional or international dominance and knowledge, but also the ability to provide one stop global logistics with the same service quality and IT sophistication. Service quality is measured by timeliness and accuracy. Efficiency can be enhanced by IT, with an international interoperability. Given the governance structure of China's logistics industry, the change and relaxation of regulations and policies across all jurisdictions will help speed up the operational efficiency of established JVs, and strategic alliances of these 3PLs with local companies.

The governmentat structure and regulatory offices are overlapping in their jurisdiction of logistics licensing and control. An issue of regulatory infrastructure of China that poses an unfriendly business environment. The establishment of new offices for MNC remains to be confrontational. This and other factors of business opportunities will be examined further in the next report.

For now, most 3rd party logistics service providers, both regional and international companies, are trying to situate themselves in the right market sector. Competitions are light, as efforts are devoted to establish a strong foothold in their markets. Nonetheless, strategic alliances and global expansions are common practices for logistics companies to enter the China market. Other efforts are ongoing to help alleviate the troublesome customs procedures, and provide a one-stop solution for global logistics to the customers. Of course, regional providers would like to access the community network, providing value-added services to their customers that some global integrators can now offer.

In here, a few discussions of what some of the steps taken by companies in the region in order to operate in this new market – China.

IV.6.1 Trade Facilitation with Easing of Customs Procedures

For example, directive 332/2001 by State Council has taken immediate actions in mobilizing the automation of Customs procedures and standardization of rules and regulatory among regions and provinces. This action is critical in bringing efficiency to cross-province trade and associated logistics. It is clear governments have an important stake in the e-modernization of their customs and other administrations and those of their trading partners. Inefficient administration is intolerable when the world moves increasingly toward trade liberalization and cut down of regulatory procedures in cross-border trade. The cost and time will become too great to bear while other parts are improving.

With accession to WTO, typical trade barriers such as tariffs and quotas are within agreeable limits. Free flow of goods and services across borders should be further enabled by removing administrative barriers of countries. Specifically, barriers arising from customs procedures, incompatible exchange mechanisms, and varying standards adaptation are prominient especially in the Asia-Pacific region. In order to effectively expand trade in the region, the three economies (HKSAR, Taiwan & Mainland) must take full advantage of the recent advancement in information technology and simplify customs and other administrative procedures.

One of the biggest administrative barriers to trade is the development status of customs regulations and procedures:

1. Inherently cumbersome; and in some cases, territorial differences penalize traders in efficiency and wasted resources
2. Outdated and failed to keep up with the expansion and increased complexity of trade
3. Lack of support to and for SME when IT is used to improve the time factor

These problems must be dealt with swiftly and removed for effective direct links. Some service sectors, such as distribution and transport, are very much contingent upon timely and efficient customs regulations and procedures. Customs simplification, harmonization and integration is a major issue for companies that find their operations and profits severely affected by administrative delays at borders. Small and medium-sized companies (SMEs) are among the most affected.

Traditionally, customs administrations perform two basic functions: trade facilitation, and customs control. The latter includes prevention of the infiltration of illicit drugs or other hazardous substances, intellectual property rights protection, and in particular, tariff collection. Correspondingly, manifest acquittal prior to delivery remains the norm of their cargo clearance process. As a result, their customs suffer from information overload, with its consequential delays on clearance times. The recent requirement of U.S. Customs Department to receive accurate cargo information of ships arriving from foreign ports 24 hours before docking at U.S.

illustrates the preparedness of both the enforcer and the traders. Tradelink[46] (of HKSAR) has launched service (AMS) that allows shippers to submit such information.

Historically, tariff collection was a major source of revenue for developing countries. With WTO under the belt, tariff barriers come down, the customs revenue-raising function has diminished in relative importance. Since customs regulations or procedures are no longer tied closely to the revenue objective, streamlining customs procedures, via the application of modern electronic technology, becomes predominantly a measure of trade facilitation. The governments would much welcome such effort if it is a possible generator of net social benefits.

Furthermore, apart from the continuing reduction of tariff, e-merchants rely on strategically located fulfilment centers and warehouses to enable speedy and economical delivery of goods ordered online. Meeting the time factor of demand chains, some companies have turned to "virtual warehousing," keeping goods in transit as a substitute for holding goods in storage. Other industries (computers, pharmaceuticals and designer clothes) have adopted the globally emerging trend of integrated, just-in-time (JIT) production and distribution systems. Specifically, companies manufacture to order and have to source their raw materials. They need to reduce inventories and cut down the time it takes to move a product to the market. Product life spans are also shortening in these and other industries. Furthermore, as a result of continuous declines in tariffs and other trade barriers, international fragmentation, i.e., outsourcing various production blocks to countries that possess a comparative advantage in that type of productive activities becomes a major economic force for firms to remain competitive. These increase the demand for international service links, in the form of distribution, logistics and transportation services.

Average annual growth in freight-ton kilometers on international scheduled services during the last decade is 7.9%. In addition, both the JIT pressures and the vertical integration of the logistics industry along with the increasing trend towards

[46] Tradelink Electronic Commerce Limited, HKSAR

outsourcing distribution have led to much faster growth in the air express market than the total air cargo market. Annual growth in international express has averaged nearly 24% since 1992 (Zhang and Zhang, 2001). Finally, e-commerce is likely to generate further increased demand for air cargo, particularly the time-definite, express market.

Studies have shown that delays as a result of customs procedures were the biggest problem faced by the integrated air express industry in ASEAN countries Integrators, airlines and a number of general cargo handlers identified time-consuming customs clearance procedures of several APEC economies as a key constraint on the development of freer and more efficient APEC trade (Ching, et al. 2000; Bridges, 2001). For instance, trans-shipment goods are in general still subject to the usual import-export procedures during transfer, unnecessarily increasing the turnaround time of trans-shipment business. Another obstacle to the integrated express industry was the restrictions on investment in ground transport operations, resulting in higher costs of doing business. The primary reason for these obstacles is because integrated, door-to-door express service as a way of movement was still relatively new in Asia, let alone in China, and customs regulations or procedures were set mainly in the context of traditional ways of cargo movement, in which customs play a relatively passive role.

Barriers arising from customs delays and red tape involve cross-sector, horizontal issues such as standardization of administrative procedures, coordination among government agencies of different economies (such as the PAA – cooperative efforts to bring trade information to the same playing field based on ebXML messaging standards), transparency of laws and regulations, and timely and accurate provision of information on regulation and administrative procedures.

Indeed, in such international service links as distribution, logistics and transportation services, customs becomes an increasingly important component. It is important in many ways:

a) Clearance time – any customs administration that can provide reliable, timely customs clearance, or immediate release based on pre-clearance, creates a competitive advantage in attracting foreign direct investment and foreign manufacturing/distribution/transportation and third-party logistics companies;

b) Predictability – arbitrary or unpredictable customs clearance delays are adversely affecting efficient manufacturing and distribution;

c) Transparency – arbitrary or unexplained changes in classification or valuation of goods can disrupt logistical flows

Governments in the APEC economies have been quick to understand the potential benefits and importance of e-technology to their work and are developing Web-based administrative systems. In Hong Kong, for example, Tradelink Electronic Commerce Limited ("Tradelink") leads the modernization of information exchange using technology. The exchange is transaction-specific. It is effective in its own right. Tradelink steps up to take up the implementation of electronic submission of manifest to the US Customs.

At the same time, the application of IT to customs and other administrative practices brings out procedural issues that can be improved. Care must be taken to ensure interoperability in all levels – communication, systems, applications and data in information exchange. In here, we discuss some of the factors that affect the application of IT and the simplification of customs and other administrative procedures.

In here, we discuss few of the significant events that lead the efforts in creating a level playing field with respect to customs clearance for all regional and international 3PL providers.

IV.6.2 Cross-border Customs Coordination

The Pan Asian e-commerce Alliance (PAA[47]), with current members from China, Hong Kong SAR, Japan, Korea, Macau SAR, Malaysia, Singapore and Taiwan, aims to facilitate global trade and logistics by promoting best-of-breed technology infrastructure and applications infrastructure. Key to PAA's mission is the issue of linking securely different networks across country boundaries – inter-

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[47] http://www.paa.net: Members from China (China International Electronic Commerce Center – an agency of China Ministry of Foreign Trade & Economic Cooperation, or MOFTEC), Hong Kong SAR

network communication. Each country has an infrastructure technology of its own, connecting these networks to be able to achieve interoperability is a huge task. PAA has identified these key tasks:

- Secure cross-border transaction services – full documents should be able to securely transmitted from one network to another network; such full documents could be permits or consignments that are requested via the networks
- Mutual recognition of public key infrastructure (PKI) – given if all countries have adopted the PKI technology, and given that only one CA (Certificate Authority) in each country, one would need to establish a 'certificate policy' for countries to follow. Certificate from one country must be accepted by another country, but how. The end-to-end authentication using PKI can be done then.
- A portal where information can be shared, such as end-to-end cross-border track-and-trace can be accomplished

The effort here is admirable – bring trade information to the same playing field based on ebXML messaging standards. The technology is similar to what was proposed for the messaging infrastructure of DTTN. The benefits would be immediate to DTTN users once cross-border customs are enabled following PAA guidelines.

Coordination among domestic government agencies must continue to reduce to a minimum on non-tariff trade barriers – in the form of quota control, additional license/permit requirement, or an increased level of surveillance activity – is to be reduced to a minimum.

IV.6.3 Efforts by International Organizations

WTO, WCO (World Customs Organization) and ICC (International Chambers of Commerce) have taken on initiatives to bring integration in customs procedures with coordinated reforms and collaborative standardization. For example, binding rules on trade facilitation should be established in the current Round of WTO

(Tradelink Electronic Commerce Limited – www.tradelink.com.hk), and Taiwan (Trade-Van negotiations and be administered by the WTO. Naturally, such rules would draw upon relevant facilitation work undertaken by other international organizations such as the WCO, the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT), the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) and ICC. In particular, the WCO's revised Kyoto Convention[48] should be adopted and may be given obligatory and enforceable status.

IV.6.4 Examples of Current Approaches and Efforts in China

Integration to Customs and Ports procedures in China requires immediate attention by the government. The State council directive 332 stipulates trade transparency and automated handling of logistics matters. Efforts are now underway in China in two key projects, 'Great Clearance Project' (GCP) and 'e-Port.'

GCP integrates all customs procedures from different provinces to achieve a one-China logistics land. GCC project is a strategic mission of the Chinese Government aiming at increasing the efficiency of customs clearance, which is directly related to the transport cost of sea freight. As the implementation of the project may quicken the speed of logistics flow, shorten the time of inventory kept at ports, and even lead to zero inventory manufacturing, more warehouse, storage and transport time capacities would be saved. Enterprises may benefit from more development capacities and opportunities.

The project is now implemented in some trade ports, such as Beijing, Tianjin and Shandong. In past, customs inspection may process both in the local inspections spot and import/export ports, which doubled the inspection fee paid. Now, the adoption of the project eliminates the duplicate inspections. Government departments are aiming at providing digitalize and scientific customs inspections with economic customs procedures in future.

Information Services Company – www.tradevan.com.tw) founded PAA in July 2000.

[48] An international instrument, established at Kyoto, Japan on 18 May 1973, to bring efforts to focus on the simplication and harmonization of Customs procedures.

E-Port is to facilitate effective handling of sea cargoes and an information portal for sea transport data and statistics. Other efforts described by key customs officials as featured speakers in the Forum are summarized as follows:

- Guangzhou Customs: Steps taken to for improvement because of WTO
  Before the accession, China as a non-member was not a participant or a contributor to the guidelines and regulations. Compliance is voluntary and is always neglected. With WTO accession is now complete, trade policy must be aligned with guidelines and/or agreements. Issues such as what regulatory issues to deal with for customs on air cargo logistics to why it is needed are now being asked and studied. As obligations of a member, State Council has taken immediate actions in mobilizing the automation of Customs procedures and standardization of rules and regulatory among regions and provinces. Reciprocal relationships must be established quickly and inherently in any agreement among provinces, cities and districts. Other issues discussed:
    - Transparency on 'trade control policy' must be created, for example, tariffs and quotas on import, (automated) issuance of import/export permit.
    - Speed customs clearance in Guangzhou: clearance booth, Internet-based clearance, accept pre-clearance declaration, customs clearance, on site inspect-and-release, express insured/bonded inspect-and-release.

- Shanghai Customs: Streamlining customs procedures
  Shanghai leads in the IT development with respect to Customs automation. Easipass.com is leading the way in bringing the IT into Customs handling, logistics information sharing and port clearance. There are a number of factors affecting the customs clearance procedure, including business process (flow volume, efficiency, automation level, control chaos) external environment, organization factors, and legal and regulation environment.
    - As an international trade and transportation center , efforts must be carried out to

- Advance the general IT sophistication level of the government and the industry as a whole,
- Make available trade/usage statistics on the Web, and,
- Increase the transparency of policy and regulations, and improve the cooperation of local and provincial administrative customs offices

Most logistics MNC's express their concerns of paperwork bottleneck (e.g., logistics process preparations from manufacturers/suppliers to forwarders) takes up an estimated 76% of total time taken for a shipment. IT-enabled procedures and easy data access are suggested as solutions to part of the problem. For example, customs clearance control IT modules should be developed to alleviate or eradicate the delay time in handling paperwork manually. These modules include

- pre-arrival module
  - credit guarantee
  - pre-entry classification
  - pre-entry valuation
  - pre-entry release
  - pre-entry doc review
  - pre-entry data entry
- post-clearance module
  - periodic bill entry
  - pre-entry review
  - random inspection
  - audit

Other efforts in bringing IT into the air cargo industry in Shanghai include the air cargo import warehouse information network system, air express services at Pudong international airport, and the use of port customs electronic standards (e.g., one-pass).

From the human resources point of view, training is needed in international logistics & customs management. This view is based on statistics that indicate

43% expected rise in sea cargo and 160% in air from 2005 to 2020. Other approaches can be taken as suggested are

- o Reorganization: job responsibility, organization structure, human resources
- o Collaboration: data/statistics, e-commerce, e-government
- o Improvement: law and regulation; operation procedure

IV.6.5 3rd Party Logistics Providers

One approach has been adopted by large forwarding companies to serve customers better among the constantly changing procedural and technological requirement imposed by the industry and by some countries such as China and USA. These changes are necessitated by recent global events such as terrorism, and the changing economic landscape with the manufacturing shift to countries like China and the Asian-pacific region, South American countries such as New Mexico. Customers are facing the demands from around the world, and subsequently the knowledge base is eroding in terms of handling logistics requirements. Third-party logistics providers must be able to meet this need.

Third party logistics providers fills the void where technology is enforced in the logistics industry. The infiltration of technology in China local logistics companies is limited. Established 3rd party logistics providers such as Exel and integrators such as Danzas and DHL can quickly provide IT services to local needs. Yet, the business environment of China remains to be fragile and multi-tonged. 3rd party logistics providers must partner with local logistics service providers to provide physical handling of goods and at the same time, must be able to link up with governmental portal to facilitate the electronic handling of trade and transport information. As technology acts as the enabler for swift cross-border customs clearance, policy of participating countries must be changed to facilitate such innovation to be benefited as it is intended.

Container Security Initiative (CSI), a key U.S. Customs initiative – onsite U.S. Customs inspectors at foreign seaports to screen containers that destined to U.S.

(50% of the value of all U.S. imports arrive via sea cargo containers every year [USCon2002].

IV.6.6 Taiwan Logistics Companies – Some Views

Taiwan, in 1970's, is an export-oriented economy (same as Hong Kong); in 1980's, based on strong technological foundation, industrial structure shifted from labour intensive industry to hi-tech industry (Hong Kong shifted to services industry), then in 1990's, China economy opens up and its low production costs attract foreign investment, subsequent Hong Kong and Taiwan investments are the first few that entered the China market because of language and cultural factors.

From the perspective of China, Taiwan accession to its production resources brings economic benefits to China such as capital, experience of production hi-tech product, international marketing experience. At the same time, there are immediate exposure to modern production technology, management and improve the organizational structure of Chinese enterprises.

Compared with Hong Kong, Taiwan investors set up factories in the Mainland, which is only be part of the supply chain of Taiwan enterprises. Human resources on product development and international marketing are still in Taiwan. i.e. only those request less technological production process will be moved to other production base, those important production processes still retain at Taiwan.

Taiwan is a hi-tech manufacturing based economy. Unlike Hong Kong, proportion of services industry in the Taiwan economy is smaller, the adjustment pressure of original manufacturing is relatively higher.

Two freight forwarding companies, wholly-owned by Taiwan investors, were visited. Their approach is similar in terms of using IT to enable their competitive advantage and global expansions For one freight forwarding company, the management team determines the new enterprise strategy is in information management. The company has outsourced 70% of its IT needs to a company in Canada. All offices around the world are now connected, using the Internet and XML files.

Another competitor sets up information development system department. The company has an in-house development team to handle the increasing demand of meeting electronic management of trade and logistics development. Their software is installed in key customer's offices to ensure interoperability.

From the perspective of a high market share cargo airline, they highly develop Hong Kong and Macau as transshipment center. As we know, these centers are needed before direct links. We believe there are three stages of direct links:

1. Open the cargo charter market to meet the demands of air cargo logistics services
2. Transshipment via a 3rd landing country as a stopover, e.g., Northern China and Central China via outlining islands, Western China via Bangkok, and Southern China via Hong Kong and Macau
3. Direct link – The success of direct link is affected by Taiwan political factors

New international routes are actively sought after by the Taiwan Civil Aeronautics Administration (CAA) for airlines to enhance their global coverage. Based on the site visit of the new cargo terminal in the International Taipei Airport (CKS), its operational aspects are similar to that of HACTL here in Hong Kong, allow the direct processing of air cargo for immediate release to ground transport for delivery to the point of consumption.

The *San Tong* plan on Taiwan Strait policy may not be apparent before the president election in 2004. Political differences continue among the 2 major political parties on Taiwan Strait policy. A conclusive consensus will not be forthcoming because support of the 2 parties is evenly distributed. Industrial practitioners adopt cautious and conservation attitude towards the direct link issue.

In general, even though Taiwan air cargo industry is restricted by the political factor, it will still focus on development of the China market and Taiwan investors' network. Prior to the implementation of direct link, Taiwan practitioners would continue to tranship their goods via Hong Kong, this is a positive factor favours Hong Kong logistics industry.

IV.7 Remarks

Opportunities abound in the open market of China for the Hong Kong air cargo logistics industry. Barriers such as customs procedural bottlenecks, provincial and state governance structure, and lack of IT readiness will eventually be dissolved. Hong Kong air cargo logistics providers must be prepared now. They need to get into the market, and establish a foothold as soon as possible, otherwise there is no competition to speak of. The urgency of breaking into the China is heightened by the recent signing of CEPA between Hong Kong and key cities in Mainland China will have some impact towards Hong Kong air cargo industry.

Tariff exemption may increase the competitiveness of local products, especially to the high-value products. In short run, because of domestic export to the Mainland is few, impact to air cargo industry is not obvious. In long run, air cargo industry may benefit if manufacturing investors set up plants in Hong Kong and export volume increases. However, the return of manufacturing investors is restricted by cost and labour supply.

Under CEPA, 17 service industries will be opened up, including several logistic related industries, like freight forwarding, warehouse, road transport, sea transport and logistics services. Hong Kong investors may set up wholly-owned enterprises in the Mainland before their competitors from the rest of the world. Even though those Hong Kong companies may already set up JV in the Mainland, wholly-owned enterprises have a better efficiency and adaptability (flexibility). As integration is an important concept in logistics industry, operation of wholly-owned enterprises may favour to the integration between enterprises and markets. In long run, CEPA benefits the local logistics industry in terms of more investment opportunities and so as the competitiveness of the entire logistics industry. Apart from logistics industry, trade services industry is also benefited from CEPA. As trade services sector may develop their businesses in Pearl River Delta easier, Hong Kong air cargo industry may gain from it. However, CEPA is a central government policy. Regional government may affect the implementation of policy. Those “regional interest” may determine the degree of benefit of CEPA captured by practitioners.

In the Forum of this September, practitioners of the Hong Kong air cargo industry agree that CEPA offers more development chances, even though its benefit brought are restricted in short run. First of all, because of limited capital and information technology level, majority of Hong Kong freight forwarding companies are small and medium enterprises. Immediate, large scale open-up China market is not feasible. Secondly, under CEPA, if more 'window' office were set up, Hong Kong enterprises may establish their wholly-owned enterprises in the Mainland and avoid dealing with different approval procedures in the Mainland departments. Otherwise, multiple application procedures in the Mainland may hinder the investment from Hong Kong investors, and 'rewards' of CEPA toward Hong Kong investors would become unrealistic.

The balance of trade and IT integration of the region bring on uncertainties that motivate corrective action and unprecedented cooperation, and opportunities that drive businesses to take risks for a better positioning of Hong Kong as the world's leading logistics hub. Further study is needed as CEPA becomes effective at the beginning of next year.

Also, the success of DTTN hinges on its smooth undeterred implementation and its neutrality. We also believe a sound and robust management structure is crucial, after the implementation of DTTN, for its success and global influence in e-logistics standards and protocols. This analytical and administrative committee is to manage the standard maintenance process. Activities of this committee include the monitoring of DTTN standards and emerging relevant standards and protocols, and review and update DTTN standards in a timely, effective and non-intrusive manner.

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Part V: Forums

WTO Implications on Air Cargo Logistics in China
6 December 2002

Integration of Hong Kong and Pearl River Delta: Issues and Concerns for the Air Cargo Industry
24 September 2003

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