



C-MAT

Centre for Maritime & Air Transport Management
University of Antwerp

3rd Istanbul Hub Seminar – 27th April 2017
The Strategy of Air Cargo airlines
Prof. Dr. W. Dewulf



C-MAT

Centre for Maritime & Air Transport Management
University of Antwerp

- **Center for Maritime and Air Transport Management**
- **University of Antwerp - Belgium**
- **Master in Air Transport Management**
- **1 year full programme**



Presentation's content

The Strategy of Air Cargo Operators. About Carpet Sellers and Cargo Stars.



- 1. Setting the Research Framework**
2. Organizational Purpose and Dimensions of Strategy
3. Indicators
4. Research Methodology
5. Typology of Strategy Models
6. Key Differences
7. Conclusions

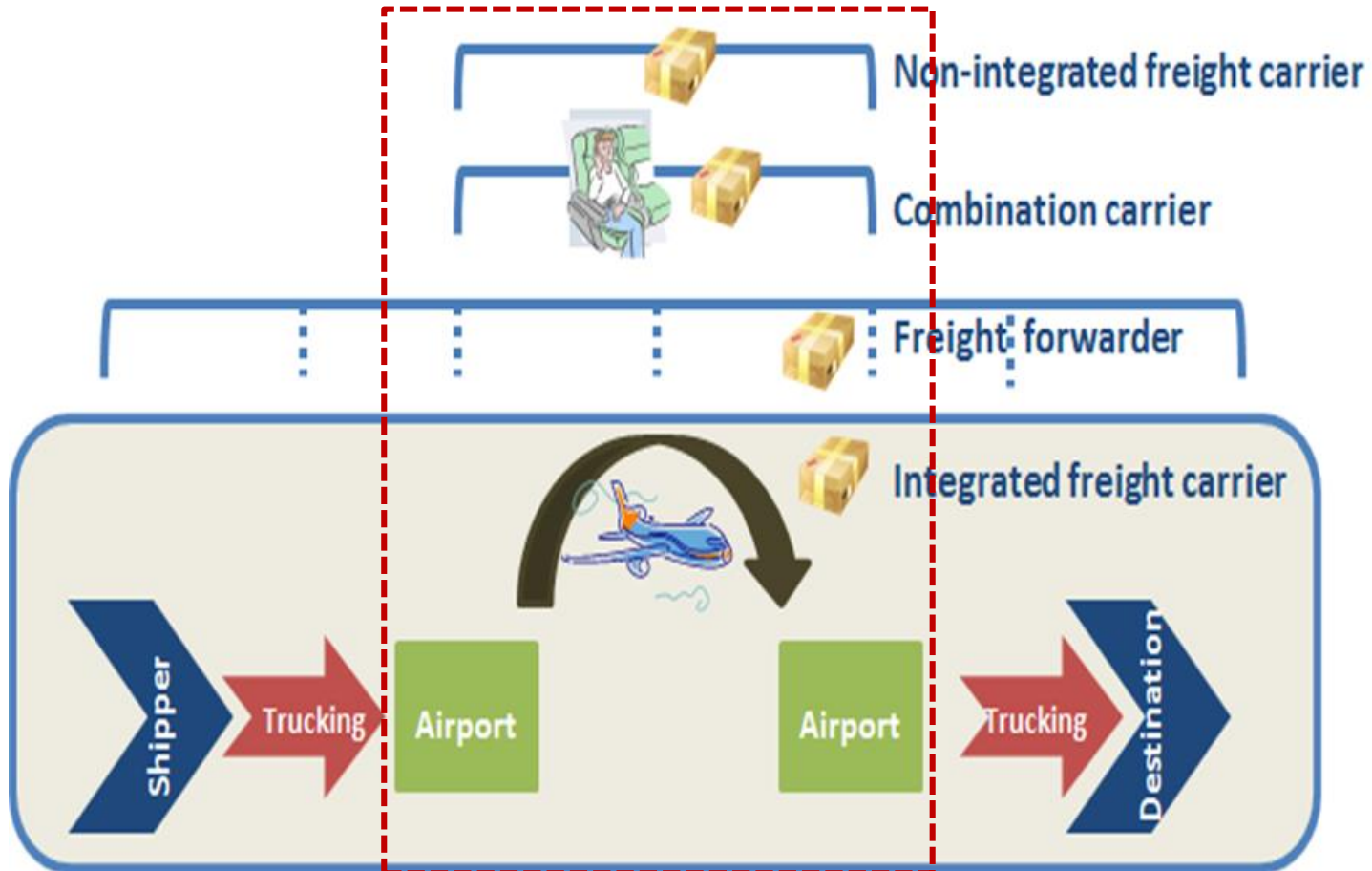


Research Framework

- Air Cargo was traditionally seen as a **by-product** of passenger transport. The last decade this vision has changed considerably.
- Global air cargo industry is nowadays a 60+ billion USD (direct revenues) **mature industry!**
- **Strategy** is being drafted far beyond the basic entrepreneurial framework in which an emerging industry operates. However, **different strategy models** are observed in the market...
- **Objective:** Investigate the strategy models of air cargo carriers.
 - Gain a better understanding of the **strategy** of air cargo carriers
 - Gain a deeper insight in the **drivers** of the strategic framework
 - Assist airlines in gaining insight in their **strategic positioning**

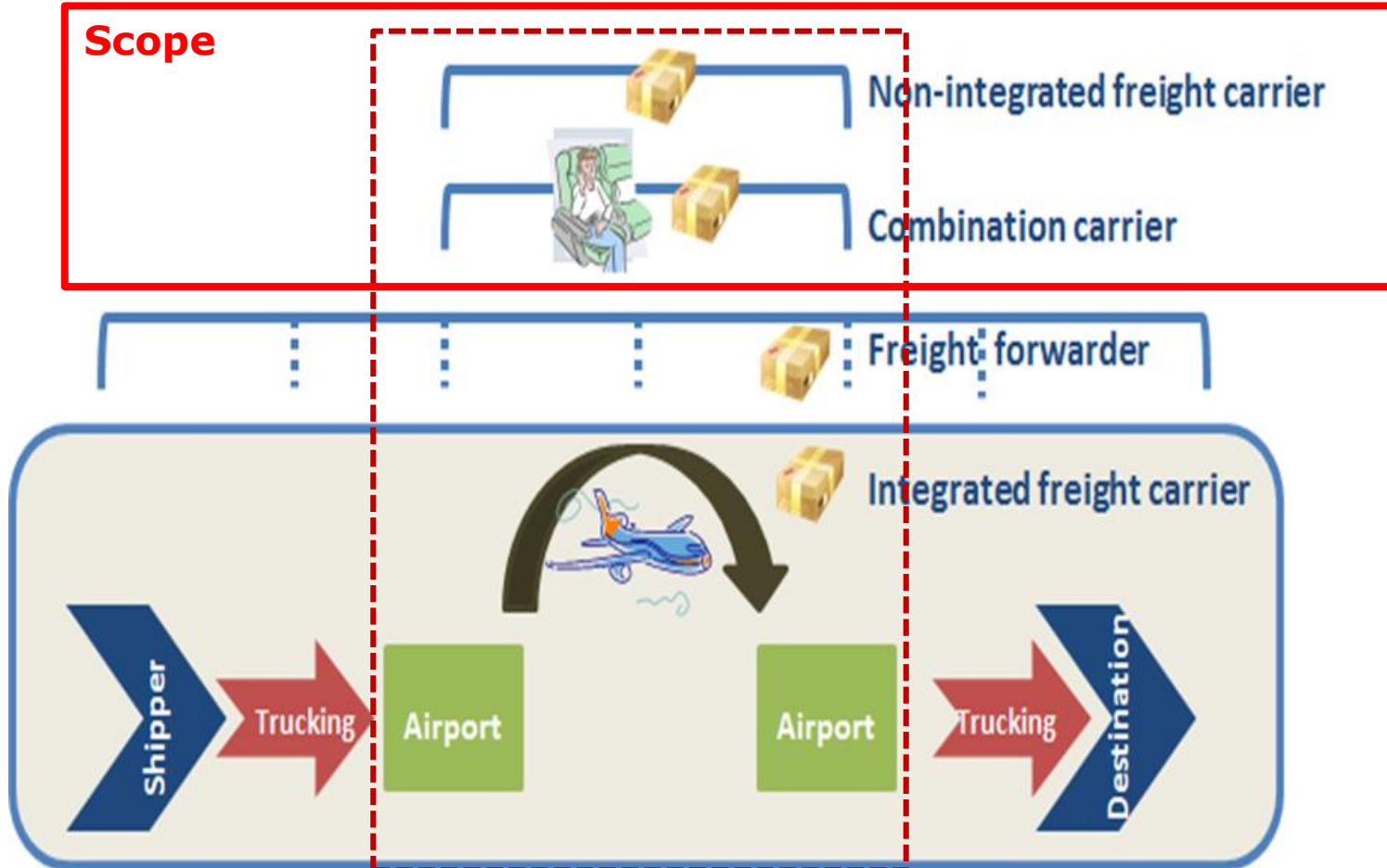


Business Models





Business Models





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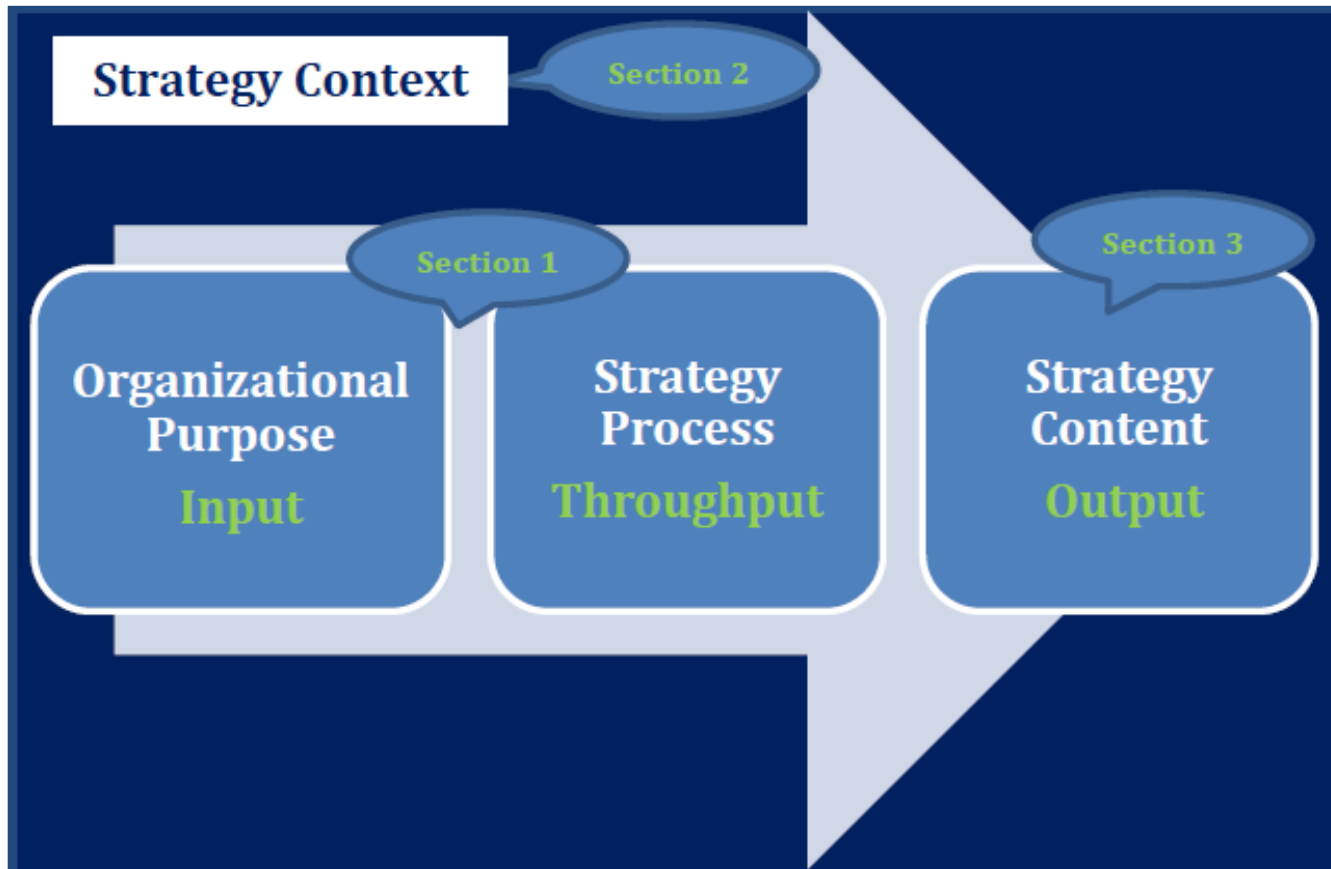
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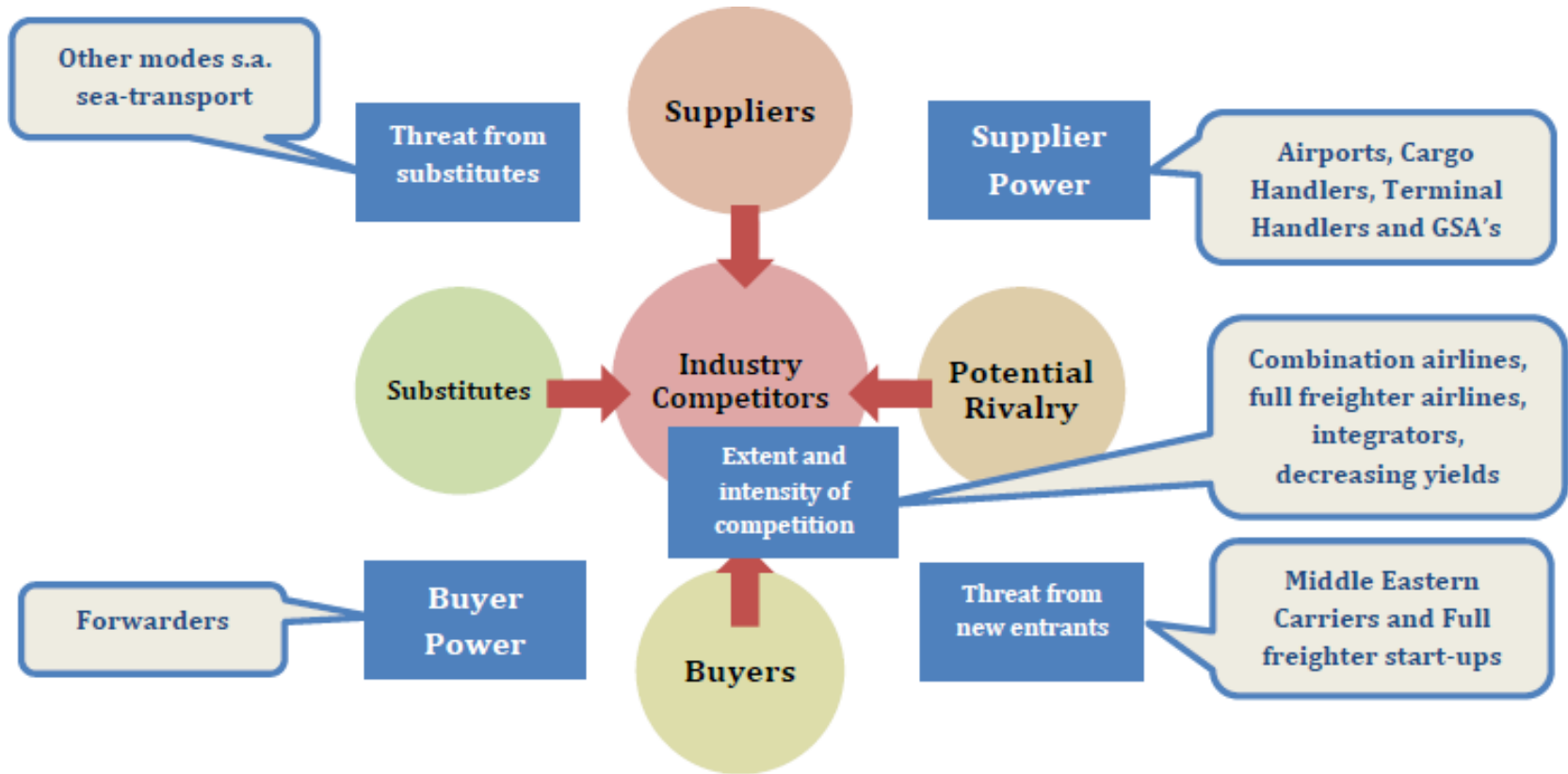
Organizational Purpose and Dimensions of Strategy



Source: Own composition based on B. de Wit et. Al (2010)



Strategy Context



Source: Own composition based on Porter (1980)



Strategy Context trends to watch...

- High cross-border E-commerce growth, especially in Asia
- Express market and hence integrators increase market share
- Expanding belly space with B777(X), B787, A350
- Stress in the all cargo sector
- Rise of Middle eastern carriers, also into US/Latin America
- Consolidation in European airline market
- Consolidation in Express market (TNT/FedEx)
- Consolidation in Forwarders market



Wide-body Capacity influx of Middle Eastern carriers continues

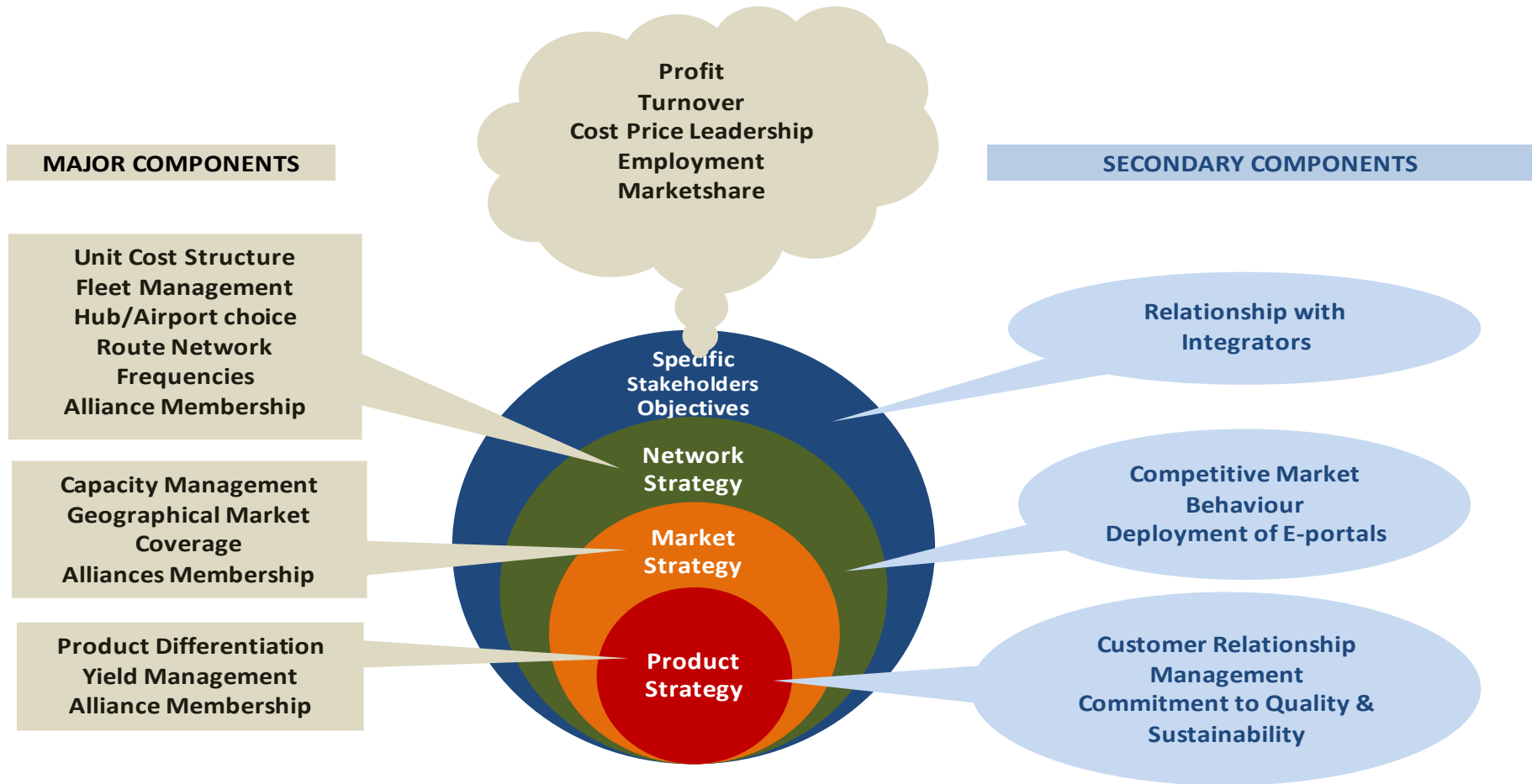
- 536 wide body aircraft coming online next decade for ME carriers only (equivalent >100 freighters)
- Capacity influx will not be offset by retirement of aircraft
- More capacity influx (+- 10 mio tons) cfr current 60 mio tons international tonnage demand
- Business model of all-cargo airlines will be first victim
- Further yield declines are envisaged 1.58\$/kg (2016), was 2.17 (2014), my forecast <1USD/kg in 2020

Source: own composition based on Boeing, Airbus, corporate websites

On order	A380	A350	B777	B777-X	B787	Total
Emirates	74	0	0	150	0	224
Qatar Airways	5	75	5	60	8	153
Etihad Airways	6	62	0	25	66	159
Total	85	137	5	235	74	536



Strategy Content





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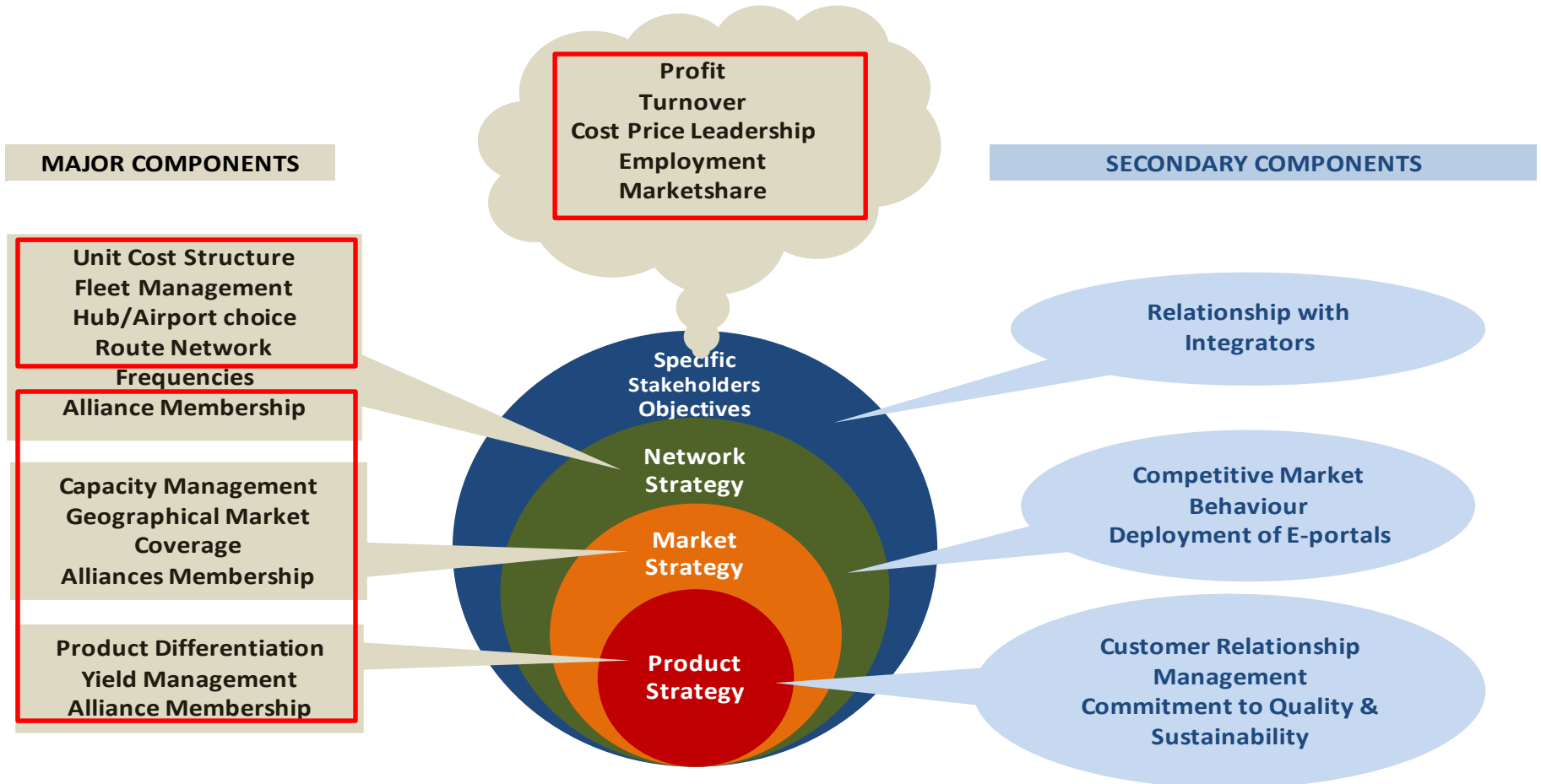
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Components to be measured by a numeric Indicator



Selected key indicators

Strategy Component		Indicator/KPI	Output
Product Strategy	Product Differentiation	Operational Revenues/RTK and /ATK	USD
		Yield Management	Operational Profit (Loss)/RTK and ATK
	Alliance Membership	Operational Revenues/RTK en /ATK	USD
		Sold Produced Passenger Kilometers (RPK)	number
		Sold Produced Ton Kilometers - Total (RTK) and - Freight (FTK)	number
Capacity Management	Member of Sky Team, Star Alliance, One world, preparatory phase or no membership	SKY/STAR/ONE/PREP/NONE	
Market Strategy	Geographical Market Coverage	Available Produced Ton Kilometers (ATK)	number
		Available Produced Passenger Kilometers (ASK)	number
		Load-factor (weight) for passenger aircraft and freighters	%
		Load-factor (seats) for passenger aircraft	%
	Alliance Membership	Stage Length Passenger aircraft (km flown/number of flights)	km
		Stage Length Freighters (km flown/number of flights)	km
		Average Distance Flown 1 ton on Passenger Aircraft (FTK/tons)	km
		Average Distance Flown 1 ton on Freighter Aircraft (FTK/tons)	km
Unit Cost Structure	Member of Sky Team, Star Alliance, One world, preparatory phase or no membership	SKY/STAR/ONE/PREP/NONE	
Network Strategy	Fleet Management	Total Operational Costs	USD
		Operational Costs/ATK	USD
		ATK/employee and FTK/employee	number
	Hub/Airport Choice	Number of Passenger aircraft in fleet	number
		Number of Freighter aircraft in fleet	number
		Kilometers flown with Freighter aircraft	km
		Flights with Freighter aircraft	number
		Flight Hours with Freighter aircraft	hours
		Tons transported by Freighter aircraft	tons
		Available produced Ton Kilometers with Freighter aircraft (ATK)	number
		Sold Produced Ton Kilometers - Freight with Freighter aircraft	number
		Sold Produced Ton Kilometers - Mail with Freighter aircraft	number
	Sold Produced Ton Kilometers - Total (FTK) with Freighter aircraft	number	
	Route Network	% tonnage transported by Freighter aircraft	%
		Tons treated in hub	tons
Rank of hub (tons) worldwide		rank	
Flown Fleet Kilometers		km	
Flown Fleet Hours		hours	
Alliances	Flown Fleet Flights	number	
	Flown average distance of 1 ton freight on Passenger and Freighter aircraft (FTK/tons)	km	
	Average Stage Length for Passenger and Freighter aircraft (Flown km/Flown flights)	km	
	Member of Sky Team, Star Alliance, One world, Preparatory phase or No membership	SKY/STAR/ONE/PREP/NONE	
	Profit	Total Operational Profit (Loss)	USD
Spec. Stakeholders' Obj.	Turnover	Operational Profit (Loss) /ATK and /FTK	USD
		Total Operational Revenues	USD
	Cost Price Leadership	Operational Costs/ATK and /FTK	USD
		Market-share	Total number of transported Passengers
	Employment	Total tonnage of transported Freight	tons
		Worldwide Marketshare (in % worldwide produced FTK's)	%
		Number of Employees (FTE)	number



Selected sample of 47 airlines represents 74,69% of scheduled worldwide FTK's

Airline	IATA	Airline	IATA	Airline	IATA	Airline	IATA
Aeroflot	SU	CAL Cargo Airlines	5C	EVA Air	BR	Nippon Cargo Airlines	KZ
Air Canada	AC	Cargolux	CV	Garuda Indonesia	GA	Philippine Airlines	PR
Air China	CA	Cathay Pacific Airways	CX	Gol airlines	GO	Qantas Airways	QF
Air France	AF	China Airlines	CI	Gulf Air	GU	Qatar Airways	QR
All Nippon Airlines	NH	China Eastern Airlines	MU	Iberia	IB	SAS	SK
American Airlines	AA	China Southern A/L	CZ	JAL	JL	Saudi Arabian A/L	SV
Asiana Airlines	OZ	Continental Airlines	CO	Jet Airways	9W	Singapore Airlines	SQ
Atlas Air	5Y	Delta Airlines	DL	KLM	KL	South African Airways	SA
Avianca	AV	El Al Israel Airlines	LY	Korean Air	KE	SWISS	LX
bmi	BD	Emirates	EK	LAN Airlines	LA	Thai Airways	TG
British Airways	BA	Ethiopian Airlines	ET	Lufthansa	LH	Turkish Airlines	TK
Brussels Airlines	SN	Etihad Airways	EY	Malaysian Airlines	MH		



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Research Methodology

- **Data set** of key indicators and key performance indicators for 47 air cargo carriers, excluding integrators, representing 74,69% of worldwide performed FTK's
- **Source** : IATA World Air Traffic Report and research at annual reports/data from respective airlines
- **Aim** : Make a typology of air cargo carriers' strategies
- **Methodology** : k-means Cluster-analysis with iterations, using PASW Statistics 19 and 20 (SPSS)
- **Results** : Cluster analysis runs with $k= 5, 6, 7$ and 8



Cluster analysis with 7 clusters

Strategy Typology will be based here-on

Excluding data from charter(ed) aircraft

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Air France Emirates Lufthansa	British Airways Continental Airlines China Southern Airlines Qantas	Avianca bmi Ethiopian Airlines Etihad Airways Gulfair El Al Israel Airlines Philippine Airlines Brussels Airlines CAL Cargo Airlines Atlas Air Nippon Cargo Airlines Polar Air Cargo Volga Dnepr Airlines	Air Canada Cathay Pacific KLM Singapore Airlines Air China JAL China Eastern	Jet Airways China Airlines Gol EVA Airways LAN Swiss Malaysia Airlines Asiana South African Airways SAS Saudi Cargolux	Iberia Korean Air Qatar Airways Thai Airways Turkish Airlines ANA	American Airlines Delta Airlines

Annotations: A blue arrow points from the Cluster 1 cell to the Cluster 2 cell. A blue arrow points from the Cluster 4 cell to a blue box containing the text "Formed a separate cluster before". Another blue arrow points from the Cluster 6 cell to the same blue box.

Final Cluster results

	Cluster						
	1	2	3	4	5	6	7
OPREVENUE	\$22,553,287	\$11,100,218	\$1,534,167	\$12,951,144	\$3,991,004	\$8,912,586	\$26,962,500
OPCOST	\$21,483,229	\$10,510,341	\$1,292,607	\$11,855,880	\$3,636,116	\$8,338,975	\$25,700,000
OPPROFITLOSS	\$1,070,058	\$589,877	\$36,301	\$1,102,407	\$233,228	\$512,175	\$1,262,500
OPPROFITATK	0.037100000	0.030350000	0.001938462	0.067100000	0.026145455	0.036483333	0.029450000
OPPROFITRTK	0.141633333	0.249075000	-0.223730769	0.289185714	0.039781818	0.179700000	0.411950000
OPREVENUERTK	1.149970787	0.791455378	1.076589920	1.164826988	0.885321132	1.147577299	1.100594650
OPREVENUEATK	0.853752937	0.579354366	0.638285654	0.815068547	0.598585746	0.689848996	0.676487682
OPCOSTATK	0.816675848	0.548993231	0.488826178	0.748475771	0.574347421	0.649065601	0.647081474
OPCOSTRTK	1.099214279	0.748831778	0.840972302	1.068074428	0.820001810	1.082458141	1.053170281
KKMFLOWNSCH	720425	718307	71904	461014	191231	323087	1488909
ACDEPSCH	424357	400983	62638	233325	127815	174846	760844
HRFLOWNSCH	1115897	1094974	126102	693239	298471	508636	2283925
PAXSCH	44856814	48136770	4808634	30864157	15124854	24034807	98643890
FRTONSCH	1165468	579369	121964	936070	500988	765502	476764
KRPKSCH	132834964	111038028	7933606	78176991	28690568	53630997	234435293
KASKSCH	165710427	138053570	10594879	97717588	37947333	71885490	284069216
PAXLFSCH	,80	,80	,74	,80	,76	,75	,83
KPTKSCH	12671171	11008657	783438	7213989	2616847	4836016	21302503
KFTKSCH	6693061	2880958	834179	4584615	2518273	3344722	2852519
KMTKSCH	195714	149448	7397	148572	26731	75203	182560
TOTALKTKSCH	19559946	14039063	1423341	11947176	4937098	8255941	24337581
KATKSCH	26783385	19225357	2205484	16663143	6976703	12928283	39465242
WEIGHTLFSCH	,73	,74	,65	,71	,70	,64	,62
KKMFLOWNFREIGHTER	36644	14787	11132	33519	41529	24503	0
ACDEPFREIGHTER	8119	3100	2422	7902	9606	8153	0
HRFLOWNFREIGHTER	48930	19750	13857	43948	55063	51840	0
FRTONSFREIGHTER	341855	111502	130180	469541	511134	313582	0
KFTKFREIGHTER	2373207	1044672	853671	2521027	2909075	1629043	0
KMAILTKFREIGHTER	19732	1704	805	11791	9597	5765	0
TOTALKTKFREIGHTER	2392938	1045808	854387	2532819	2914560	1634807	0
KATKFREIGHTER	3361282	1516830	1181709	3393903	3916216	2059997	0
WEIGHTLFFREIGHTER	,70	,68	,63	,74	,70	,75	,00
PAXAC	310	291	29	183	82	124	670
FREIGHTERS	9	2	6	7	8	8	0
PROCUSEFREIGHTER	31,33	12,00	48,08	27,43	36,58	26,38	,00
EMPLOYEES	67675	30864	3706	21752	11503	17693	72496
ATKPEREMPLOYEE	550	816	1604	902	1088	795	545
FTKPEREMPLOYEE	136	126	909	250	533	199	40
METRICTONSHUB2010	2314890	785685	989386	2137679	815722	1304272	654857
RANKHUB2010	7	71	60	14	53	25	31
FTKFTCPAXAC	5845	5113	2069	4297	3736	4200	5981
FTKFTCFREIGHTER	6928	8170	3488	4282	2951	3949	0
AVGSTGLGTHPAXAC	2311	1956	954	2515	1503	2125	1968
AVGSTGLGTHFREIGHTER	4574	4199	2916	3602	4302	2082	0
TOTALMKTSHR	3,8333	1,6475	,6946	2,6343	1,4767	1,9117	1,6300



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Typology of air cargo carriers



Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Air France Emirates Lufthansa	British Airways Continental Airlines China Southern Airlines Qantas	Avianca bmi Ethiopian Airlines Etihad Airways Gulfair El Al Israel Airlines Philippine Airlines Brussels Airlines CAL Cargo Airlines Atlas Air Nippon Cargo Airlines Polar Air Cargo Volga Dnepr Airlines	Air Canada Cathay Pacific KLM Singapore Airlines Air China JAL China Eastern	Jet Airways China Airlines Gol EVA Airways LAN Swiss Malaysia Airlines Asiana South African Airways SAS Saudi Cargolux	Iberia Korean Air Qatar Airways Thai Airways Turkish Airlines ANA	American Airlines Delta Airlines

Formed a separate cluster before



Typology of air cargo carriers

Typology		Cluster 3	Cluster 6	Cluster 5	Cluster 7	Cluster 2	Cluster 4	Cluster 1
Component		Carpet Sellers	Basic Cargo Operators	Strong Regionals	Huge Americans	Large PAX WB Operators	Premium Cargo Operators	Cargo Stars
Product Strategy	Yield	Average	High	Low	Average	Low	High	High
	Operational revenues/RTK (1)	\$1.0766	\$1.1476	\$0.8853	\$1.1006	\$0.7915	\$1.1648	\$1.1500
	Operational revenues/ATK (2)	\$0.6383	\$0.6898	\$0.5986	\$0.6765	\$0.5794	\$0.8151	\$0.8538
Product Strategy	Product differentiation	Low/average	Average	Low	Average	Low	Broad	Broad
	PCD-index (1)x(2)x100	68.72	79.16	52.99	74.45	45.85	94.94	98.18
Market Strategy	Load factor (weight)	65%	64%	70%	62%	74%	71%	73%
	Capacity management	Low	Low	Average	Low	High	Average	High
	Size of central cargo hub	Small	Strong regional	Small	Small	Varying	Avg/Large	Large
	Stage length (km) passenger a/c	954	2125	1503	1968	1956	2515	2311
	Stage length (km) freighters	2916	2082	4302	0	4199	3602	4574
Network Strategy	Unit cost	Low/average	Average	Low	Average	Low	High	Highest
	Operational costs/ATK	\$0,6381	\$0,6491	\$0,5743	\$0,6471	\$0,5490	\$0,7485	\$0,8167
	Fleet (pass/freighters)	29/6	124/8	82/8	670/0	291/2	183/7	310/9
	Utilisation of freighters (ATK)	0%/100%	26.38%	36.58%	0.00%	12.00%	27.43%	31.33%
	Flown distance freighters (MIO km)	11132	24503	41529	0	14787	33519	36644
	Avg distance 1 ton in pass. aircraft	2069	4200	3736	5981	5113	4297	5845
Stakeholders' Objectives	Avg distance 1 ton in freighter	0/3488	3,949	2,951	0	8,170	4,282	6,928
	Profit (Operat. profit USDcents/ATK)	\$0.1938	\$3.6483	\$2.6145	\$2.9450	\$3.0350	\$6.7100	\$3.7100
	Turnover (thousands)	\$1,534,167	\$8,912,586	\$3,991,004	\$26,962,500	\$11,100,218	\$12,951,144	\$22,553,287
	Cost price leadership (ATK)	Good	Fair	Very good	Fair	Very good	Bad	Worst
	Employment (FTE)	3706	17693	11503	72496	30864	21752	67675
Market share (% worldwide FTK)	0.69%	1.91%	1.48%	1.63%	1.65%	2.63%	3.83%	



Striking observations

- **Yield and product differentiation** go hand in hand:
 - **High:** Basic and Premium Cargo Operators and Cargo Stars
 - **Low:** Strong Regionals and Large Pax W/B Ops
 - **Medium:** Huge Americans
- **Low operational costs** from Strong Regionals and Large Pax W/B Ops are passed onto customer to obtain **higher load factors**
- **Load factors** differ significantly:
 - **High:** Large Pax W/B Ops and Cargo Stars
 - **Medium:** Strong Regionals and Premium Cargo Ops
 - **Low:** Basic Cargo Ops and Huge Americans



Striking observations (2)

- Combination of **high yield, large product differentiation** and good **load factors** only for Premium Ops and Cargo Stars operation from a **large cargo hub** (<-> Huge Americans which operate from a small cargo hub)
- However, this strategy generates **higher operational costs**
- **Higher market share** generates **higher revenues** and **higher profits**



Observed relationships between objectives

Cluster Name	Members' Market-share (ATK worldwide)	Profit per ATK	Operational Revenues per ATK
Carpet Sellers	0.69%	0.19 USD cents	0.64 USD
Strong Regionals	1.48%	2.61 USD cents	0.60 USD
Huge Americans	1.63%	2.94 USD cents	0.68 USD
Large Passengers Wide Body-Ops	1.65%	3.03 USD cents	0.58 USD
Basic Cargo Operators	1.91%	3.65 USD cents	0.69 USD
Premium Cargo Operators	2.63%	6.71 USD cents	0.81 USD
Cargo Stars	3.83%	3.71 USD cents	0.85 USD



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Key Success Factors for a Profitable Strategy Model

1. Level of **Product Differentiation**
2. Level of **Capacity Management**
3. Level of **Network** usage for Cargo
4. The **size of cargo Hub**
5. Limited deployment of **Freighter** aircraft
6. **Cost Level**



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Recommendations for IST-hub

- **Strong long haul passenger home carrier** with cargo strategy is key to develop a cargo hub
- **Large size** of home carrier will generate more connections, improve pricing and attract forwarders
- A **large cargo hub** is critical to develop the home carrier
- Largest (only) cargo growth is in **perishables and E-commerce**, specific areas for these products will enhance competitiveness
- **Reliability** and **connectivity** are more important than costs for high yield E-commerce logistics



Conclusions

- The business level **strategy** of an air cargo operator consists of a **number of components**.
- Using a k-means Cluster Analysis, key indicators and Key Performance Indicators can be used to draft a **typology** of 7 representative air cargo operator strategy models
- Our findings prove the clear **existence of different strategy models** and the differing degree of focus on air cargo strategy development and deployment among the air cargo carriers' population.
- **Hub size** and **airline size** are important key success factors
- Our findings prove the **existence of superior strategy models** which are determined mainly by a differentiation in product and network strategies.



Thank you for your kind attention!

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