

PECC International Roundtable

Session: Logistics – The Driver of Change

**AIRPORT DEVELOPMENT AND AIR CARGO LOGISTICS:
KOREA'S INITIATIVES IN NORTHEAST ASIA**

Oh Kyoung Kwon

Inha University

and

Yonghwa Park

The Korea Transport Institute

PECC International Roundtable

Role of Airports and Airlines in Trade Liberalization & Economic Growth

September 4-6 2003, Singapore

1. INTRODUCTION

The potential and real throughputs of air transportation demand in the Asia region had shown enormous for the last several years, due to the region's high population density, strong economic growth, improving political stability and gradual free market environment through the open-skies policies' adoption. China, in particular, has been the fastest growth rate of air transport traffic in the world for last decade. According to "global market forecast" by Airbus Industrie (2000), Chinese air traffic demand, in terms of revenue passenger-kilometers (RPK) will grow on average by 8.1% per annum over the next two decades. The forecast of annual growth rate for Asian countries is to be 7.7% per year over the period compared to 4.9% per year for the global market. Chinese air cargo throughputs had a significant growth rate of 24% during the periods of 1990-1995 and 15% of 1995-2000.

The demand of air cargo industry in the Asian region had the highest growth rate for the last five years, even though some negative factors such as financial crisis, September 11, and more over SARS (Severe Acute Respiratory Syndrome) were affected. Boeing (2002) forecasted that air cargo volume in worldwide would be tripled in the next fifteen years. It is also expected that the Asian market will grow at 8.4% of annual average rate and the region's market share will increase from 13.6% in 2001 to 19% by year 2020. Many Asian countries have undertaken expansions and reinforcements of their existing airport facilities to accommodate air cargo demand as well as to compete as regional hubs.

In the Northeast Asia, the most salient trend is the emergence of regional airfreight hub serving neighboring countries and other continents. Consolidation of airfreight hub as a distribution center is expected to occur in this region, due to the progress of globalization and the corporate incentive to reduce logistics related costs in fiercely competitive business setting. In Northeast Asia, the logistics infrastructure need to be further improved and the current market is yet well integrated functionally and organizationally. Therefore, a well-functioning air cargo hub in the region will be brought a positive economic impact on the entire region as well as on the host country by enhancing economic performance and facilitating other related social developments.

This paper introduces Korea's initiatives air cargo hub at Incheon International Airport (ICN) in the region of Northeast Asia. The opening of Incheon International Airport in March 2001 provides new opportunities for Korean aviation. In order to be a regional air logistics hub, ICN has a strong potential circumstance geographically and economically but its success is definitely depended on the capability of rapidly attracting a critical mass of global logistics service providers. The "Winged City" strategy, the image of new ICN as the whole ICN's

complex flying ahead of the competition in the global airport industry, can be enable to create of a logistics hub in Northeast Asia. Therefore, the main object of the Winged City strategies is stressed on the development of a hub in terms of airfreight and inter-modal logistics in Northeast Asia.

2. CHANGE AND IMPORTANCE OF AIR CARGO INDUSTRY

The primary hub functional cargo airports in the Asian region, Hong Kong, Tokyo Narita, Seoul Incheon, Singapore Changi, and Taipei Chiang Kai Shek International Airport, have seen a significant growth in cargo business. The growth is at least in part due to more liberal bilateral air service agreements (ASA) although they are still a constraint. These agreements have also shaped in part the relative positions of airports. Some Asia-Pacific economies such as Singapore, Korea, and Taiwan have been signed with the US for the seventh-freedom traffic rights on cargo, which is the hubbing or change of gauge, rights in a foreign territory (Zhanng, 2003:123).

The air cargo industry has been strong interests in due to a change in international trade patterns and customer needs. Expanding mass markets for uniform, common and standardization of products are resulting in the steady growth of international trade, and creating an alternative transport demand within new commercial conditions, for example, longer inland transport distances, shorter and more reliable deliveries, new distribution networks based on a reduction in the size and weight of shipments, more frequent shipments, and shipment tracking (Lu, 2003:49). Under new circumstances, just-in-time production and distribution systems to accommodate various needs of customers are decisive. An open trade regime and global integrated networks have made air cargo services in general and air express in particular.

As a result of continuous declines in air cargo tariffs, increasing global production system to save costs that possess a comparative advantage in that type of productive activity, and growing e-commerce market, the demand of international air cargo services will be gradually expanded to much efficient international links. Simultaneously, the role of international distribution centers and global logistics companies have become increasingly important to enable speedy and economical delivery of goods to customers. The enlargement of the cargo handling capabilities is currently on progress for providing comprehensive value added logistics services by the global logistics affiliates.

2.1 Changes of Air Cargo Industry

Strategic Alliances in Air Cargo Service

Likewise air passenger services, air cargo carriers are co-operating through common service options, sales, service standards, and compatible information systems in order to build their own global networks. The first air cargo alliance was Sky Team Cargo involving Aeromexico, Air France, Delta Air, and Korean Air, it has launched in September 2000. Sky Team Cargo has extended its members to join Czech Airlines in April 2001 and Alitalia in August 2001. Sky Team Cargo alliance has 1,224 aircrafts in total combined fleet, and 8,217 daily flights through their allied network. With the addition of Czech Airlines and Alitalia Cargo, Sky Team Cargo has grown from 411 to 512 unduplicated destinations, 100 to 114 countries served, 14 to 15.1 billion freight ton-kilometers carried per annum (Kim *et al.*, 2003).

Another air cargo alliance, WOW cargo alliance, has started in October 2001 by Lufthansa, Singapore Airlines, and SAS. Japan Airlines has joined in July 2002. WOW alliance offers a combined network of over 500 destinations in 103 countries, 3,660 daily flights on 810 aircrafts. These types of cargo alliance are expected substantial progressive discussion to search for a more efficient networks.

Innovation Technology

The developments of digital technology and Internet have been caused great changes in all industries, and air cargo industry would not be exception. As traditional practices of trade have to be changed essentially by information technology, discussions on paperless trade and global e-business will be focused as an important agenda in WTO and APEC. The computerized reservation system through Internet is a useful example of information technology applied to air transport area. In general, cargo services require a various exchanges of documents and information in related with the processes of custom clearance, security check, and others. The IT based air cargo community systems, the connection between air carriers and forwarders, need to be developed in order to satisfy for their needs such as cargo tracing, provision of detailed information to forwarders and integrators in real time.

Emerging Integrators

The concept of air cargo transport is moving from port-to-port to door-to-door services. This changing incurred an installment of precisional cargo tracing system and importance of air cargo integrators. Integrators, however, are threatening conventional airlines and forwarders by

penetrating into general air cargo market while utilizing their global networks. This trend means that the market segmentation of conventional air transport cargo and express cargo is becoming less important and carriers need to set a new paradigm. Consequently, carriers have to prepare and develop worldwide total logistics services as to cut down the time and cost it takes to move products to the market and then survive in this fierce competition.

2.2 Importance of Air Cargo Industry

World air cargo carriers can be segmented into two categories; combined air carriers and all cargo carriers. Combined air carriers mean that an air carrier serves both of air passengers and freight, besides all cargo carriers handles only airfreight services. Although air express carriers are growing up rapidly, combined air carriers are dominating air cargo about 75% of market share. In general, yield of air cargo services is higher than passenger services due to cargo transport does not require complicated process such as in-flight, ground and transfer services.

When comparing air and sea cargo, although air cargo accounted for only 1% by weight of all cargo handled by Hong Kong in 2000, its value share was much higher at more than 23% (Zhang, 2003). Korea has an equivalent cargo structures with Hong Kong, air cargo accounted for about 0.34% by weight of all cargo, but its value share was 32% in 2000 as shown in Table 1.

Table 1

Modal share of export cargo in Korea

Year	Mode	Weight		Value	
		Thousand Ton	Share (%)	Million \$	Share (%)
1997	Sea	78,993	99.67	99,616	73.44
	Air	262	0.33	36,027	26.56
1999	Sea	101,086	99.64	101,158	70.62
	Air	363	0.36	42,077	29.38
2001	Sea	106,290	99.65	110,814	73.83
	Air	374	0.35	39,273	26.17

Source: Korea International Trade Association

3. TRENDS OF AIR CARGO VOLUME IN NORTHEAST ASIA

3.1 Air Cargo Volumes by Nations

Japanese air cargo volume shows the highest in Northeast Asia as 2.9 million tons in terms of international traffic in 2001 as shown in Table 2. Japan, Hong Kong, and Korea have been reduced air cargo volumes in year 2001 comparing to previous year. China has the second largest domestic air cargo market in the world and its average growth rate has shown at around 20% during year 1990 to 2000. Taiwan achieved rapid growth in air cargo services for last decade, and especially international cargo has been increased at the highest rate.

Table 2

Air cargo volumes in Northeast Asia in 2001

Nation	Domestic Traffic		International Traffic	
	Volume (000 tons)	Growth rate (%)	Volume (000 tons)	Growth rate (%)
Japan	930	4.1	2,927	-5.6
Hong Kong	N/A	-	2,267	-7.4
China	N/A	-	1,710	6.6
Korea	431	-0.7	1,872	-4.0
Taiwan	66	-29.0	1,820	19.3

Note: N/A is for non available.

Source: KADA, Aviation Statistics, 2001.

In Korea, international air cargo volume was 1,872 thousand tons in 2001. More than half of the export air cargo was destined to Southeast Asia at 56.2%, followed on North America (20.8%), Europe (10.1%), Japan (5.5%), and China (1.4%). In the import air cargo, the portion of Southeast Asia was the highest share of 25.7%, followed on Japan (23.0%), Europe (22.3%), North America (17.9%), and China (3.9%). The air cargo share in total of Korea is shown in Figure 1.

Air cargo volumes between Seoul and other major cities in Northeast Asia are shown in Table 3. Seoul Incheon International Airport (ICN) and Tokyo Narita International Airport (NRT) was the highest traffic volume of 201 thousand tons, followed on 176 thousand tons of Seoul and Hong Kong, 102 thousand tons of Seoul and Osaka Kansai International Airport (KIX) in year 2002. Although an air cargo volume between Korea and China was insufficient to

consider, they have been shown expeditions growth rates after establishing diplomatic relations in 1992.

Table 3

Air cargo volumes between Korea and other Northeast Asian Cities

Unit: Thousand Ton

Route	1995	2000	2002	Growth rate (%)
Seoul ~ Tokyo (Narita)	147	175	2001	4.6
Seoul ~ Hong Kong	91	144	176	9.9
Seoul ~ Osaka (Kansai)	-	129	102	2.2
Seoul ~ Taipei	31	42	46	5.7
Seoul ~ Beijing	12	31	37	17.3
Seoul ~ Shanghai	11	34	34	17.5

Note: Cargo volumes include cargo and mail by non-scheduled flight services

Source: KADA, Aviation Statistics, Annual Report.

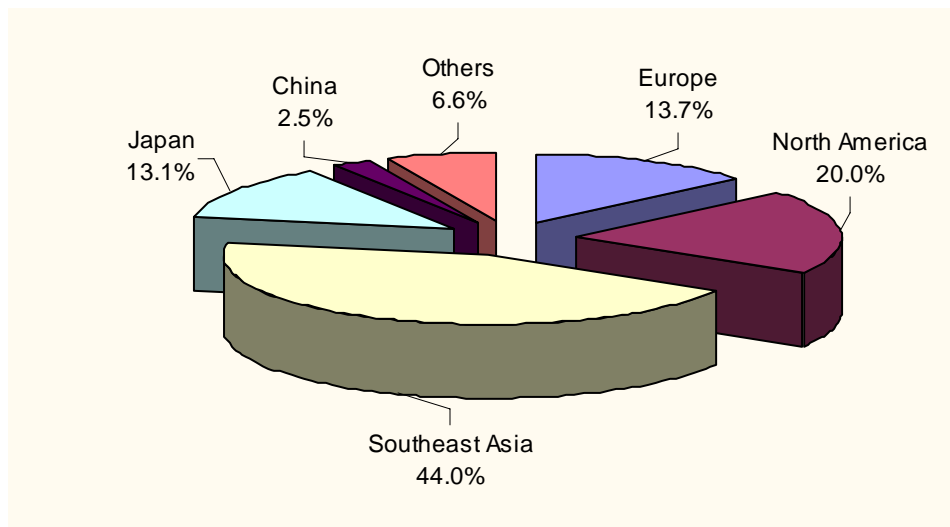


Figure 1. Origin-Destination share of air cargo in Korea year 2001

3.2 Air Cargo Volume by Airport

Air cargo volume of major airports in Northeast Asia had decreased due to economic recession in Asia between 1997 and 1998, September 11 terror in US in 2001, and SARS in

2002. However, this decreased growth rates has been recovering recently. New Hong Kong International Airport (HKG) recorded the highest air cargo volume among the airports in Northeast Asia as approximately 2,100 thousand tons in 2001. Beijing Capital (PEK) and Tokyo Narita (NRT) had sharply decreased 24.3% and 13% respectively to its growth rates in 2001. However, as shown in Table 4, the air cargo volume of almost airports in the region has highly increased in the first half of 2002 compared to the previous year. This indicates that the air cargo volume in the region has been fairly recovered and the world ranks of each airport have been raised simultaneously.

Table 4

Air cargo volume of major airports in Northeast Asia

Airport	2000			2001			2002 (January ~ July)		
	Volume (000 ton)	Rate (%)	World Rank	Volume (000 ton)	Rate (%)	World Rank	Volume (000 ton)	Rate (%)	World Rank
GMP/ICN	1,874	13.2	5	1,197	-	15	979	9.9	6
PEK	774	67.5	25	587	-24.2	28	347	6.8	26
HKG	2,268	13.4	2	2,100	-7.4	3	1,360	18.7	2
TPE	1,209	14.5	16	1,190	-1.6	16	767	13.2	13
NRT	1,933	4.9	4.9	1,681	-1.3	5	1,034	9.9	3

Note: The volume of ICN in 2001 counts for ICN only, excluding Gimpo volume 598,620 tons.

Source: Airport Council International (2002), http://www.airports.org/traffic/cargo_2002.html.

4. DEVELOPMENT OF THE NORTHEAST LOGISTICS HUB

4.1 Conceptual Framework of the Hub

A hub center in Northeast Asia may be seen to consist of a logistics center and business center. The Asian hub center manages and controls the physical flow and information flow through it. The Asian hub center would be developed within the customs-free zone and free-trade zone as a logistics and production hub whilst the Asian business center would be responsible for international distribution, marketing, and business (Lee *et al.*, 2003:115). As a primary functional hub for air transport and logistics, and moreover international business, following conditions would inevitably require;

- Infrastructure offering excellent inter-connectivity of transport modes and integrated

logistics facilities as hardware on par with global standards.

- Institutional and legal barriers should be eliminated to provide convenience and satisfaction for the users of services and facilities at the hub.
- Systematic and customer-oriented administration ought to serve to stimulate the foreign investments and business activities within airport and its vicinity areas where foreign enterprises such as multi-national logistics company, headquarter and call center of international distribution company, high-tech producers, high value creative enterprises and so on.
- There is a requirement for extensive logistics and trade-related databases for the hub to serve as a core of information networks to facilitate in the region.
- The minimum or none of charge for usage of land and facilities can be allowed to users so as to attract the investors nationally and internationally in financial perspective.
- The basic demand of origin and destination (O-D) air cargo at airport and high rate of transfer cargo volumes are essential to be an air cargo hub.
- A proactive international aviation policy should be created through multilateral co-operation among neighboring nations to integrated air transport market, as well as aggressive marketing strategies would need to be adopted in the running of the hub.

4.2 Development Strategies for Air Logistics Hub

For the success for as a major airfreight hub, the airport generally needs to be associated with mixed land-use developments in its vicinity. Indeed, airport can be operated in hub functions by passengers and cargo handling, in particular transit and transfer operations. However, the airport operation deals with a stereotype or narrowed concept of hub airport as shown in Figure 2. Changing the concept and function of airport, the vicinity development has been becoming an important issue to provide various kinds of activities and purposes.

In this paper, it is assumed that the air logistics hub can be achieved by “Airport City” which is a comprehensive and complex concept through airport’s vicinity developments including a transport and logistics, regional headquarters of international business, free trade zone, custom free zone, high-tech research and development center, international tourism and entertainment centers, moreover inter-modal transport systems such as sea-and-air services. Therefore, development strategies for air cargo logistics hub depend on how to successfully actualize the Airport City.

As economic co-operation in the region advances, Airport City could ultimately be expected to play a leading role in international business environment by occupying a hub

function in transport and logistics networks. Development of an Airport City could be utilize as a springboard to foster frontier industries such as IT and telecommunication, international business and other service industries, improve competitiveness of existing industries, and revitalized a nation's economy (Lee *et al.*, 2003:117).

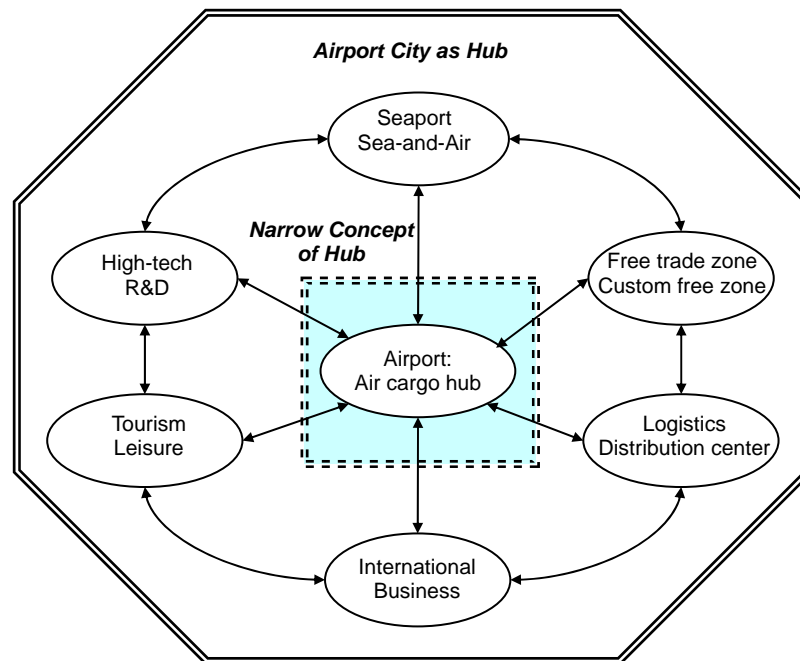


Figure 2. The conceptual diagram of airport city

4.3 Competitive Factors

How do we measure the competitive advantage of an airport? The answer is ambiguous and complex. In this paper, however, the competitive advantage of an airport depends on the following factors (Park, 2003).

- *Spatial factors*: Refers to the level of regional development of the surrounding the airport cite, influencing the economics of the airport's vicinity, such as international trade zones, logistics and convention centers, aviation-related industrial complexes and other facilities.
- *Facility factors*: Related to the level of airport facilities and expandability of the facilities at the existing airports in order to increase capacity.
- *Demand factors*: Represents the level of origin-destination (O-D) demand and

sufficient transit and transfer traffic volumes for hub-and-spoke network at an airport.

- *Service factors*: Mainly consists of level of service to users, type of airport operations, and level of airport charges.
- *Managerial factors*: Refers to economical considerations such as airport operating cost, productivity, revenue structure, revenue scales per provision space, etc.

5. CASE OF INCHEON INTERNATIONAL AIRPORT

5.1 Overview of Cargo Traffic

Trends of Air Cargo Volume

The international air cargo had been increasing 9.6% annually in Korea during 1990s, which shows much higher growth rate than passengers. They predict 5.0% annual growth rate for the next decade due to the slow economic growth. On the contrary, they expect to have a bigger role of air transport in domestic logistics with 12.9% annual growth rate in 2000s. Currently the domestic air cargo is a money-losing business due to the long access time in the ground and the short distance of domestic routes (Lee, 2002:199).

The leading commodities of air export from Korea are electronics products and semiconductor, the portion of which exceeds 58% in value term in 2001 as shown in Table 5. As both electronics goods and machinery have major portion of 82.5% with the weight portion of only 46.3%, export air cargo is found to be composed of high-value goods with low weight. Five leading export commodities take the share of 56% in weight and 91% in value. The leading commodities of air import to Korea are also electronics goods and machinery, whose portion is 69.6% in value term and 34.8% in weight term as shown in Table 6. While garments are included in the top export list, chemical products are included in the top import list.

Table 5

Leading export commodities in air cargo in Korea

Unit: % share in weight and value

Year		Five leading commodities						Others
		Total	Electronics & Semi-conductor	Machinery	Jewelry, coin & metal	Optical & instrumental machinery	Garments & accessory	
1999	Weight	54.7	23.3	17.9	1.3	2.7	9.5	45.3
	Value	91.0	60.2	13.7	8.2	7.3	1.6	9.0
2000	Weight	56.0	27.3	17.6	1.3	2.2	7.6	44.0
	Value	92.1	59.0	25.5	4.2	2.3	1.1	7.9
2001	Weight	55.9	25.9	20.4	1.4	2.0	6.2	44.1
	Value	90.9	58.4	24.1	4.4	2.9	1.1	9.1

Source: Korea International Trade Association

Table 6

Leading import commodities in air cargo in Korea

Unit: % Share in weight and value

Year		Five leading commodities						Others
		Total	Electronics	Machinery	Jewelry, coin & metal	Optical & instrumental machinery	Chemical products	
1999	Weight	57.7	27.2	22.2	6.3	0.4	1.6	42.3
	Value	88.5	53.7	15.6	9.0	8.8	1.4	11.5
2000	Weight	60.1	27.2	24.5	6.5	0.3	1.6	39.9
	Value	88.4	53.0	19.3	9.7	5.1	1.3	11.6
2001	Weight	40.8	18.6	16.2	4.4	0.2	1.4	59.2
	Value	85.8	52.5	17.1	9.4	5.2	1.6	14.2

Source: Korea International Trade Association

Transfer and Sea-and-Air Cargo at ICN

An important characteristics of air logistics hub is a transfer and transit center of air cargo. In this sense, ICN appears to have been close to air logistics hub in Northeast Asia. The shares of transfer and transit cargo in international routes of Korean flag carriers exceed 50% in recent years. But, it is a disadvantage for ICN that there are no foreign carriers, which use ICN as their

transferring center of air cargo so far. The sea-and-air cargo volume of Korean carriers is only 9,000 ton in 2001, most of which is from China. As it corresponds to 450 TEU in sea transport a year, it is too small to be a policy target for building a seaport either in west coast of Korea or in ICN. Besides, sea-and-air cargo is lagging behind in airline business, as it has only minor portion of 1~2% in international air cargo in Korea.

Air Networks

In the end of 2002, Korea has signed bilateral air services agreements (ASA) with 78 countries worldwide. Incheon International Airport has been launched 46 airlines and connected with 108 cities worldwide. In the cargo aspects, Korea-US air routes were the highest traffic volume of 308,277 tons in and out of ICN in 2001 as shown in Table 7. Korean national flag carriers shared approximately 74% among total volume. The second cargo volume was Korea-Japan of 230,824 tons and market share by Korean flag carriers reached to 60%. The following was Korea-China of 281,108 tons in 2001. About 64% of total volume served by Korean flag carriers; Korean Air and Asiana Airlines.

Table 7

Share of air cargo traffic by carriers on major routes from and to ICN

Unit: thousand tons, %

Carriers	Korea - US			Korea - Japan			Korea - China		
	Arrival	Departure	Total	Arrival	Departure	Total	Arrival	Departure	Total
Korean carriers	136	232	368	111	133	244	99	80	172
Foreign carrier	52	75	127	44	67	111	48	46	94
Others	2	2	4	21	30	51	4	4	8
Total	191	308	499	175	230	406	151	130	281

5.2 Airport Facilities

Incheon International Airport (ICN) has four cargo terminals and two integrators' terminal and forwarders' warehouse as shown in Table 8. Cargo terminal A has the capacity to handle 800,000 metric tons of freight annually. Terminal B is capable of processing up to 400,000 metric tons of freight per annum. Terminal C is run by the Incheon International Airport Foreign Carrier Cargo Terminal Co. Ltd. and has a capacity of 400,000 metric tons per year. Each

terminal has its own automated system for cargo transfer that includes a state-of-the-art cargo handling equipments.

Even if the most air cargo is shipped through freight forwarders, the handling warehouse is only 11,596m² (10%) terminal spaces. This is a heavy constraint to developing ICN as a logistics hub. Comparing to Singapore, Hong Kong, and Malaysia, forwarders' warehouse has much spacious site than airlines' cargo terminal.

Table 8
Facilities of ICN air cargo terminals

Classifications		Terminal A	Terminal B	Terminal C		Terminal D	Inter-modal Storage	Total
Area (m)		360×105	270×105	KAS	210×105	3 buildings	39×280 2 buildings	1,050×105 (A, B, C in total)
				AAS	120×102			
				FDX	60×105			
				UPS	30×105			
				Total	420×105			
Sub-total (m ²)		37,800	28,350	44,100		-	21,840	204,953
Canopy (m)	Air	25	15	15		-	-	55
	Land	10	10	10		-	-	30
Floor space	Terminal	57,864	33,736	57,342		2,133	11,596	162,671
	Agent BD	7,810	7,966	6,459		-	-	22,235
	Other	237	-	-		-	-	237
	Total	65,911	41,702	63,801		2,133	11,596	185,143
Capacity (000 ton)		1,030	710	520		-	-	2,260
Owner		Korean Air	Asiana Airlines	Incheon Airport Foreign carrier cargo Co. Ltd		Asiana Air Cargo Development	Incheon Air Cargo Terminal Co. Ltd.	-
Terms of Agreement		20 years	20 years	12 years		12 years	20 years	-

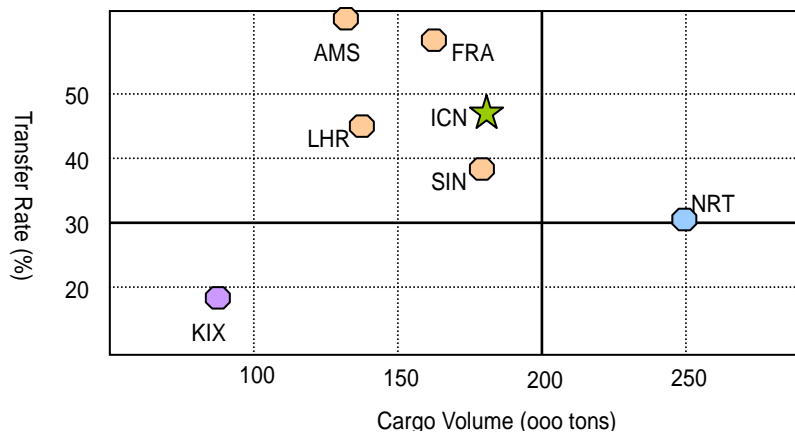
5.3 Prospectives of ICN as Hub Airport

Incheon International Airport had adopted “The Winged City” concept as a strategy to be hub airport in Northeast Asia. “The Winged City” is the image of new Incheon International Airport, reflecting its ambition and flight into the future - the whole ICN complex flying ahead of the competition in the global airport industry. In this dynamic century, travel, leisure and international business are constantly changing. When planners were developing the concept for the new ICN, they realized that in order to meet these changing needs, they would have to build more than an airport. The result was a vision for a community, a metropolis of sorts, to serve not only Korea but also the entire region of Northeast Asia (ICN, 2003)

To complete ICN's initial fulfill, this is analyze of potential possibility of major hub airport in the Asian region, and Incheon International Airport should offers as follows:

- Physical conditions: A location at the geographical limits of long-range transport aircraft such as a fully loaded B747-400 serving the East-coast of the US as well as the same holds for Trans Siberian routes for Europe bound. The ICN can be linkage the intercontinental routes and major markets like China and Japan.
- Hub-and-spoke network: In order to build up an efficient hub-and-spoke network, it is not only well-developed long-haul routes, but also high density of feeder routes in neighboring areas. Hence, the feeder route's framework can be the main element of a hub-and-spoke network. Over 40 neighboring cities within 2 hours itinerary from and to Incheon are located with populations of over one million and overall the region has a population 197 million and with a GDP of \$1.7 trillion. The easier local connect conditions provide a strong challenger to airlines so as to build more efficient and dense networks. The results of this positive conditions have been stimulated push to ahead the portion of transfer freight handled at ICN. The transfer rate of air cargo at ICN has been recorded over 43% since late 1990s. Figure 3 shows air cargo volumes and transfer rates at major airport. ICN is likely to designated as a hub airport in terms of airfreight handling.

Figure 3. Cargo throughputs of major air cargo airport in 2001



- Demand factor: In order to analyze the level of induced force of air transport demand, the degree of city development, inter- and intra-city networks, and the size of the airport hinterlands can be considered. It means that the solid induced demand can be generated by economy strengthen of airport hinterland. ICN serves Seoul metropolitan area, which accounts for approximately 40% of Korean GDP

and 90% of its international flight demand.

- Facility factor: The capacity of airport expansion is an important precondition for accommodating surplus air traffic demand. The development phases of large-scale airports are generally divided into 2 or 3 stages. In the earlier stage of construction, a sufficient expansion plan has to be carefully concerned. Incheon has the greatest capability for expansion among the airports in the region such as Narita (NRT), Kansai (KIX), and Chiang Kai Shek (TPE). It has fully developed airport space of over 40Km² and the ultimate target number of flights is 530,000 operations per annum, whilst Pudong at Shanghai, China is performed on 28Km² and 320,000 aircraft operations.
- Spatial factor: It has multi-use development plans including the vicinity that extends beyond an Airport City or Winged City concept. The airport related regional development were found at several airports- Rinku Town along with Kansai Airport; an air distributional commerce and industrial park near Changi Airport; hotels and airport related facilities at Narita; Formula One racing facilities near Kuala Lumpur Airport at Sepang. In the equivalent cognizance, Incheon metropolitan city has been established an ambitious project, so-called penta-port, inclusion of airport, seaport, businessport, leisureport, and teleport. The co-ordination and co-operation with legislative agency customs-free zone (CFZ) plan is on the last stage of procedures, the first phase will be completed on year 2005 for business specializing in loading and unloading, warehousing, sales and simple processing. The custom free zone is intended to help the airport serve as a logistics hub. The facilities under construction will be used for the transfer, loading; unloading, exhibition and labeling of over 500,000 tons of duty-free transit freight annually.
- Major carrier's competitive strength: Analysis of a hub airport reveals that one of main factors contributing to the hub function is definitely an airline. There are two national flag carriers in Korea, Korean Air and Asiana Airlines, both of which are world leaders in terms of air cargo handling. Korea Air was ranked second position to Lufthansa in terms of international scheduled air cargo. The share of international air cargo traffic carried by the national carriers was 75.7% in 1998, but it has decreased to 65.7% in 2001. The decrease share by the Korean carriers caused to more competitive market situation and the increasing the number of foreign carriers starting to launch Incheon Airport. Even under these trends, the national carriers continue to expand air cargo network through ICN as the hub

airport.

- International aviation policy: Korea's aviation regime is widely open policy rather than Japan and China in the region. The proactive international aviation policy will be helpful to stimulate induce air cargo traffic to handle at ICN by expanding 5th and 7th freedom rights.

In order to strengthen Incheon International Airport would probably need to create sufficient origin-destination (O-D) and transshipment freight by positioning itself as a global trade center as well as a hub for international logistics (Lee *et al.* 2003:115). A Winged City as a long-term strategy of ICN requires prior to air cargo logistics hub itself, and then airport vicinity development to integrate various functions including international business; information technology services; telecommunication; R&D and manufacturing; tourism and leisure; and other logistics-related functions. The development of sea-and-air inter modal transport system may be important in attracting freight from Northeast coastal cities in China and Japan. Incheon has excellent potentials for achieving a cargo logistics hub in the Northeast Asian region, but has also big hurdles to reach the competitive strength position, for example, development of integrated and multi-modal transport system, enhancement of airport access system, upgrade managerial skills and operational processing system, improvement of profitability, and its speedy and systematic vicinity developments.

6. CONCLUSION

For the next decade, air cargo market will be steadily expanded in worldwide. In particular, the Northeast Asia region will be much higher rate than the other regions'. The annual air freight growth rate for the next decade is expected to lower than the growth rate of previous decade. Average annual growth in freight ton-kilometers on international scheduled services during the last decade was 7.9%. Future air-cargo growth is expected to be 6.4% per annum because the matured and stable economic growth is expected. China, however, has numerous potential with scale of its population, geopolitical importance of the location in Asia, the fastest economic growth, leading high-technology innovation, and other positive externality. The potential power of China will likely play a key role in air transport market, in particular, air cargo logistics. Considering near future new era, the nations of the Northeast Asian region have to co-operate to build up integration air transport market for taking win-win strategy.

Despite of numerous variables impact aviation industry last several years, ICN already positioned as world-class international hub airport in passenger and cargo perspective and the

role of importance as the Northeast Asian region is remarkable for the next decade with any doubtfulness. For ascending as a competitive major international hub, the co-operation and co-ordination with the Northeast Asian air transport entities are essential to figure the solution to carry on altogether prior to uncertainty in aviation industry. For the focal point of the Northeast Asian regional aviation market, ICN ought to plan for the seamless procedures to incorporate with government, authorities, air carriers, other air transport affiliates to provide upscale envision for the future ICN. It is primitive to acquire the customer-oriented operation along with proactive marketing strategy.

REFERENCES

- Airbus Industrie (2000), *Global market forecast 2000-2019*, Toulouse.
- Airport Council International (2002), http://www.airports.org/traffic/cargo_2002.html.
- Boeing (2002), *World air cargo forecast*, Seattle.
- ICN (2003), <http://www.airport.or.kr/winged city>.
- KADA (2001), *Aviation Statistics*, Korea Civil Aviation Development Association.
- Kim, J. C. and C. Y. Ye (2003), "A comparative study on air cargo transportation policies of Northeast Asian countries", submitted on *the 7th World Conference on Air Transport Research Society*, Toulouse, July 10-12.
- Lee, Y. H. (2002), "Korea's Air Transport Market and Hub Prospect", in *Comprehensive study on building a regional distribution and logistics hub in Korea*, 2002 Special report, The Korea Transport Institute and Northeast Asia Economic Forum.
- Lee, H. S. and H. M. Yang (2003), "Strategies for a global logistics and economic hub: Incheon International Airport", *Journal of air transport management* 9, 113-121.
- Lu, C. S. (2003), "Market segment evaluation and international distribution centers", *Transportation Research, Part E (Logistics)* 39, 49-60.
- Park, Y. (2003), "An analysis for the competitive strength of Asian major airports", Submitted paper on *Journal of air transport management*.
- Zhang, A. (2003), "Analysis of an international air-cargo hub: the case of Hong Kong", *Journal of air transport management* 9, 123-138.