



Air Cargo

Istanbul Technical University

Air Transportation Management, M.Sc.
Program

Aviation Economics and Financial Analysis

Module 11

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Air Cargo

The forgotten element??



Air Cargo

Air Cargo includes:

➔ “All freight”



➔ Mail, *the original air freight*



➔ Door-to-door small-package air express



Cargo does not include baggage

- But emerging door to door baggage services can covert baggage to cargo sold by forwarder or integrator

Air Cargo

Air Freight Demand can be subdivided:

✈ Domestic price sensitive

- easily diverted to other modes - trucking
- delivery of 1 - 2 days acceptable
- normally uses belly hold space

✈ Domestic service sensitive

✈ International

- alternative is liner shipping

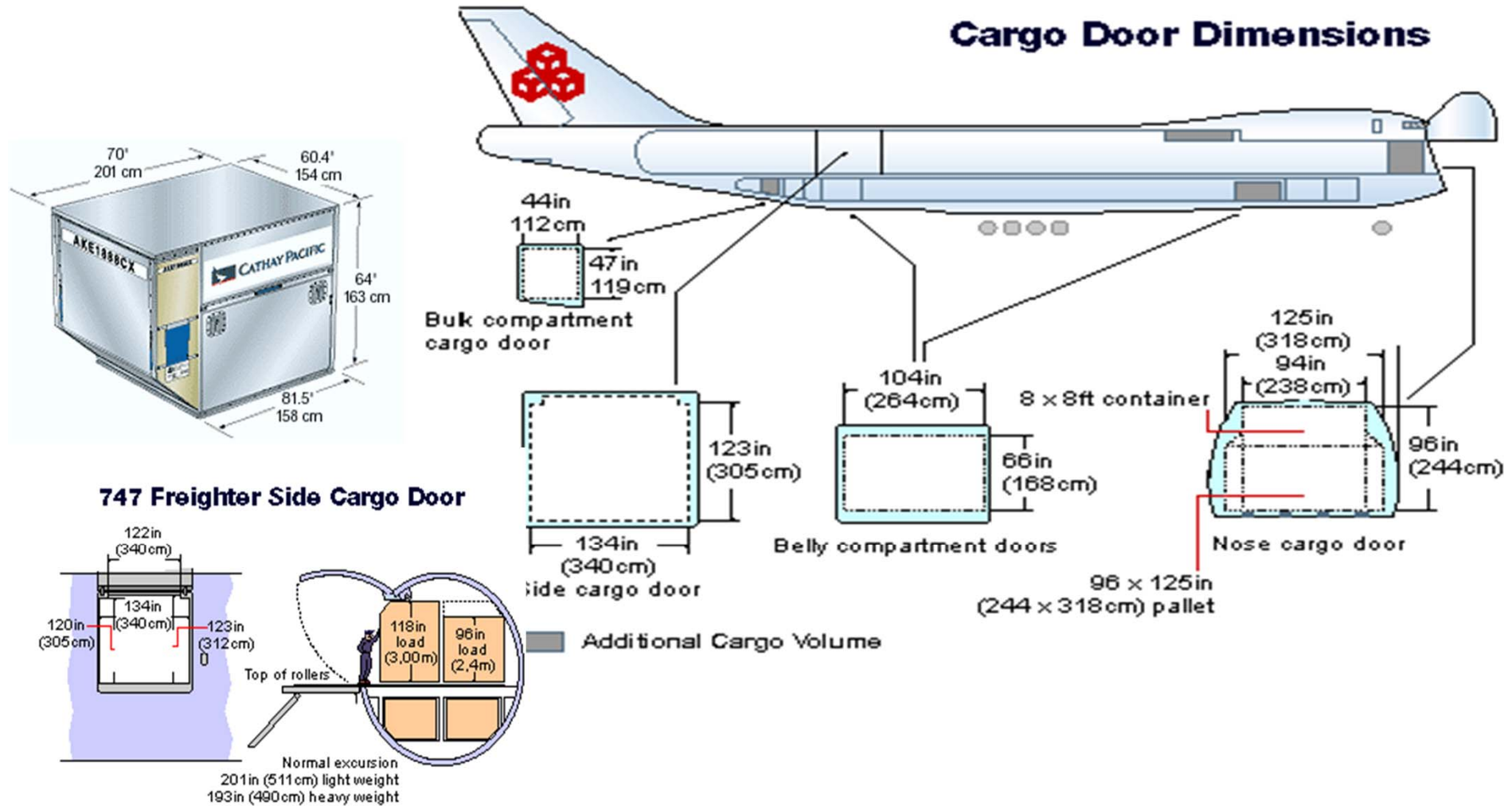
Air Cargo

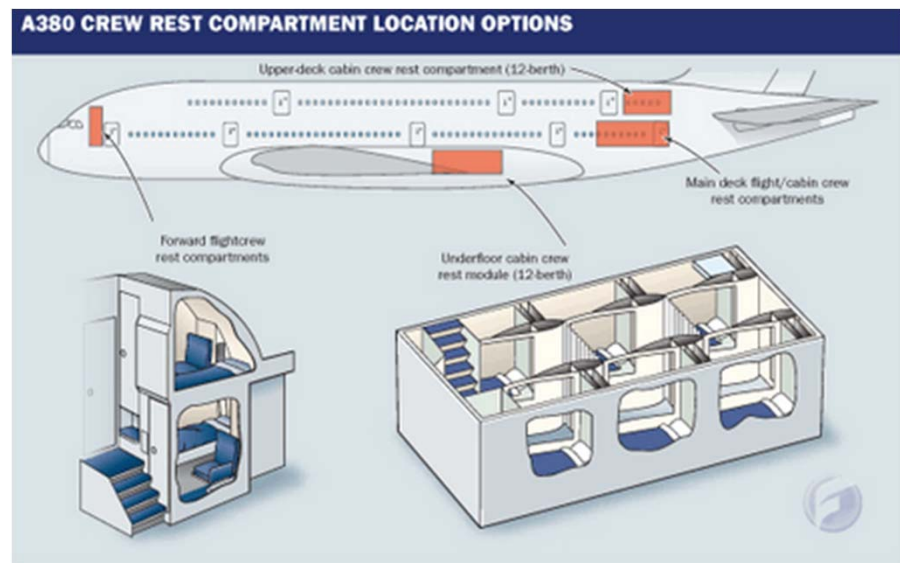
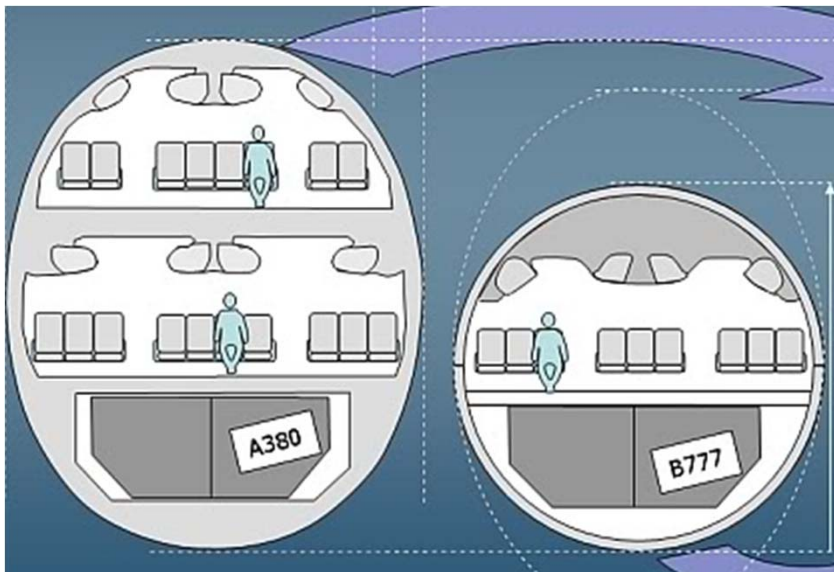
Air Freight Supply:

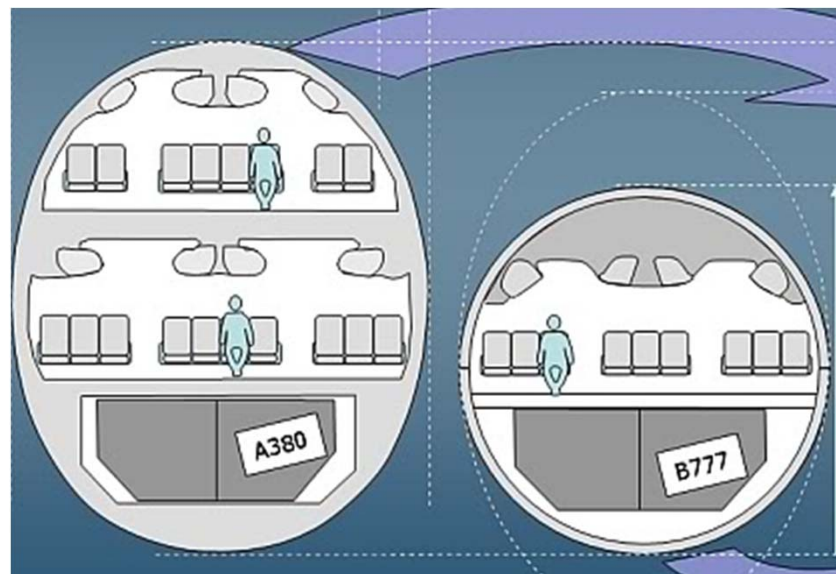
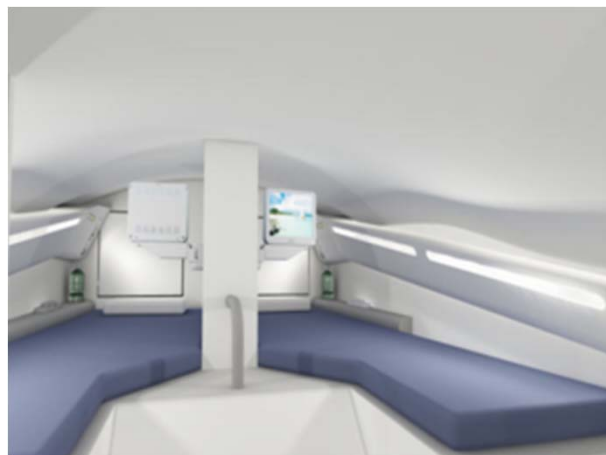
- **Main Deck cargo (freighters) is expensive**
 - Cargo must pay all the costs of the flight
 - There are also combi aircraft
 - Main deck is part cargo, part pax
- **Bellyspace on passenger aircraft**
 - **Pax pays most of flight cost**
 - **cargo can be incrementally priced**

Air Cargo: Where is it carried ?

“Belly” and “Main Deck”







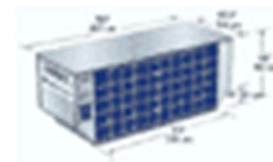
Air Cargo's Early History

- ➔ **1920s: “Mail” contracts provided impetus for the development of air routes and carriers**
- ➔ **1940s: DC-3 cargo capacity of < 4 tonnes**
 - unable to make money at 30¢/tm (6x that of trucks)
- ➔ **1950s: DC-6A... 17 tonnes**
 - Operating costs still high at 30¢/tm
- ➔ **1960s: Jet aircraft**
 - Domestic rates to 16¢/tm

The Past 40 Years

➔ Introduction of the “widebody”

- DC-10F & B747-200F
 - 80 & 113 tons capacity respectively
 - 747-8f: 150 tons
- By 1973 costs dropped to:
 - 21 ¢/tm for combination carriers
 - 16 ¢/tm for all-cargo carriers
- Containerized belly hold
- Belly hold in widebodies > x5-6 than narrow body aircraft



➔ Advent of express of integrators



Evolution of Air Cargo

✈ **World freight carried by Air:**

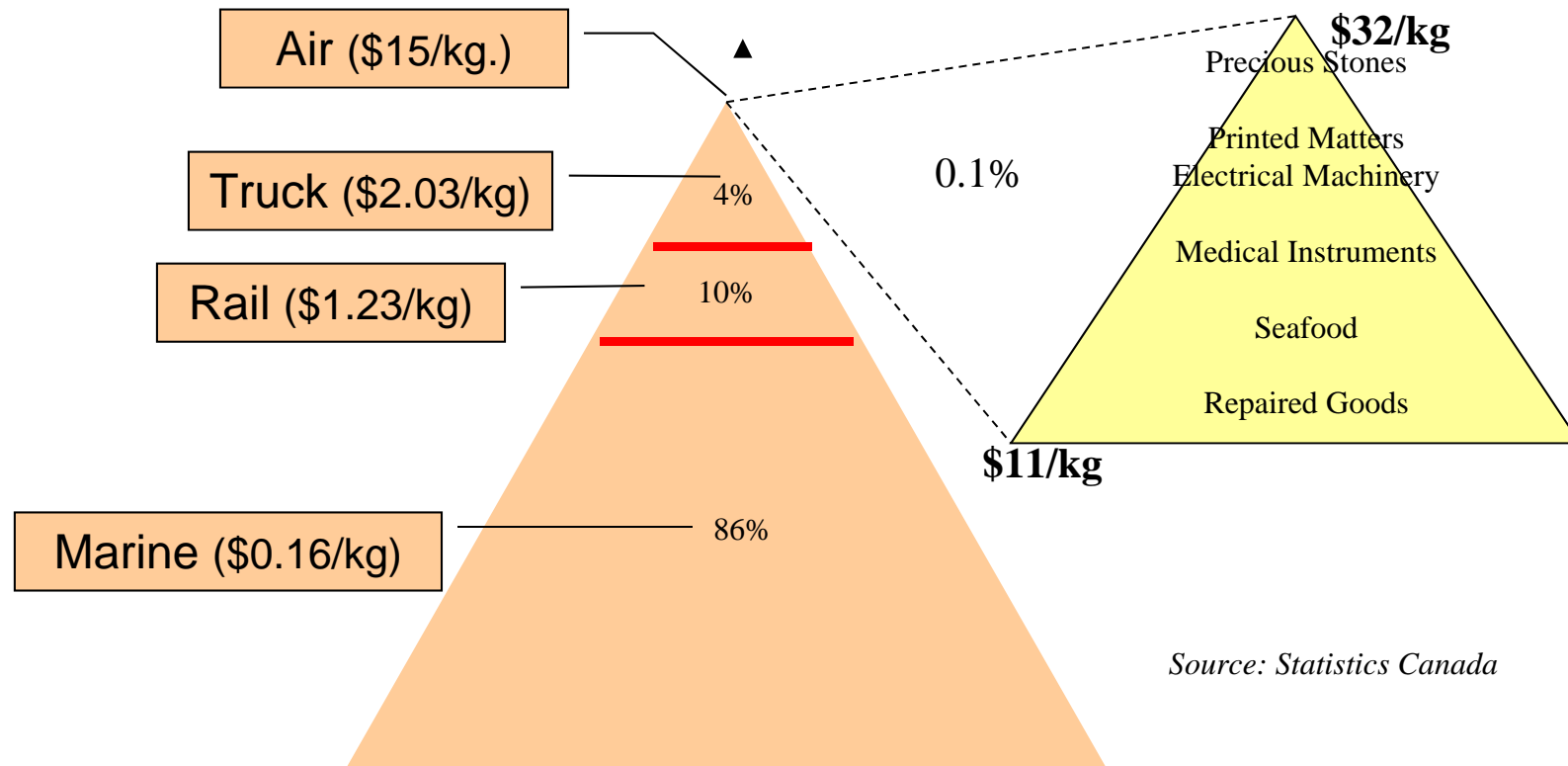
- 1% by weight
- 39% by value

✈ **Still driven by the passenger component**

- 55% of air cargo carried in “belly”

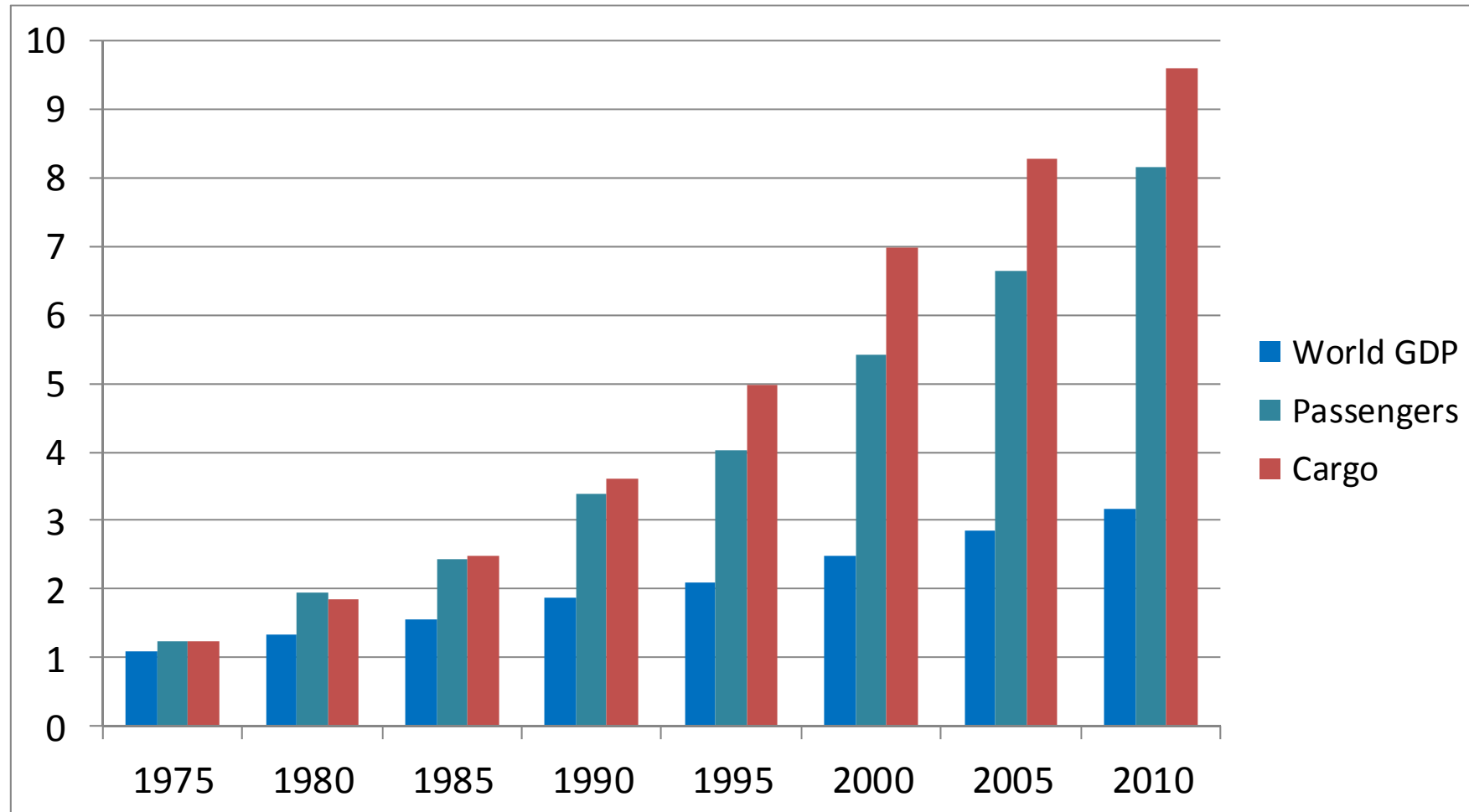
Value Pyramid

Tonnes Exported from BC by Mode - 1997

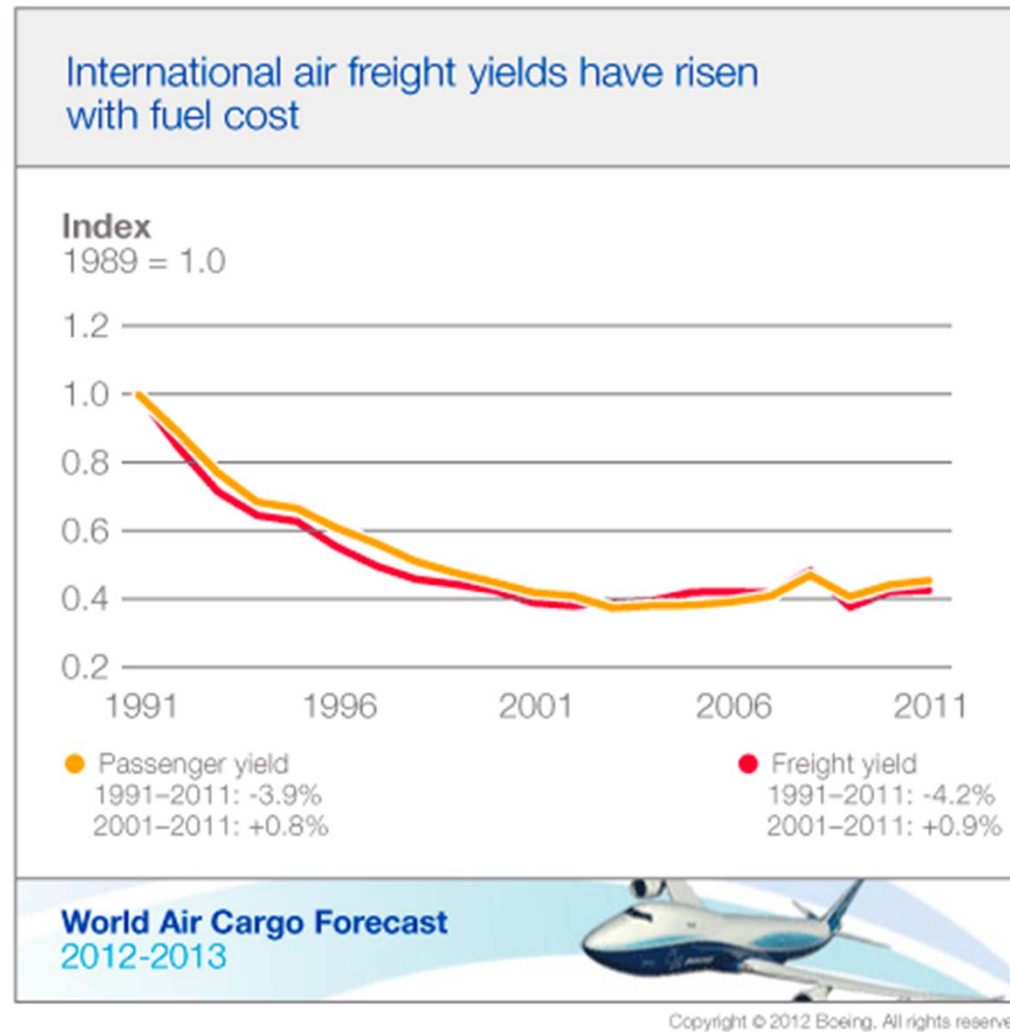


- Exports: 3.6% by value depart by air
- Imports: 10.2% by value arrive by air.

Air Cargo Grows at Double to Triple Rate of World Economy



Cargo Trends: World Yield Trends



Source: Boeing World Air Cargo Forecast, 2012-2013

The Cargo Community

- ➔ **Manufacturer**
- ➔ **Freight Forwarders**
- ➔ **Brokers**
- ➔ **Customs**
- ➔ **GSA's**
- ➔ **Passenger Combination carriers**
- ➔ **All-Cargo carriers**
 - "Wet" Lease carriers
- ➔ **Integrators**
- ➔ **The Airport Operators**

DANZAS



FedEx Express

Manufacturer / Shipper

- **The forgotten “player”**
- **Has logistical choices:**
 - Freight forwarder
 - Integrator
 - Trucker
 - Air, Sea or Land ??
- **The supply chain starts here**

Freight Forwarders



- Linkage between the manufacturer / shipper and the air carrier.
- Can be viewed as the consolidator *consolidates shipments from multiple customers*
- Leverages their larger volumes with the transportation providers to lower their rates
- Numerous companies
 - mid size airport may have 50+
- Handle >70% of world's freight
 - Freight forwarders play critical role in cargo value chain



Freight Forwarders

- **Evolving rapidly to become full service logistic providers**
 - Inventory control
 - Quality inspection
 - Order fulfillment
- **Some are have worldwide networks**
 - Danzas, Panalpina
- **Others are national or regional in scope, others are niche or specialized forwarders**

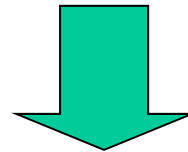
Intensively competitive between forwarders

+

Being squeezed from the integrators

+

Globalization & Liberalization



Consolidation and Mergers

Brokers

- **Individuals / firms licensed by Revenue Canada to transact business with Customs on behalf of importers to facilitate the entry of goods into the country**
- **Facilitate the payment of duties and other related taxes on behalf of their client.**
- **Many freight forwarders are also brokers**

Customs

- ➔ **Integral player**
 - A Federal Agency
- ➔ **Responsible for for:**
 - Collection of duties and fees
 - Watchdog for contraband and illegal goods
- ➔ **Key ingredient to Port of Entry's reputation**
- ➔ **Steadily liberalizing its procedures**
- ➔ **Proponent of electronic interchange / clearance**

Trucking

- ✈ **Closest intermodal linkage with air cargo**
 - Local delivery, to/from manufacturer/shipper to airport
 - Regional trucking
 - Vancouver to California

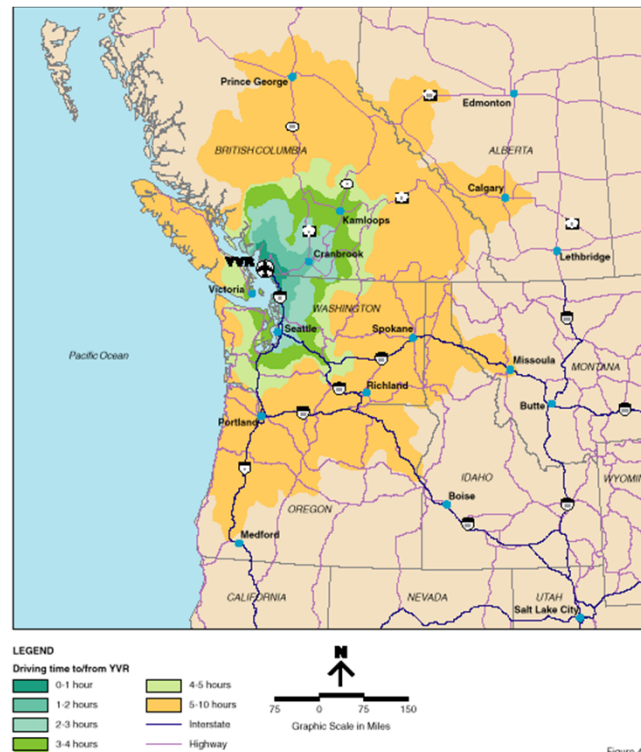


Figure 4-29
DRIVE TIME ANALYSIS—
VANCOUVER INTERNATIONAL AIRPORT
(Continuation of Figure 4-28)

Cargo Handling



Air Carriers

✈ Passenger Combination Carriers

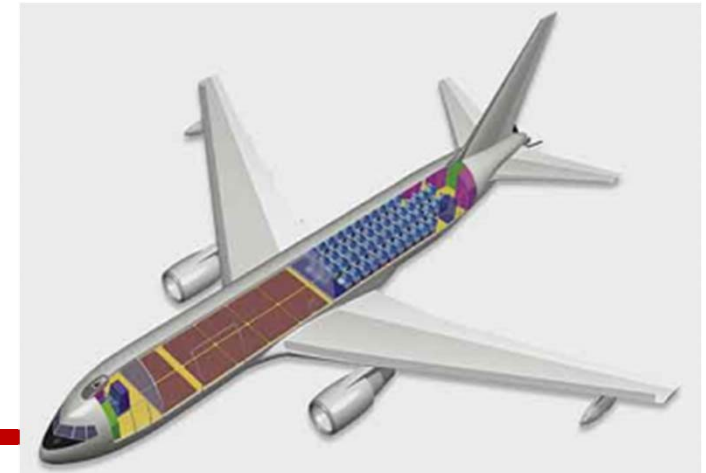
- Carries cargo (and baggage) in the belly of the aircraft
- Widebody aircraft or narrow body
 - Widebodies carry 5 - 6 x more cargo than narrow bodies (even though marginally less passenger capacity, i.e. B767 vs B757)
- Schedules and routes driven by the passenger component
 - Cargo viewed as a “filler”
 - Passenger & Baggage priority over cargo
- Costs of carrying freight debatable
 - Often treated as incremental; includes only handling, incremental fuel storage. Not fully allocated.....
 - Pressure on accepting lower yields



Air Carriers

✈ “Combi’s”

- Back of “Main Deck: allocated to cargo”
 - On B747s passenger capacity reduced from 390-420 to 290 seats
 - Allows for 6 - 7 pallet positions
- Many are flexible between “combi” and “All-Passenger” configurations
 - 24-48 hours to reconfigure
- Combi fleets are more common in Asia and Europe
 - largely absent in the U.S.
 - Used in Canada for Northern Services



Air Carriers

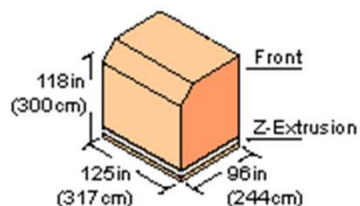
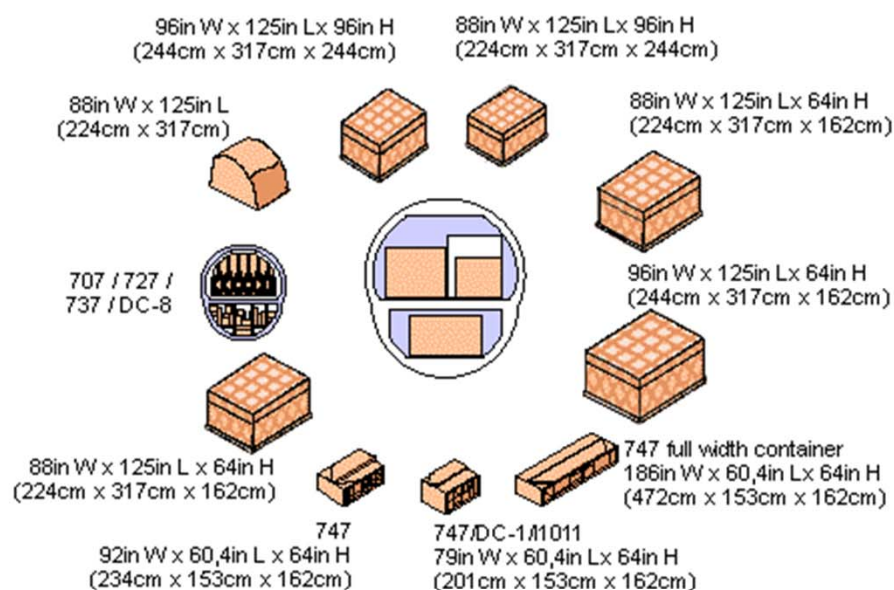
✈ “All-Freighters”

- Cargo dedicated
 - Belly hold + entire Main Deck
- Scheduling & Planning driven by cargo needs
- “Wet Leasing” Atlas Air
- No International “All-freighters” in Canada
 - Domestic services only (Royal Air Cargo, ICC)
 - Air Canada / Canadian pulled out of that market in the early 1990s



Air Carriers

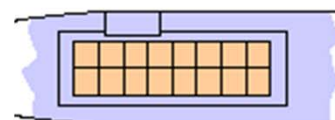
Cargo Module Interchangeability



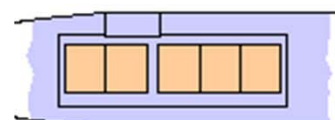
High Cube Container

Container tare weight 765lb (360kg)
 Container interior volume 708ft³/130,3m³
 Maximum gross weight 15000lb (6804 kg)

FWD Hold

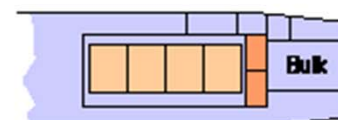
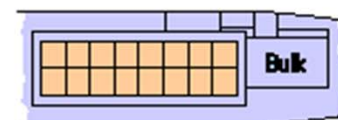


(32) Halfwidth containers
 Total volume = 5576ft³/157,8m³
 Total volume (Bulk) = 520ft³/14,7m³



(9) 96in x 125in pallets
 (2) Halfwidth containers
 Total volume = 4601ft³/130,3m³
 Total volume (Bulk) = 520ft³/14,7m³

AFT Hold



Main Deck (30) 96in Pallet Positions



- (2) 96in x 125in x 8ft contoured pallets
- (5) 96in x 125in x 8ft pallets
- (23) 96in x 125in x 10ft pallets

Leading Air Cargo Airlines

#	Airline	FTKs ¹ (millions)	@YVR	Hub Airport (Rank)2010	YVR Services
1.	FedEx	15,939	Yes	#2 - MEM	Spoke pt.
2.	UPS Airlines	10,566	Yes	#10 - SDF	Spoke pt.
3.	Cathay Pacific	9,109	Yes	#1 - HKG	
4.	Korean Air Lines	8,974	Yes	#4 - ICN	
5.	Emirates	8,123	No	#8 - DXB	
6.	Lufthansa	7,674	Yes	#7 - FRA	
7.	Singapore	7,118	Yes	#11 - SIN	
8.	China Airlines	5,411	Yes	#13 - TPE	
9.	EVA Air	4,882	Yes	#13 - TPE	
10	Air France	4,702	Yes	#6 - CDG	
24	Air Canada	1,440¹⁹⁹⁷	Yes	#- YYZ	Secondary hub

Source: (1) IATA World Air Transport Statistics 56th edition, 2011; (2) Airports Council International Website

YVR Cargo Community

- ➔ **40 Passenger Combination Air Carriers**
 - Dominated by Canadian and Air Canada
- ➔ **One Freighter service - Cathay Pacific**
- ➔ **7 integrators**
- ➔ **70 Freight Forwarders and 20 Brokers**
- ➔ **11 Suffrance and Bonded Warehouses**
- ➔ **Canada Customs**
- ➔ **Landlords (developers)**
- ➔ **Airport Authority**

Future Global Cargo Trends

- ➔ **Yield and shipment values will continue to decline**
- ➔ **Cargo to continue to grows 2-3x economic growth**
- ➔ **Fastest segment: integrator carriers**
- ➔ **All Growth to Integrator Carriers ?**
 - 5% international freight (to 35%)
 - Adopting multiple hubs
 - Permanent sort facilities
 - Declining belly space in some new aircraft models and substitution of RJs for narrow bodies



Thank You!

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